



City of Guelph 2020 Asset Management Plan

Thursday, October 22, 2020

Alternate format statement

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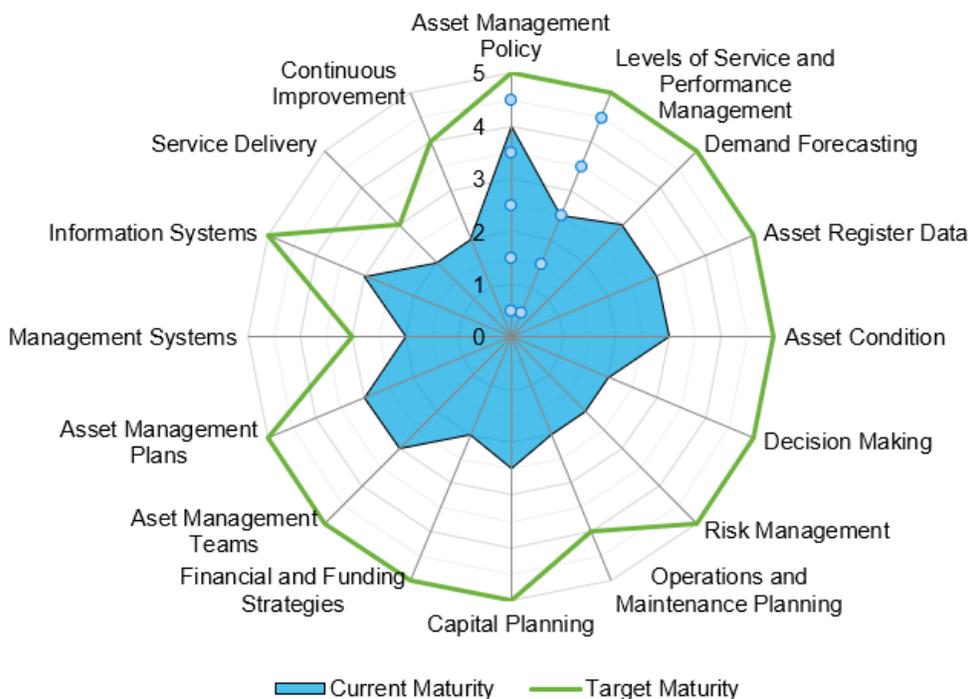
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Executive summary

Since 2016, the City has been rapidly advancing the City-wide asset management program, with the end goal of ensuring that the City makes the best possible decisions regarding its assets. Initiatives have been implemented to increase the knowledge of infrastructure, documenting levels of service (LOS), managing risks and implementing full lifecycle planning. In December 2017, O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure was filed, which sets out new requirements for Asset Management Planning and the Strategic Asset Management Policy. The City has surpassed compliance to the regulation through the 2020 update of the Asset Management Plan.

Since 2016, the City's asset management capabilities have advanced from "Basic" (2.6 out of 5) to "Core" (3.6 out of 5), when measured against the International Infrastructure Management Manual maturity index (IPWEA, 2015) as illustrated in Figure 1. A work-plan has been developed to move the City to "Intermediate" to "Advanced" categories by 2024 (which would be a maturity rating of 4.6 out of 5). The City of Guelph is already viewed as very strong within Asset Management as we have surpassed the Ontario Regulations, have integrated asset management into our Capital Budget, created innovative tools to report prioritization data, presented at various conferences and are continuously approached by various other municipalities to share our developments.

Figure 1 - Asset management maturity



Since 2016, the Corporate Asset Management Program has been rapidly maturing, developing award winning innovative tools and surpassing Ontario regulations. The report will highlight many of the goals and initiatives that have been accomplished:

- Guelph is leading within asset management as the City has integrated asset management plan data into budget analysis to help develop the Capital Budget.
- Developed performance and financial forecasts for 17 asset portfolios.
- Incorporated performance forecasting into the budget process.
- Developed Levels of Service (LOS) metrics for all asset types. Defined O.Reg 588/17 mandated LOS for the Core assets (Roads, Bridges, Water, Wastewater and Stormwater) and will continue to define LOS for all asset types while also defining our Community driven LOS.
- Developed water, wastewater and stormwater risk management framework.
- Inventory and condition assessments have been completed for roads, bridges, sewers, solid waste, wastewater, water facilities, corporate facilities, recreation facilities and structure.
- Developed an Integrated Corridor Model Tool to assist in lifecycle planning for all road network assets. New innovation was recognized by municipalities across the province and won an award in early 2020 through the Ontario Public Works Association.
- Currently in the process of securing a new Enterprise Resource Planning Solution (ERP). This will allow the corporation to enhance our maintenance

management practices while interfacing with various record systems to create efficient processes and advanced reporting tools.

- Successfully piloted an asset management training program with 18 staff across the organization in 2018 and 2019.

As work continues on the Corporate Asset Management Program, the level of sophistication and detail in both the funding allocation and project optimization is expected to increase. In addition, the integration between asset management planning and capital budgeting will only get stronger. Overall this will help ensure the best possible decisions are being made regarding our assets, based on evidence-based business cases and long term financial forecasts that support sustainability.

2020 Corporate asset management plan

The 2020 Corporate Asset Management Plan is a strategic document that states how the City's assets are to be managed over a period of time. The Plan describes the characteristics and condition of infrastructure assets, the LOS expected from them, planned actions to ensure the assets are providing the expected LOS, and financing strategies to implement the planned actions. The following sections provide a summary of the key components of the Plan.

The City is responsible for an asset portfolio that would cost approximately \$4.39 billion to replace. Of the asset portfolio, approximately \$1.41 billion have below 40 per cent remaining life, meaning these assets will likely be due for replacement within the next 10-20 years. These assets will be addressed as a priority within the City's Capital Budget forecast, using the Infrastructure Renewal Strategy as the key funding model.

The Plan is the first significant update since the inception of the asset management practices and the key updates include:

- Use of asset condition to estimate the infrastructure backlog as opposed to age, has seen the balance revised down from \$490M to \$289M
- Improvements in asset inventories and condition assessments has seen the sustainable capital funding target increased from \$114M per year to \$124M

- Implementation of sustainable funding targets in the tax supported and non-tax supported businesses allows for improved demonstration of funding needs

While the backlog reduction by \$201M is a positive change, the City has still not reached sustainable funding levels required to stop the backlog from growing. This means the City's funding strategy will still require the on-going 1% tax supported Infrastructure Renewal Strategy as well as sustainable rate models to ensure the City reaches its sustainable funding targets. Put simply, this Plan update confirms that the City's long-term financial strategies are successful and should remain in place to reach our sustainable funding levels by 2037. Once the City reaches sustainability, addressing the reduced backlog is now more achievable.

As described, the City has taken steps to increase funding towards sustainability to ensure infrastructure renewal projects are able to be funded over the 25 year horizon. However, as the Capital Budget/funding levels have been growing, the unspent capital budget figure has also been increasing. This trend, coupled with the Plan's identified need to increase Capital Budgets, will mean increasing the City's capacity to deliver projects from a staffing perspective. Without an increase in staffing resources, unspent capital will likely continue to grow or Capital Budgets will need to be reduced. Without executing an increasingly larger capital plan, aged assets will begin to fail causing significant concern to service continuity and community safety. Staff are developing a strategy to address these resourcing concerns including the increasing number of temporary project managers within the City, which will be brought to Council during 2021.

As the Asset Management Program continues on its journey to 'Advanced Maturity', the data will only continue to improve providing greater confidence in the Plan to ensure the City meets its obligations and continuity of service delivery.

Assets included in the plan

This asset management plan is intended to include all assets with available information at the time of development. The following physical asset systems that support the City's core services are included in the plan:

- Administrative facilities;
- Corporate vehicles and equipment
- Culture and recreation;
- Emergency services;
- Information technology
- Parking;
- Solid waste;
- Stormwater;
- Transit
- Transportation
- Wastewater; and
- Water

In addition to physical assets, this asset management plan includes non-physical assets such as digital and non-digital records where applicable.

Purpose of the plan

The purpose of this plan is to:

- Ensure that the City is well-positioned for current and future grant programs and regulations, by meeting the requirements of the Ontario Ministry of Infrastructure (2012) Building Together Guide for Municipal Asset Management Plans.
- Establish a baseline of current asset management practices to inform a work plan for continually improving asset management.
- More accurately quantify the infrastructure deficit and investment gap.
- Demonstrate long-term asset care and sustainability.
- Support the development of improved practices that clarify and justify funding requirements.
- Provide increased transparency related to the City's asset management practices, challenges and opportunities.

The asset management plan is comprised of the following core sections:

- **Executive Summary** providing a succinct overview of the plan.
- **Introduction** describing the importance of infrastructure to municipalities, the relationship of the asset management plan to municipal planning and budget documents and the purpose of the asset management plan.

- **State of the Assets** summarizing the asset types, financial accounting and replacement cost valuation, asset age distribution and asset age as a proportion of expected life, and asset condition.
- **Desired Levels of Service** defining levels of service through performance measures, targets and timeframes to achieve targets.
- **Asset Management Strategy** summarizing planned actions including non-infrastructure solutions, maintenance activities, renewal/rehabilitation activities, replacement activities, disposal activities and expansion activities.
- **Budget Analysis** showing yearly expenditure forecasts broken down for each of the planned actions in the strategy, along with actual expenditures from previous years and yearly revenues.
- **Recommendations** outlining actions related to improving future asset management plans, and actions to advance the City's overall asset management capabilities.

State of the assets and budget analysis

The City of Guelph has an infrastructure Asset Base with a 2020 calculated replacement value of approximately \$4.39B. Of the asset portfolio, approximately \$1.4 billion (32%) have below 40 per cent remaining life, meaning these assets will likely be due for replacement within the next 10-20 years. These assets will be addressed as a priority within our Capital Budget. Support will also be provided through the Infrastructure Renewal Funding Strategy.

While the available asset information used to generate this AMP did not indicate that there are any major physical issues with the assets at a whole-system perspective, normal degradation of physical and electromechanical assets will continue on an individual asset level, and these will require funding to address future needs.

The infrastructure investment backlog represents the assets that have exceeded their service life. Since the Asset Management Program began in 2016, the program has been continuously maturing through increasing asset inventory and condition data collected in a quantitative manner. In 2017, the backlog was calculated using the best information available, which at that time was measuring the asset's expected lifespan based on the asset installation date. In 2020, we now have more mature data for the majority of our assets and are calculating the backlog values based upon data from actual condition assessments for the majority of the assets. An age-based assessment was again used for the remaining assets.

The replacement value of the backlog was determined to be approximately \$290 million for the City asset portfolio (\$92 million for tax-supported assets, and \$198 million for rate-supported assets). This reduction of the backlog by a value of approximately \$211 million is due to a combination of factors, including the introduction of an infrastructure levy following the 2017 AMP, an increase in the maturity in asset management data, and refined methods used to understand the asset conditions and needs. It should be noted assets that are included in the backlog are not necessarily performing poorly, only that they will soon be in need of replacement or rehabilitation in order to ensure they continue to function to their intended capacity and performance levels. Also of note is that while the backlog has decreased the level of detail and the confidence in the asset information included in the analysis has increased compared to 2016.

A lifecycle analysis of all City assets was conducted which estimated that over the next 25 years the forecast required infrastructure needs. This included asset replacement, renewal and rehabilitation needs, an allowance to reduce the existing backlog, plus an annual allowance for maintenance and expansion due to the growth of the City of Guelph. This analysis resulted in a 25-year annual average requirement estimated at \$256M per year and a 25-year total of \$6.4B (Table 1). Using the information in the 2021-2045 Capital Budget plan which has been prepared during the same time period as the preparation of this AMP, the average forecast funding value is \$226M per year and \$5.7B total respectively. The forecast funding is not expected to be sufficient to sustain the current asset base, and an annual average funding gap of approximately \$28M per year is estimated to be the result of the current funding situation.

The City has taken many steps to increase funding to ensure we can continue increasing our levels of infrastructure renewals, including the Infrastructure Levy. The Capital Budget has also increased in value, however, the unspent capital amount continues to grow. If the City does not start executing an increasingly larger capital plan, the aged assets will begin to fail causing significant concern to service continuity and community safety. The next step is to begin including the cost of people to deliver the plan required to meet sustainability targets and focus on project management resourcing.

Guelph's population, partly due to its geographic proximity with the densely populated Greater Toronto Area which is the major economic region of Canada, is expected to continue to increase in size and so it is certain that an expansion of the infrastructure services will be required. Within the forecast requirements in the AMP an allowance for increasing the size and capacity of the infrastructure systems has been included, and City staff are aware of and addressing the future needs ahead of time with plans to accommodate the coming growth.

Table 1 - Summary of 25 year financial review

Item	25 year totals	25 year average
Total approved funding (2021-2045 Capital Plan)	\$5,654,537,077	\$226,181,483
Required For Asset Replacement / Renewal / Rehabilitation	\$2,638,028,660	\$105,521,146
Required To Reduce 2020 Backlog	\$288,907,961	\$11,556,318
Required For Maintenance	\$1,816,765,319	\$72,670,613
Required For Forecast Growth	\$637,416,119	\$25,496,645
Total Required	\$6,401,213,345	\$256,048,534
Funding Gap	\$(746,676,267)	\$(29,867,051)

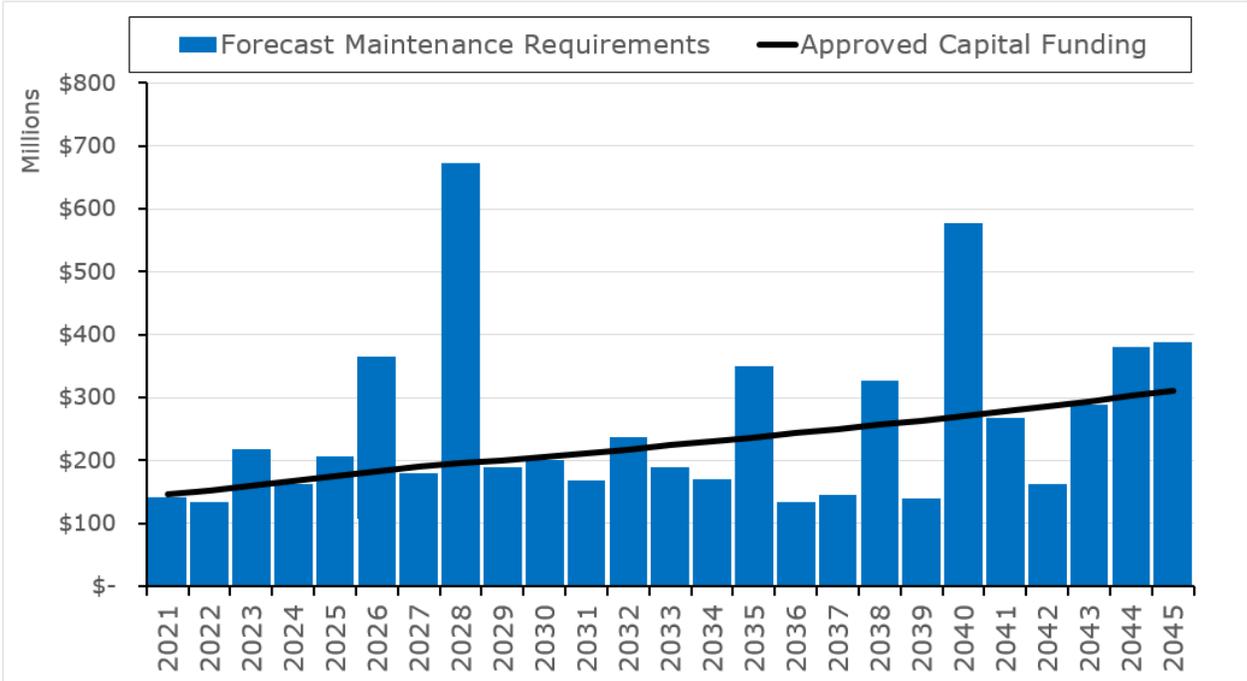
Refer to **Error! Reference source not found.** for a 25 year financial forecast that illustrates the City’s requirements for maintenance, growth and renewal against the projected level of available funding for all three. The Plan supports the City’s long-term financial strategies through determining the estimated backlog and setting sustainable funding targets by service.

The Corporate Asset Management Plan utilizes a 25-year forecast of replacement needs based on asset condition to establish the sustainable annual funding targets. These targets are used to allocate available tax funding equitably amongst the various services and asset groups, allowing each service to plan using a reliable source of funding. Capital plan decisions are based on evaluating asset condition, level of service and risk of deferral, ensuring that available funds are used most effectively.

As the graph demonstrates, required funding in the first 15 years is higher each year than available funding, resulting in critical project deferral decisions. This

deferral may increase annual maintenance costs above current projected levels requiring additional investment in these activities to ensure continued operation of assets. As the City reaches the later years of the forecast funding will allow for some catch-up on deferred projects, however, funding does not cross the average level until 2042, meaning that the backlog by that time will have increased and it will take time to bring assets back to a state of good repair.

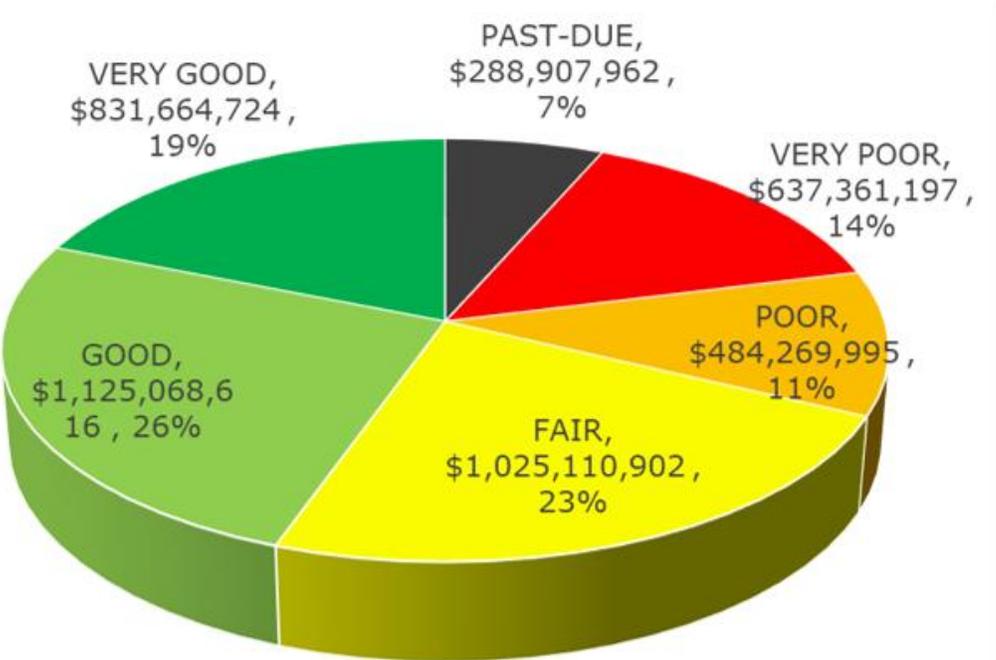
Figure 2 - City of Guelph 25-year financial review - All asset categories



With regards to physical condition, the chart in Figure 4 displays the condition of the City assets based on their current replacement value (CRV). About 45% of the total inventory with a value of approximately \$1.95B is considered in “very good” and “good” condition. About 23% of the total inventory with a value of approximately \$1B is considered in “fair” condition. About 32% of the total inventory with a value of approximately \$1.42B is considered in “very poor”, “poor” or “past due” condition. This indicates that within the next 1-5 years those assets in “very poor” or “past due” conditions (\$927M) may require complete replacement or significant renewal efforts to ensure continued long-term performance, and those in “poor” condition will require attention within 5-10 years, or sooner. While this is a challenge, many municipalities in Canada are in a similar situation, and so the situation in Guelph can be considered typical.

Recognizing this challenge, the City has begun addressing the issue by building prioritized plans to first address assets in poorest condition, or those that are most critical to the future service delivery by the City. While it will take a few years, this AMP includes forecast scenarios that will help to eliminate the backlog, and enable the services delivered to be completed in a sustainable manner.

Figure 3 - Condition of City of Guelph assets (% based on CRV)



Further details regarding the needs of each of the asset categories, including specific financial requirements, are outlined in the chapter dedicated to each category, as well as an overall, whole-City level analysis.

Sustainable Funding Targets

Since 2017, the City has been using Asset Management Data to inform sustainable capital renewal funding levels. The sustainable targets focus on supporting the renewal and replacement of assets, they do not include maintenance or growth funding requirements. Maintenance and growth are assumed to be at stable levels

currently, however future work will focus on better understanding optimal investment relative to current investment.

The target sustainable funding, which includes annual operating transfers to capital renewal reserve funds for tax and non-tax services as well as reliable annual funding from other levels of government, specifically Federal and Provincial Gas Tax Funding programs, has increased by 8%. This is due to a better understanding of inventories and expected useful life of assets.

For tax funded areas the progress made since 2017 through annual increases in capital funding remains in line with the new estimates, based on this update continuation on the plan laid out in 2017 will see sustainable tax funding levels in approximately 2037; this remains in line with prior estimates.

Through the current update the non-tax funded services; Parking, Stormwater, Wastewater and Water saw significant changes in their respective annual sustainable funding levels. Parking and Wastewater estimates have decreased 58% and 30% respectively, while Stormwater and Water have increased 76% and 69% respectively. In total the non-tax target has increased, reflecting that future infrastructure renewal budgets will focus funding increases on the services which have the highest need as presented in Table 1.

These changes will require city staff to bring forward updated funding models for non-tax services in 2021.

Table 1 - Sustainability funding comparison 2017 to 2020

Funding	2017 Estimate	2020 Estimate	% Change
Tax	62,871,000	63,200,50	0.5%
Parking	2,500,000	1,058,900	-58%
Stormwater*	11,100,000	19,576,800	+76%
Wastewater	24,600,000	17,305,200	-30%
Water	13,400,000	22,614,900	+69%
Total	114,471,000	123,756,400	8%

*Stormwater target was updated in the 2019 budget due to revised inventories since 2017.

Infrastructure Funding Progress

The infrastructure gap is the difference between the funding needed in a given year to build, maintain, repair and replace infrastructure and the amount funding available. Once sustainable funding is reached and asset data is fully matured, the value of the backlog will remain constant. The sustainable funding level estimate is based on the 25 year average replacement cost of all assets currently in place. The replacement costs and timelines were established by the initial Corporate Asset Management Plan using available data, industry best practices and some investigation of current state.

The current tax supported infrastructure renewal strategy was introduced in 2017 to move the City towards sustainable funding over a planned 10 year implementation phase, through the first four years of the strategy the increase in annual tax funding directed to infrastructure renewal is \$7,583,189 with a cumulative amount of \$19,099,115.

Through the maturity of the City's asset data, the estimated backlog has decreased; however, this does not mean the City is funding capital at a sustainable level. The asset management program indicates that the City's Infrastructure Renewal Funding Strategy is successful and that this should continue to be a priority focus for financial investment.

Project Management Capacity

The City has taken steps to increase funding towards sustainability to ensure infrastructure renewal projects are able to be funded over the 25 year horizon. However, as the Capital Budget/funding levels have been growing, the unspent capital budget figure has also been increasing. This trend, coupled with the Plan's identified need to increase Capital Budgets, will mean increasing the City's capacity to deliver projects from a staffing perspective. Without an increase in staffing resources, unspent capital will likely continue to grow or Capital Budgets will need to be reduced. Without, executing an increasingly larger capital plan, aged assets will begin to fail causing significant concern to service continuity and community safety. Staff are developing a strategy to address these resourcing concerns including the increasing number of temporary project managers within the City, which will be brought to Council during 2021.

Improvement Monitoring and Next Steps

One of the goals of this asset management plan was to continue progressing the baseline of current asset management practices to inform a work plan for

continuous improvement of the asset management program (see Attachment 1). Any assumptions made and opportunities identified have been documented to serve as the basis for continuous improvement. This Plan presents a continuous improvement program in terms of two components:

1. Actions related to improving future asset management plans; and,
2. Actions to advance the City's overall asset management capabilities

As the Asset Management Program continues to mature if the City continues to address these two components the City will get to an advanced maturity by making very smart decisions regarding funding and the state of the assets moving forward.

Conclusions

The City entrenched itself as an industry leader in asset management practices. Over the past 4 years, there has been significant progress in the asset management program, and the program is positioned to move from a core to advanced rating by 2024. This evolution has been the City's aim, and significant progress has been made over the past 4 years as outlined in this report.

As the City matures the Asset Management Program, there continues to be improvements in the confidence of data, which will improve the accuracy of calculations such as the City's backlog and sustainable funding targets. Based on current calculations, the backlog is \$289M, which solidifies that the City needs to continue executing the long-term capital financial strategies with a new focus on addressing the increasing staff resource requirements to deliver a growing capital plan.

Using consistent asset management guidelines and principles with an effort placed on continuous improvement will lead to an optimized balance between asset performance and asset risks that will create real value for the City of Guelph and its citizens.

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Introduction

Our Community – The City of Guelph

The City of Guelph, Ontario is a vibrant community of approximately 135,000 people situated in the heart of southern Ontario, 100 km west of Toronto. The City is home to award-winning festivals, vibrant communities and unique cultural events. The University of Guelph, recognized as a world leader in physical and life sciences, food science, agricultural studies, is also home to the Ontario Veterinary College, a reflection of the role of agriculture and farming in the history of Guelph.

Today the City is known for its low crime rates, progressive environmental practices and a high standard of living. It is home to a diverse and growing number of businesses that are helping the economy evolve and grow in the fields of advanced manufacturing, agri-food and innovation, environmental management and technology and tourism. It is these five facets of the local economy that have been identified in Guelph's Economic Development Strategy as growth industries on which to focus economic development activities in the years to come.

The City of Guelph, not unlike the majority of Canadian cities, has seen significant growth throughout the 20th and 21st centuries. According to the most recent Statistics Canada Census information, the City population in 2016 was 131,790 people¹. Between 2018 and 2019 the city population grew at a rate of about 1.6% - slightly higher than the National and Provincial averages, but lower than that of surrounding municipalities². By 2031 the population of Guelph is expected to be approximately 170,000 people³. Figure 7 presents the historical and projected

¹ Statistics Canada. Table 17-10-0135-01 Population estimates, July 1, by census metropolitan area and census agglomeration, 2016 boundaries; <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710013501>

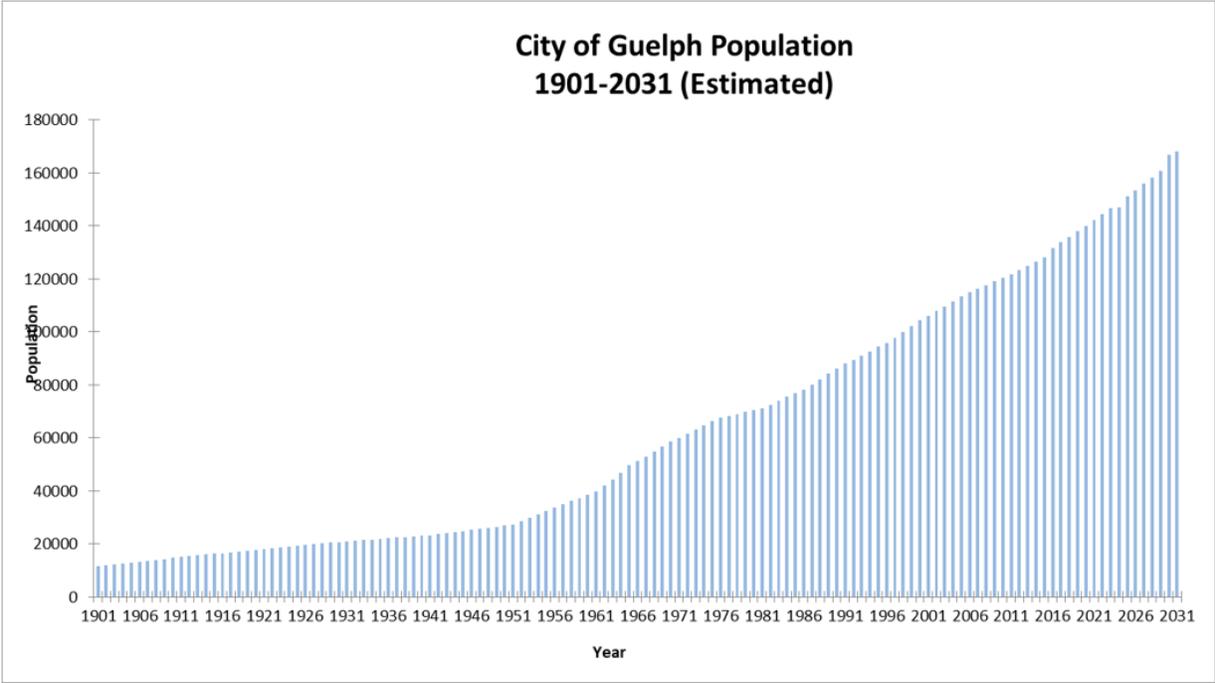
² Statistics Canada, Tables 71-607-X Annual Demographic Estimates, census metropolitan areas and census agglomerations: Interactive Dashboard; <https://www150.statcan.gc.ca/n1/pub/71-607-x/71-607-x2020003-eng.htm>

³ Statistics Canada provides data for the municipality, and the Census Metropolitan Area (CMA). For Guelph the CMA includes the City of Guelph, Guelph/Eramosa Township the Township of Puslinch. According to data associated with the Guelph CMA the population in 2016 was 157,088, the population in 2019 was 165,236, and in 2031 the population is forecast to reach slightly more than 199,000.

population within the City since the beginning of the 20th century to 2016, and forecast population numbers from 2017 to 2031.⁴

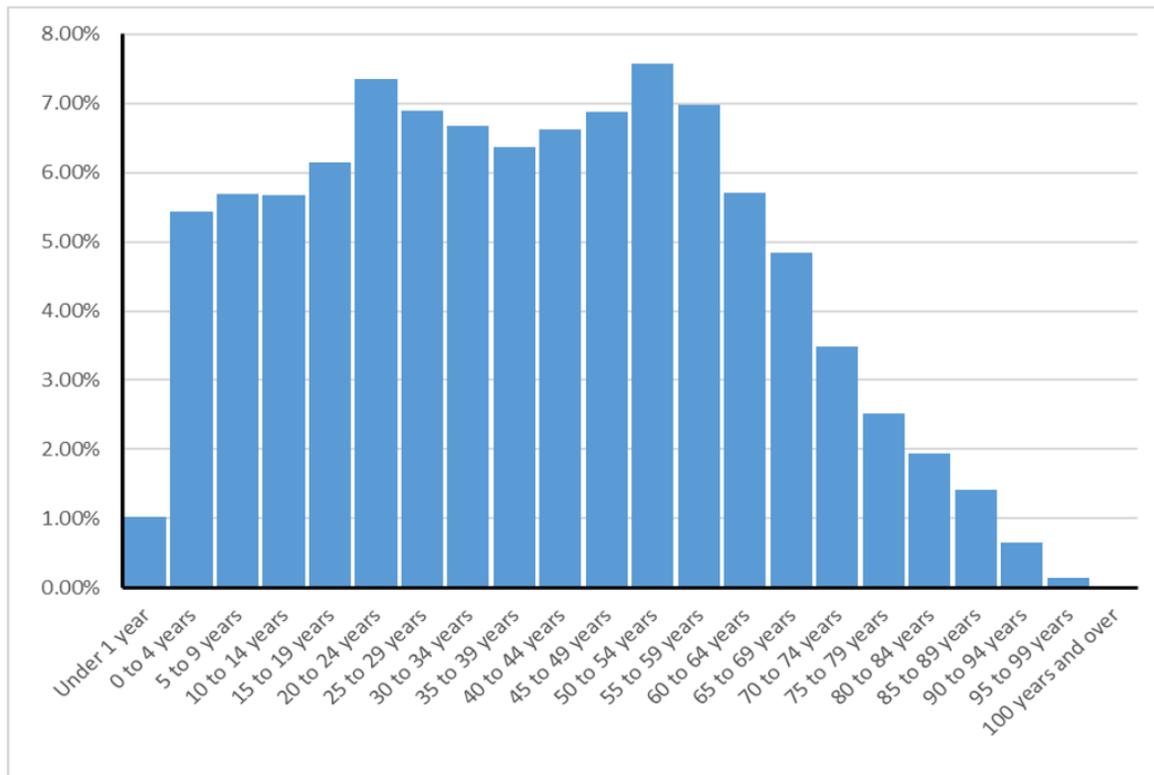
The average age of the population is 39.7 years. Figure 5 demonstrates the percentage of the population according to age in five-year blocks. Statistics Canada also indicates that in 2016 there were 55,927 private dwellings within the City.

Figure 4 - Historical and forecast City of Guelph population growth



⁴ The last Statistics Canada census for which data is available was completed in 2016

Figure 5 - Population age breakdown

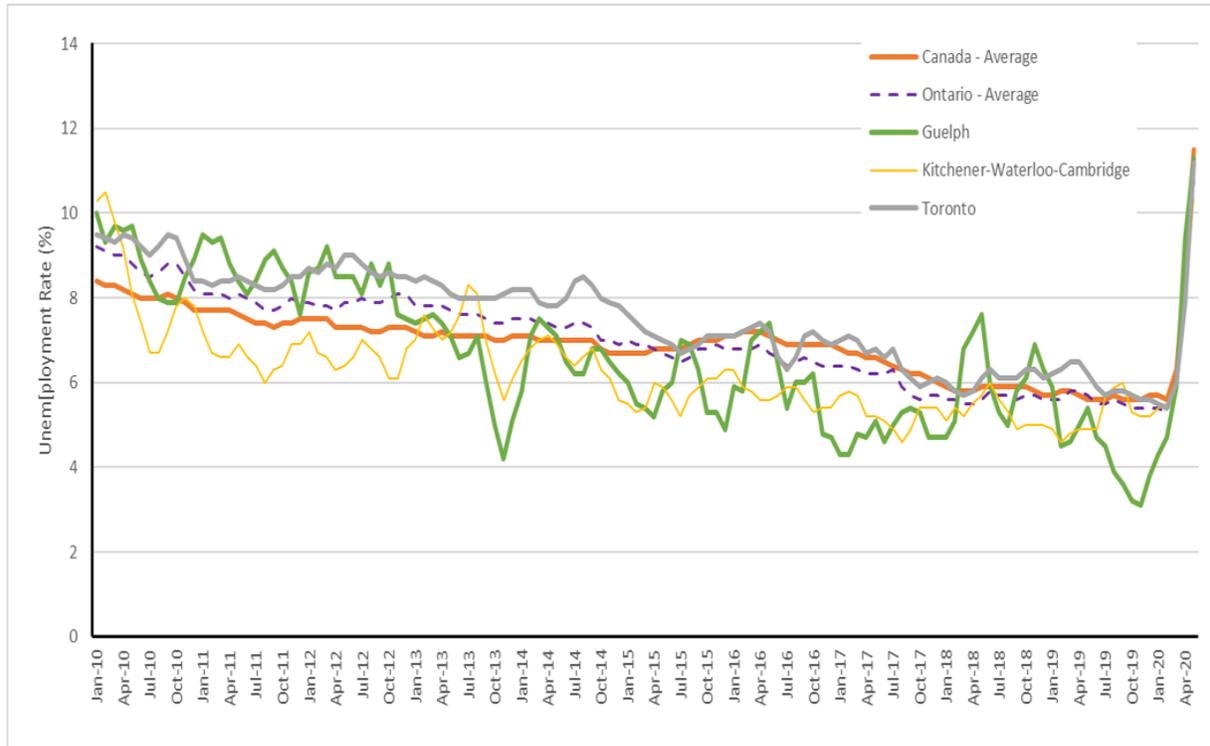


Despite the population growth, steady economic growth and business development has allowed Guelph to have an unemployment rate generally lower than the National and Provincial averages, and neighbouring municipalities. According to the 2016 census data, there were approximately 75,685 people employed at jobs within the City of Guelph, representing about 66.1% of the potential labour force.⁵ The unemployment rate has tended to remain below the National and Provincial averages, and in March 2020 was measured at 5.3%⁶.

⁵ Statistics Canada. 2017. Guelph, CY [Census subdivision], Ontario and Ontario [Province] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E>. The potential labour force includes people aged 15 and over.

⁶ The impact of the COVID-19 pandemic resulted in a spike of the unemployment rate to almost 13% in May 2020 - a spike that was represented in all regions of Canada - this is considered an anomaly that will correct itself when the effects of the pandemic and the emergency measures put in place are mitigated.

Figure 6 - Historic unemployment rates in Guelph, with comparisons



Proximity to Toronto and the Greater Golden Horseshoe

The City of Toronto and the surrounding municipalities are often recognized as the economic centre of Canada, generating as much as 25% of the National Gross Domestic Product (GDP)⁷ within a geographic area that is only a small percentage of the total country. This is the result of the large and well educated population, the region’s proximity to the United States and major transportation hubs for international trade, and the mix of manufacturing and knowledge-based business opportunities. The area is also recognized for being the location of some of Canada’s most important and productive agricultural farmland. Despite the extensive man-made development in Greater Golden Horseshoe (GGH), there remains significant and large areas of natural land with major ecological,

⁷ Calculated from Statistics Canada (Metropolitan Gross Domestic Product, 2014) and Conference Board of Canada (Metropolitan Outlook 1 & 2, 2014)

hydrological and scenic environments that are protected, and provide drinking water and other environmental benefits to the area.

The City of Guelph is included in the GGH area, and as a result is impacted by the development and activities in the surrounding municipalities, Toronto foremost among those. The Ontario Provincial Government has produced a planning document called "A Place to Grow – Growth Plan for the Greater Golden Horseshoe"⁸ which outlines several broad planning goals and initiatives that will impact decisions made by the City of Guelph.

According to A Place to Grow, Guelph is predicted to increase its population to 177,000, by 2031 – a 20% increase from current values - , and nearly 191,000 by 2041⁹. An increase in population will bring an increase in employment, and A Place to Grow predicts that by 2031 there will be 94,000 jobs in the City – about a 28% increase from current values. To support this forecast growth, the City of Guelph will be required to manage the City infrastructure ensuring Services and functions remain at the levels and standards that are currently enjoyed by City residents.

A Place to Grow, among other requirements, identifies that:

- Planning for new or expanded infrastructure will occur in an integrated manner, including evaluations of long-range scenario-based land use planning, environmental planning and financial planning, and will be supported by relevant studies, and should involve:
 - Leveraging infrastructure investments to direct future growth to meet the minimum intensification and density targets in the plan,
 - Provide sufficient infrastructure capacity in strategic growth areas
 - Identify full life cycle costs of infrastructure and developing options to pay for them over the long-term
 - Consider the impacts of changing climate
- Design, refurbishment, or reconstruction of the street network utilize a complete streets approach
- Support active transportation modes
- Infrastructure corridors be developed that maximize the options to co-locate linear type Assets

⁸ <https://files.ontario.ca/mmah-greater-golden-horseshoe-place-to-grow-english-15may2019.pdf#page=102&zoom=100,338,870>

⁹ The reason for the disparity with Statistics Canada values is unknown

- Water and Wastewater systems should be sustainable: municipal revenues should be sufficient to recover the costs of these systems (capital and operating)
- That a Master Plan for Water, Wastewater and Stormwater systems be developed
- Policies that encourage and support water conservation and recycling, energy conservation or alternative energy sources
- Future development be focused in areas where active or public transportation corridors can be facilitated in place of surface parking

All of the above points, and others in the A Place to Grow plan will have a direct impact of the asset planning that the City of Guelph will be required to follow. In fact, the above points form the foundation for effective asset planning.

Infrastructure Development

As the City of Guelph has grown and flourished, a diverse portfolio of Assets – the City infrastructure - has been established to support residents with the Services expected of a municipality to provide that ensures a high quality of life.

In the modern context, infrastructure assets exist to support the provision of:

- Safe drinking water
- Safe wastewater management
- Fire, Police and Paramedic Services
- Parks, recreation and sports facilities
- Efficient Transportation network
- Stormwater management
- Solid waste management
- Arts and cultural facilities

In the 21st century, residents further expect that municipal Services be accessible to all, be provided in a sustainable manner so as not compromise the natural environment, and be cost efficient to operate. The challenges facing the City of Guelph are significant, but by following sound and effective asset management practices the challenges can be managed.

If all of the existing City of Guelph assets were to be replaced today, it would cost approximately \$4.39 Billion dollars - approximately \$31,000 per resident. The City assets are part of an interrelated network that requires significant resources to operate throughout their lifecycles. City assets of all types require regular maintenance and performance monitoring. No matter how well assets are maintained, most will eventually require replacing as the systems, components and elements that comprise the assets reach the end of their lifecycles. Further costs are associated with the safe disposal of assets that are no longer required.

The initial purchase or construction capital costs of an asset are significant, but the costs associated with operating and maintaining the assets through the duration of their lifecycle can often amount to five times the initial capital costs. The principles of asset management will help ensure the City realizes the greatest value from these significant investments, maintain or surpass the expected levels of service and minimize any risks.

Asset management – What does this mean?

The practice of Asset Management (AM), which is focused on integration, sustainability, and whole lifecycle optimization, has in the past few years become the de facto standard by which organizations of all sizes and operations type improve both the current and long-term planning of the organization resources. Where assets are defined as “an item, thing or entity that has potential or actual value to an organization.” and “can be tangible or intangible, financial or non-financial.”¹⁰

The discipline of Asset Management is a combination of management, financial, economic, engineering, operations and other skills used with the objective of managing the assets to provide the required levels of service in the most cost effective manner, with an eye on the long-term future as well as immediate needs. The benefit of AM is to “enable an organization to realize value from assets in the achievement of its organizational objectives.” A successful AM strategy employed by the City of Guelph will provide:

- Improved financial performance
- Allow informed asset investment decisions
- Help manage risks associated with City assets
- Improve performance of Services and outputs that the assets provide
- Improve efficiency and effectiveness of the City operations
- Demonstrate good social responsibility and improve the reputation of the City governance among the residents.

The basic requirements, functions and enablers affecting and depending on asset management are outlined in Figure 7, which is adapted from one of the ISO standards guiding asset management. Clearly demonstrated in this graphic is the interdependency of each part of the asset management system, and the repeating, cyclical nature of asset management.

Asset Management practices are guided by several relevant standard and best practices documents that have quickly evolved over recent years. Foremost among these are the ISO5500x series:

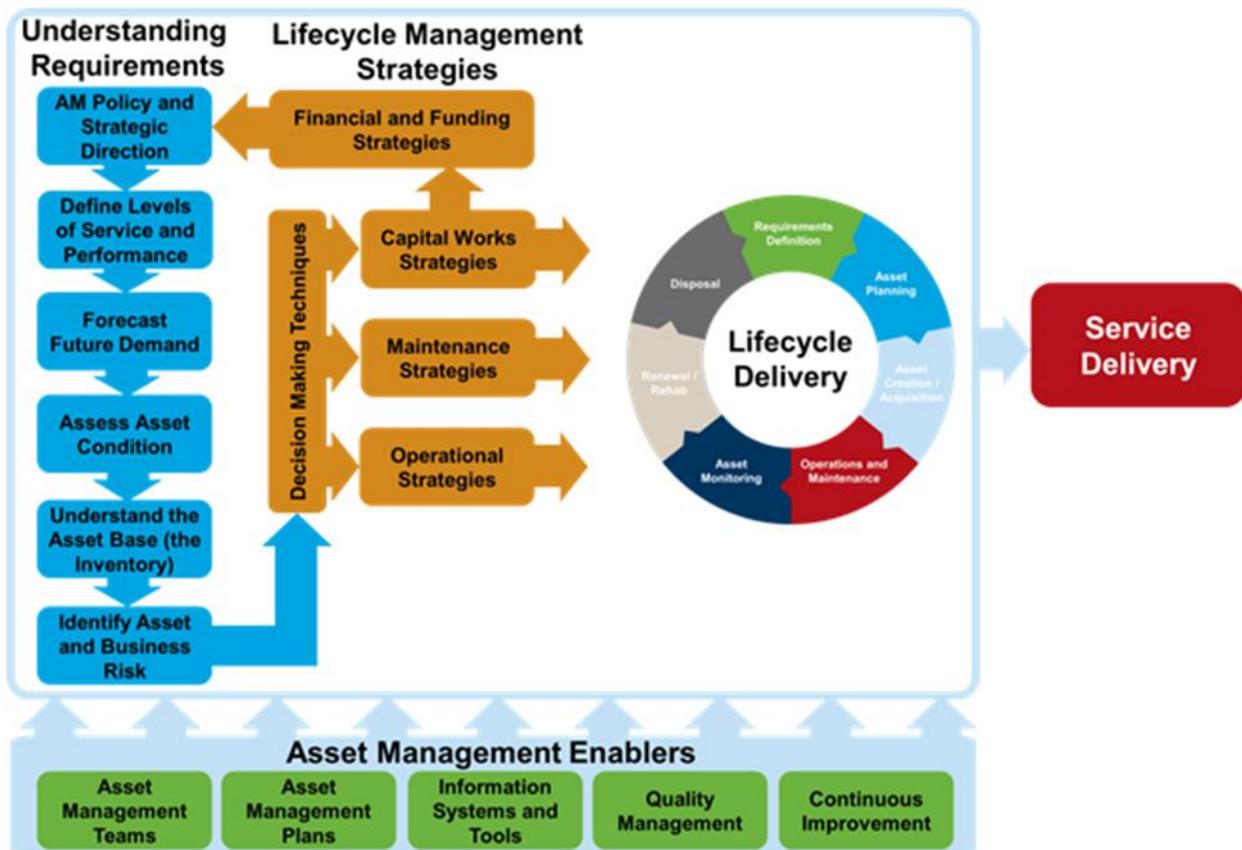
- ISO 55000: Asset Management – Overview, Principles and Terminology
- ISO 55001: Asset Management – Management Systems - Requirements

¹⁰ International Organization for Standardization (ISO). (2014). Asset Management – Overview, Principles and terminology (ISO Standard 55000:2014).

- ISO 55002: Asset Management – Management Systems – Guidelines for the application of ISO 55001
- ISO 55010: Asset Management – Guidance on alignment of asset management, finance and accounting.¹¹

The ISO standards were first introduced in 2014 and evolved from the British Standards Institution Publicly Available Standards (BSI-PAS) 55:2008 document. The Institute of Public Works Engineering Australasia (IPWEA) has also been a leader in AM with the development of several documents and books related to AM, foremost among these the International Infrastructure Management Manual (IIMM). While these agencies and documents were not mandated for use in Canada, AM professionals made wide use of them prior to the adoption of the ISO standards, and were influential in the development of AM practices and requirements that the City of Guelph follows today.

Figure 7 - The asset management lifecycle



¹¹ Published in 2019 and not yet in widespread use

The Province of Ontario has identified the benefits of AM in legislation. The Province of Ontario implemented O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure, effective January 1, 2018¹² which requires Municipalities to follow established AM practices and standards and mandates some specific levels of service that are required to be reported on.

Perhaps most importantly the O.Reg 588/17 requires municipalities to have a Strategic Asset Management Policy that:

- identifies goals, policies or plans supported by the asset management plan,
- emphasize a continuous improvement approach to AM,
- ensuring that AM is aligned with financial plans and Provincial Land Use Plans,
- identify the persons in the City governance structure who will be responsible for AM including the executive lead, City Council, and
- identifies a commitment to provide opportunities for the residents and other parties to provide input to the AM planning.

Municipalities were required to have a Strategic Asset Management Policy in place by July 1, 2019. The City of Guelph pre-emptively met this date goal by having a Corporate Asset Management Policy in 2013. The City then established the Corporate Asset Management Division (CAM) in 2016 specifically to develop a whole City, holistic and coordinated approach to asset management that ensures levels of service are met and risks are managed in the most cost effective manner. Some of the City Service areas have already developed relatively mature processes with respect to asset management, however, the City's overall corporate asset management practices remain in a development stage with a number of targeted strategies to advance the overall level of practice over the next few years. CAM is taking a leading role in the AM program for the City of Guelph including preparing the Asset Management Plan (AMP) required by O.Reg 588/17. The AMP must include:

- the inventory of City assets
- the current levels of service being provided
- the current replacement value, average age, and physical condition of the assets
- what activities will be required to maintain current levels of service
- the proposed levels of service for each asset category that the City proposes to provide

¹² O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure, filed December 27, 2017 under Infrastructure for Jobs and Prosperity Act, 2015, S.O. 2015, c.15: <https://www.ontario.ca/laws/regulation/r17588>

- a lifecycle and financial strategy that identifies how the City intends to meet the stated goals

Most importantly O.Reg 588/17 requires the City to use established lifecycle planning and risk management practices in both the assessment of the current state of the assets, and the plans for future years. Further, the O.Reg identifies a phased approach to developing an AMP. Five core asset categories – roads, bridges, potable water, wastewater and stormwater - have been identified by the Provincial Government with the requirement that these should be included in an AMP by July 1, 2021, with all remaining asset categories included by July 1, 2023. The Regulation also identifies the requirement to review and update the AMP at least every five years. For more detailed information, please review the full regulation.

In 2017 the City of Guelph released the first Asset Management Plan (AMP) developed and published by the City. The purpose of this AMP was to outline processes and practices that are in place to ensure the delivery of the City's Services in the next 10 years. While the 2017 AMP was the first document of this kind, the City has in fact been managing assets since even before its incorporation in 1879. Within the following sections it will become clear what the current and future needs of the City are, and how those needs will be met.

Goals of the City and the dependence on assets

City of Guelph Strategic Plan 2019-2023

The City of Guelph released a new Strategic Plan, "Guelph. Future Ready." to guide the future growth and development the City will face in future years. The intent of the Strategic Plan is to help the City deliver the various programs and services offered to the residents of Guelph while engaging them and finding innovative ways to create a future ready Guelph.

City employees were engaged to develop the plan and incorporated existing and new City vision, mission and value statements for a Strong Foundation, while incorporating aspects of the Community Plan, shaping what Guelph will look like over the next 10 to 20 years while incorporating a role for everyone – City Council, City Staff, and the Community.

The strategic plan resulted in the identification of five main priorities:

- Powering our future
 - An economy that empowers us
- Sustaining our future
 - An environment that sustains us
- Navigating our future
 - A transportation network that connects us
- Working together for our future
 - A modern government that works for us
- Building our future
 - A community that supports us

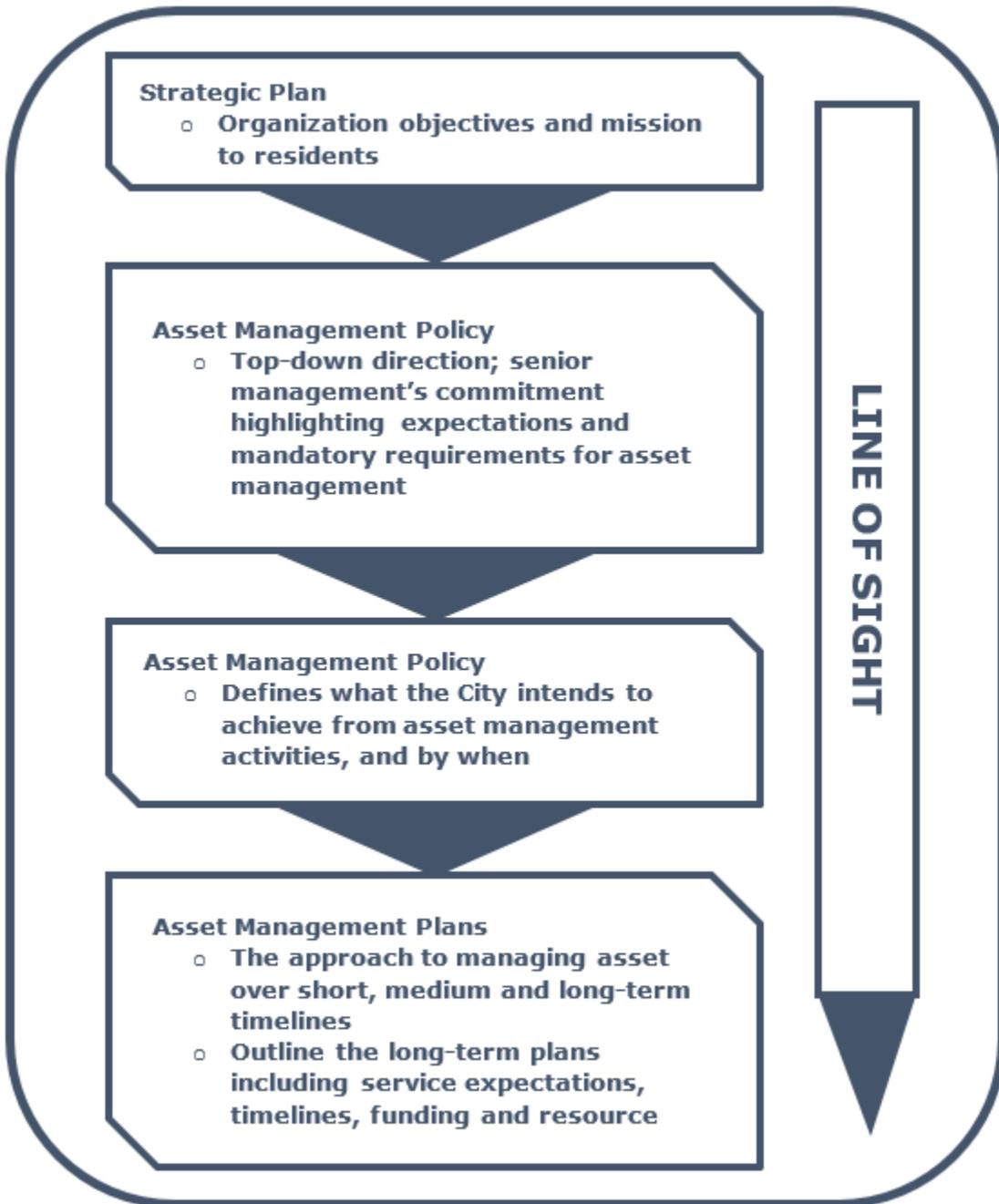
A review of the document presents a clear picture that the City assets will be essential in allowing the City to meet the goals and priorities of the plan. It is also clear that a sound asset management strategy and plan is required by the City to do so.

Strategic Asset Management

One of the essential concepts of asset management is the "Line of Sight" – the idea that an organization's objectives are understood from the top-level management to the front-line employees.

The ISO55000 documents encourages this “line of sight” by recommending an organization prepare a suite of aligned documents that work together across all departments of that organization. This idea is demonstrated in Figure 8.

Figure 8 - ISO55000 Line-Of-Sight documents



The City of Guelph has a recently developed a Strategic Plan¹³, and an Asset Management Policy that was introduced in 2017¹⁴.

Though the City has not yet developed a stand-alone asset management strategy, aspects of what such a document should include have been captured in the 2017 AMP, and also in this current document.

These documents require periodic review and updating as circumstances and requirements change.

¹³ See previous section

¹⁴ See next section

2018 Asset Management Policy

The first Corporate Asset Management Policy, released in 2013, detailed the City's key objectives for asset management, and established a baseline that Guelph has continued to build on. In 2016, as part of efforts to incorporate advances in asset management at the City of Guelph, the CAM Division developed an updated Corporate Asset Management Policy (the Policy). The Policy details the principles and general framework for a consistent and coordinated approach to asset management required to achieve the City's asset management objectives, which ultimately are guided by the City's Strategic Plan, Official Plan and related legislation from the municipal or provincial levels of government.

The core principles of the Policy are:

Service Excellence

- The City will adopt a whole organization, all asset approach asset management, that considers the interdependency between asset systems and services
- Asset management decisions will be made using City Strategic planning documents in the development of asset plans
- Approach asset management from a collaborative and cross-disciplinary perspective

Financial stability

- Optimize decisions based on lowest lifecycle costs , acceptable risk levels and desired levels of service, ultimately linking investment decisions to service outcomes;
- Ensuring evidence based, transparent decision making, and engagement with stakeholders

Innovation

- Being innovative in the approach to asset management, always striving to follow and implement best practices while continuing to improve
- Demonstrating sustainable, full lifecycle planning

As with all asset management principles and documents the Policy will be regularly reviewed and modified as needed.

A copy of the complete Policy is included in Appendix A.

Relationship with municipal planning documents

The City’s Asset Management System, and subsequently the AMP are supported by a number of municipal planning and financial documents that include those summarized in Table 3.

Table 2 - Key documents that relate to the asset management system

Asset Management System Component and Relationship	Document or strategy
Asset Management Policy and Strategic Direction - Guides the long term vision and goals of asset management.	<ul style="list-style-type: none"> • Asset Management Policy • City of Guelph Strategic Plan 2019-2023 • <u>Enterprise Framework</u>
Levels of Service and Performance - Informs and establishes key service criteria, service expectations and performance measures.	<ul style="list-style-type: none"> • Service Review Framework • Accountability Framework • <u>Community Engagement Framework</u> • <u>Communications Plan</u> • Downtown Guelph Streetscape Manual, Built Form Standards and St. George’s Square Concept • <u>Multi-Year Accessibility Plan</u> • <u>Think Youth: 2013-2018 Guelph Youth Strategy</u> • <u>Open Government Action Plan</u>

Asset Management System Component and Relationship	Document or strategy
<p>Future Growth and Demand - Identifies future demand patterns and capacity requirements</p>	<ul style="list-style-type: none"> • <u>Biosolids Management Master Plan</u> • <u>Development Priorities Plan</u> • <u>Cycling Master Plan – Bicycle-Friendly Guelph</u> • <u>Downtown Secondary Plan</u> • <u>Growth Management Strategy</u> • <u>Natural Heritage System (Official Plan Amendment 42)</u> • <u>Official Plan</u> • <u>Guelph Market Place Strategic Urban Design Plan</u> • <u>Water Supply Master Plan</u> • <u>Water Efficiency Strategy</u> • <u>Parking Master Plan</u> • <u>Parks and trails planning</u> • <u>Recreation, Parks and Culture Strategic Master Plan</u> • <u>Stormwater Management Master Plan</u> • <u>Transit Growth Strategy</u> • <u>Transportation Master Plan</u> • <u>Solid Waste Management Master Plan</u> • <u>Urban Forest Management Plan</u> • <u>Wastewater Treatment Master Plan</u> • <u>Water and Wastewater Servicing Master Plan</u> • <u>Guelph Innovation District (York District Lands)</u> • <u>Prosperity 2020</u> • <u>South Gordon Community Plan</u> • <u>Older Adult Strategy</u>
<p>Understanding the Asset Portfolio - Develops, analyzes and improves asset inventory and attribute information.</p>	<ul style="list-style-type: none"> • <u>Corporate GIS Strategic Plan</u> • Enterprise Asset Management Implementation • Water and Wastewater Data Modelling • Corporate GIS Data Modelling

Asset Management System Component and Relationship	Document or strategy
<p>Identifying Asset and Business Risks - Defines processes for the evaluation of risks, and identification of risk management strategies.</p>	<ul style="list-style-type: none"> • <u>Emerald Ash Borer (EAB) Plan</u> • <u>Emergency Response Plan</u> • <u>Source Water Protection Program</u> • Enterprise Risk Management Framework • Water and Wastewater Linear Network Risk Management Framework
<p>Financial and Funding Strategies - Outlines investment and funding opportunities - Evaluates revenues and funding streams.</p>	<ul style="list-style-type: none"> • <u>Community Investment Strategy</u> • <u>General Reserve and Reserve Fund Policy</u>
<p>Operations and Maintenance Strategies - Informs operational and service delivery processes</p>	<ul style="list-style-type: none"> • <u>Community Energy Initiative</u> • <u>Corporate Energy Management Plan</u> • <u>City of Guelph Budget</u>
<p>Capital Works Strategies - Summarizes specific capital plans and improvement strategies.</p>	<ul style="list-style-type: none"> • <u>Old University and Centennial Neighbourhoods Community Improvement Plan</u> • <u>St Patrick's Ward Community Improvement Plan</u> • <u>City of Guelph Budget</u>
<p>Asset Management Human Resources and Capabilities - Outlines requirements for available resources and capability development.</p>	<ul style="list-style-type: none"> • <u>Diversity and Inclusion Strategy</u> • <u>Integrated Talent Blueprint</u> • <u>Wellness Strategy</u>
<p>Asset Management Plans - Documents the processes, procedures and plans.</p>	<ul style="list-style-type: none"> • 2017 Corporate Asset Management Plan • Asset System Management Plans • Water Services Property Acquisition Master Plan
<p>Information Systems and Tools - Advances information systems and tools to complete asset management activities quicker and more efficiently.</p>	<ul style="list-style-type: none"> • <u>Corporate Technology Strategic Plan</u> • <u>Records and Information Management (RIM) Strategy</u>

**Asset Management System
Component and Relationship**

Document or strategy

Quality Management and Continuous Improvement - Establishes a quality management system, and pushes for continual improvement.

- Drinking Water Quality Management Standard

2. 2020 Asset Management Plan

Background

The 2020 plan builds upon the 2017 plan, incorporating new and enhanced information about the City's assets that has been developed in response to some of the items identified in the first plan, but also with benefit of experience more detailed analysis tools have been used to provide more detail. Where the 2017 plan was developed with consideration to meet and exceed the requirements of the Infrastructure Ontario (2012) Building Together Guide for Asset Management Plans, the introduction of the Infrastructure for Jobs and Prosperity Act in December 2017, and specifically O.Reg 588/17 has changed the requirements of what the City AMP should include.

AMPs are intended to be high-level documents, providing a high level review and information about the assets and the financial needs of the City of Guelph. The AMP helps to identify gaps and opportunities that exist in the context of meeting intended service level targets. Like all such documents, it is a snapshot in time based on the best information regarding the assets and the asset management processes and practices that was available. An AMP outlines a roadmap for continual improvement in the future as the City's asset management practices mature.

Effective Asset Management is a combination of knowledgeable staff, with good data, managing assets using established processes with the support of the entire organization. The core fundamentals that drive asset management can be stated in seven basic questions:

1. What do you own?
2. Where is it?
3. What is it worth?

4. What condition is it in?
5. What are the deferred maintenance needs and cost (i.e. what is the backlog)?
6. What is the remaining service life?
7. What gets fixed first?

By answering these questions, any person, at any level of the organization should be able to make effective, evidence based decisions regarding the state of assets within the organization. City staff responsible for each of the different Services work diligently to answer these questions and their results are presented in the AMP at a high-level.

The frameworks and tools used in the preparation of this AMP will allow future versions to continue to be improved, as well as provide the ability to measure progress against historical decisions and plans with respect to how well the City is meeting the goals outlined in the AMP.

Purpose of the AMP

The purpose of this plan is to:

- Outline the status-quo asset inventory, including physical condition and value to the City of Guelph;
- Identify estimated financial resources required to maintain the asset inventory, including costs for individual asset renewal and/or replacement actions and maintenance of the assets;
- Identify estimated financial resources required to accommodate growth of the asset inventory as the City of Guelph continues to grow;
- Quantify the infrastructure deficit and investment gap;
- Demonstrate long-term asset stewardship and sustainability;
- Collate a single master asset hierarchy and inventory;
- Support the development of improved practices that communicate and justify funding requirements;
- Provide increased transparency related to the City's asset management practices, challenges and opportunities.

The AMP works as a "baseline" or framework type document that other documents can reference. These include:

- Corporate level of service framework;
- Risk management and prioritization strategies;
- Condition assessment strategies;
- Data management strategies; and
- Detailed Asset System Management Plans.

Further, the AMP is intended to work in conjunction with the City Budget to improve both planning and accountability.

Assets Included in the 2020 AMP

This asset management plan is intended to include all City assets with the most up-to-date information that is available at the time of development. The following physical asset systems that support the City's core Services are included in the plan:

City Administrative & Operational Facilities & Buildings	Potable Water Treatment and Pumping Facilities and Pipe Distribution Network
Roads, Sidewalks, Traffic control Equipment	Information Technology Equipment
Corporate Vehicles and Equipment	Stormwater Management Systems
Bridges and Major Culverts	Transit Facilities and Vehicles
Parks, Recreation and Cultural Facilities	Land: Natural and Open Spaces
Solid Waste Management Facilities and Collection Vehicles	Wastewater Treatment Facilities and Collection
Fire, Police and Paramedic Emergency Services	

It should be noted that the above list does include some asset systems that are relevant to delivering Services to the residents of the City of Guelph, but are managed by various Boards and Agencies such as Guelph Police Services and the Guelph Public Library.

At this time, assets owned by affiliated organizations such as the Guelph Cemetery Commission, Guelph Hydro, the Guelph Junction Railroad and others are excluded from the plan. In addition, social housing is managed by Guelph Non-Profit Housing Corporation, an external entity, and therefore is also not included in the AMP

AMP Lifecycle

The AMP is a snapshot in time. The information in that snapshot is used to predict how the City of Guelph might change, and as a result how the City assets will change over time - how are assets performing with regards to their expected level of service delivery, and what are the financial implications of that information.

Most infrastructure asset types have an expected useful lifecycle in the range of 40-75 years. Some types are longer, and some are shorter. However, predicting infrastructure needs, asset conditions, and forecasting costs for the City through lifecycles of those time lengths is difficult. Forecasting the needs of a City and its assets 50 years and beyond is difficult. A 25-year forecast period can provide a good long-term view forward while maintaining a higher confidence in the accuracy of the data compared to longer periods.

Asset Management works closely with the City finance staff, and so the 25-year AMP matches the 25-year City budget. The results from the AMP can feed the information that is used to develop the budget. With the two documents sharing a common outlook period, the City knowledge with regards to asset management will be improved.

Updating the AMP

This asset management plan will be updated annually, with a full re-evaluation at least every four years or following the update of the City’s Corporate Strategic Plan and/or the Corporate Administrative Plan shows the intended update frequencies of the Plan and associated documents.

Table 3 - Timeframes and update frequency of asset management and planning documents

Document	Update Frequency
Asset Management Policy	Reviewed by the Asset Management Steering Committee annually, and following any updates to the Corporate Strategic Plan or Corporate Administrative Plan.
Corporate Asset Management Plan	Annual Update Full re-evaluation every 4 years
Asset System Management Plans	Annual Update Full re-evaluation every 4 years
Capital and Operating Budgets	Annual Update

Developing the AMP

The 2020 AMP development builds and expands on the 2017 AMP and the data that was collected during the completion of that plan. The first AMP led to improved knowledge and awareness of City staff about the assets, which has improved the quality of the data used in the 2020AMP.

The development of the initial 2017 AMP plan primarily included data collection – mostly the compilation of service area data from multiple inventories and sources. Initial data analysis tools were developed, and meetings with working groups were held to discuss each component of the plan and initial results.

Updated asset inventory information that was collected and reviewed during the 2020 capital budget planning period was shared with service area staff along with Level of Service Framework information for review. CAM staff sought to ensure a collaborative approach to developing the AMP, which has resulted in even more improvements to the quality and volume of information that has been incorporated to this AMP. This process will be further refined in future iterations. An outline of key tasks, the stakeholders involved, and limitations of the work plan are provided in the following sections.

Limitations and Constraints

Building on the 2017 AMP, this AMP was developed based on the best available information and expanded outreach to City staff in the Service areas directly responsible for managing the assets. The Asset Management Program is only continuing to mature and develop its asset inventory and database. As we continue maturing the level of confidence will continue to increase. Since 2017, the City has focused on developing the core asset inventories and condition assessments and strive to accomplish most other service areas by 2024.

Some of the limitations and constraints are listed below, including known or potential mitigation strategies that are being developed or improved upon so that future AMP and analysis work can be even further improved.

- i. Corporate Asset Management Program Still Maturing

The current corporate-wide asset management program, and the concept of holistic asset management is still growing at the City of Guelph, and different service areas within the City organization have different approaches to asset management and asset inventory management. However, The City of Guelph is maturing rapidly and recognized for its successes in the past few years.

Mitigation

The CAM team continues to help the other service area staff implement better asset management by introducing best practices, organizing internal information sessions and building relationships among staff by requesting their direct input regarding the data availability and analysis efforts. In turn the service area staff responded positively and the mitigation efforts further outlined below are part of this effort.

ii. Lack of Centralized Asset Inventory

There is no centralized asset management system with a single complete inventory of the assets. Each service area has their own inventory of assets that fall within their areas of responsibility, and the City Finance department also has a separate asset inventory. Each of these inventories are of varying degrees of completeness, and use different data fields and formats. The City currently relies on its geodatabase (i.e. GIS), work order management system and its financial software to collect most of its asset information.

Mitigation

In June 2020 the City received several responses to an RFP seeking a provider of an Enterprise Resource Planning (ERP) Solution. A main concept of a successful ERP solution is a central inventory which other functions of the ERP use as a baseline for the tool. Once the successful proponent is selected the City will begin developing a centralized inventory within the ERP to create efficiencies across the organization.

The GIS geodatabase will remain as the "first line" data repository for assets with a geographic component – i.e. roads, pipes, bridges, pathways etc. - and the GIS staff work continuously to improve the data completeness and quality. GIS integration with the new ERP is also likely to be completed.

iii. Metadata not always available

Limited information regarding when and how data about the assets was collected was available. This metadata (data about data) was particularly noticed with condition and replacement value information, but was also sometimes a problem with the ages or years of installation. Those three fields are the essential elements of asset planning, and the lack of metadata impacts the confidence of the overall analysis as it cannot be stated with certainty that current information is always being used.

Mitigation

Implementation of the CMMS will greatly improve the metadata. All CMMS and asset inventory are able to track this important information

iv. Age Based Condition Ratings

Many of the assets have no quantitative assessment information associated with them and so use of an age based condition rating was the only option available to rate the current condition of the assets. For some asset types, particularly those with short expected lifecycles, this is normal (i.e. vehicles and IT equipment) and perfectly acceptable. For assets with a longer expected useful lifecycle, an age-based condition rating is imperfect. In these instances, the asset condition rating was assigned based on the remaining service lifecycle of the asset as a percentage of the theoretical, normal full expected useful service lifecycle.

It is possible for an asset to be of an age where it would be considered "past due" but in fact the asset might remain properly functional - an age based condition rating will not identify this, therefore a false picture of the asset needs is being provided.

Mitigation

Quantitative, actual assessments to establish asset conditions should be done whenever possible so that true condition ratings are used in the analysis. The City already has good practices for condition evaluations of asset types like for roads with pavement condition index studies, and with pipes using CCTV inspections. These programs should be expanded in scope and frequency when possible.

Improved and more frequent assessments of the City facilities – especially the water and wastewater treatment plants, and the large recreation facilities – will also improve the overall analysis in the future.

As asset management at the City continues to mature, records of work done to the assets will be able to be incorporated to the data allowing a refinement of the analysis techniques so that future forecasts will be developed using more than just the theoretical age based replacement dates.

v. Missing historic original costs

When actual historic acquisition or construction costs were not available estimates based on professional judgment were used.

Mitigation

As the City asset management program matures and the data management improves, there will be less instances like this.

vi. Service Area Master Plans

Service Area Master Plans were provided for some of the service areas, but for others none were available. These plans tend to provide a good and more detailed focus on the future needs of the asset systems needs than a high level AMP can. They are also very good at identifying “wish list” type items – i.e. identification of community wishes for changes or additions to the services and related assets that are desires. This is the type of long-term planning information that should be included as early as possible in an AMP so that proper and sound planning can begin.

Mitigation

Within the 2021-2045 Capital Plan document several projects were identified that indicated master plans for several different service areas will be developed and implemented in the next few years. The Transportation, Water, Wastewater, Stormwater and Parks & Recreation Masterplans are currently underway. This information will be reflected in the 2024 Asset Management Plan Update.

vii. Budget Information and Project Management Resources

Budget information: a common concern raised among City staff is the lack of resources available to be able to manage the implementation City Projects if every desired project was funded. As a result, staff advised that in some cases project funding requests were not put forward because there would be no staff able to manage them. The value of needed but unrequested work is unknown at this time – this lack of information affects the analysis with regards to understanding the actual required work.

Mitigation

Focusing on project management capacity and including resources in our capital funding to ensure the approved capital budgets are being completed on time with lower unspent balances.

COVID-19

During the spring of 2020 the Covid-19 pandemic affected the City of Guelph. The timing of the pandemic coincided with the beginning of the preparation of this AMP.

The effects of the Covid pandemic may result in physical changes to some of the assets, but as of this writing the full extent of any required changes are unknown and will need to be identified through future iterations of the Plan.

How the Plan Will be Evaluated and Improved

The City's asset management program – in accordance with asset management best practices - is founded on continuous improvement, transparency, and accountability. This Asset Management Plan is just one part of the overall Quality Management System for Asset Management at the City of Guelph that is being established based on best practices. As such, the Corporate Asset Management division intends on completing annual audits of the asset management practices using asset management industry best practices as the performance indicators to measure against. These include the materials identified in section 1.2, namely the ISO 55000 documents, the International Infrastructure Management Manual (IIMM) and material referenced by the IAM (Institute of Asset Management).

In the course of establishing the asset management program, the City of Guelph has conducted self-assessments based upon these references to evaluate the maturity level of the City of Guelph AM program against identify areas and processes to improve as the City moves forward. In the initial years, the maturity assessment will be completed internally on an annual basis and reported to the asset management steering committee to evaluate the progress and improvements towards asset management excellence. In the future, independent audits may be completed to provide an impartial view of the asset management capabilities.

As described in the description of what asset management is, the concept of "line of sight" is essential to having a successful organizational asset management strategy. As a step towards achieving this the Corporate Asset Management Team has engaged stakeholders from various City departments and service areas to ensure a collaborative, consistent and whole picture understanding of the asset needs.

The idea behind this approach is that CAM staff are not the asset managers per se, but rely on the service area staff as experts for ensuring the validity of the data for each asset type with guidance from CAM on what data fields and tools should be used. To date feedback from City staff indicates that this is a desired manner to manage the asset management data, but as this process is at the early stages of implementation, there remains room to grow and improve. By continuing these efforts future asset management information will be improved, resulting in a City wide benefit in understanding the infrastructure needs.

Evaluating Assets

Understanding the condition of an asset, as well as the remaining useful functional life of an asset is essential to being able to forecast future service needs and budgets for capital replacement and cyclical maintenance.

Asset ages are relatively simple to estimate: each asset type (i.e. police vehicle, building roof, sewer pipe etc.) is given an "expected useful lifecycle" (EUL) in years which is a theoretical period of time when the asset is expected to remain in functional service. This value is based on references and experiences managing those types of assets not only in Guelph, but in communities around the world. EUL

values can be obtained from industry reference manuals, owner’s operating manuals or other similar documentation. These values have been established after many years of research and review of how assets perform in real life service. By comparing the current age of an asset to the EUL for an asset, the estimated “remaining service life” (RSL) can be calculated. The ratio of the RSL to the EUL can then be used as a basic measure of the condition of an asset – the closer in age an asset is to its EUL the poorer the condition rating will be. Table 5 outlines the criteria used to assign a condition rated when only age based information is available and further details on the definition of each condition are provided in Table 6.

Table 4: Assigning Rated Condition Based on Age

Percentage of RSL / EUL	Rated Condition	Rating Score
80-100	Very Good	5
60-80	Good	4
40-60	Fair	3
20-40	Poor	2
0-20	Very Poor	1
<0	Past Due	0

Typically an asset will undergo some kind of rehabilitation or renewal project during its lifetime which will extend its lifecycle beyond the theoretical normal EUL and extending the period of time before the asset ultimately needs replacing. If that information is not known or recorded anywhere, the age-based rating method will fail to identify the proper condition and remaining life, and the resulting financial planning will identify a forecast required cost earlier than is actually needed.

Ideally the true condition of an asset will be determined based on quantitative and evidenced based information – i.e. inspecting, testing and assessing assets in the actual performance of their function. An assessment like this should be able to identify the extended lifecycle of an asset due to any mid-life rehabilitation work, and would also be able to identify an asset that is performing better, or worse, than the theoretical EUL ages would allow for.

Assessments are generally contracted to consultants who specialize in certain asset types and can provide an unbiased 3rd party opinion based on established criteria.

The City of Guelph assets have been assessed using a combination of the two methods noted above. While several service areas complete regular assessment and inspection programs, to date there has not been a 100% completion rate in these actions.¹⁵ When available, the actual assessment information is used to generate an asset condition rating - in the absence of assessment information the final condition rating is based on the age and RSL compared to the EUL.

Regardless of the method used to determine asset condition, all assets were assigned a condition rating based on the criteria in Table 6.

Within the datasets from the different service areas it was observed that different evaluation and condition rating criteria were used. This is the result of different consultants using different systems based on the normal evaluation criteria for a certain asset type. For example roadway pavement condition information is provided in the form of a percentage where 100% is very good and lower values indicative of poorer conditions. Some consultant rating systems are based on a 10-point score while others used a 4-point score. Regardless of what system the initial condition information was provided in, for all City of Guelph assets the criteria in Table 6 was used to ensure consistency across all the assets, regardless of the original source of the assessment information. In some cases this required extensive effort to convert the provided information to the final criteria.

Table 5: Condition Rating Definitions and Criteria

Rating Category	Rating Score	% of Remaining Service Life	Definition
Very Good	5	80% - 100%	Fit for the Future - An asset in very good condition is typically new or recently rehabilitated. Regular maintenance should enable the asset to reach its full EULA few elements exhibit deficiencies; failure to complete intended or recommended maintenance will shorten the EUL and increase resources required to manage the asset.

¹⁵ The type of assessment and inspection performed varies by the type of asset. Details on the different actions are outlined in the following chapters dedicated to each service area.

Rating Category	Rating Score	% of Remaining Service Life	Definition
Good	4	60% - 79%	Adequate for Now - Assets show general signs of deterioration from normal use but the asset is still able to provide its intended function without problems. Levels of service are not affected. Regular maintenance should enable the asset to reach its full EULA few elements exhibit deficiencies
Fair	3	40% - 59%	Requires Attention – The asset shows general signs of deterioration, likely from normal use but possibly as the result of another deficiency and require repair or some rehabilitation. Maintenance needs and costs will increase, but the asset should still reach its EUL if these tasks are performed when planned.
Poor	2	20% - 39%	At Risk – An asset in poor condition is approaching its EUL and likely can no longer provide its intended design function; levels of service will be negatively affected. Major repairs or rehabilitation will be required with full replacement possibly needed.
Very Poor	1	<20%	Unfit for Sustained Service – An asset in Very Poor condition will demonstrate evidence of advanced deterioration. Service levels will be negatively affected, and there may be a risk to health and safety of persons using the asset without mitigation in the form of major rehabilitation or replacement taking place.

Rating Category	Rating Score	% of Remaining Service Life	Definition
Past Due	0	0% or less	<p>Past Recommended Replacement Date – Based on age the asset is past its EUL</p> <p>- Or -</p> <p>Based on an actual assessment of the asset it has been determined that the asset is no longer able to provide its intended design function.</p> <p>In both situations, replacement or extensive rehabilitation is recommended.</p>

Budget & Financial Needs Analysis

In conjunction with the City of Guelph Finance Department and the Manager, Financial Strategy & Long Term Planning the results of the state of the assets analysis and forecast costs identified through that analysis were compared against the approved 2021-2045 Capital Plan document which was provided to CAM.

The following assumptions were made during the financial review

1. Future Required costs

The future required costs for the assets were forecast using the rated condition of the asset in order to predict a year when the asset will require replacement. This method accounts for assets that have quantitative assessment info, as well as assets that have a rated condition based only their age. It also provides a more mature method of determining future requirements compared to only using the estimated remaining service life (RSL) of an asset – many assets with an indicated RSL less then zero were assessed in better than “past due” condition. In these cases simply using the RSL to determine what year the asset should be replaced would provide incorrect information and poor planning information. The rated condition of the asset – determined as outlined in previous section – was used to establish the replacement year according to the following criteria:

Table 6: Criteria Used to Determine Forecast Replacement Year

Condition Rating	Replacement Year (RY)
Past Due	2020
Very Poor	2020 + 10% of EUL
Poor	2020 + 30% OF EUL
Fair	2020 + 50% OF EUL
Good	2020 + 70% OF EUL
Very Good	2020 + 90% OF EUL

Where the EUL is the normal Expected Useful Lifecycle of an asset.

Example:

If the Condition rating is Fair, and the EUL is 20 years,

$$RY = 2020 + 50\% \text{ of } 20$$

$$= 2020 + 10$$

$$= 2030$$

Therefore the replacement cost for the asset is assigned to 2030 as a forecast requirement in that year. When the above analysis is completed for all the assets in the City inventory an annual forecast funding requirement was developed.

With the long, multi-year forecast period used in the AMP many assets would need to be replaced more than once in the forecast period – some assets would require replacing multiple times. The example above identifies the first required replacement. Subsequent required replacements would be determined by adding the EUL (in years) to the year of the first replacement. Continuing the above example:

$$\text{RY}(2) = 2030 + \text{EUL}$$

$$= 2030 + 20$$

$$= 2050$$

By continuing this exercise for all the assets predicted replacement years for them can be forecast, and a good prediction of future capital requirements for the City is available.

In accordance with capital project estimating best practices, a contingency value has been added to each annual replacement cost in order to account for variances in cost estimates, project soft costs like design, planning or project management, or future economic challenges that may affect the infrastructure construction and acquisition industry. The rate of the contingency varies depending on the asset type.

Including the contingency, forecast required costs included in this AMP should be considered class "D" estimates with a +/- 25% accuracy level. This is a typical strategy for estimating infrastructure costs in the high-level analysis that the AMP represents.

2. Approved Funding in 2021-2045 Capital Plan

The values identified as "funding" through the AMP analysis are the values identified directly in the 2021-2045 Capital Plan and provided by staff in the City Finance Department with whom CAM staff have worked closely on the financial analysis sections of this AMP.

3. Project type

The 2021-2045 Capital Plan provided project funding values, but did not include a direct comparison identifying if the project was classified as replacement, renewal or rehabilitation work. When the project title was not clear, an assumption was made identifying the project type, and the identified funding source.

Non-infrastructure related projects were clearly identified (i.e. funding for master plans).

Within this report only the sum of the funding values is referenced, but throughout the background analysis work the project type distinctions were identified and used.

4. Maintenance and operating costs

Annual maintenance and operating costs were not identified in the datasets used to evaluate the state of the asset information, nor was specific funding for those items identified in the 2021-2045 Capital Plan.

In the 2017 AMP, the calculated funding requirements for maintenance and operating costs for each asset category was determined as a percentage of the total asset replacement cost using historical budget info from 2012-2017. In the interest of continuity the same percentages have been carried forward on this AMP and used to determine the forecast annual maintenance requirements based on the updated 2020 replacement costs. Refer to Table 8 to identify the rates used for each asset category.

5. Allowance for expansion

Within the state of the asset data there were no records representing new assets that will be required to support the expansion of the current infrastructure system capacities that will be needed to support the future growth of the City of Guelph.

As was done for the maintenance and operating costs, a similar method was applied to calculate an annual forecast cost requirement for infrastructure expansion projects. Refer to Table 8 to identify the rates used for each asset category.

Table 7: Maintenance and Expansion Rates as a Percentage of CRV

Asset Category	Allowance for maintenance (% of CRV)	Allowance for Expansion (% of CRV)
Administrative Facilities	2.19%	0.0708%
Contaminated Sites	0.00%	
Corporate Vehicles and Equipment	1.36%	0.4897%
Culture and Recreation	3.26%	0.8996%
Emergency Services	5.31%	0.9426%

Asset Category	Allowance for maintenance (5 of CRV)	Allowance for Expansion (% of CRV)
Information Technology	7.53%	0.4897%
Parking	0.02%	0.4897%
Solid Waste	2.25%	0.4897%
Stormwater	0.09%	0.0177%
Transit	1.27%	0.2753%
Transportation	0.92%	0.1561%
Wastewater	1.16%	0.7391%
Water	0.83%	0.8160%

6. Backlog Requirements

Historically not all required infrastructure projects have been funded on time, meaning for some assets replacement or renewal work was not done in the years it should have been. This is defined as the “backlog” work, also commonly known as “deferred” work. Within the AMP analysis the backlog was calculated by reviewing the year when an asset should have been replaced, but wasn’t. If that replacement year was determined to have been required in 2020 or earlier (see Table 7) the asset was assigned a condition rating of “past due” and the replacement cost for that asset (i.e. the required funding) was added to the backlog sum.

Looking forward the 2020 backlog value - the cost to replace assets that have already surpassed their normal useful lifecycle- was distributed over a period of the next ten future years in order to distribute a significant one-time cost requirements that would address the backlog immediately.

7. 25-Year Forecast

The 2017 AMP forecast needs over the next 100-years as part of the analysis that was done. The reason for this was that many asset types have an expected normal lifecycle of 50-60 years or more, so a 100-year review would include at least one replacement cycle for every asset in the inventory.

While the reasoning behind the 2017AMP 100-year forecast is sound, in this updated AMP the forecast period has been reduced to 25 years. This time period coincides with the same planning period as the 2021-2045 Capital Plan.

It also reduces risks associated with long-term asset needs assessment: making predictions of asset needs and related costs is less accurate the longer the forecast period is. A 25-year forecast provides data that can be validated with a good level of confidence.

Current Year Valuation

Unless otherwise stated all financial figures in this AMP are described in current year (i.e. 2020), Present Value dollar values. This includes the values associated with the asset replacement costs, and the forecast replacement, renewal, maintenance and growth costs.

With regards to current replacement values (CRV), if a recently prepared estimate was not provided the value available was inflated to 2020\$ values using information published by StatsCan and based on the historical rates for the Consumer Price Index (CPI).¹⁶

¹⁶ The following StatsCan table was used for this reference: "Table: 18-10-0004-02, Consumer Price Index by geography, all items, monthly, percentage change, not seasonally adjusted, Canada, Provinces, Whitehorse, Yellowknife and Iqaluit". Results for Ontario selected.
<https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000402>

Contributors

Preparing an AMP is not a project that is completed by one person. Several people and groups within the City of Guelph have provided input and feedback through the process. Table 9 summarizes the roles and responsibilities of many of the stakeholders who were involved.

Table 8: Stakeholder Teams Involved in Asset Management Plan

Stakeholder Team	Roles and Responsibilities	
Corporate Asset Management (CAM)	Coordinate and manage the work plan.	Monica Silva
		Kevin Nelson
	Collate asset data (including GIS)	Tracey Lesage
	Compile and reconcile asset inventory	Charles Knight
	Develop tools and conduct analysis	Spencer Stroszka-Li
	Research levels of service and current asset management strategies	
	Arrange meetings with asset management working groups	
	Develop draft and final plan	
	Address comments with other City Staff	
	Present and publish the final plan	
Finance	Collaborative effort reviewing and analysing the 2021-2045 Capital Plan	Greg Clark
		Patricia Zukowski
	Analysing the Sustainability Target	Tara Baker

Stakeholder Team	Roles and Responsibilities
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Asset Management Steering Committee	<p>Provide direction to the overall asset management work plan.</p> <p>Support the development of the asset management plan through ensuring staff availability where required.</p> <p>Review and provide comment on the draft asset management plan.</p> <p>Approve the final asset management plan.</p>
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Executive Team	Approve the final asset management plan for publication.
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Council	Endorse and approve the final asset management plan.
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Solid Waste	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information.	David Gordon
	Attend update meetings.	Ryan Gilbert
	Review the draft asset management plan.	

Roads, Bridges, Traffic	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information.	Terry Dooling
	Attend update meetings.	Yanick Beaudin
	Review the draft asset management plan.	Bryan Ho-Yan
		Tracey Lesage
		Steve Anderson
		Paul Hutchinson

Stakeholder Team	Roles and Responsibilities	
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Stormwater	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information. Attend update meetings. Review the draft asset management plan.	Terry Dooling Yanick Beaudin Arun Hindupur Mary Angelo
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Fleet and Equipment	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information. Attend update meetings. Review the draft asset management plan.	Chris Hill
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Parking	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information. Attend update meetings. Review the draft asset management plan.	Jamie Zettle
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Police Department	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information. Attend update meetings. Review the draft asset management plan.	Scott Grover Scott Green
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Stakeholder Team	Roles and Responsibilities	
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Information Technology	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information.	Colin McReynolds
	Attend update meetings.	Adam Fischer
	Review the draft asset management plan.	David Boyle Manjusha Pradham
Water	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information.	Wayne Galliher
	Attend update meetings.	Tara Roumelloitis
	Review the draft asset management plan.	Chris Garcia Amanda Pepping Annette Indoe
Wastewater	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information.	Jeffery Beatty
	Attend update meetings.	Tim Robertson
	Review the draft asset management plan.	Annette Indoe
Administration Facilities	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information.	Jean Starchuk
	Attend update meetings.	
	Review the draft asset management plan.	

Stakeholder Team	Roles and Responsibilities	
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Parks and Recreation	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information.	Tiffany Hanna
	Attend update meetings.	Heather Flaherty
	Review the draft asset management plan.	

Fire Department	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information.	Dave Elloway
	Attend update meetings.	
	Review the draft asset management plan.	

Emergency Medical Services	Supply and collate service area specific inventory data, levels of service, documents and other pertinent information.	Andrea Harvie
	Attend update meetings.	
	Review the draft asset management plan.	

Other Contributors	Review the draft asset management plan.	Jennifer Charles, Associate Solicitor
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City of Guelph Infrastructure Assets

City of Guelph Infrastructure Assets

Quick Facts

The City of Guelph has a total infrastructure asset base with a 2020 calculated replacement value (CRV) of approximately \$4.4Billion. Based on a review of the available inventory and asset condition information approximately \$535M worth of assets remain in service but have aged past a normal expected lifecycle. These assets make up what is known as 'the backlog'. Likewise approximately \$1.41Billion worth of assets have been assessed in "poor", "very poor" or "past due" condition.

Figure 9 and Table 10 present the categorization and valuation of the assets in the City inventory.

Figure 9: City of Guelph Asset Base by CRV

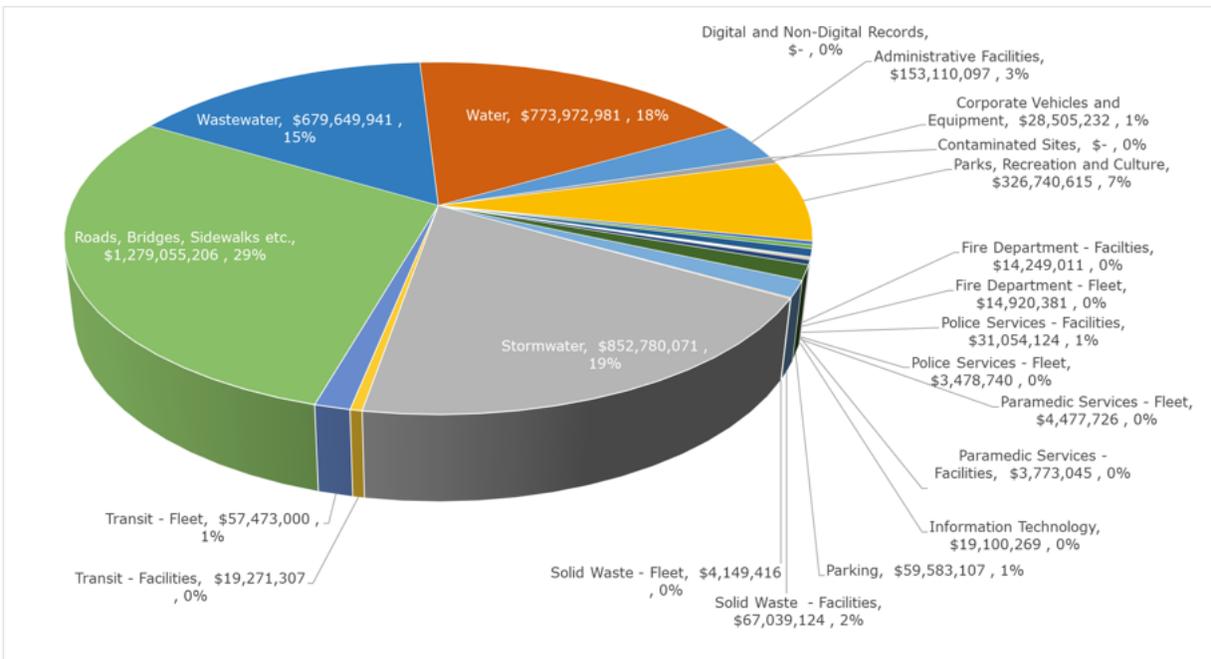


Table 9 - City of Guelph Asset Base

Asset Category	Source	2020 Replacement Cost	Backlog		Asset values in Past-Due, Very Poor or Poor condition
Administrative Facilities	Tax	\$153,110,097	\$-	0.00%	\$3,247,527
Contaminated Sites	Tax	\$-	\$-		\$-
Corporate Vehicles and Equipment	Tax	\$28,505,232	\$5,955,266	20.89%	\$12,546,129
Parks, Recreation and Culture	Tax	\$326,740,615	\$13,665,667	4.18%	\$37,005,692
Fire Department - Facilities	Tax	\$14,249,011	\$-	0.00%	\$245,304
Fire Department - Fleet	Tax	\$14,920,381	\$6,194,000		\$8,033,441
Police Services - Facilities	Tax	\$31,054,124	\$-	0.00%	\$89,807
Police Services - Fleet	Tax	\$3,478,740	\$2,780,706		\$3,023,725
Paramedic Services - Facilities	Tax	\$3,773,045	\$53,776	1.43%	\$174,381
Paramedic Services - Fleet	Tax	\$4,477,726	\$3,686,825		\$3,931,826
Information Technology	Tax	\$19,100,269	\$6,530,447	34.19%	\$10,158,607

Asset Category	Source	2020 Replacement Cost	Backlog		Asset values in Past-Due, Very Poor or Poor condition
Parking	Rate	\$59,583,107	\$8,340,670	14.00%	\$19,856,685
Solid Waste- Facilities	Tax	\$67,039,124	\$8,068,608	12.04%	\$27,129,087
Solid Waste - Fleet	Tax	\$4,149,416	\$815,142		\$4,149,416
Stormwater	Rate	\$852,780,071	\$33,681,938	3.95%	\$391,879,583
Transit - Facilities	Tax	\$19,271,307	\$3,178	0.02%	\$2,011,379
Transit – Fleet	Tax	\$57,473,000	\$8,181,000	14.23%	\$25,179,000
Roads, Bridges, Sidewalks etc.	Tax	\$1,279,055,206	\$35,208,181	2.75%	\$150,030,979
Wastewater	Rate	\$679,649,941	\$28,748,172	4.23%	\$215,632,192
Water	Rate	\$773,972,981	\$126,994,386	16.41%	\$496,214,394
Digital and Non-Digital Records	Tax	\$-			\$-
Overall Portfolio		4,392,383,397	\$288,907,961	6.58%	

State of the Assets

The assets in the inventory serve various functions, and are of various ages and materials, but in all cases they are physical items that despite best efforts at maintaining them will eventually degrade. Most of the assets will degrade normally –meaning they will function well through their entire expected normal lifecycle but as they age their material will degrade, or perhaps they will no longer be able to fulfill their intended design level capacity. Other assets will degrade as a result of other reasons such as poor quality materials, excessive use or use for something beyond the original intended purpose, or as the result of something unexpected.

These are all normal challenges faced by asset managers, and the City of Guelph, and this asset management plan, work daily to ensure the assets remain functional and safe for the City to continue to operate as the residents and public expect it to.

Table 11 summarizes the replacement costs of the assets in each condition rating, and according to whether the management and operation of the assets are funded by City taxes or user fees.

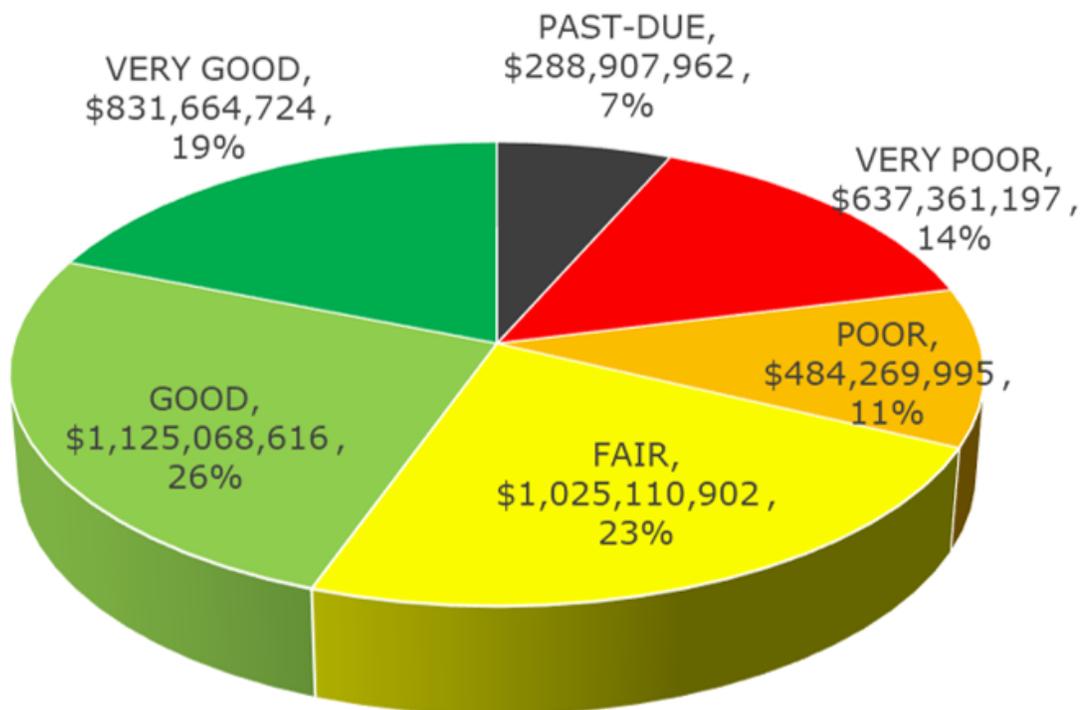
Table 10: Summary of Asset Conditions

	TAX Portfolio	RATE Portfolio	TOTAL	
PAST-DUE	\$91,142,797	\$197,765,165	\$288,907,962	6.58%
VERY POOR	\$54,966,605	\$582,394,592	\$637,361,197	14.51%
POOR	\$140,846,899	\$343,423,097	\$484,269,995	11.03%
FAIR	\$547,921,125	\$477,189,778	\$1,025,110,902	23.34%
GOOD	\$714,774,324	\$410,294,292	\$1,125,068,616	25.61%
VERY GOOD	\$476,745,547	\$354,919,177	\$831,664,724	18.93%
Asset values in Past-Due, Very Poor or Poor condition	\$286,956,300	\$1,123,582,854	\$1,410,539,154	32.11%

The chart in Figure 10 presents the breakdown of the condition of the City asset inventory according to the replacement value of the assets. The condition of the

assets is fairly evenly split among the different condition levels. Slightly more than 44% of the assets are rated in “good” or “very good” condition while about 32% are rated in less than “fair”. This is a good distribution – the lack of a large percentage of assets rated in “very poor” or “poor” condition indicates that regular activities have been occurring to keep the asset base in an overall beneficial and functional condition.

Figure 10: Overall Condition of the Asset Base by CRV



The main asset categories¹⁷ – roads, bridges and structures, potable water treatment, wastewater and stormwater - are mostly in “fair” or better condition. Refer to Figure 11 and Figure 12 which provide a visual representation of the relative value of each asset category as well as the value of the assets by condition in each category.

Details of the specific asset categories including their status-quo condition and future plans to continue to ensure the assets remain in good functional condition are outlined in the following sections of this AMP.

¹⁷ Defined in Ontario Regulation O.Reg 588/17 which mandates what municipalities are required to do with regards to asset management

Important to note however, an asset considered in less than “fair” condition does not imply it is no longer functioning, only that increased attention to the asset is required in order to ensure it remains functional. Additionally, when evaluating an asset by age, an asset that may be considered “past due” because of its age may in fact be in good functional condition. This occurred many times through the analysis for the AMP. When an asset had a condition rating based on an actual assessment, the age based rating was ignored.

Figure 11: Condition of City Assets by Category: Core Asset Types and Administration Facilities: Total CRV

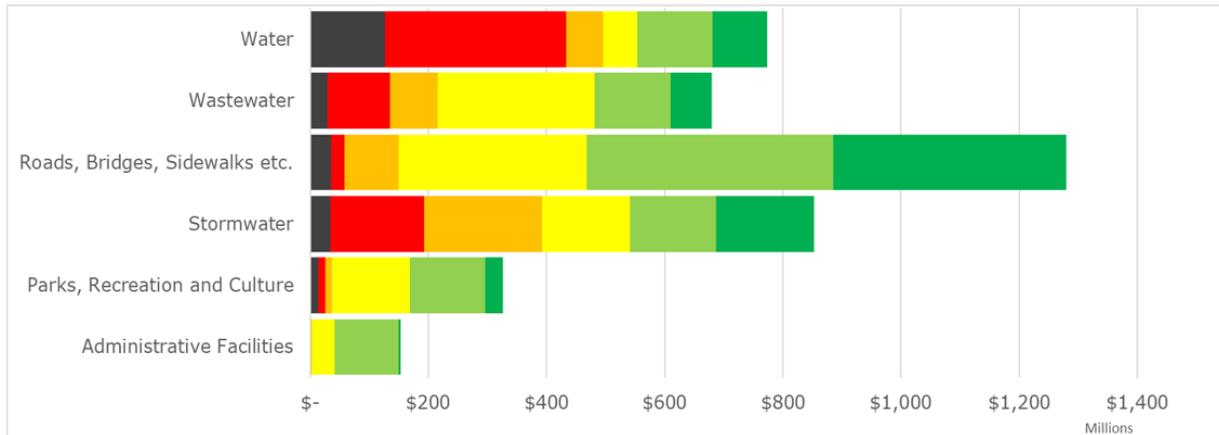
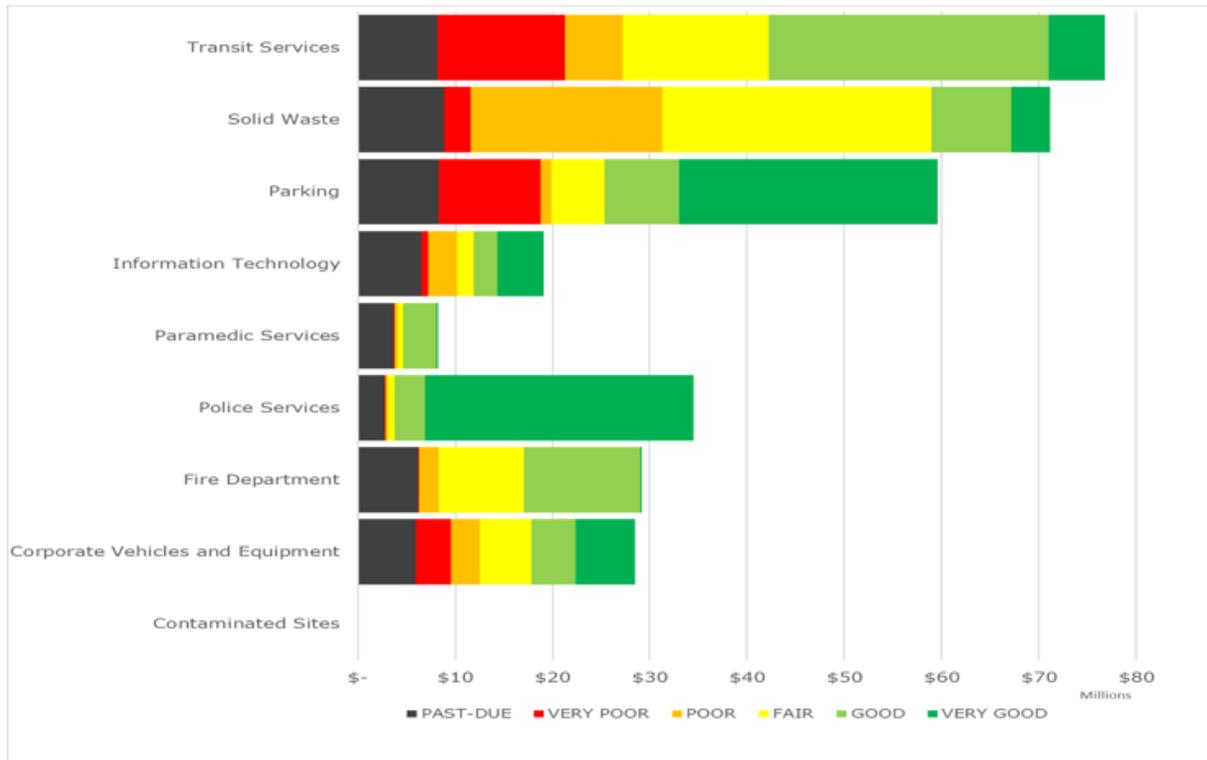


Figure 12: Condition of City Assets by Category: Non-core Asset Types



Comparison to 2017 AMP

In 2020 the asset inventory was evaluated to have a value of about \$4.4B, an increase of 8.5% from 2017. Refer to Table 12 for more details. The reasons for the increase are primarily due to inflation and expansion of the City asset base. With the growing maturity of the City asset base the level of detail and completeness of the inventory and data about specific assets is also improved and this refined data has also partly contributed to the increased asset value.

At the same time the infrastructure backlog has decreased to a value of \$288.9M, a reduction of 44%. This is partly due to an improved understanding of the asset needs that has been gained since 2017 through the completion of quantitative condition assessment studies, and partly due to a maturing of the data in the asset inventory compared to 2017. Refer to Table 13.

Table 11: 2017 vs. 2020 Asset Inventory

Funding Portfolio	2017 Replacement Cost	2020 Replacement Cost	Change
TAX Portfolio	\$2,273,572,746	\$2,026,397,294	-10.87%
RATE Portfolio	\$1,774,278,964	\$2,365,986,100	33.35%
TOTAL	\$4,047,851,710	\$4,392,383,395	8.51%

Table 12: 2017 vs. 2020 Infrastructure Backlog

Funding Portfolio	2017 Backlog	% of Portfolio	2020 Backlog	% of Portfolio	Change
TAX Portfolio	\$219,675,420	9.66%	\$91,142,796	4.50%	-58.5%
RATE Portfolio	\$281,482,139	15.86%	197,765,165	8.36%	-29.7%
TOTAL	\$501,157,559	12.38%	288,907,961	6.58%	-42.3%

The data used in the 2020 AMP is more mature and more refined compared to the data in the 2017 AMP, allowing an improved approach to the analysis, which in turn has provided improved confidence in the final results. Table 13 provides a comparison of the data between 2017 and 2020. Key points that stand-out include:

- There are 73,367 records in 2020 compared to 87,630 in 2017, but in most categories there are more records, implying more detail available for analysis
- For the two categories with less records (Stormwater and Water) in 2020 the data used was sourced from the City GIS database and is considered more refined and complete compared to 2017, regardless of the number of records
- In 2017 there were 1,361 records used in the analysis with no recorded replacement value. In 2020 only 249 records had no replacement value (82% reduction) and most of these are in the Wastewater category and were minor elements within the WWTP. The other large grouping of these records was with the Paramedic facilities, but at this time there is no clear identifier for why there are no replacement costs with these assets

In summary, the data in 2020 is more mature and more detailed. In future years this will only improve as asset management practices at the City of Guelph continue to expand.

Table 13: Comparison of 2017 and 2020 Dataset

Analysis of Data		AMP 2017		AMP 2020	
Asset Category	Total # Records	Records with CRV = \$0		Total # Records	Records with CRV = \$0
Administrative Facilities	84	24		1,142	
Corporate Vehicles and Equipment	960	10		901	2
Culture and Recreation	986	347		8,180	
Emergency Services	304	20	facilities	1,185	82
			fleet / equipment	953	
Information Technology	6,786			8,112	
Transportation	8,531	188		9,091	0
Transit	813	216		995	

Analysis of Data		AMP 2017	AMP 2020	
Solid Waste	109	20	1,632	
Stormwater	38,757	531	10,693	0
Wastewater	16,416	5	21,994	165
Water	13,884	0	8,489	0
Parking	18	1	1,413	
		1.55%		0.34%

FUTURE YEAR FORECAST REQUIREMENTS

To determine how much investment is required to maintain the current asset base, and remove any backlog, the status-quo condition of the assets was used to determine the forecast work requirements in future years (for 25-years). Using a combination of age-based information and quantitative assessment information (depending on asset type), the year when an asset should be replaced or rehabilitated was recommended was identified, and the 2020 replacement value used to identify the cost. By summing all the costs in a given year the forecast requirements for the entire City asset portfolio were able to be extrapolated.

When the determined replacement date was 2020 or earlier, the value was considered "backlog" (often known as "deferred maintenance"). The total backlog values were distributed over 10-years so as to spread out the one time impact of what for some categories were very large spending requirements.

Added to the forecast replacement value was an allowance for future growth, and a second allowance for regular maintenance. These two values were calculated by reviewing the 2017 AMP where an evaluation of budgets from 2011-2016 was done to determine the percent of the replacement value of an asset class for which the budget included costs defined as "growth" or "maintenance". Review the section titled "Budget & Financial Needs Analysis" for more details on these allowances.

The 2021-2045 Capital Plan prepared in July 2020 was used to identify the approved Program of Work funding values for each asset category. The Capital Plan information, presented as a list of approved projects, was analysed to categorize the information using categories that matched the AMP data. From this work, an annual approved program of work funding amount for each asset category was calculated.

The results of this financial review can be seen in Table 12 and Figure 13. A summary of the results of this analysis indicate that:

Over a period of 25-years (2021-2045):

- The total approved capital funding is approximately \$5,654M
 - o average annual funding \$226M
- Including replacement, backlog, growth and maintenance, the total forecast required to fund all asset needs is approximately \$6,401M
 - o Average annual requirement approximately \$256M
- The resulting average annual funding gap is (\$29.9M) per year

Over a period of 10-years (2021-2030):

- The total approved capital funding is approximately \$1,776M
 - o average annual funded program value of \$177M
- The total forecast required to fund all asset needs is approximately \$2.472M
 - o Average annual requirement approximately \$247M
- The resulting average annual funding gap is \$(69.6M) per year

Trends in this data indicate that:

- While in some years there is a predicted surplus in funding compared to forecast requirements, on average, the funding requirement for City infrastructure assets are expected to be greater than the currently approved program funding
- This will result in a continued growth of the backlog requirements as predicted required projects will not be able to be completed

Table 14: Summary of 25-Year Financial Review

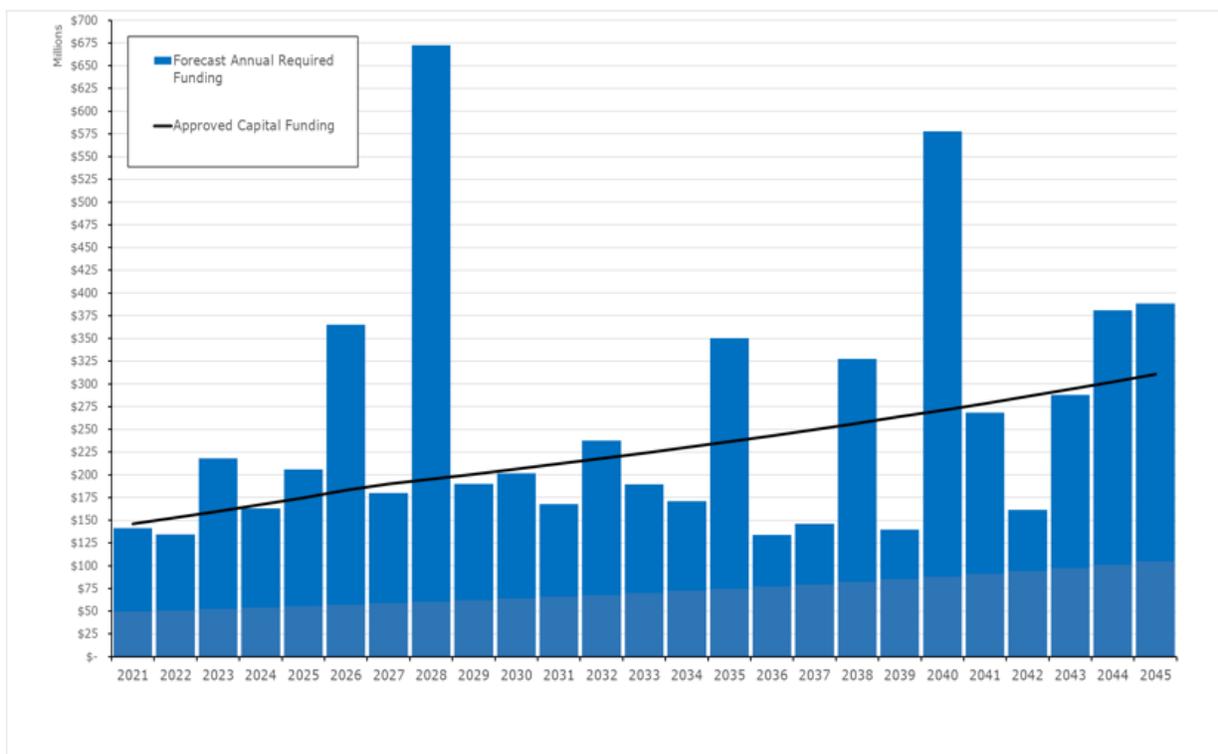
	25-YEAR ANALYSIS		10-YEAR ANALYSIS	
	Total	Average	Total	Average
Total Approved Capital Funding	\$5,654,537,077	\$226,181,483	\$1,776,001,755	\$177,600,175
Required For Asset Replacement / Renewal / Rehabilitation	\$3,658,123,946	\$146,324,958	\$1,409,510,254	\$56,380,410
Required To Reduce Backlog	\$288,907,961	\$11,556,318	\$288,907,961	\$28,890,796
Required For Maintenance	\$1,816,765,319	\$72,670,613	\$564,180,011	\$56,418,001
Required For Forecast Growth	\$637,416,119	\$25,496,645	\$209,648,483	\$20,964,848
Total Required	\$6,401,213,345	\$256,048,534	\$2,472,246,709	\$247,224,670.93
Funding Gap	\$(746,676,267)	\$(29,867,051)	\$(696,244,955)	\$(69,624,495)

The 25-year analysis shows that – for the City asset inventory as a whole - in most years the approved program of work funding is less than the identified requirements. Specifics for each asset category are discussed in following sections.

The summary information above is compiled by reviewing the City asset inventory on a category by category basis. In the following sections of this AMP details about each asset category including the current inventory, status-quo condition of the assets and identified future funding requirements will be detailed.

Within the forecast requirements section for each category, the approved “Program of Work” funding has been used in order to identify how much the annual projects that address the infrastructure needs are funded. These program funding levels are then compared against the identified requirements and a resulting forecast of the needs for each asset category are clear.

Figure 13: 25-Year Financial Review



Sustainable Funding Targets

Since 2017, the City has been using Asset Management Data to inform sustainable capital renewal funding levels. The sustainable targets focus on supporting the renewal and replacement of assets, they do not include maintenance or growth funding requirements. Maintenance and growth are assumed to be at stable levels

currently, however future work will focus on better understanding optimal investment relative to current investment.

The target sustainable funding, which includes annual operating transfers to capital renewal reserve funds for tax and non-tax services as well as reliable annual funding from other levels of government, specifically Federal and Provincial Gas Tax Funding programs, has increased by 8%. This is due to a better understanding of inventories and expected useful life of assets.

For tax funded areas the progress made since 2017 through annual increases in capital funding remains in line with the new estimates, based on this update continuation on the plan laid out in 2017 will see sustainable tax funding levels in approximately 2037; this remains in line with prior estimates.

Through the current update the non-tax funded services; Parking, Stormwater, Wastewater and Water saw significant changes in their respective annual sustainable funding levels. Parking and Wastewater estimates have decreased 58% and 30% respectively, while Stormwater and Water have increased 76% and 69% respectively. In total the non-tax target has increased, reflecting that future infrastructure renewal budgets will focus funding increases on the services which have the highest need as presented in Table 13.

These changes will require city staff to bring forward updated funding models for non-tax services in 2021.

Table 15: Sustainability Funding Comparison 2017 to 2020

Funding	2017 Estimate	2020 Estimate	% Change
Tax	62,871,000	63,200,50	0.5%
Parking	2,500,000	1,058,900	-58%
Stormwater ¹⁸	11,100,000	19,576,800	+76%
Wastewater	24,600,000	17,305,200	-30%
Water	13,400,000	22,614,900	+69%
Total	114,471,000	123,756,400	8%

¹⁸ Stormwater target was updated in the 2019 budget due to revised inventories since 2017

Infrastructure Funding Progress

The infrastructure gap is the difference between the funding needed in a given year to build, maintain, repair and replace infrastructure and the amount funding available. Once sustainable funding is reached and asset data is fully matured, the value of the backlog will remain constant. The sustainable funding level estimate is based on the 25 year average replacement cost of all assets currently in place. The replacement costs and timelines were established by the initial Corporate Asset Management Plan using available data, industry best practices and some investigation of current state.

The current tax supported infrastructure renewal strategy was introduced in 2017 to move the City towards sustainable funding over a planned 10 year implementation phase, through the first four years of the strategy the increase in annual tax funding directed to infrastructure renewal is \$7,583,189 with a cumulative amount of \$19,099,115.

Through the maturity of the City's asset data, the estimated backlog has decreased; however, this does not mean the City is funding capital at a sustainable level. The asset management program indicates that the City's Infrastructure Renewal Funding Strategy is successful and that this should continue to be a priority focus for financial investment.

Project Management Resourcing

The City has taken steps to increase funding towards sustainability to ensure infrastructure renewal projects are able to be funded over the 25 year horizon. However, as the Capital Budget/funding levels have been growing, the unspent capital budget figure has also been increasing. This trend, coupled with the Plan's identified need to increase Capital Budgets, will mean increasing the City's capacity to deliver projects from a staffing perspective. Without an increase in staffing resources, unspent capital will likely continue to grow or Capital Budgets will need to be reduced. Without, executing an increasingly larger capital plan, aged assets will begin to fail causing significant concern to service continuity and community safety. Staff are developing a strategy to address these resourcing concerns including the increasing number of temporary project managers within the City, which will be brought to Council during 2021.

**Transportation Assets:
Roads, Bridges, Sidewalks etc.**

Service Area: Transportation Roads, bridges and structures

Quick Facts:

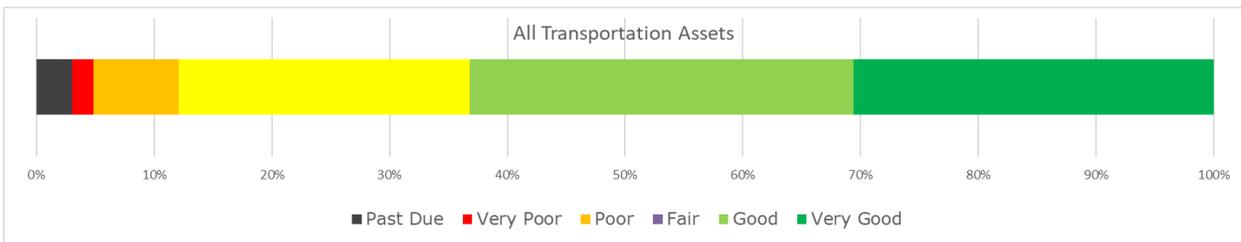
Table 16 - Quick facts about transportation assets

Subclass	Total # records	Total Length (km)	Total CRV	% of inventory
ROADS	3530	604	\$932,283,994	72.89%
Bridges and Structures	110	1	\$119,713,748	9.36%
Sidewalks	5072	707	\$184,263,265	14.41%
Streetlights	14,053	N/A	\$10,127,994	0.79%
Traffic Controls	377	N/A	\$32,666,204	2.55%
		Total CRV for Transportation Asset class	\$1,279,055,206	
		Identified 2020 Backlog	\$35,208,181	2.75%
		Data Quality:		
		70%		

Figure 14 - Overall condition of transportation assets by \$CRV



Figure 15 - Condition of transportation assets by CRV

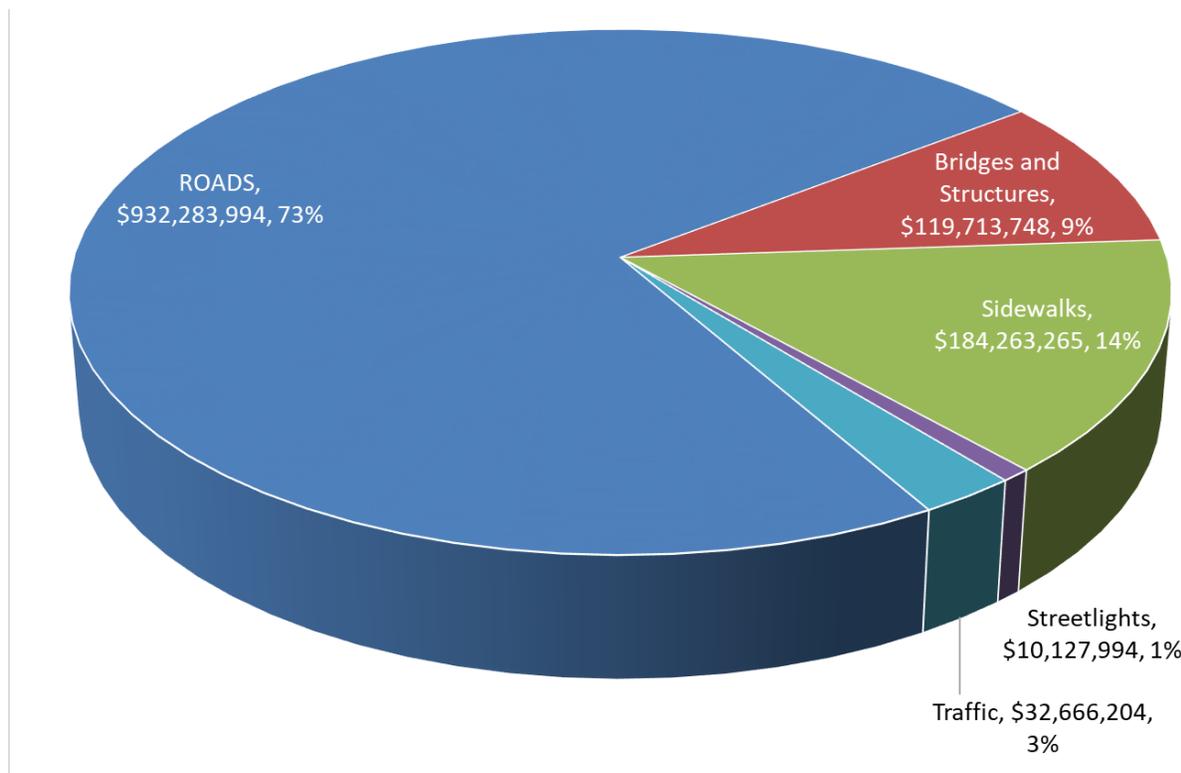


State of the assets: Transportation assets– Roads, bridges & structures et al

The Transportation Asset category contains the largest diversity of asset types within any of the categories defined by the City, and is also the largest category of assets by CRV. This is to be expected – the roads, bridges, sidewalks and related supporting asset types like street-lighting and traffic controls (including signage and paint marking) are critical to allowing city residents to navigate through the City, and to allow the transport of goods and Services through the City.

While in general the transportation assets are well maintained and effectively managed, there exist what can be considered normal concerns and issues that face the City with regards to ensuring the long-term functionality is maintained within a sustainable economic manner. Further details and specifics regarding the inventory are outlined in following sections.

Figure 16 - Transportation asset types by CRV



Asset condition by type

A breakdown of the overall asset inventory by condition and replacement value is shown in Figure 17: Condition of Road Assets by CRV (bridges not included).

Figure 17 - Condition of road assets by CRV (bridges not included)

CONDITION	CRV	% of total
Past Due	\$35,208,181	3.04%
Very Poor	\$21,355,114	1.84%
Poor	\$90,236,469	7.78%
Fair	\$305,298,910	26.33%
Good	\$324,757,427	28.01%
Very Good	\$382,485,356	32.99%
	\$1,159,341,457	100%

While the condition of a road asset is somewhat dependant on the age of the asset, age alone is not the only metric that provides an indication of the condition. Road condition can vary depending on traffic volumes, the use of the road by heavy vehicles or not, historical maintenance practices and other factors. That being said, the age distribution of the City roads can be seen in Figure 20. For the City of Guelph, a normal useful lifecycle of the road is established at 40 years. This assumes that regular maintenance to the roadway surface will be performed during this time, but not necessarily any reconstruction of the base layers, or changes to the road width. As the chart demonstrates the average age of the roads regardless of class is about 16.6 years old, or about 40% of an expected lifecycle. The 40 EUL does not expect that no maintenance or rehabilitation work would be required, it is simply an age at which most roadways will require extensive to full rehabilitation.

The City of Guelph completes cyclical pavement condition surveys with the most recent survey having been completed in 2019. The survey data is compiled according to best practices established by the Ontario Good Roads Association and other roadway engineering standards. Though many metrics are evaluated, for the purposes of the AMP the Overall Condition Index (OCI) determined in the study has been used. If a road segment was not included in the 2019 PCI survey and no other condition information was available a condition rating based on the age of the asset as a percentage of a normal expected lifecycle for that class of asset was used.

The majority of the road assets are considered in Fair condition or better. Only 13.54%

Figure 19 provides a graphic displaying the condition of the roads by sub-class. Overall the roads condition indicates that good maintenance practices are in place but normal annual maintenance and rehabilitation projects need to continue so that the road conditions do not worsen.

The traffic control asset types (controls and intersections) both have high percentages of the asset inventory in less than "fair" condition, including many assets considered "past due". Again, this is not necessarily indicative that these are no longer functional assets, but given that these asset types consist of many electrical components, they tend to have shorter expected useable lifecycles. In practice the lifecycles of the assets tend to be longer than their theoretical lifecycle, but good maintenance and capital planning would include the identification of the need to replace them prior to failure of the inventory is considered in Poor, Very Poor or Past Due condition, and most of these are Local class roads. The total value of assets in less than Fair condition is approximately \$147M.

Figure 18 - Condition of roads and sidewalk assets by type

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Arterial	\$0	\$1,544,180	\$9,713,701	\$51,537,785	\$80,645,506	\$83,976,289
	0.00%	0.68%	4.27%	22.66%	35.46%	35.46%
Collector	\$0	\$0	\$10,392,726	\$10,090,353	\$26,624,159	\$55,776,460
	0.00%	0.00%	10.10%	9.81%	25.88%	25.88%
Local	\$0	\$4,893,070	\$50,092,774	\$111,011,383	\$123,222,162	\$209,414,542
	0.00%	0.98%	10.05%	22.26%	24.71%	24.71%
Laneway	\$0	\$0	\$0	\$14,716,213	\$0	\$0
	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%
Road - unknown	\$27,845,518	\$11,984,917	\$9,647,602	\$10,765,603	\$12,992,000	\$7,082,186
	34.67%	14.92%	12.01%	13.40%	16.18%	16.18%
Bridge - arterial	\$0	\$0	\$84,562	\$0	\$414,239	\$2,404,172

	Past Due	Very Poor	Poor	Fair	Good	Very Good
	0.00%	0.00%	2.91%	0.00%	14.27%	14.27%
Bridge - collector	\$0	\$0	\$0	\$0	\$46,335	\$946,943
	0.00%	0.00%	0.00%	0.00%	4.66%	4.66%
Bridge - local	\$0	\$0	\$0	\$0	\$64,945	\$239,132
	0.00%	0.00%	0.00%	0.00%	21.36%	21.36%
Overpass - Arterial	\$0	\$0	\$0	\$137,902	\$1,016,044	\$1,142,186
	0.00%	0.00%	0.00%	6.01%	44.25%	44.25%
Overpass - Collector	\$0	\$0	\$0	\$0	\$1,121,933	\$373,556
	0.00%	0.00%	0.00%	0.00%	75.02%	75.02%
Underpass - local	\$0	\$0	\$0	\$0	\$0	\$322,916
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sidewalks	\$0	\$491,820	\$3,643,915	\$99,235,255	\$71,135,206	\$9,757,070
	0.00%	0.27%	1.98%	53.86%	38.61%	38.61%

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Streetlights	\$0	\$0	\$0	\$593,272	\$0	\$9,534,722
	0.00%	0.00%	0.00%	5.86%	0.00%	0.00%
Traffic - Controller	\$1,734,042	\$404,049	\$319,872	\$707,085	\$0	\$0
	54.79%	12.77%	10.11%	22.34%	0.00%	0.00%
Traffic - Intersection	\$5,628,621	\$2,037,078	\$6,341,318	\$6,504,060	\$7,474,899	\$1,515,182
	19.08%	6.91%	21.50%	22.05%	25.34%	25.34%
Totals	\$35,208,181	\$21,355,114	\$90,236,469	\$305,298,910	\$324,757,427	\$382,485,356
	3.04%	1.84%	7.78%	26.33%	28.01%	32.99%

Figure 19 - Condition of road and sidewalk asset types, by CRV

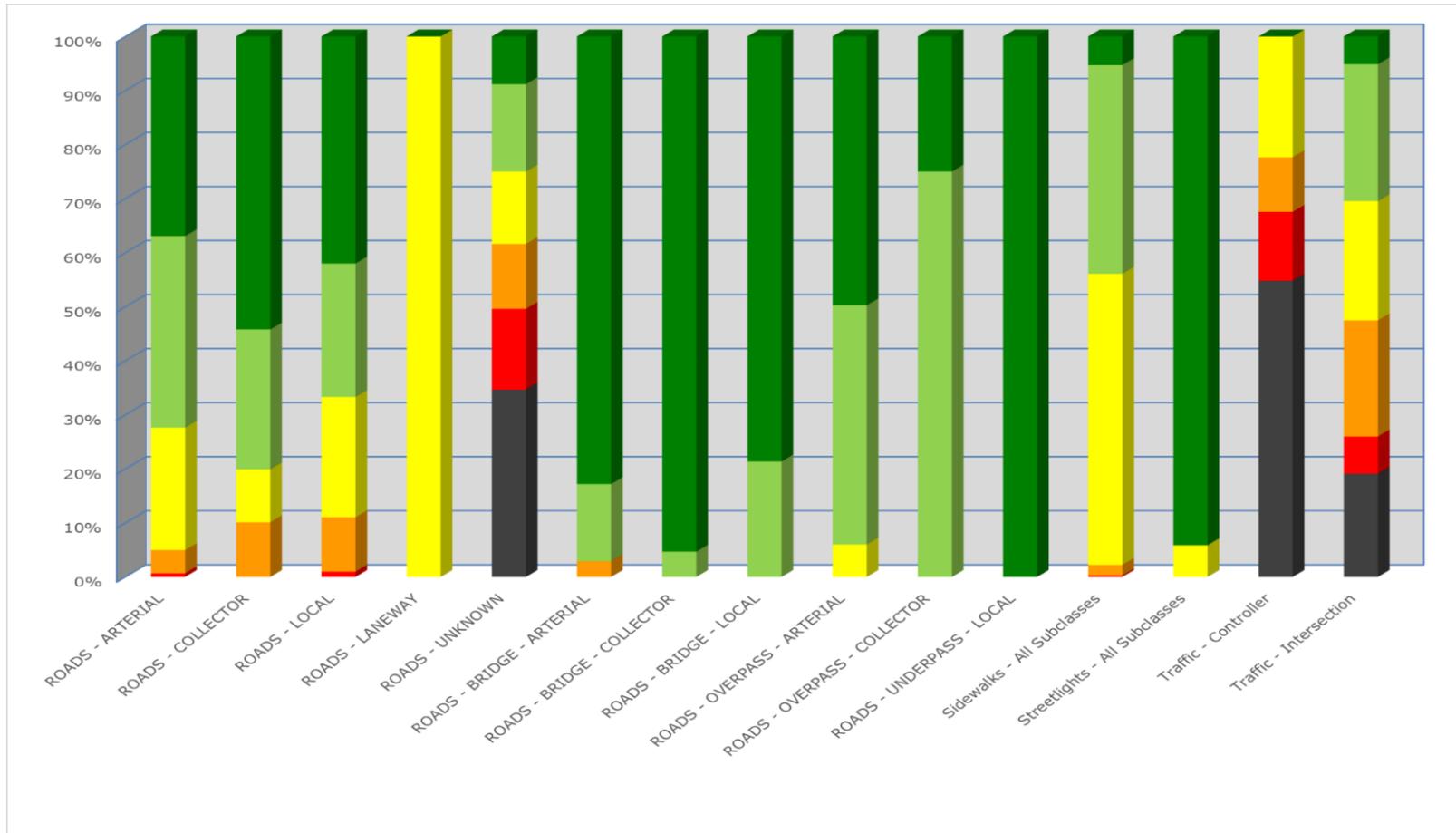
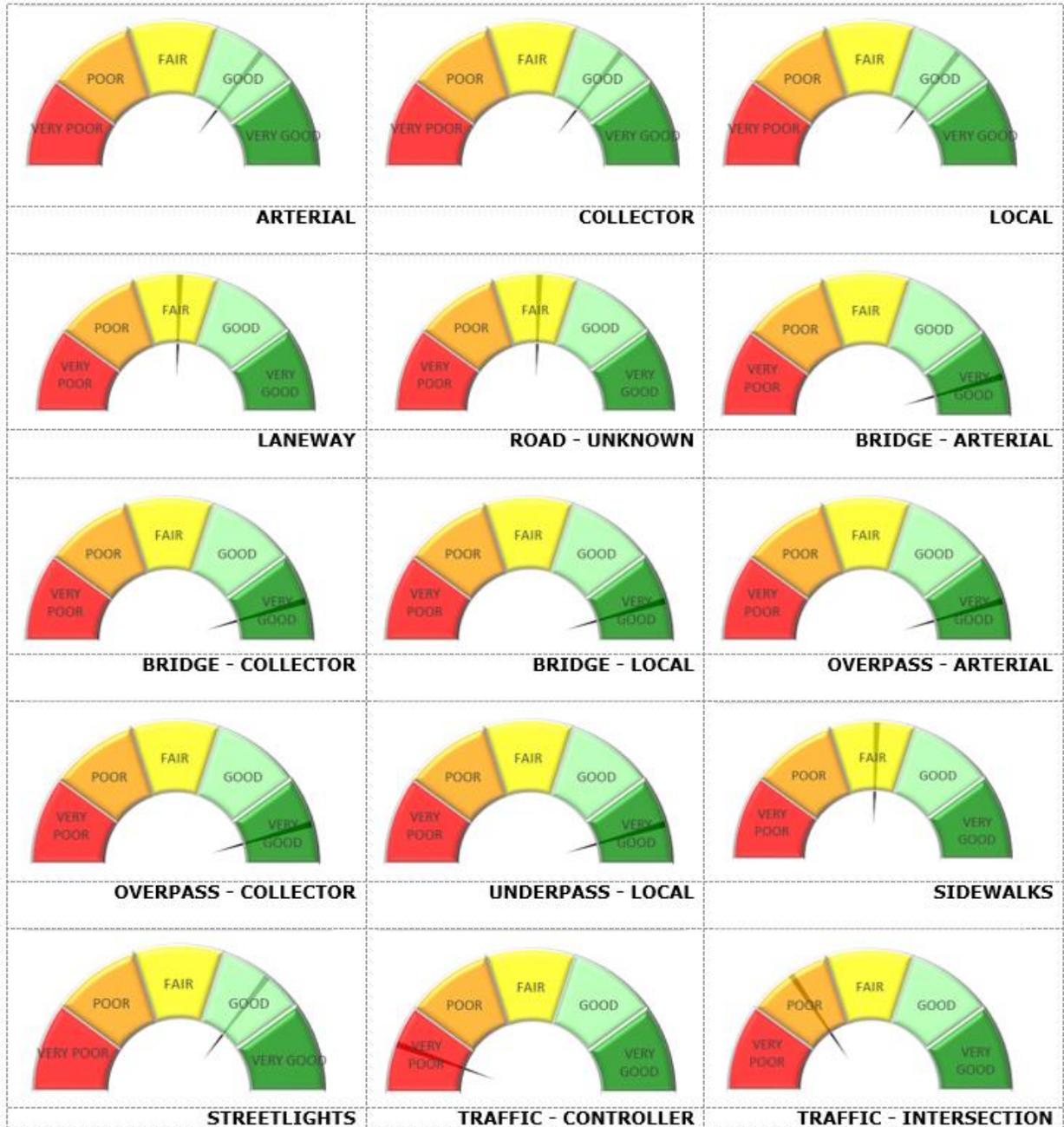


Figure 19 provides a visual image of the condition of the asset types in the transportation category based on CRV with the actual values listed in Figure 17 while in Figure 20, the average condition of each asset type is displayed.

Figure 20 - Average condition of transportation assets by type



Asset Ages

The average age of the asset in the Roads category is 54.49 years. However this value must be considered in the context of the different asset types in the category, compared to the typical expected useful lifecycle of each asset type.

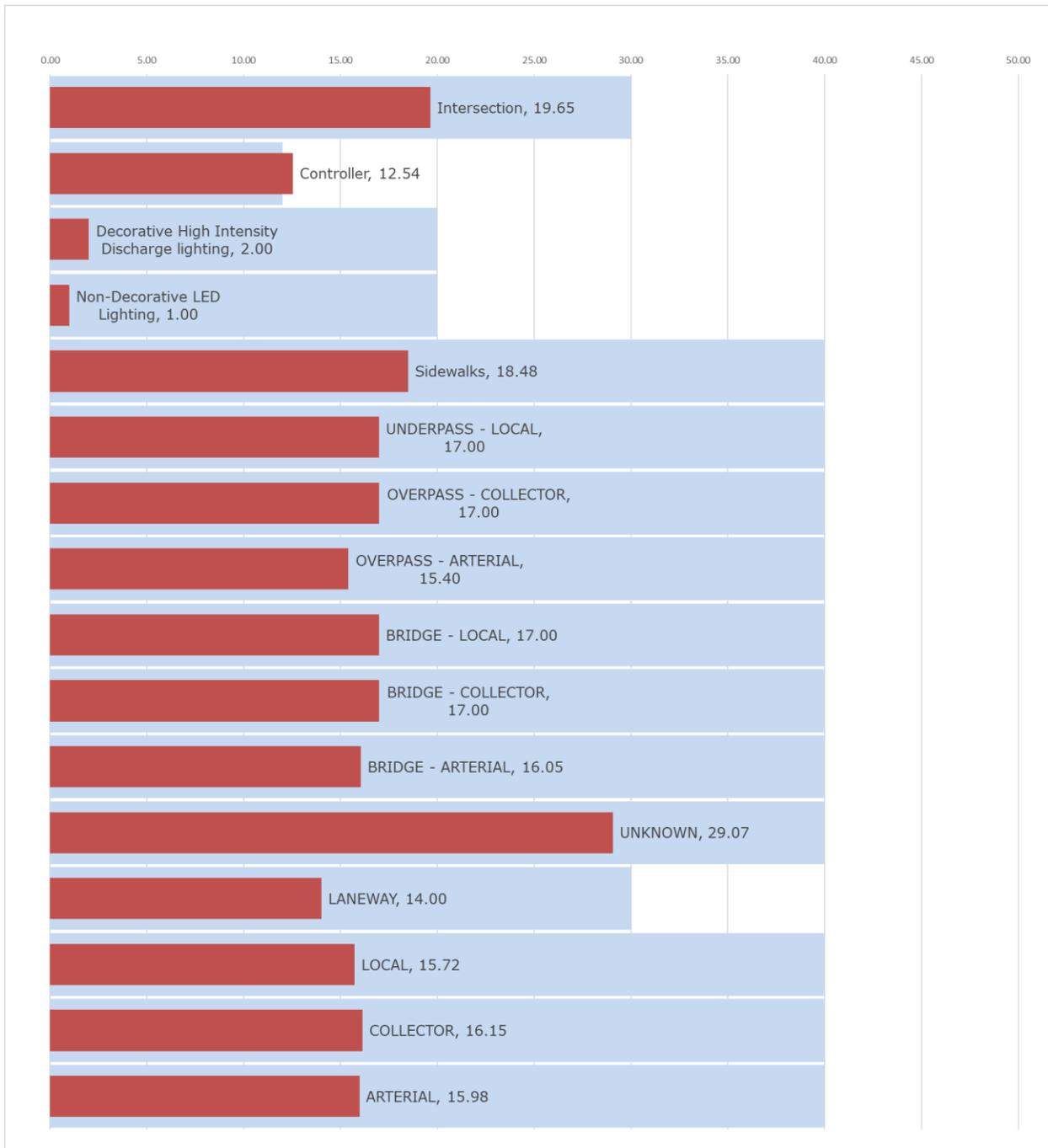
For most of the asset types the average ages are well below the expected useful lifecycle.

No other issues with respect to asset ages were identified.

Figure 21 - Asset types average age

Asset Type	Average Age	EUL (avg.)
ARTERIAL	15.98	40.00
COLLECTOR	16.15	40.00
LOCAL	15.72	40.00
LANEWAY	14.00	30.00
UNKNOWN	29.07	40.00
BRIDGE - ARTERIAL	16.05	40.00
BRIDGE - COLLECTOR	17.00	40.00
BRIDGE - LOCAL	17.00	40.00
OVERPASS - ARTERIAL	15.40	40.00
OVERPASS - COLLECTOR	17.00	40.00
UNDERPASS - LOCAL	17.00	40.00
Sidewalks	18.48	40.00
Non-Decorative LED Lighting	1.00	20.00
Decorative High Intensity Discharge lighting	2.00	20.00
Controller	12.54	12.00
Intersection	19.65	30.00
Average Age, all Assets	54.49	

Figure 22 - Average age of road assets by class



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific assets, nor specific projects or actions required to correct any deficiencies but does present broad, high-level needs.

City staff who have contributed information to the AMP have worked to identify specific asset needs and converted those needs to projects with identified costs for future work.

The future year forecast requirements were determined by identifying what the estimated replacement year for each asset is predicted to be following the criteria outlined in the Budget & Financial Needs Analysis section of this AMP beginning on page 31.

This includes the “past due” assets where the determined replacement year was 2020 or earlier – the replacement value for these assets has been added to the “backlog” sum. For the purposes of analysis the backlog value has been distributed over ten (10) years to be able to lessen the impact of trying to reduce the backlog at one time.

In 2020 a \$35.2M backlog in capital road replacement costs was identified, along with an annual average forecast need of \$17.7M. The 25-year forecast total is estimated to be \$442.8M. In 2040 the annual forecast replacement cost is \$283M. The reason for this spike, which in turn has greatly affected the annual average, is due to the age of the assets and their lifecycles. Other spikes are forecast in 2024, 2032 and 035. According to the graphic in Figure 20 the average age of nearly all the asset types is very close together – about 16 or 17 years. This is due to the closeness in age of many of the assets and the related replacement years coinciding. Managing a replacement plan with such spikes is not realistic in practice, and careful planning will allow the single year forecast spike to be avoided and spread over multiple years.

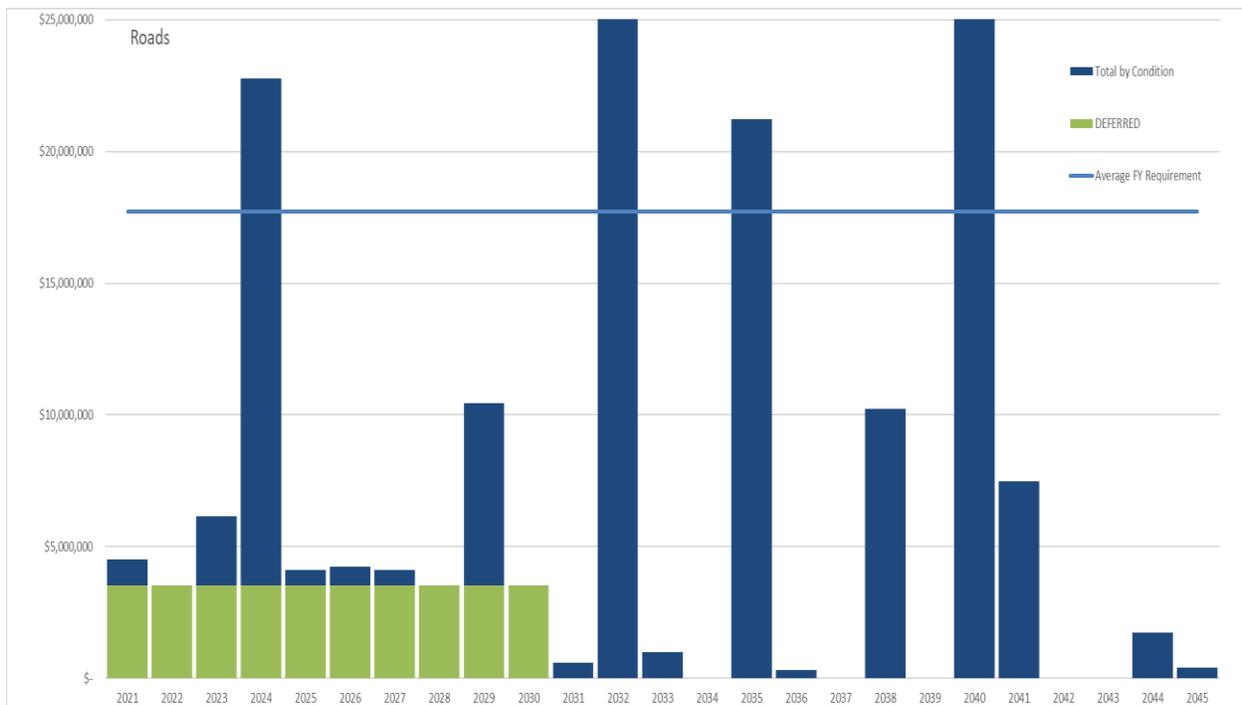
City staff have developed a series of projects that are scheduled to be implemented that will address many of the identified backlog items the AMP has flagged.

Figure 23 - 25 year forecast replacement costs by RSL

2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	in Year
\$35,208,181	\$442,762,882	\$17,710,515	\$282,778,281	2040

Note that these values represent only the estimated asset replacement costs, and do not represent any other costs that may be required in future years such as normal maintenance budgets, non-infrastructure related studies, design and consulting fees or other.

Figure 24 - 25-Year forecast replacement based on asset condition



Levels of service: Roads etc.

Physical assets exist to provide a service to the residents of Guelph. To be able to understand if the assets are delivering that service in accordance with expectations a series of metrics have been developed to help City staff with this analysis. Furthermore, the Government of Ontario has defined a set of metrics, which the City is required to measure against and report on. Understanding these metrics, and evaluating the performance of the assets over time will help the City to continuously meet the public’s expected LOS.

O.Reg requirements

As previously discussed O/Reg. 588/17 defines assets in the “roads” category as one of the five core asset types with mandated Levels of Service (LoS) metrics which must be reported on by July 1, 2021. These are listed in Table 18.

While City staff have begun efforts to measure the City asset performance against the indicated metrics in the O.Reg, that work remains ongoing, and is not ready to be included in the AMP at this time. Available information is included in the table where possible.

Service attribute	Community levels of service (qualitative descriptions)	Technical levels of service (technical metrics)	
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity.	Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality.	The roadway data in its current format is not able to be analyzed to answer this question. CAM staff will work with appropriate City staff to improve this in future versions of the AMP
Quality	Description or images that illustrate the different levels of road class pavement condition.	<ol style="list-style-type: none"> <li data-bbox="781 678 1084 936">1. For paved roads in the municipality, the average pavement condition index value. <li data-bbox="781 961 1084 1220">2. For unpaved roads in the municipality, the average surface condition (e.g. excellent, good, fair or poor). 	The pavement condition index is available for each roadway segment within the data tables that were used to develop this AMP. Refer to Error! Reference source not found. and Error! Reference source not found. for whole-category condition information.

City Defined Metrics

In addition to the O.Reg Level of Service Metrics, municipalities have been encouraged to develop their own set of metrics that can be used to measure and understand the performance of the assets. In early 2018 the City of Guelph began efforts to define a Levels of Service Framework. That work is ongoing, but as part of the analysis of this it was decided that the framework and available data are not mature enough to complete the LOS review. This will be done at a later date.

Summary and Conclusion

While no major issues affecting the maintenance or functionality of the road, sidewalk, street lighting or traffic control assets were identified during the AMP

analysis, several points do require attention to ensure that future asset management can continue effectively.

Of these, the most important would be the aging of the traffic control infrastructure. While there are no indications that the functionality of the system is affected on a large scale, based on the age of the assets comprising the system it is likely that future maintenance and rehabilitation needs will increase. Staff are aware of this situation and addressing the needs. Some of the approved funding for the 2021 program of work includes work on the traffic control systems.

General trends in the analysis of the road assets data show that the assets are aging per normal trends. The indicated condition ratings show that the majority of assets are in “fair” or better condition, implying maintenance and rehabilitation activities are well managed.

Recommendations

1. Improved coordination between the asset records and the actual projects will help better understand status quo needs, and plan for the future. As the asset management team becomes more engaged with the other City departments it is expected that this will occur with good effectiveness.
2. The forecast costs for maintenance should be better defined to ensure actual needs are represented in future years.

Bridges and Structures: Quick Facts

Figure 25 - Bridge and structure asset sub-types

Subclass	Total CRV	% of inventory	Total # records
Vehicle Bridge	\$50,904,824	42.52%	18
Culvert	\$34,960,648	29.20%	42
Pedestrian Bridge	\$4,878,600	4.08%	14
Dam	\$4,237,654	3.54%	2
Retaining Wall	\$22,533,740	18.82%	25
Unknown	\$2,198,283	1.84%	9

Subclass	Total CRV	% of inventory	Total # records
Total	\$119,713,748		
2020 Backlog	\$0		

Figure 26 - Overall condition of bridge and structure asset types

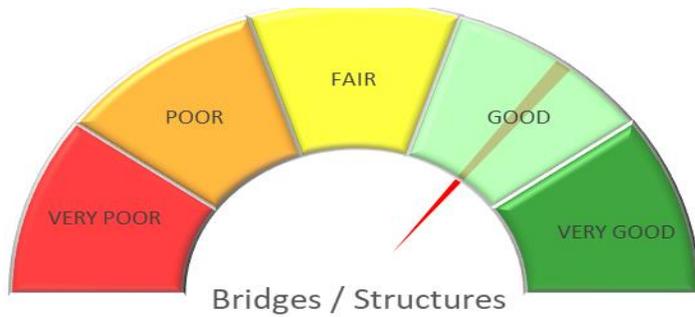
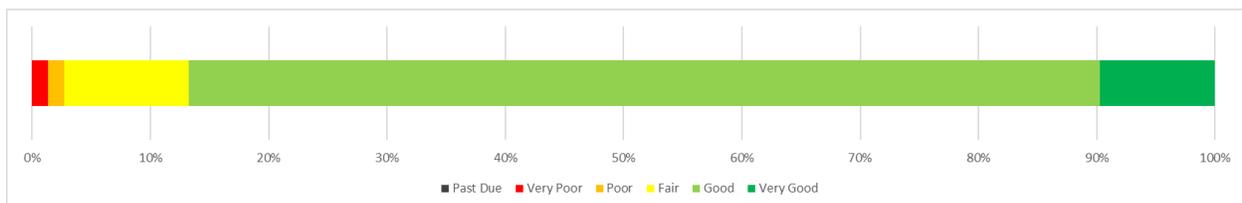


Figure 27 - Condition of bridge and asset types by CRV



State of the Assets: Bridges and Structures

Working as part of the road network vehicle bridges are essential in allowed traffic to cross bodies of water and other geographic features that do not allow construction of level roadways. This includes the network of pedestrian and multi-use pathways that the City of Guelph has constructed. Bridges are an asset type with long service lives, but consequences of failure can be drastic so proper management and maintenance of the structures is essential.

Another structure type with significant consequences in the event of failure are culverts – engineered structures that allow the flow of water in either natural or purpose-made facilities – to pass under a roadway or pathway without negatively affecting the performance of the road. In the Province of Ontario culverts larger than 3m width or diameter are considered equal to traditional bridges with regards to the requirements for their inspection and maintenance. The City of Guelph has further identified culverts smaller than the 3m limit that would cause significant consequences in the event of their failure and included them in the same category.

In summary, within the bridge and structure category the City has identified:

- 18 vehicle bridges

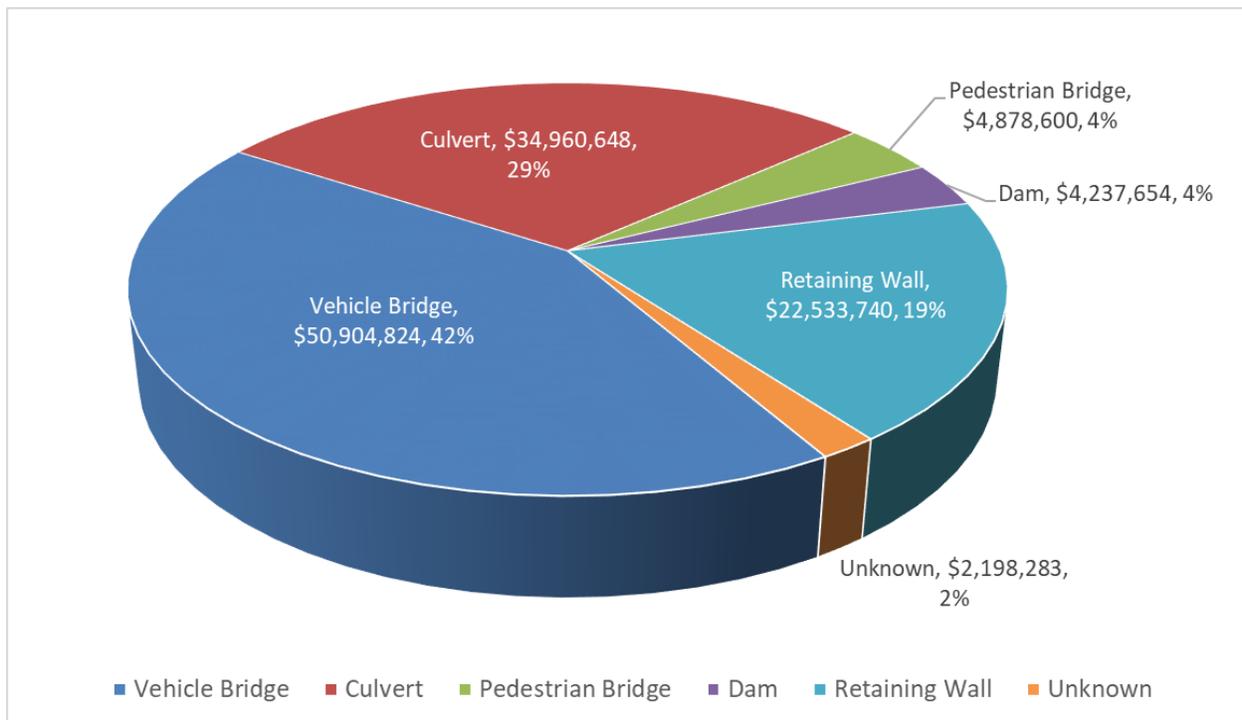
- 14 pedestrian bridges
- 42 culverts

Bridges and large culverts are required to be inspected every 2-years in accordance with the Ontario Structure Inspection Manual (OSIM) standard. The City engages 3rd party Consultants to complete these inspections, and the information from the last set of inspections was used in the analysis of the information in this AMP.

These Consultant reports also include a calculated replacement cost for each bridge.

Other structures included in this category include retaining walls and dams. While the “2020 dataset” did include information about retaining walls, the level of detail was not equal to that of the bridges. Information that was available was used in the best manner possible, however, there is a known margin of error in the data. CAM staff are aware of this inconsistency, and have already begun work to improve the data.

Figure 28 - Classification of bridge and structure assets by CRV



Asset Condition by Type

Overall, the bridge and structures inventory is considered in “Good” condition with an average condition score of 3.81 / 5.

A breakdown of the overall asset inventory by condition and replacement value is shown in the table below.

Table 17 - Condition of bridge and structure assets

Condition	Replacement Value	Percent
Past Due	\$0	0.00%
Very Poor	\$1,589,122	1.33%
Poor	\$1,642,091	1.37%
Fair	\$12,607,026	10.53%
Good	\$92,221,960	77.04%
Very Good	\$11,653,549	9.73%
	\$119,713,748	100%

Table 18 - Condition of bridges and structures by CRV

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Vehicle Bridge	\$0	\$0	\$1,165,355	\$2,330,710	\$35,914,121	\$11,494,637
	0.00%	0.00%	2.29%	4.58%	70.55%	70.55%
Culvert	\$0	\$0	\$476,736	\$423,765	\$33,901,235	\$158,912
	0.00%	0.00%	1.36%	1.21%	96.97%	96.97%
Pedestrian Bridge	\$0	\$0	\$0	\$0	\$4,878,600	\$0
	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%
Dam	\$0	\$1,589,120	\$0	\$0	\$2,648,534	\$0
	0.00%	37.50%	0.00%	0.00%	62.50%	62.50%
Retaining Wall	\$0	\$2	\$0	\$8,687,196	\$13,846,542	\$0
	0.00%	0.00%	0.00%	38.55%	61.45%	61.45%
Unknown	\$0	\$0	\$0	\$1,165,355	\$1,032,928	\$0
	0.00%	0.00%	0.00%	53.01%	46.99%	46.99%
Total	\$0	\$1,589,122	\$1,642,091	\$12,607,026	\$92,221,960	\$11,653,549

Past Due	Very Poor	Poor	Fair	Good	Very Good
0.00%	1.33%	1.37%	10.53%	77.04%	9.73%

An overwhelming majority of the bridge and structures are considered in "good" condition, with more than 97% of the total asset base in "fair" or better condition. This shows excellent attention to the planning and completion of necessary cyclical maintenance activities on the bridges.

Figure 29 - Condition of bridge and structure asset types by CRV

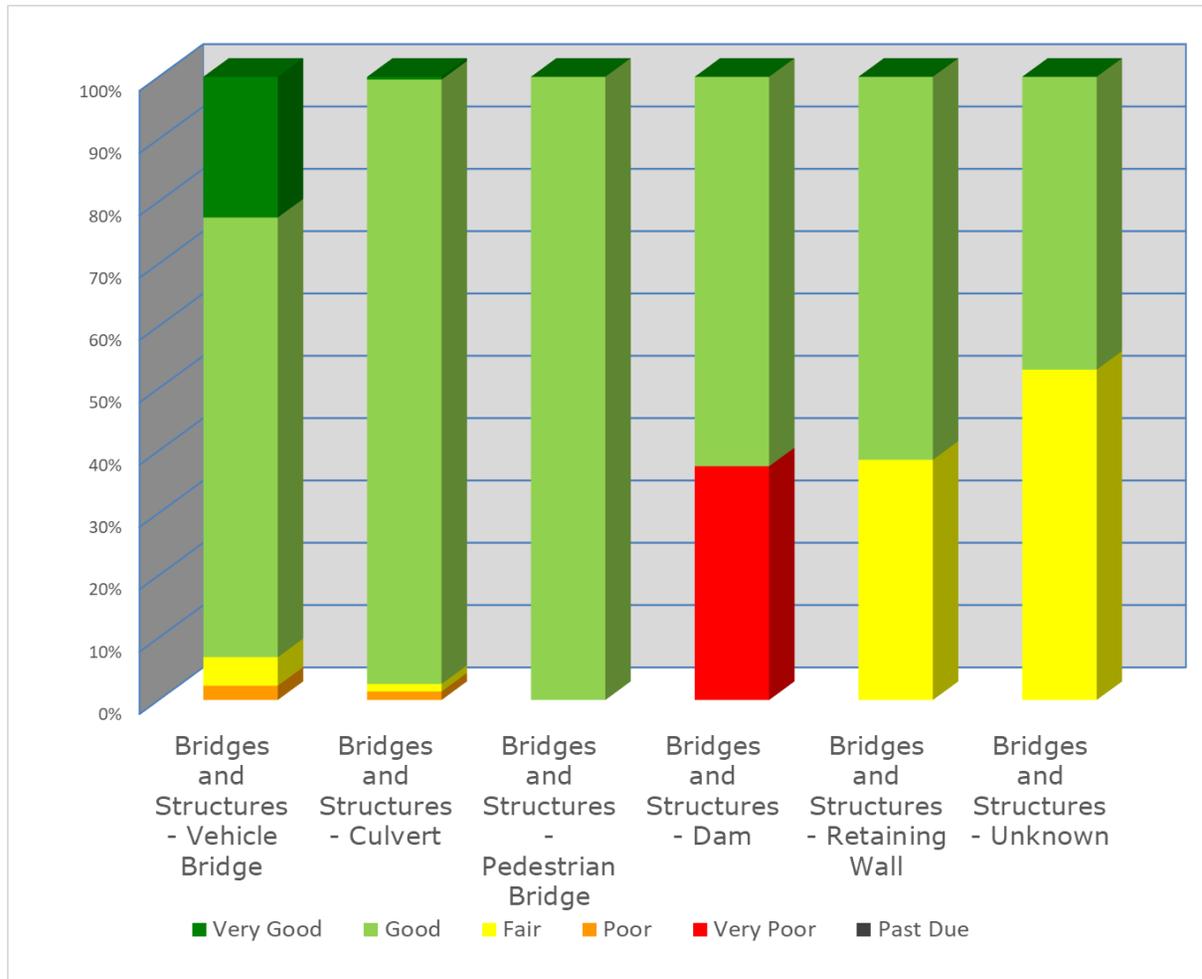
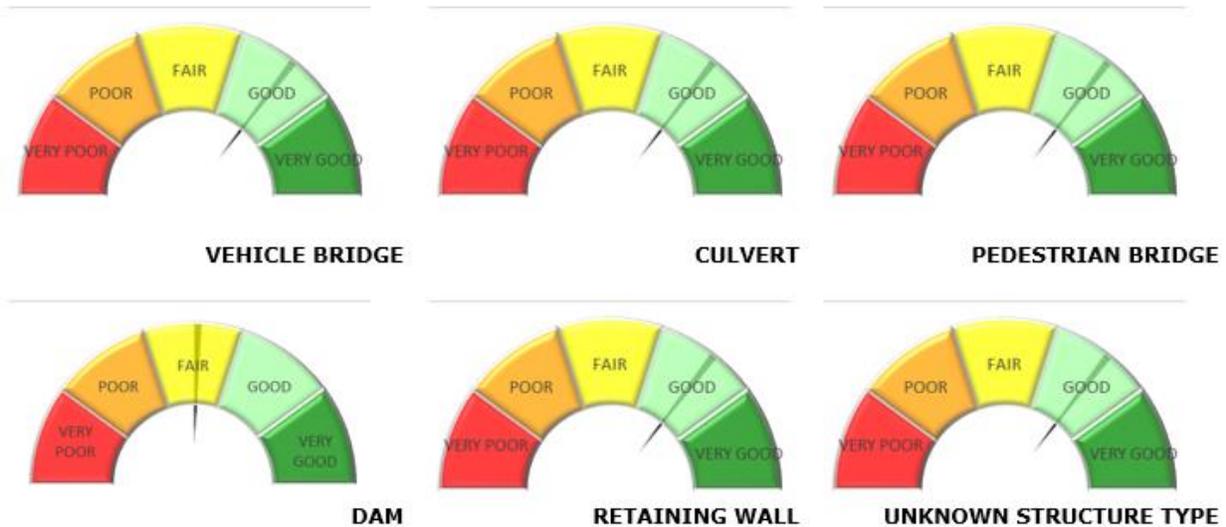


Figure 32 provides a visual image of the condition of the asset types based on CRV with the actual values listed in Table 21, while in Figure 33 the average condition of each asset type is displayed.

Figure 30 - Average Condition of Bridge and Structure Assets by Type



Asset Ages

The age of the bridges and structures would match the age of the road (or pathway) that the structure serves. A significant difference is the typical useful lifecycle for structures. Where a road would have a typical lifecycle of about 40 years with planned cyclical maintenance and rehabilitation within that period, a structure will have a typical expected lifecycle of about 50 years, with less maintenance or planned rehabilitation work required in that time period. In practice, the major components of most structures have a useful service lifecycle of much longer than 50 years and it is common to see structures in use for 75 years or longer. There are examples of this in Guelph.

The vehicle bridges in the City of Guelph have an average age of slightly more than 50 years. This value is greatly affected by five bridges that are also historic in character: Norwich St. over the Speed River (1882), Gow's Bridge (1897), Stone Rd. over Eramosa River (1916), Old Downey Rd. over Hanlon Creek (1920) and Allan's Dam Bridge (1938). Removing those five bridges from the average age calculation reduces the average age by more than 22 years, to 37 years. This results in a bridge inventory well within the expected useful lifecycle range. It is also safe to assume that the five historical bridges would have been regularly

rehabilitated since their original construction, and as the OSIM condition assessments show, they are in good condition.

The pedestrian bridges are calculated to have an average age of 45 years, or about 90% of an expected useful lifecycle. However, as with the vehicle bridges there are 3 of the 14 that because of their original construction dates of 1913 greatly affect the average. Without those 3, the average age is about 25 years.

Due to the data issues with the other asset types, no further analysis is provided for those.

In summary the ages of the assets do not indicate any major requirements in the short to 25-year future forecast.

Table 19 - Average Age of Bridges and Structures

Asset Type	Average Age	EUL (avg.)
Vehicle Bridge	59.28	50.00
Culvert	44.00	50.00
Pedestrian Bridge	45.43	50.00
Dam	40.00	50.00
Retaining Wall	40.36	50.00
Unknown	46.41	50.00
Average Age, all Assets	54.49	

Figure 31 - Average Age of Bridge and Structure Assets by Class



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific assets, nor specific projects or actions required to correct any deficiencies - this is not the purpose of a high-level AMP. City staff who have contributed information to the AMP have worked to identify specific asset needs and converted those needs to projects with identified costs for future work. Those future project costs have been included in this AMP, with the cooperation of the City Financial staff.

The future year forecast requirements were determined by identifying what the estimated replacement year for each asset is predicted to be following the criteria outlined in the Budget & Financial Needs Analysis section of this AMP beginning on page 31.

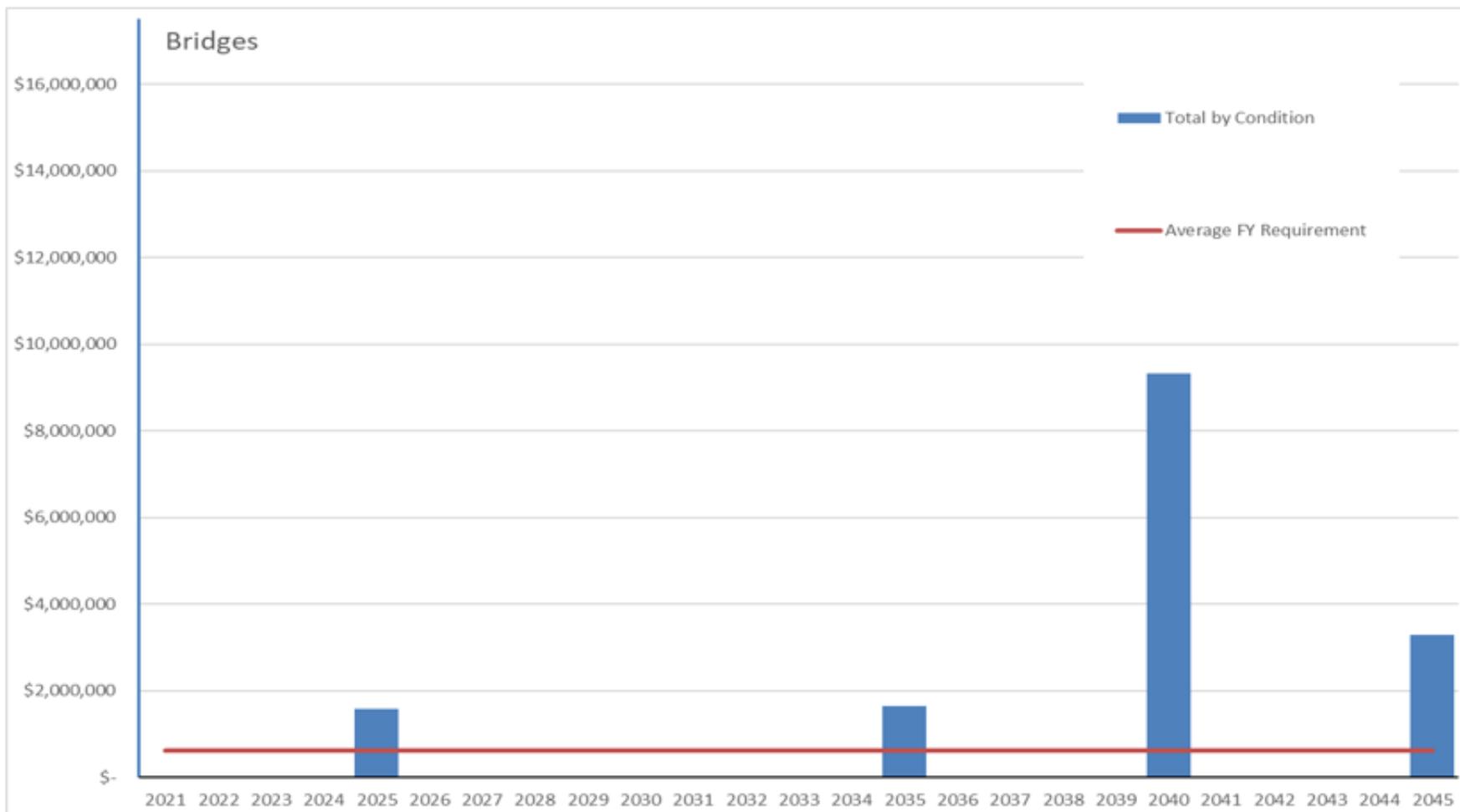
This includes the “past due” assets where the determined replacement year was 2020 or earlier – in the case of the bridges and structures this is \$0 – no backlog needs were identified. Given the nature of bridges with long lifecycles, the forecast replacement costs are well spread out. Within the next 25-years only four years are predicted to have a bridge cost.

Table 20 - 25-Year Financial Requirements - Bridges & Structures

2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	in Year
	\$15,838,239	\$633,530	\$9,322,840	2040

Note that these values represent only the estimated asset replacement costs, and do not represent any other costs that may be required in future years such as non-infrastructure related studies, design and consulting fees or other.

Figure 32 - 25-Year Forecast Replacement based on RSL



Levels of Service: Bridges & Structures

Physical assets exist to provide a service to the residents of Guelph. To be able to understand if the assets are delivering that service in accordance with expectations a series of metrics have been developed to help City staff with this analysis.

Furthermore, the Government of Ontario has defined a set of metrics which the City is required to measure and report on. Understanding these metrics, and evaluating the performance of the assets over time will help the City to continuously meet the requirements of the residents.

O.Reg Requirements

As previously discussed O/Reg. 588/17 defines assets in the “bridges” category as one of the five core asset types with mandated Levels of Service (LoS) metrics which must be reported on by July 1, 2021. The metrics for bridges are listed in Table 24.

While City staff have begun efforts to measure the City asset performance against the indicated metrics in the O.Reg, that work remains ongoing, and is not ready to be included in the AMP at this time. Available information is included in the table where possible.

Table 21 - O Reg 588/17 Levels of Service for Bridges and Structures

Service attribute	Community levels of service (qualitative descriptions)	Technical levels of service (technical metrics)	City Results
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	Percentage of bridges in the municipality with loading or dimensional restrictions.	While transportation department staff track this info it was not in a format that was able to be transferred to the AMP. Future versions of the AMP will improve on this.

Service attribute	Community levels of service (qualitative descriptions)	Technical levels of service (technical metrics)	City Results
Quality	1. Description or images of the condition of bridges and how this would affect use of the bridges. 2. Description or images of the condition of culverts and how this would affect use of the culverts.	1. For bridges in the municipality, the average bridge condition index value. 2. For structural culverts in the municipality, the average bridge condition index value.	The bridge condition index is available for each individual bridge and culvert within the data tables that were used to develop this AMP. Refer to Error! Reference source not found. and Error! Reference source not found. for whole-category condition information.

City Defined Metrics

In addition to the O.Reg Level of Service Metrics, municipalities have been encouraged to develop their own set of metrics that can be used to measure and understand the performance of the assets. In early 2018 the City of Guelph began efforts to define a Levels of Service Framework, however, as of May 2018 the work ended but was not completed. As part of the analysis of this AMP the LOS Framework was shared with City staff responsible for managing the roads and bridge assets, but after consideration it was decided that the available data is not mature enough to complete the LOS review, and so this will be done at a later date.

Budget Analysis: Transportation Assets –

Roads, Bridges & Structures

The budget analysis encompasses the identified forecast annual requirements (based on current rated condition of the assets) plus the allowances for maintenance and expansion compared to the approved program of work funding as indicated in the 2021-2045 Capital Budget. An analysis including a contingency value was also completed.

A summary of the budget analysis is shown in

Table 25 while a graph demonstrating the analysis results is shown in Figure 29.

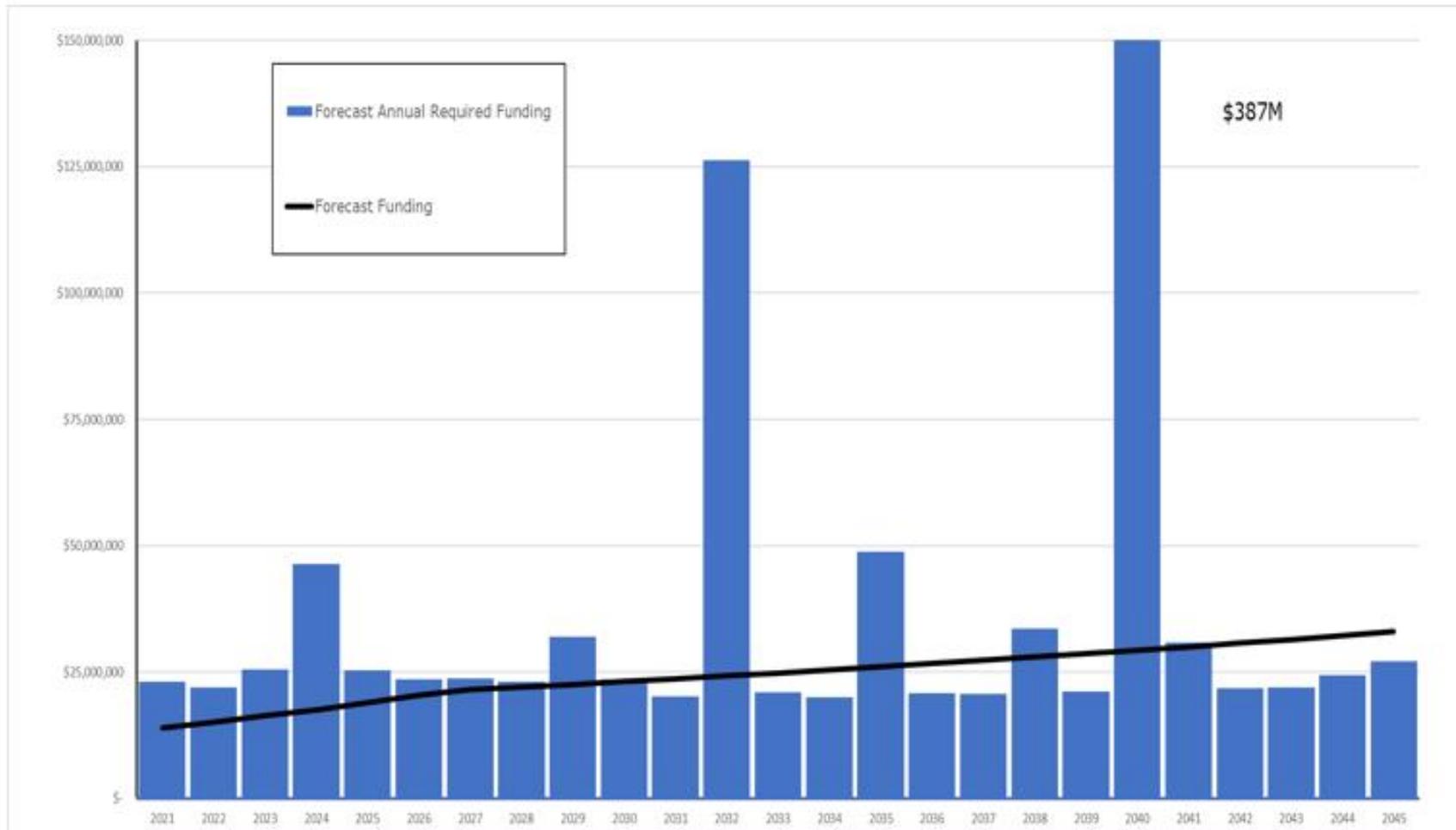
The analysis also shows that the transportation assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year average of about \$44.5M (including maintenance and growth).

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average funding gap of \$24.5M.

Table 22 - 25-Year Financial Summary Roads, Bridges, Sidewalks, etc.

Total 25-Year Requirements	\$1,113,071,299	Annual Average	\$ 44,522,852
Total 25-Year Funding	\$ 612,936,742	Annual Average	\$ 24,517,470
		Annual Average Funding Gap	\$(20,005,382)

Figure 33 - 25-Year Financial Analysis Roads, Bridges, Sidewalks, etc.



Summary and Conclusion

Despite ages, the bridges in the City remain fully functional with no major issues. Regular mandated condition assessments in accordance with OSIM standards are completed every two years so that if an issue with one of the bridges were to develop it would be quickly identified and mitigated. However, this is not expected to occur, as the bridges and structures are well maintained.

Likewise the roads and sidewalks are well maintained and functional but due to normal aging and use they will degrade. City staff are aware of these needs and implementing annual plans for rehabilitation and replacement when necessary, but despite these efforts the approved program of work funding shows an annual funding gap compared to forecast needs.

Recommendations

1. Improved coordination between the asset management information and the actual funding forecasts will result in more accurate future needs forecasting. As the asset management program continues to mature at the City this will occur and future year planning will be improved.

Potable Water Distribution and Treatment

Service Area: Potable Water Supply and Distribution

Quick Facts

Table 23 - Water Asset Quick Facts

	Asset Type	Count	\$CRV	
1	F.M. Woods Water Treatment Plant	1 Facility	\$67,297,802	8.70%
2	Watermains	582km / 4,847 segments	\$509,646,248	65.85%
3	Water Tower	3	\$16,401,660	2.12%
4	Groundwater Well Station	21	\$77,867,386	10.06%
5	Pumping Station	3 Active / 3 inactive	\$17,114,458	2.21%
6	Well Station (inactive)	3	\$4,823,486	0.62%
7	Arkell Aqueduct – Water Spring Groundwater Collection System	1	\$25,931,340	3.17%
8	Water Spring Recharge system	1	\$24,550,268	3.35%
9	Hydrants	3328 Active / 6 Inactive	\$28,910,973	3.74%
10	Water flow meter Stations	52	\$1,377,238	0.18%
			\$773,972,981	100%
	Identified 2020 Backlog		\$126,994,386	16.41%

Asset Type	Count	\$CRV
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Data Quality: 60%

Figure 34 - Overall Condition of Water System Assets by \$CRV

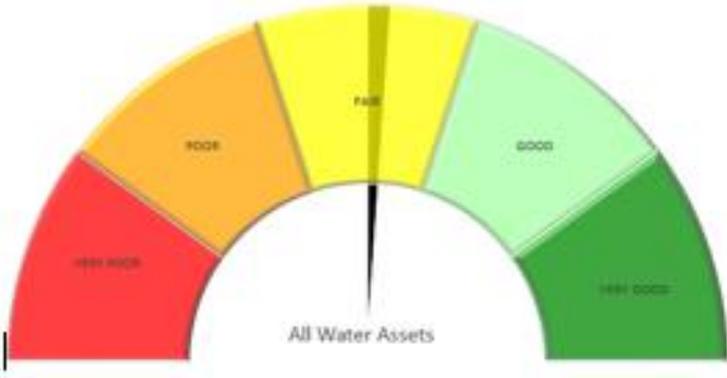
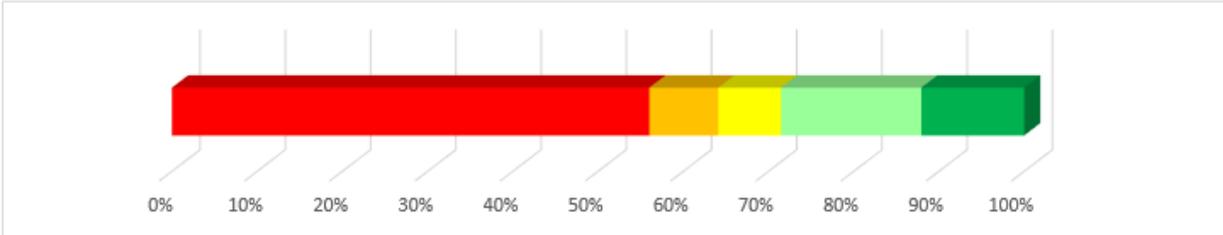


Figure 35 - Condition of Water System Assets by CRV



State of the Infrastructure: Potable Water Supply and Distribution

It goes with saying that safe potable water is an essential service that residents expect a municipality to be able to deliver in a modern City. Within Guelph, residents and businesses rely on the City to provide water for drinking, cooking, cleaning, manufacturing, fire-fighting, and recreation.

According to information on the City of Guelph website the City uses about 45-million litres of water per day, nearly all of which is provided via groundwater sources. The City of Guelph is the largest Canadian city to rely almost exclusively on groundwater for its drinking water supply due to the geographic location of the city being located near two aquifers that are able to provide the City with high-quality water, and not being located on the shores or a large body of freshwater or a large river.

Water is extracted from the ground by a series of 21 wells and transmitted to the F.M. Woods Water Treatment Plant by a network of pipes. Part of the groundwater is collected at the Arkell Spring Grounds and the Glen Collector System – a series of wells, pumps and perforated pipes that collect shallow groundwater which is then transmitted to the F.M. Woods WTP. A unique feature of the Arkell Spring Grounds is the recharging of the groundwater with water pumped from the Eramosa River back into the ground for future collection.

Post treatment, the water is distributed through the City for use by the residents through a network of supply and distribution watermains which also include three (3) above ground storage towers.

The City of Guelph has excellent water quality, but as with all cities facing climate change challenges, the resource must be protected. Periods of drought or excessive manufacturing processes can greatly impact the available supply of groundwater, and so the City has implemented policies in the City Official Plan to restrict or prohibit development where municipal water Services may be insufficient. The City also implements temporary restrictions on when and how water can be used during times of drought.

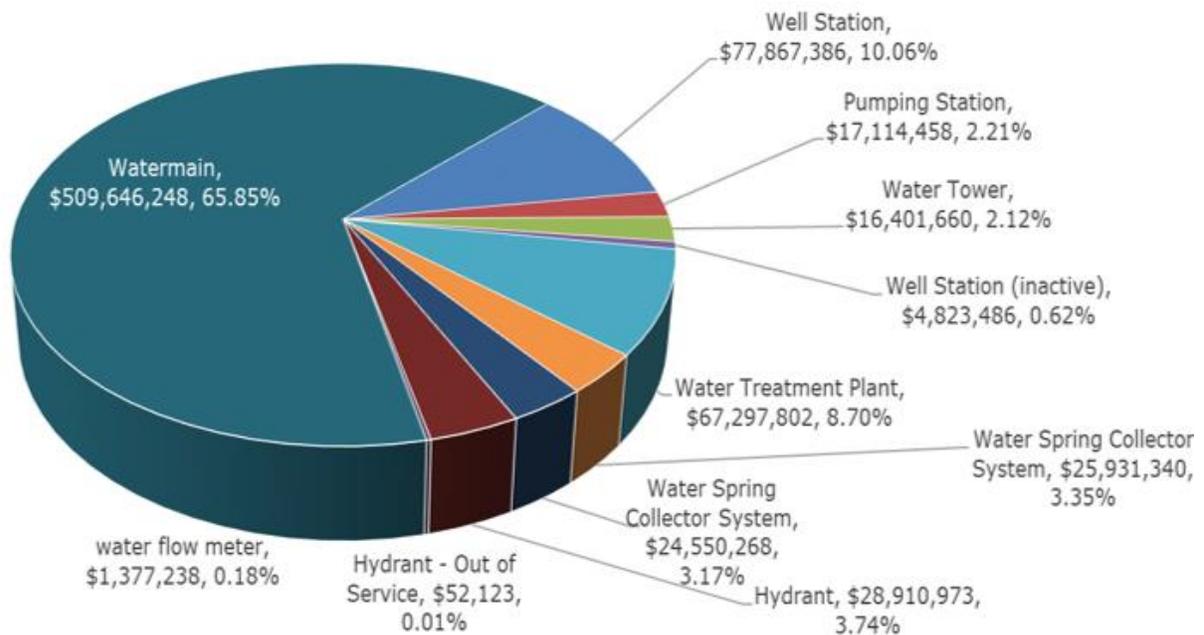
To support the provision and delivery of safe water to Guelph residents, the City manages a complex set of assets. Their performance and needs are outlined in following sections. The AMP does not present specific deficiencies or project needs, but presents a high-level review of the state of the water system assets and general needs that have been identified for the future.

Asset Types Comprising the Water System

The water system assets can be broadly classified into two groups:

- Linear, which includes supply and distribution watermains and the connectors, valves, meters and related parts required in a pipe network¹⁹. Also included in this grouping are fire hydrants
- Vertical, which represent the F.M. Woods Water Treatment plant facility (and the multiple buildings and structures that facility is comprised of). wells and pumping station equipment and the buildings they are located in, storage towers and the Arkell Spring facility

Figure 36 - Classification of Water Assets by CRV



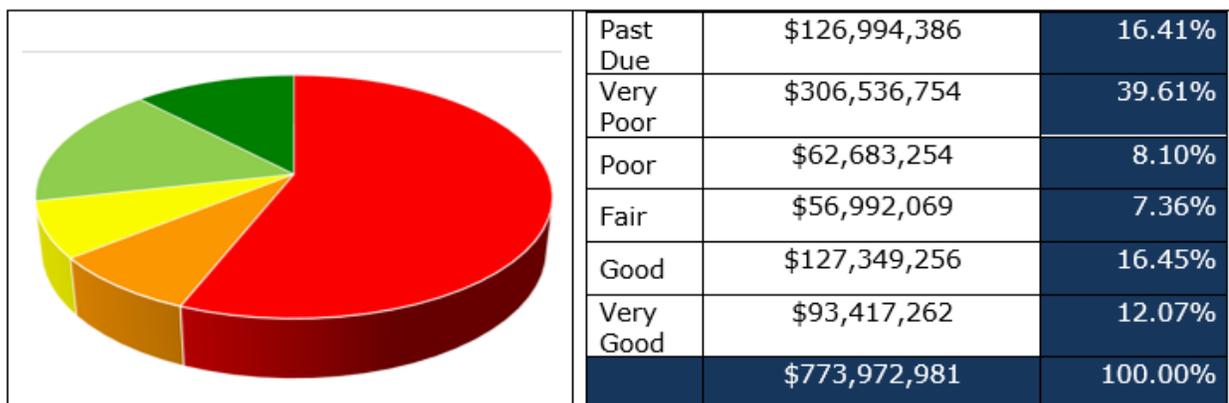
Overall, the inventory is considered in "FAIR" condition with an average condition score of 2.5 / 5.

Asset Condition by Type

A breakdown of the overall asset inventory by condition and replacement value is shown in Figure 40.

¹⁹ Not included in the inventory of pipes are any lateral connections due to concerns with the quality of data regarding those items City GIS staff advised that efforts are underway to mitigate these issues for future analysis

Figure 37 - Condition of water system assets by CRV



About 16.4% of the assets, with a replacement value estimated at \$127M are rated in a “past due” condition. A further 40% of the assets with a value of \$307M are rated in “very poor” condition. A further \$62.8M (8%) of the water assets are described as being in “Poor” condition. Therefore a total of nearly \$496M worth of assets may require replacement or major rehabilitation in the short to mid-term future, although many of the projects identified in the 2021-2045 Capital that are scheduled in 2021 or 2022 already include renewal work.

The above is a very broad analysis, and while it provides a general picture of the water asset inventory, only by examining the assets on a per-type basis will a more effective picture of the state of the assets be presented.

Figure 44 provides a visual image of the condition of the asset types based on CRV with the actual values listed in a table, while in Figure 45, the average condition of each asset type is displayed.

As the bars in Figure 46 show, several of the asset types have large percentages of the inventory with assets rated in “very poor” condition. Of particular concern:

- The Arkell Spring collection system (pipe network and pumping facilities) with the majority of the assets in those systems rated in “past due” condition
- Water Towers, well stations and watermain pipes also have significant percentages of their assets in “very Poor” condition.

The implication is that significant capital and/or rehabilitation costs can be expected in the near-to-mid-term future as the assets age and continue to deteriorate.

Given that many of the assets are electro-mechanical in nature (i.e. pumps and related equipment) that are known to have typical lifecycles of 20-30 years programs and plans are already in place to complete regular maintenance including cyclical replacement on these types of assets as part of normal operations. This has been standard practice among City staff responsible for the Water system, but

because of the relatively low value of some of these assets, they might not necessarily be represented in the AMP data.

Table 24 - Condition of water facility assets by type

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Well Station (\$)	\$0	\$35,454,808	\$9,980,224	\$7,999,369	\$15,743,905	\$8,689,081
Well Station (%)	0.00%	45.53%	12.82%	10.27%	20.22%	11.16%
Pumping Station (\$)	\$0	\$4,541,985	\$3,081,764	\$6,046,692	\$2,566,016	\$878,002
Pumping Station (%)	0.00%	26.54%	18.01%	35.33%	14.99%	5.13%
Water Tower (\$)	\$0	\$7,669,897	\$2,468,416	\$1,126,737	\$2,523,582	\$2,613,028
Water Tower (%)	0.00%	46.76%	15.05%	6.87%	15.39%	15.93%
Well Station (inactive) (\$)	\$0	\$4,135,335	\$354,601	\$333,550	\$0	\$0
Well Station (inactive) (%)	0.00%	85.73%	7.35%	6.92%	0.00%	0.00%
Water Treatment Plant (\$)	\$0	\$13,504,224	\$7,970,329	\$9,713,840	\$30,731,677	\$5,377,731

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Water Treatment Plant (%)	0.00%	20.07%	11.84%	14.43%	45.67%	7.99%
Water Spring Collector System (Facility) (\$)	\$0	\$13,447,168	\$482,633	\$5,299,225	\$6,467,659	\$234,655
Water Spring Collector System (Facility) (%)	0.00%	51.86%	1.86%	20.44%	24.94%	0.90%
Water Spring Collector System (Distribution) (\$)	\$0	\$23,804,969	\$0	\$0	\$745,299	\$0
Water Spring Collector System (Distribution) (%)	0.00%	96.96%	0.00%	0.00%	3.04%	0.00%
Hydrant (\$)	\$0	\$5,368,684	\$3,527,000	\$4,074,293	\$7,479,672	\$8,461,324
Hydrant (%)	0.00%	18.57%	12.20%	14.09%	25.87%	29.27%
Water flow meter (\$)	\$0	\$0	\$0	\$0	\$0	\$1,377,238
Water flow meter (%)	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Watermain (\$)	\$0	\$325,604,070	\$34,818,289	\$22,398,363	\$61,082,759	\$65,742,768
Watermain (%)	0.00%	63.89%	6.83%	4.39%	11.99%	12.90%
Overall (\$)	\$0	\$433,531,139	\$62,683,254	\$56,992,069	\$127,349,256	\$93,417,262
Overall (%)	0.00%	56.01%	8.10%	7.36%	16.45%	12.07%

Figure 38 - Condition of water system asset types, by CRV

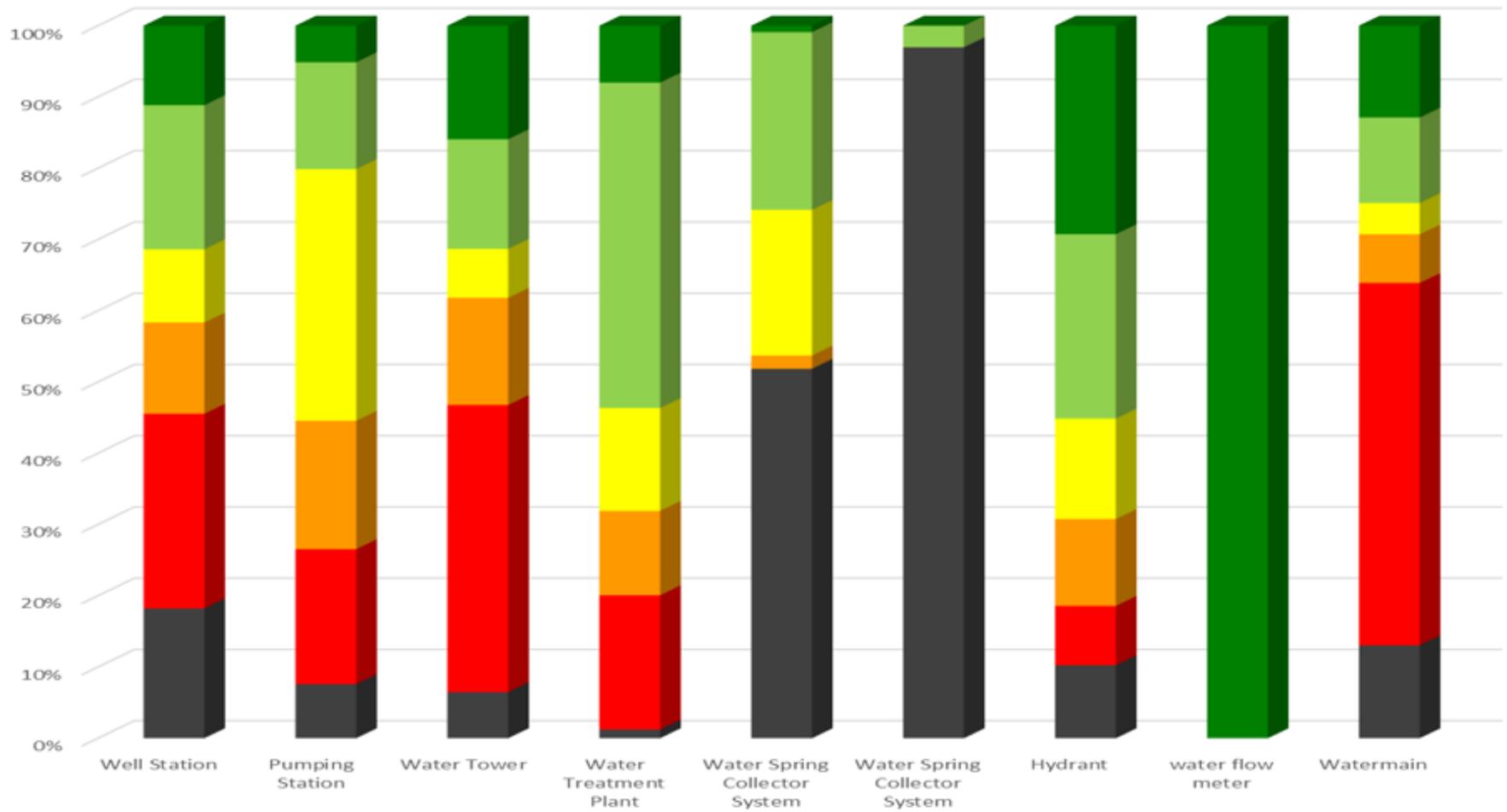
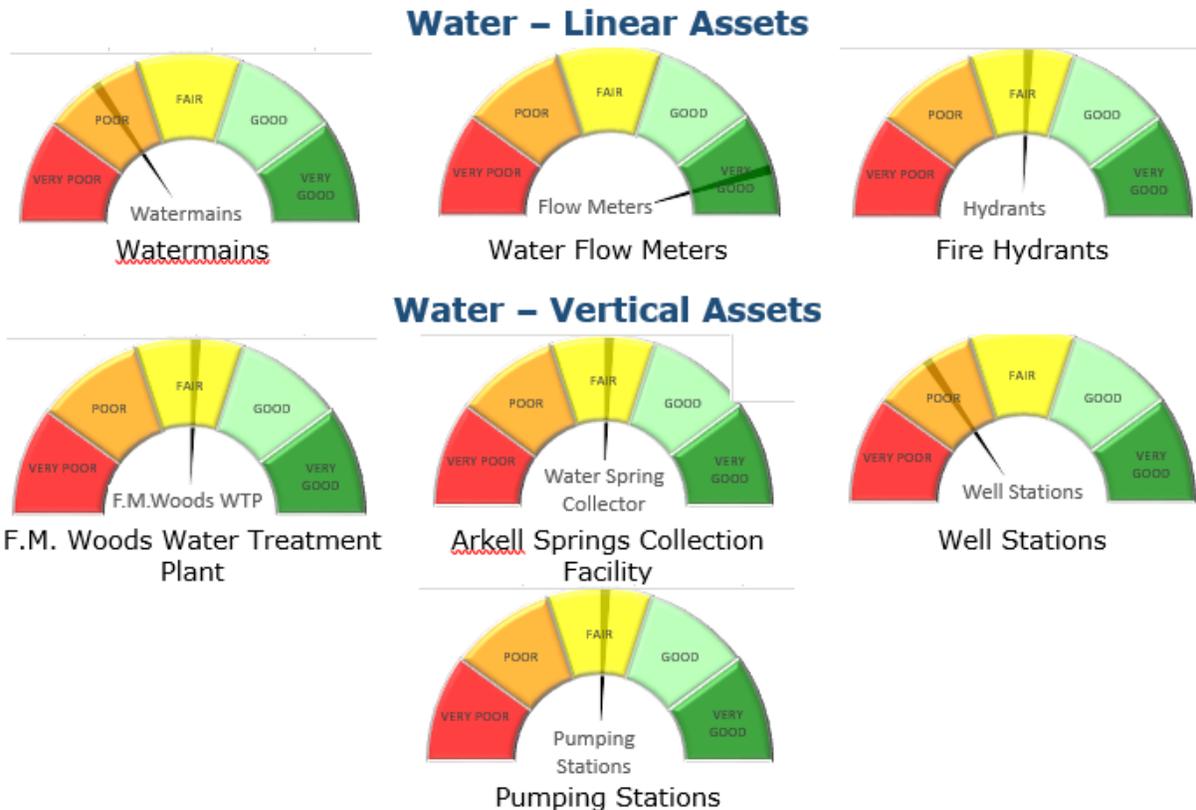


Figure 39 - Average condition of water assets by type



Note: Well Stations and Hydrants indicated as "out of service" are not included in the above ratings

The water system assets are all physical in nature, and as a result suffer from normal degradation in condition that are typical of physical assets. Typical deficiencies associated with age generally include:

- Degradation of materials due to aging (i.e. normal wear and tear)
- Mechanical failures
- Insufficient capacity due to increased demand or load on the systems
- Degradation of materials due to external sources like tree root impact, poor workmanship etc.

As detailed quantitative condition information was not available it is not possible to review potential causes for degradation other than normal aging. It is to be expected though that some of the needed repair or rehabilitation work for the water system assets will most certainly be due to the impacts of non-aging events.

Asset Ages

The average age of the water system assets is 33.75 years, however this value must be considered in the context of the different asset types in the category, compared to the typical expected useful lifecycle of each asset type.

Watermain pipes have a typical average useful life expectancy of about 68.6 years with the expected life of each pipe segment changing depending on the material each pipe segment is made of. With a current average age of about 42 years the water distribution pipes are within an expected useful lifecycle, but as noted previously a high percentage of these asset types are in "very poor" condition indicating that some of the assets may be aging faster than expected.

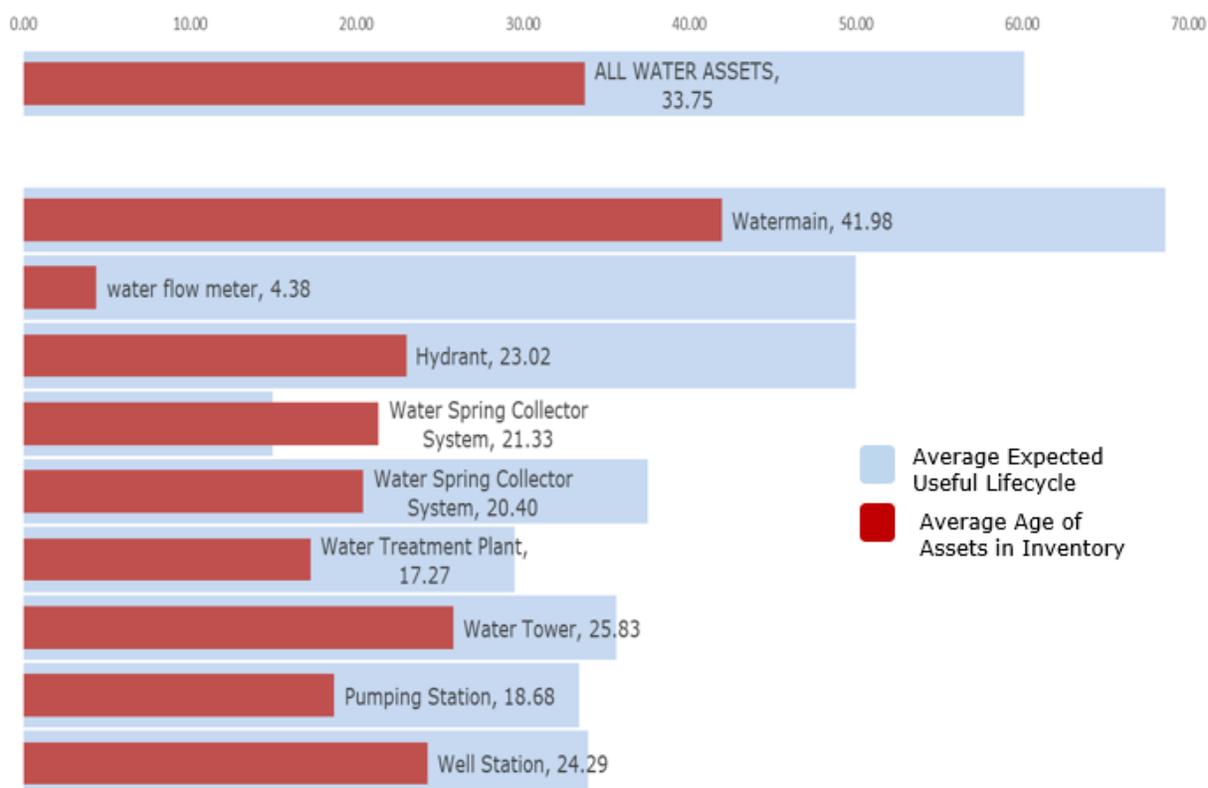
Equally important to note is that the assets included in the Arkell Springs groundwater collector facility have an average age greater than the normal expected useful lifecycle. This is not to imply the system is no longer functional, however, as assets age beyond an expected lifecycle, the greater the risk of failure, and so this unique facility will require attention in the near future.

Table 25 - Water system assets average age

Asset Type	Average Age	EUL
Well Station	24.29	33.90
Pumping Station	18.68	33.41
Water Tower	25.83	35.63
Water Treatment Plant	17.27	29.50
Water Spring Collector System	20.40	37.50
Water Spring Collector System	21.33	15.00
Hydrant	23.02	50.00
water flow meter	4.38	50.00

Asset Type	Average Age	EUL
Watermain	41.98	68.60
ALL WATER Assets	33.75	60.12

Figure 40 - Average age of water assets by class



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific assets, nor specific projects or actions required to correct any deficiencies - this is not the purpose of a high-level AMP. A full and complete asset management plan for the water system would include detailed facility management plans for each of the several major assets that are themselves comprised of multiple larger assets (i.e. F.M. Woods WTP, Well Stations, and Towers). By completing such a plan, more and improved information about the

status quo condition of the water system assets, and the future needs would be available. That level of detail is beyond the scope of this high-level, whole-City AMP however.

City staff who have contributed information to the AMP have worked to identify specific asset needs and converted those needs to projects with identified costs for future work. Those future project costs have been included in this AMP, with the cooperation of the City Financial staff.

The future year forecast requirements were determined by identifying what the estimated replacement year for each asset is predicted to be following the criteria outlined in the Budget & Financial Needs Analysis section of this AMP beginning on page 31.

This includes the “past due” assets where the determined replacement year was 2020 or earlier – the replacement value for these assets has been added to the “backlog” sum. For the purposes of analysis the backlog value has been distributed over ten (10) years to be able to lessen the impact of trying to reduce the backlog at one time. The results of this analysis are shown in Figure 48. Even with this distribution, addressing the backlog forms a significant percentage of the future annual needs.

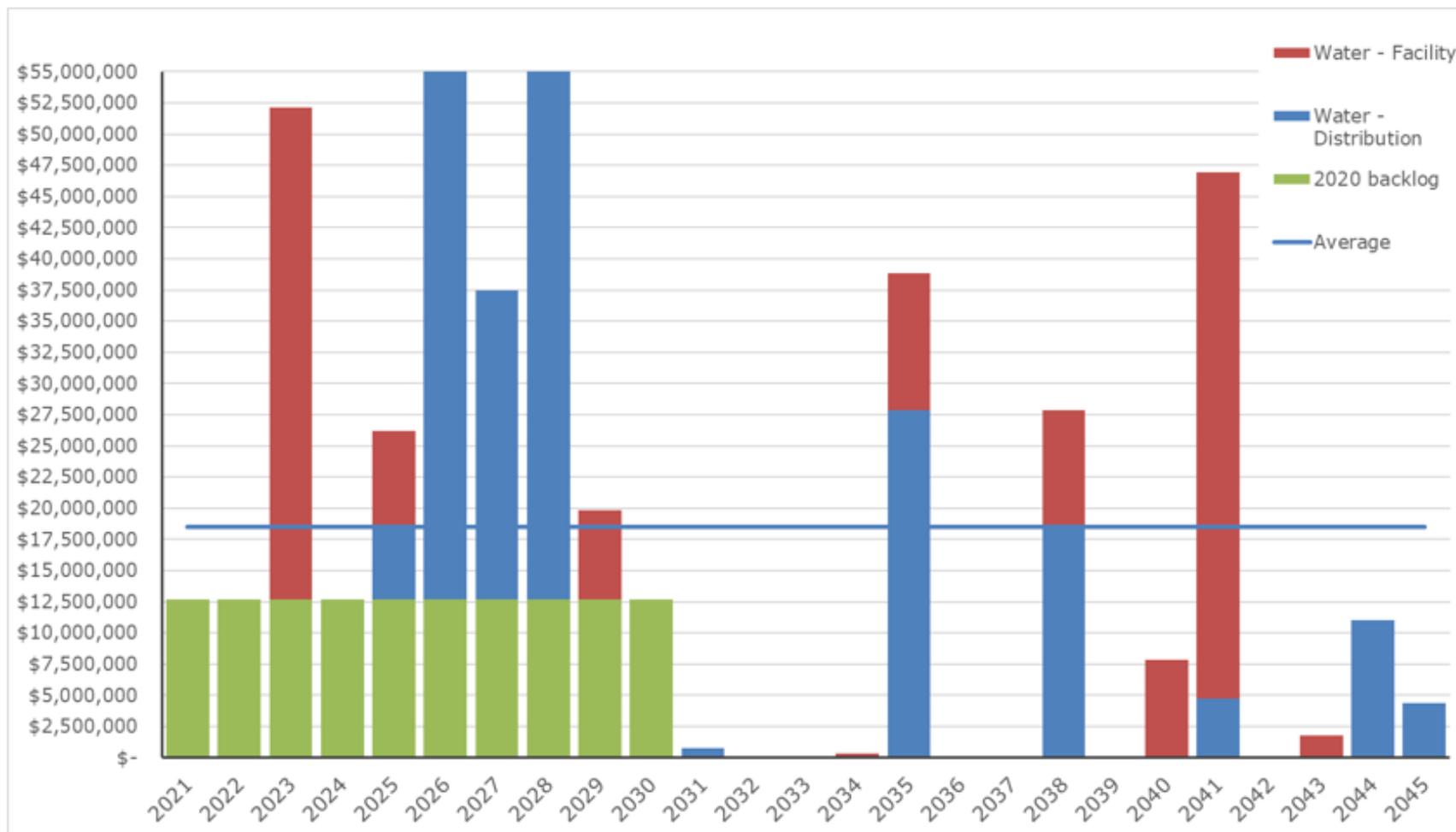
Using the categorization of Distribution and Facility assets as an identifier for grouping assets, the following table summarizes the findings from the data. The values in the following table and graph do not correlate to the City budget, nor are they intended to. A number of other factors go into adapting the asset information into workable projects besides simply the remaining estimated service lifecycle. The RSL analysis is intended to provide a preliminary potential needs analysis only.

Table 26 - Water system 25-year financial requirements by RSL

Item	2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	In Year
Water - Distribution	\$93,219,705	\$328,824,122	\$13,152,965	\$127,336,558	2026
Water - Facility	\$33,774,680	\$134,211,788	\$5,368,472	\$42,201,136	2041
Totals	\$126,994,386	\$463,035,909	\$18,521,436		

Note that these values represent only the estimated asset replacement costs, and do not represent any other costs that may be required in future years such as non-infrastructure related studies, design and consulting fees or other.

Figure 41 - Forecast future replacement costs of water



Levels of Service

Physical assets exist to provide a service to the residents of Guelph. To be able to understand if the assets are delivering that service in accordance with expectations a series of metrics have been developed to help City staff with this analysis. Furthermore, the Government of Ontario has defined a set of metrics which the City is required to measure and report on. Understanding these metrics, and evaluating the performance of the assets over time will help the City to continuously meet the requirements of the residents.

O.Reg Requirements

As previously discussed O/Reg. 588/17 defines assets in the “water” category as one of the five core asset types with mandated Levels of Service (LoS) metrics which must be reported on by July 1, 2021. These are listed in Table 31.

While City staff have begun efforts to measure the City asset performance against the indicated metrics in the O.Reg, that work remains ongoing, and is not ready to be included in the AMP at this time. Available information is included in the table where possible.

Table 27 - O. Reg LoS requirements for water assets

Service attribute	Community levels of service (qualitative descriptions)	Technical levels of service (technical metrics)	
Scope	<p>1. Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system.</p> <p>2. Description, which may include maps, of the user groups or areas of the municipality that have fire flow.</p>	<p>1. Percentage of properties connected to the municipal water system.</p> <p>2. Percentage of properties where fire flow is available.</p>	<p>At present, the data related to the water system does not indicated the percentage of properties connected to the municipal system. However, according to staff there are 44,000 metered connections to the system. All those connected have suitable volume / pressure for fire fighting.</p>
Reliability	<p>Description of boil water advisories and service interruptions.</p>	<p>1. The 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.</p> <p>2. The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system.</p>	<p>At present the data available is not able to answer these questions. More analysis and data formatting will be required, and these efforts are under way.</p>

City Defined Metrics

In addition to the O.Reg Level of Service Metrics, municipalities have been encouraged to develop their own set of metrics that can be used to measure and understand the performance of the assets. In early 2018 the City of Guelph began efforts to define a Levels of Service Framework, however, as of May 2018 the work ended but was not completed. As part of the analysis of this AMP the LOS Framework was shared with City staff responsible for managing the water system assets, however, at the present time staff considered that the performance data readily available was not suitable for inclusion in the LOS framework at this time. Efforts are underway to improve these metrics for inclusion in the short term future.

Sustainability Analysis

Funding for the water assets is intended to be provided entirely from user fees (i.e. rate based) with the target funding levels determined partly based on the analysis completed in the AMP. The following table indicates the sustainable funding target in 2020, compared to what was determined in 2017.

Table 28 - Sustainable Funding Target Analysis

Funding	2017 Estimate	2020 Estimate	\$ Change
Water	13,400,000	22,614,900	+69%

In 2020 the majority of the data was sourced from the City GIS database which is being continuously updated and improved with input from City water department staff. Although the number of records used in 2020 was less than the number of records in 2017, overall the data is considered more accurate and refined.

Like other asset categories the 2017 analysis of the status-quo condition of the stormwater assets was purely aged based, where in 2020 quantitative condition assessment data was available that improved the analysis, meaning the assignment of replacement work in future years is better clarified than it was in 2017.

Another factor affecting the difference in the sustainability target is the improved understanding of the condition of some of the major water system assets like the groundwater re-charge system and the Arkell aqueduct. In 2020 data all those systems were flagged in very poor or past due, but in 2017 they weren't and those two major assets alone have a replacement value of approximately \$50M (6.5%) of the total system. Information about hydrants was added in 2020, and the total value of the hydrant inventory is worth an additional \$30M was not included in 2017.

There remain gaps in the data, primarily in the missing “lateral” pipes that connect the City watermains to the customers. This is being addressed in the GIS database, and when they are included there will be an increase in the total value of the water infrastructure, which in turn will have an impact to the sustainability funding target.

In summary, the data quality in 2020 is better than 2017, and so the sustainability analysis can be considered more accurate.

Budget Analysis: Potable Water System

The budget analysis encompasses the identified forecast annual requirements (based on current rated condition of the assets) plus the allowances for maintenance and expansion compared to the approved program of work funding as indicated in the 2021-2045 Capital Budget. An analysis including a contingency value was also completed.

A summary of the budget analysis is shown in Table 34 while a graph demonstrating the analysis results is shown in Figure 35.

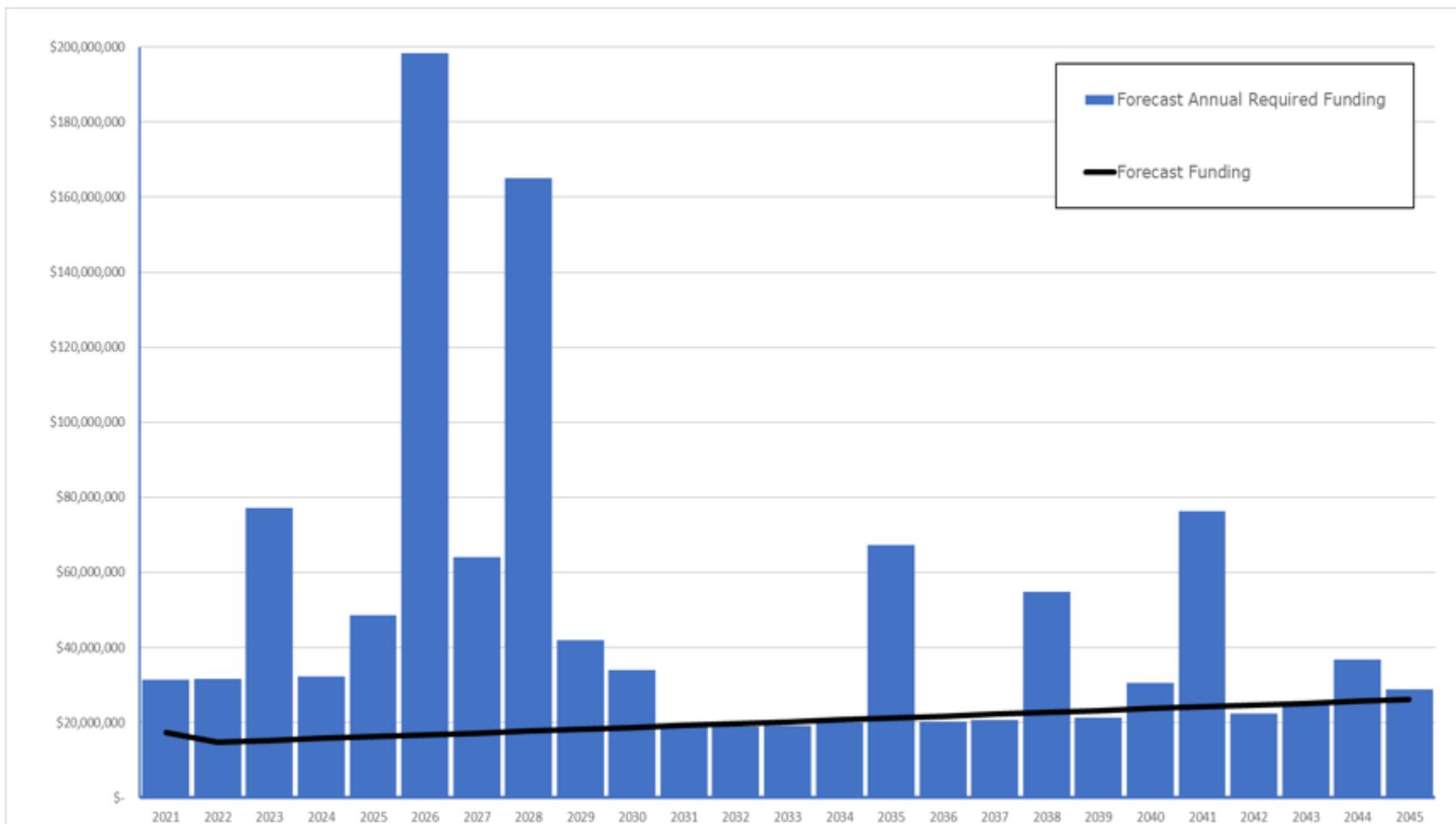
The analysis also shows that the potable water system assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$48.2M (including maintenance and growth).

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$27.9M.

Table 29- 25-Year Financial Summary for Water System Assets

Total 25-Year Requirements	\$1,205,670,421	Annual Average	\$ 48,226,817
Total 25-Year Funding	\$ 508,158,436	Annual Average	\$ 20,326,337
		Annual Average Funding Gap	\$(27,900,479)

Figure 42- 25-Year Budget Analysis for Water System Assets



Summary and Conclusion

The production of safe drinking water in Ontario is regulated by the Safe Water Drinking Act, 2002 which outlines in detail the requirements a municipality must fulfill in order to obtain a Municipal Drinking Water Licence. The City of Guelph adheres to this regulation, and the Water Department staff have prepared a Water and Wastewater Long-Range Financial Plan - required under Ontario Regulation 453/07 – that was most recently prepared for and approved by Council in spring 2019. The information in this AMP should be considered additional to, and not a replacement for that Long-Range Financial Plan.

Despite a high percentage and replacement value of assets currently rated in “poor” or “very poor” condition there are no indications that the City of Guelph water service is at risk of not being able to continue to maintain the ability to deliver high quality and safe water to the residents of the City. The status quo condition and forecast costs based on estimated remaining service lifecycle represent a water system that is aging normally with replacements forecast based on the age of the assets. The age of the assets in turn tend to match periods of growth in the City, and so the future needs represent normal lifecycle activities based on when the assets were installed. Quantitative condition assessments of all the water system assets have been, and continue to be completed at regular cycles. Any potential deficiencies are identified early and mitigation plans implemented.

However, the budget analysis shows a clear need for increased funding to maintain the current infrastructure and accommodate predicted growth. With an average annual funding of about \$21M between 2021 and 2045 there remains an annual shortfall average of \$18.5M.

Recommendations

1. The Water and Wastewater Long-Range Financial Plan should be referred to, and updated as needed, to guide the future decisions related to the management of the Water System assets.
2. Detailed facility asset management plans – with greater detail than this AMP can provide – are recommended to be completed for:
 - F.M. Woods WTP
 - Arkell Springs Pumping Facility and Collection System

These essential facilities cannot be allowed to degrade to a point where they become incapable of meeting their desired levels of service

Notes:

Bibliography

1. Water Services Facility and Property Asset Management Plan, George Illaszewicz, M.A.Sc., P.Eng., PMP, ENV SP Project Manager, Infrastructure Management & Planning, WSP, April 21, 2017

6. Wastewater: Collection and Treatment

Service Area: Sanitary Wastewater Collection and Treatment

Quick facts

Table 30- Sanitary wastewater collection and treatment quick facts

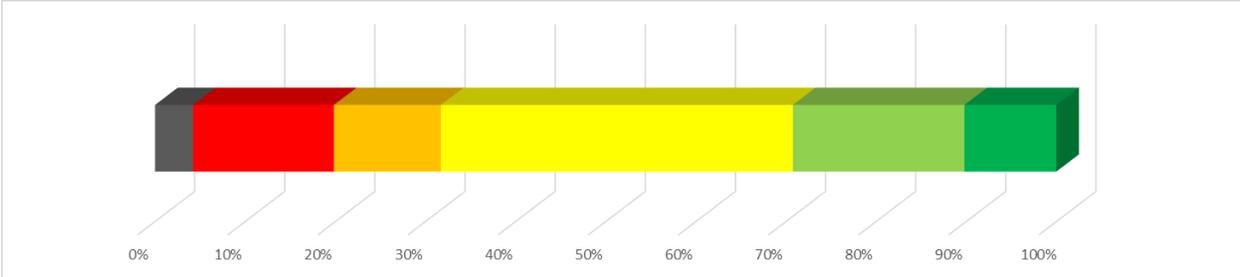
Subclass	Total CRV	Total # records	
Maintenance Hole	\$43,743,187	8258	6.43%
Sanitary Pipe	\$401,965,836	533km	59.12%
Wastewater Treatment Plant Facility	\$222,090,276	N/A	32.67%
Wastewater Pumping Station	\$11,338,247	7 station	1.67%
Siphon	\$512,396	N/A	0.08%
	\$679,649,941		
Identified 2020 Backlog	\$27,748,172		

Data Quality: 38%

Figure 43 - Overall condition of wastewater system assets by \$CRV



Figure 44 - Condition of wastewater system assets by CRV



State of the Infrastructure: Sanitary Wastewater Collection and Treatment

Wastewater generated by the residents and businesses in the City of Guelph is collected in a network of sanitary waste pipes for treatment at the Guelph Wastewater Treatment Plant (WWTP) on Wellington St. The collected sanitary waste is filtered, treated and released into the Speed River, with the entire treatment process completed in accordance with strict standards and processes as mandated by the Ontario Provincial Government.

The collection pipe network consists of a mix of gravity-flow pipes and forcemains, where the flow is managed by use of a booster pump. Seven (7) pumping stations located throughout the City are in use to provide the needed pressure boosts.

The WWTP is a large complex, with several different buildings, settling tanks, digesters and other components comprising the facility. The facility as a whole, and all the sub-assets within the facility, could itself be the subject of a dedicated asset management plan.

State of the Assets

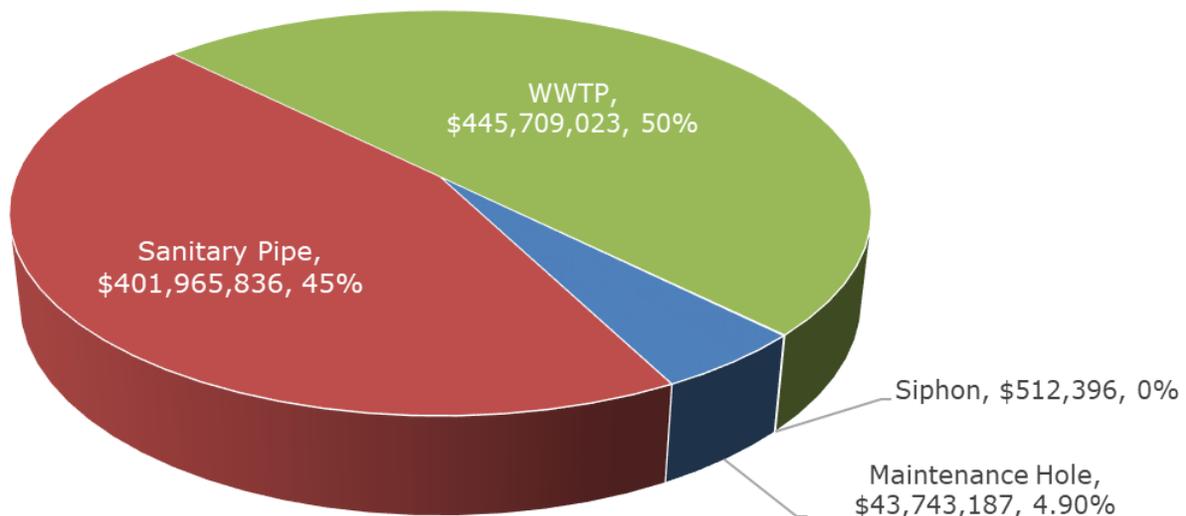
Asset Types Comprising the Wastewater System

The wastewater system assets can be broadly classified into two groups:

- Linear, which represent the collection pipe network, including the maintenance holes, connectors, valves, meters and related parts required in such a pipe network.
- Vertical, which represent WWTP facility (and the multiple buildings and structures that facility is comprised of), pumping station equipment and the buildings they are located in.

The assets within the pipe network comprise the largest portion of the City wastewater system representing about 66% of the total inventory (based on CRV). Approximately 533km of pipes and 8,258 maintenance holes with a total value of about \$422M are installed across Guelph. This collection network transfers the waste to the WWTP on Wellington St. This facility has an estimated replacement value of about \$210M.

Figure 45 - Wastewater Asset Types by CRV



Overall, the inventory is considered in "FAIR" condition with an average condition score of 2.93 / 5.

Asset Condition by Type

A breakdown of the overall asset inventory by condition and replacement value is shown in Figure 54.

Figure 46 - Condition of wastewater assets by crv



Slightly more than 4% of the wastewater Assets are classified as “past due” meaning that they are older than what a typical age for the asset type would be considered normal, or they have been evaluated to be in a condition where replacement is recommended.

The majority of the assets – about 39% - are in “fair” condition, which can be broadly described as about mid-way through their expected service lifecycle. The remaining assets are distributed nearly evenly across the other rating conditions.

The above is a very broad analysis, and while it provides a general picture of the asset inventory, only by examining the assets on a per-type basis will a more effective picture of the state of the assets be presented.

Table 31 - Condition of wastewater collection network assets by type

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Maintenance Hole (\$)	\$10,594	\$0	\$0	\$42,900,953	\$0	\$831,640
Maintenance Hole (%)	0.02%	0.00%	0.00%	98.07%	0.00%	1.90%
Sanitary Pipe (\$)	\$28,737,578	\$91,305,874	\$54,584,740	\$73,992,822	\$93,889,492	\$59,455,330
Sanitary Pipe (%)	7.15%	22.71%	13.58%	18.41%	23.36%	14.79%
Wastewater Treatment Plant Facility (\$)	\$0	\$14,745,119	\$25,150,788	\$143,560,893	\$29,987,264	\$8,646,212
Wastewater Treatment Plant Facility (%)	0.00%	6.64%	11.32%	64.64%	13.50%	3.89%

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Wastewater Pumping Station (\$)	\$0	\$173,532	\$894,643	\$4,640,136	\$5,277,469	\$352,467
Wastewater Pumping Station (%)	0.00%	1.53%	7.89%	40.92%	46.55%	3.11%
Siphon (\$)	\$0	\$0	\$29,325	\$226,715	\$256,357	\$0
Siphon (%)	0.00%	0.00%	5.72%	44.25%	50.03%	0.00%
Totals (\$)	\$28,748,172	\$106,224,525	\$80,659,495	\$265,321,519	\$129,410,582	\$69,285,649
Totals (%)	4.23%	15.62%	11.86%	39.04%	19.04%	10.19%

Figure 47 - Condition of asset types, by crv

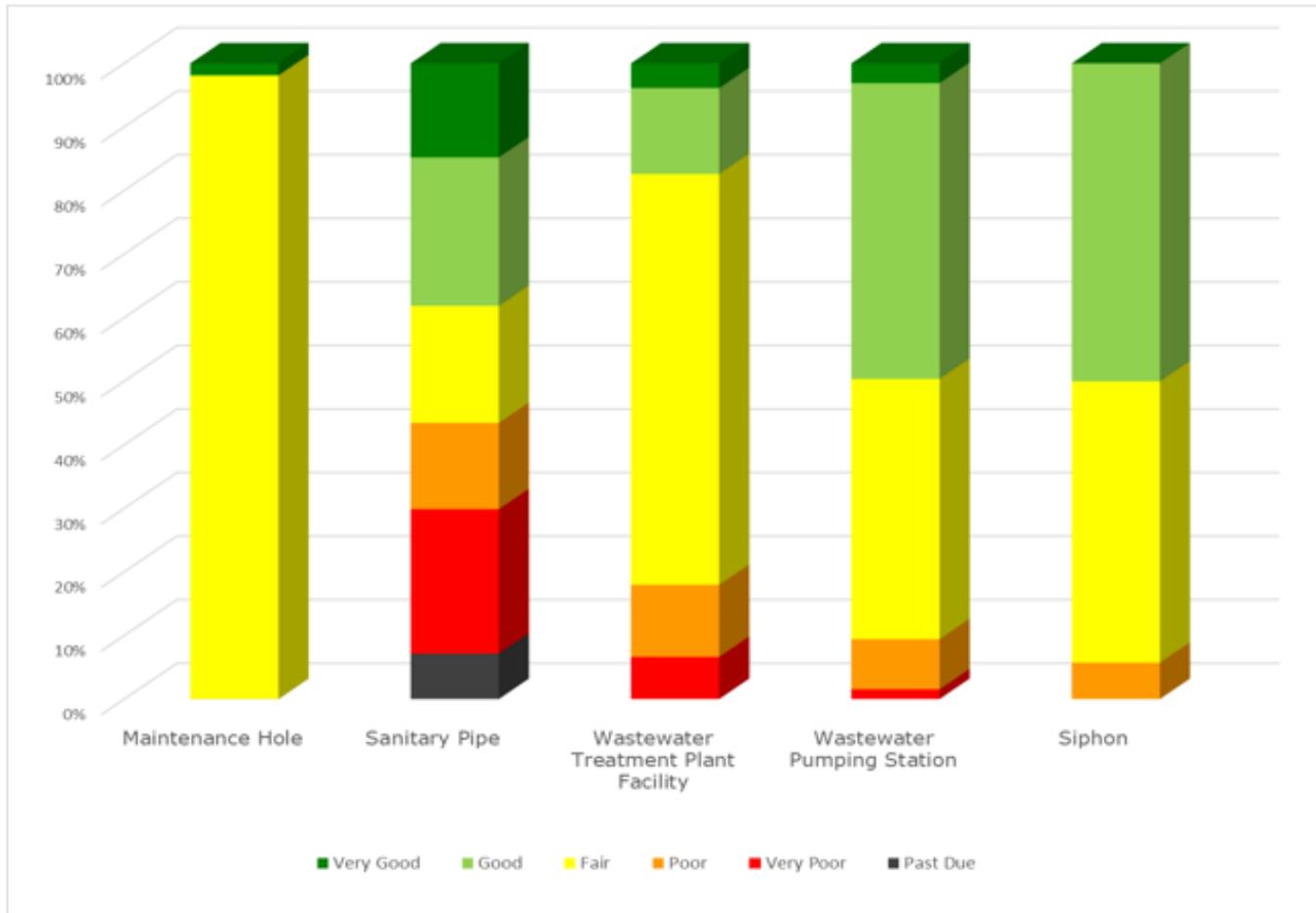


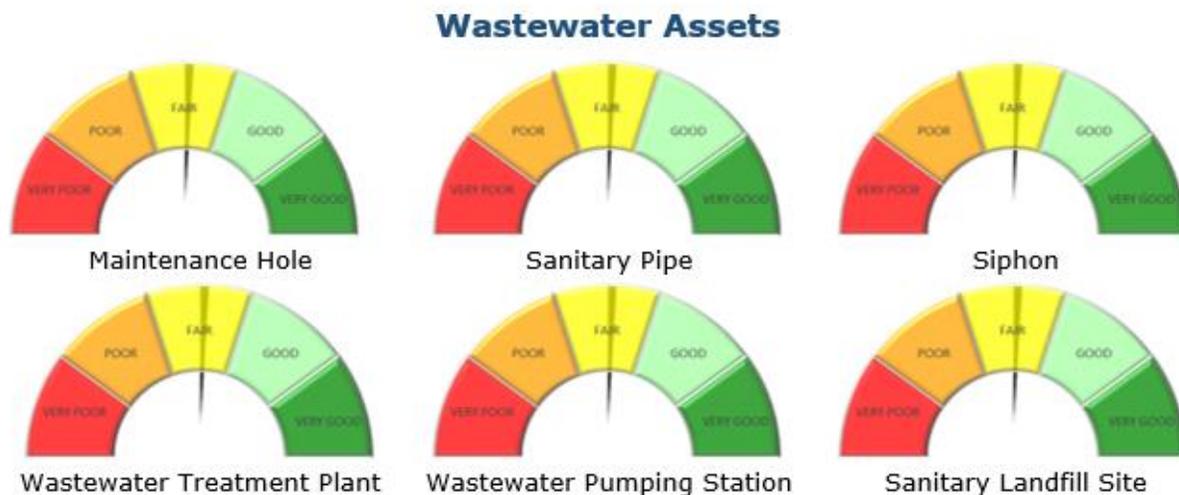
Figure 58 provides a visual image of the condition of the asset types based on CRV with the actual values listed in Table 38 while in Figure 60 the average condition of each asset type is displayed.

Approximately half of the sanitary pipes, comprising the largest grouping of assets in the overall inventory, are rated in a condition less than "poor". This does not necessarily indicate the pipes are not functioning properly, but it does indicate that within the short to mid-term future (1-5 years) the City should examine in more detail the needs of the assets in the pipe network to properly plan for degrading assets.

Likewise at the WWTP – about 20% of the assets at the facility are in less than "fair" condition. Given that many of the assets would be mechanical in nature (i.e. pumps and related equipment) that are known to have typical lifecycles of 20-30 years it is likely that plans exist to complete regular maintenance including cyclical replacement on these types of assets as part of normal operations. This is good, but might not be represented in the data due to the limitations of the information that was made available to complete this AMP.

The remaining asset types are predominantly in "fair" condition – typical for assets about midway through a service lifecycle.

Figure 48 - Average condition of wastewater assets by type



As demonstrated by indicators in Figure 58, all of the asset types within the wastewater category have an average condition of "fair". The system assets are all physical in nature, and as a result suffer from normal degradation in condition that

are typical of physical assets. Typical deficiencies associated with age generally include:

- Degradation of materials due to aging (i.e. normal wear and tear)
- Mechanical failures
- Insufficient capacity due to increased demand or load on the systems
- Degradation of materials due to external sources like tree root impact, poor workmanship etc.

As detailed quantitative condition information was not available, nor was a capacity review, it is not possible to review potential causes for degradation other than normal aging. It is to be expected though that some of the needed repair or rehabilitation work for the wastewater system assets will most certainly be due to the impacts of non-aging events.

Asset Ages

The average age of the wastewater system assets is slightly more than 32 years, however this value must be considered in the context of the different asset types in the category, compared to the typical expected useful lifecycle of each asset type.

Sanitary pipes, which are often constructed of concrete or other very durable materials, have an average expected useful lifecycle of about 70 years. The average age of the pipes in the City network is almost 42 years – about 2/3 of a lifecycle, and not of an age which would cause concern.

The WWTP has an average age of about 28 years, but in reviewing this it must be considered that some of the assets at the WWTP will have a EUL greater than 50 years (even nearing 100) while others that are electro-mechanical in nature will have much shorter lifecycles. Only a detailed facility asset management plan would provide sound details, however, in general it can be broadly described that the WWTP should have many years of functional life remaining.

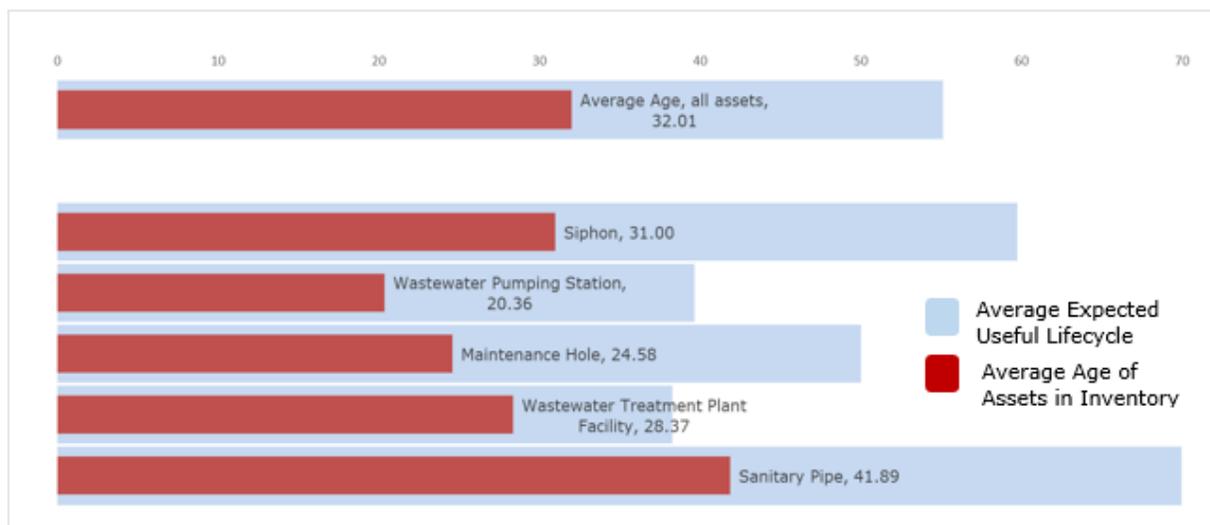
The same comment holds true for the other asset types – based on ages, there are no indications that the assets will not be able to continue to serve their intended functions for many years.

Table 32 - Average age of wastewater assets

Asset Type	Average Age	EUL
Sanitary Pipe	41.89	69.97
Wastewater Treatment Plant Facility	28.37	38.29

Asset Type	Average Age	EUL
Maintenance Hole	24.58	50.00
Sanitary Landfill Site	26.67	50.00
Wastewater Pumping Station	20.36	39.68
Siphon	31.00	59.75

Figure 49 - Average age of wastewater assets by class



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific assets, nor specific projects or actions required to correct any deficiencies - this is not the purpose of a high-level AMP. A full and complete asset management plan for the wastewater system would include a detailed facility management for the WWTP, as well as the pumping stations.²⁰ By completing such a plan, more and improved information about the status quo condition of the system assets, and the future needs would be available. That level of detail is beyond the scope of this high-level City AMP however.

²⁰ As shown in the table, an average forecast replacement cost of about \$14.4M is predicted, based only the current rated condition of the assets.

City staff who have contributed information to the AMP have worked to identify specific asset needs and converted those needs to projects with identified costs for future work. Those future project costs have been included in this AMP, with the cooperation of the City Financial staff.

The future year forecast requirements were determined by identifying what the estimated replacement year for each asset is predicted to be following the criteria outlined in the Budget & Financial Needs Analysis section of this AMP beginning on page 31.

This includes the “past due” assets where the determined replacement year was 2020 or earlier – the replacement value for these assets has been added to the “backlog” sum. For the purposes of analysis the backlog value has been distributed over ten (10) years to be able to lessen the impact of trying to reduce the backlog at one time.

Figure 62 presents a graphical view of forecast asset replacement costs using the rated condition of the assets compared to a normal expected useful service life for the asset types, over a period of 25-years.

Using the distinction of Linear and Vertical assets for grouping assets, the following table summarizes the findings from the data. The values in the following table and graph do not correlate to the City budget, nor are they intended to. A number of other factors go into adapting the asset information into workable projects besides simply the remaining estimated service lifecycle.

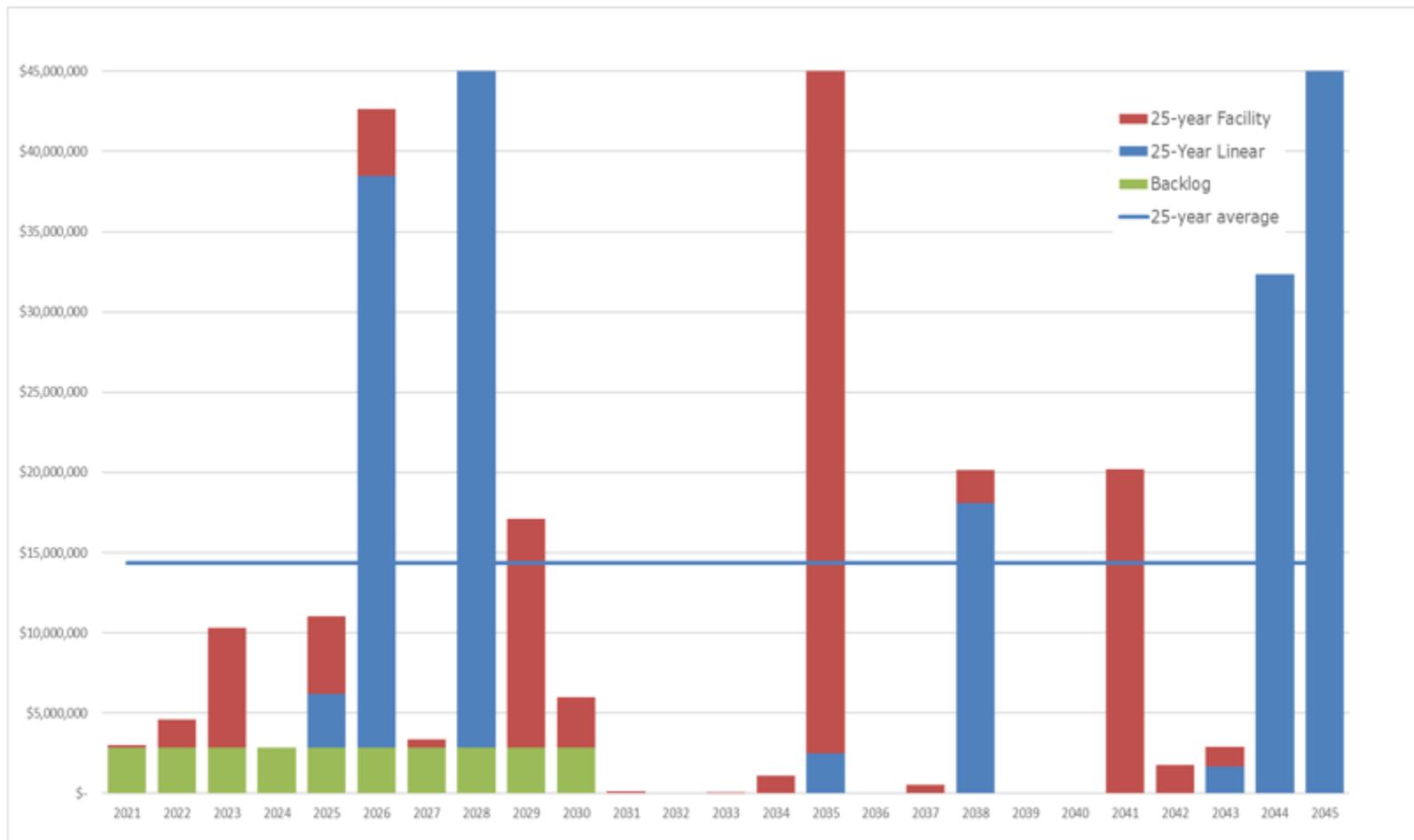
Table 33 - 25-Year financial summary for wastewater

Item	2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	in Year
Wastewater - Linear	\$28,748,172	\$194,185,583	\$7,767,423	\$52,375,670	2028
Wastewater - Facility	\$0	\$164,980,635	\$6,599,225	\$67,018,120	2035
Totals	\$28,748,172	\$359,166,217	\$14,366,649		

As shown in the table, an average forecast replacement cost of about \$14.4M is predicted, based only the current rated condition of the assets.

Note that these values represent only the estimated asset replacement costs, and do not represent any other costs that may be required in future years such as maintenance, non-infrastructure related studies, design and consulting fees or other. Major spikes in different years are identified as large numbers of assets reach their expected useful lifecycles around the same time periods.

Figure 50 – Forecast future replacement costs for wastewater based on asset remaining service life



Budget Analysis: Wastewater

The budget analysis encompasses the identified forecast annual requirements (based on current rated condition of the assets) plus the allowances for maintenance and expansion compared to the approved program of work funding as indicated in the 2021-2045 Capital Budget. An analysis including a contingency value was also completed.

A summary of the budget analysis is shown in Table 41 while a graph demonstrating the analysis results is shown in Figure 63.

The analysis also shows that the wastewater system assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$37.9M (including maintenance and growth).

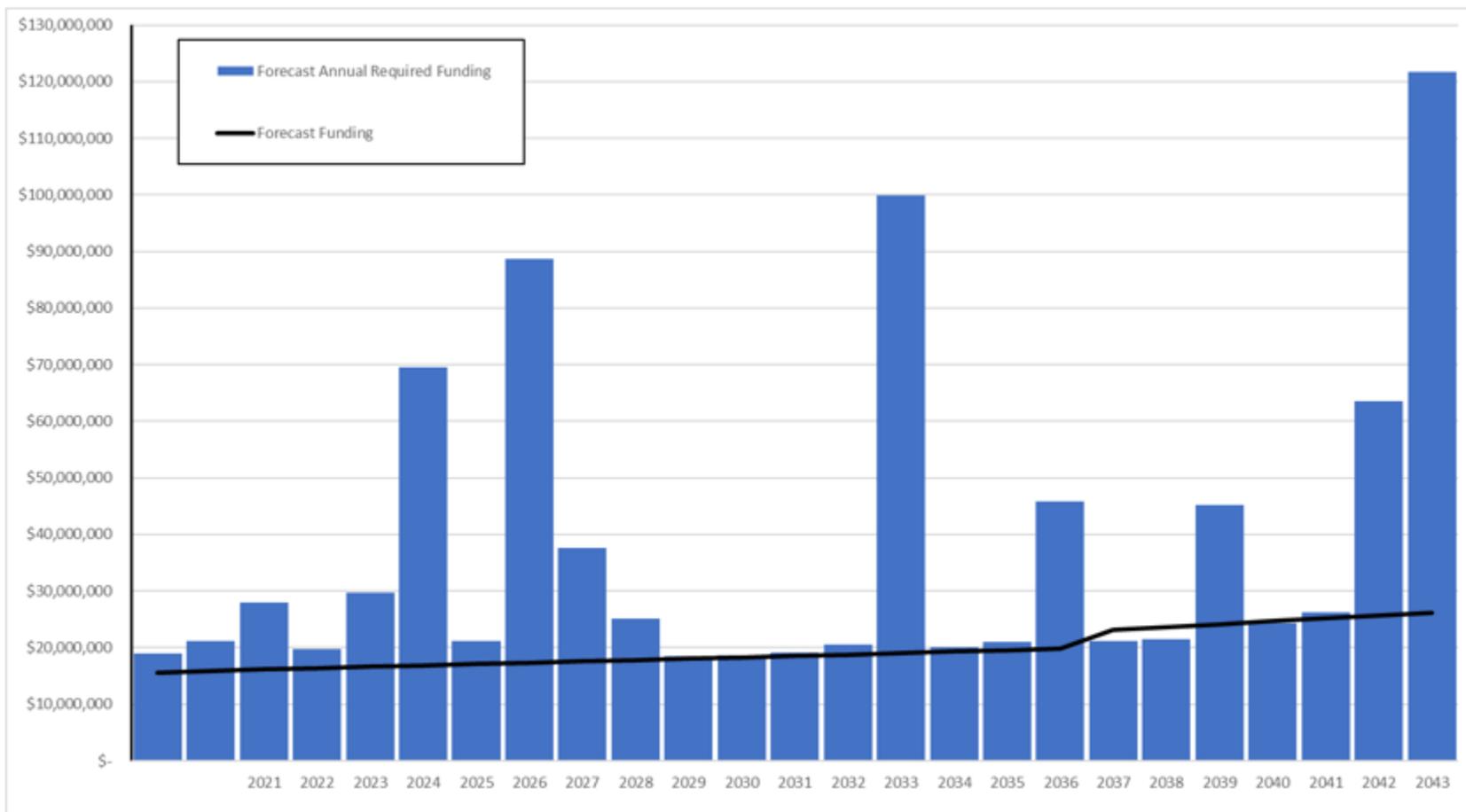
The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$18.2M.

Table 34 - 25-Year summary of financial review for wastewater

Total 25-Year Requirements	\$ 947,318,778	Annual Average	\$ 37,892,751
Total 25-Year Funding	\$ 491,531,604	Annual Average	\$ 19,661,264
		Annual Average Funding Gap	\$(18,231,487)

The financial review clearly demonstrates that the forecast funding levels are well below estimated requirements which will result in an increasing backlog of required work, and possibly impacts to the functionality of the system.

Figure 51 - 25-Year financial review of wastewater assets



Levels of Service

Physical assets exist to provide a service to the residents of Guelph. To be able to understand if the assets are delivering that service in accordance with expectations a series of metrics have been developed to help City staff with this analysis. Furthermore, the Government of Ontario has defined a set of metrics which the City is required to measure and report on. Understanding these metrics, and evaluating the performance of the assets over time will help the City to continuously meet the requirements of the residents.

O.Reg Requirements

As previously discussed O/Reg. 588/17 defines assets in the “wastewater” category as one of the five core asset types with mandated Levels of Service (LoS) metrics which must be reported on by July 1, 2021. The metrics for wastewater assets are described in Table 38.

While City staff have begun efforts to measure the City asset performance against the indicated metrics in the O.Reg, that work remains ongoing, and is not ready to be included in the AMP at this time. Available information is included in the table where possible.

Table 35 - O.Reg 588/17 LOS for Wastewater

Service attribute	Community levels of service (qualitative descriptions)	Technical levels of service (technical metrics)	
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system.	Percentage of properties connected to the municipal wastewater system.	At present, the data related to the wastewater system does not indicate the percentage of properties connected to the municipal system. According to staff there are 44,000 properties with a metered water connection. The same number of properties are connected to the City wastewater system.

Reliability	<ol style="list-style-type: none"> 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. 2. Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches. 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. 4. Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described in paragraph. 5. Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system. 	<ol style="list-style-type: none"> 1. The number 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. 2. The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system. 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. 	<p>At present the data available is not able to answer these questions. More analysis and data formatting will be required, and these efforts are under way.</p>
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City Defined Metrics

In addition to the O.Reg Level of Service Metrics, municipalities have been encouraged to develop their own set of metrics that can be used to measure and understand the performance of the assets. In early 2018 the City of Guelph began efforts to define a Levels of Service Framework, however, as of May 2018 the work ended but was not completed. As part of the analysis of this AMP the LOS Framework was shared with City staff responsible for managing the wastewater system assets. A review of this 2018 work by current staff revealed that much of that work was no longer considered suitable, and so the inclusion of the LOS review will be done at a later date.

Sustainability Analysis

Funding for the wastewater assets is intended to be provided entirely from user fees (i.e. rate based) with the target funding levels determined partly based on the analysis completed in the AMP. The following table indicates the sustainable funding target in 2020, compared to what was determined in 2017.

Table 36 - Sustainable funding target analysis

Funding	2017 Estimate	2020 Estimate	\$ Change
	24,600,000	17,305,200	-30%

In 2020 the wastewater data for the pipe network was based on the City GIS data, which has undergone continuous improvement since 2017. So the accuracy of the data can be considered much improved from 2017.

The 2017 analysis of the status-quo condition of the stormwater assets was purely aged based, where in 2020 quantitative condition assessment data was available that improved the analysis, meaning the assignment of replacement work in future years is better clarified than it was in 2017.

The WWTP facility data in 2020 is much more detailed than 2017. The facility data is based on a consultant led condition assessment in 2018/2019 that identified elemental details at the WWTP and provided a quantitative condition assessment for each element. Therefore the 2020 data is more detailed and more accurate than 2017, leading to higher confidence in the data compared to 2017. The use of accurate condition data present a more clear picture of the capital needs, so the reduction in the sustainable target funding level can be supported with good confidence.

There remain gaps in the data, primarily in the missing “lateral” pipes that connect the City wastewater mains to the customer facilities. This is being addressed in the GIS database, and when they are included there will be an increase in the total value of the water infrastructure, which in turn will have an impact to the sustainability funding target.

In summary, the data quality in 2020 is better than 2017, and so the sustainability analysis can be considered more accurate.

Summary and Conclusion

A high percentage of the wastewater assets are rated in “fair” condition or worse, indicating a system that is aging. There are no indications in the data that the system will not be able to treat wastewater in accordance with needs or expectations – in contrast all accounts indicate that the wastewater treatment system is functioning very well – there is a probability that simply due to aging assets some significant capital investment is going to be required in the period of time 10-years from today and beyond.

Wastewater Treatment and Biosolids Management Master Plan

At the time of writing this AMP the City has begun the process to update the wastewater treatment master plan. This new plan is intended to help the City ensure wastewater and biosolids management continues to be done effectively and efficiently, ensuring only clean water is returned to the environment, for the next 30-years. At present the City is working with a plan that was prepared in 2009 and while that plan has been effective, advances in treatment technologies, changes in infrastructure needs due to a growing City and legislation, a renewed focus on sustainable and cost efficient wastewater treatment concepts that mitigate climate change effects and contribute to reaching the City’s goal of using 100 per cent renewable energy sources by 2050 are all reasons that require the City to update its plan.

Because the new Master Plan is in the very early stages of development, it is not possible to identify any impacts from that work on this AMP. However as the City asset management practices evolve, increased coordination with wastewater management staff and correlating the master plan with any future AMPs is recommended.

Recommendations

1. The Water and Wastewater Long-Range Financial Plan should be referred to, and updated as needed, to guide the future decisions related to the management of the Wastewater System assets.

2. Detailed facility asset management plans – with greater detail than this AMP can provide – are recommended to be completed for the Wastewater Treatment Plant. Though no evidence has been identified that indicates there are maintenance or condition issues at the plant, this essential facility cannot be allowed to degrade to a point where it becomes incapable of meeting their desired levels of service.

NOTES:

Bibliography

Water Services Facility and Property Asset Management Plan, George Illaszewicz, M.A.Sc., P.Eng., PMP, ENV SP Project Manager, Infrastructure Management & Planning, WSP, April 21, 2017

7. Stormwater Collection

Service Area: Stormwater

Quick Facts

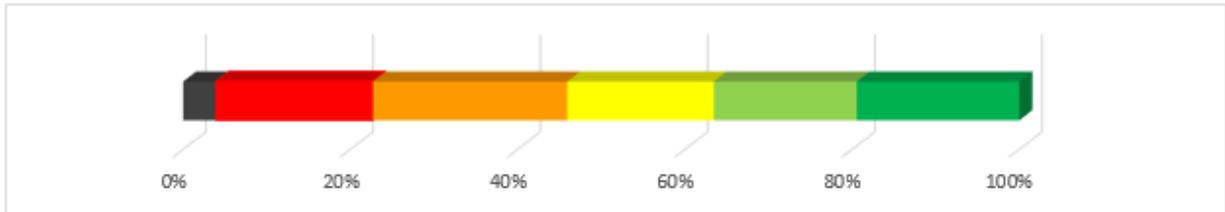
Table 37 - Overall summary of stormwater assets

Subclass	Total # records	Total Length (m)	Total CRV	% of inventory
Stormwater Pipe	9445 (pipe segments)	494,440	\$681,457,417	79.91%
Stormwater Channels	25	10,733	\$12,493,030	1.46%
Stormwater Culvert (<3m Span)	916	n/a	\$23,170,318	2.72%
Stormwater Oil And Grit Separator	187	n/a	\$2,098,808	0.25%
Stormwater Management Ponds	119	49,968	\$133,560,499	15.66%
		Total CRV for stormwater Asset class	\$852,780,071	100%
		Total identified backlog	\$33,681,938	
		Data Quality:		
		38%		

Figure 52 - Overall condition of stormwater assets by \$crv



Figure 53 - Condition of stormwater of assets by crv



State of the Infrastructure: Stormwater Assets

Managing rain water (storm water) is an important and effective step in reducing the risk of flooding, and the risk of damage to other infrastructure and assets within the City of Guelph.

It is also an important step in protecting the quality of the water in the natural aquifers from which the City draws its drinking water. The City has constructed an integrated series of stormwater collection ponds, channels, collection pipes and ancillary equipment that work to ensure the risks of flooding and damage are minimized.

The City of Guelph stormwater asset inventory can be broadly classed in two categories:

- Linear assets (i.e. pipes, culverts, channels etc.)
- Stormwater management ponds

Stormwater flows naturally to the management ponds and collection pipe network with no mechanical assistance (i.e. pumping stations) in use to facilitate the flow. Engineered oil and grit separators are located throughout the stormwater network to remove foreign objects and debris from being discharged to the natural waterways where the stormwater outflows are located.

While the City of Guelph owns and maintains the stormwater network much of the system has been constructed in partnership with private sector partners responsible for new residential and commercial development in the City. This work is done in accordance with City defined standards and specifications and helps offset initial high capital costs associated with constructing stormwater assets. The age of the assets in the stormwater network can be closely matched with the age of development of the different parts of the City.

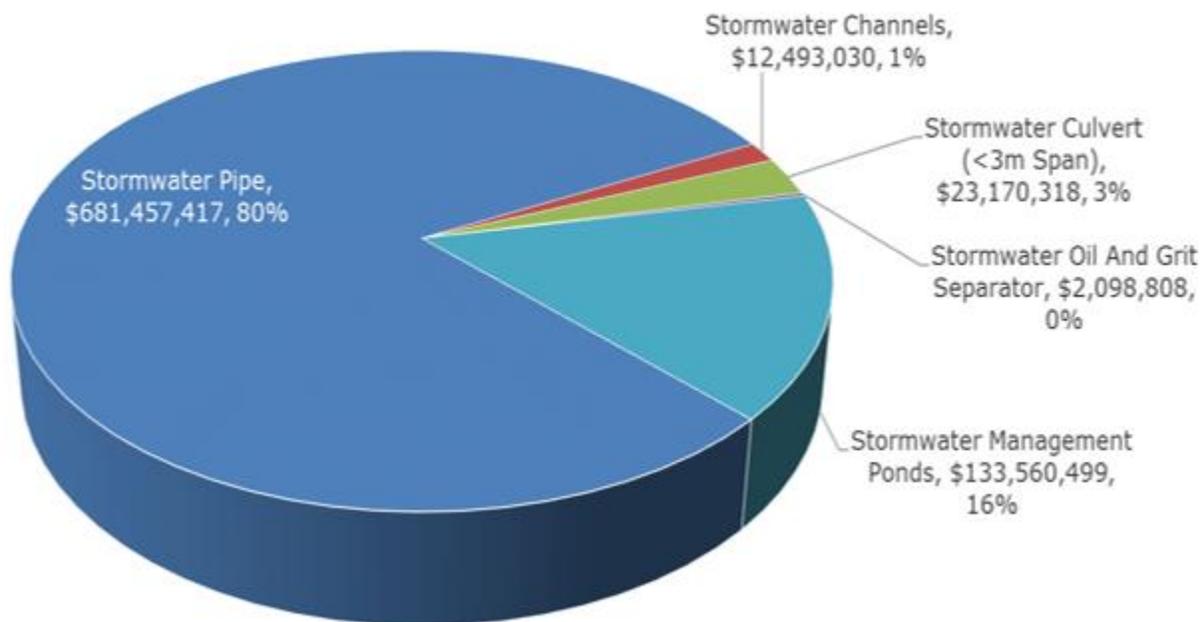
Further details and specifics regarding the inventory are outlined in following sections.

The stormwater collection pipe networks comprise the largest percentage of the stormwater asset base approximately 80% by replacement value of the total inventory, and a total of 495km of pipes.²¹ Stormwater management ponds comprise the next largest grouping of asset types with a value of about \$126M or 15.7% of the total, and 119 individual ponds identified. Other stormwater

²¹ Not included in the inventory of pipes are any lateral connections due to concerns with the quality of data regarding those items. City GIS staff advised that efforts are underway to mitigate these issues for future analysis

management equipment like oil and grit separators, and culverts²² complete the inventory. Refer to Figure 67.

Figure 54 - Classification of stormwater management areas by crv



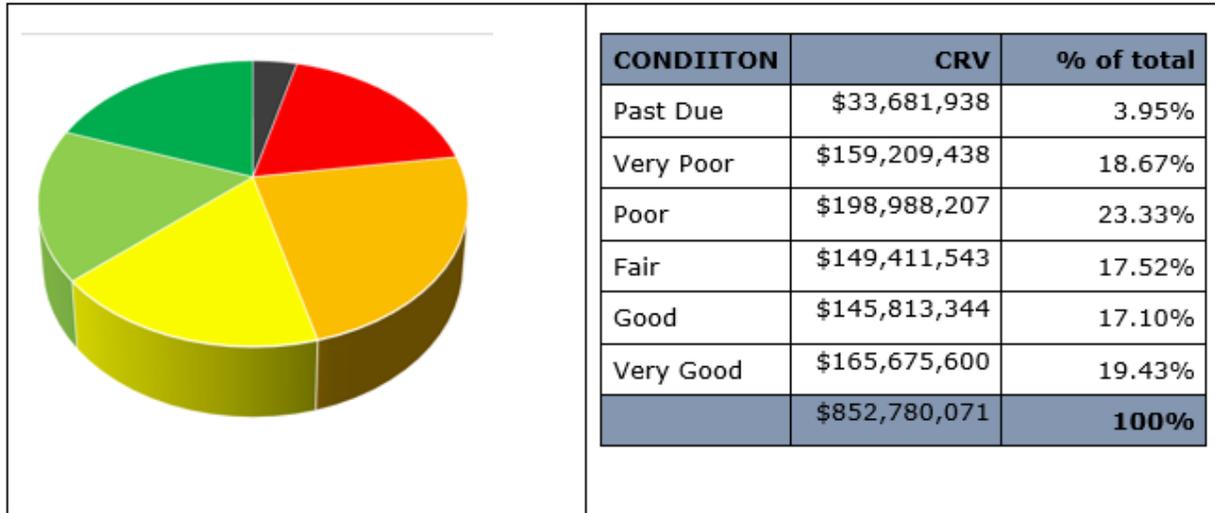
Overall, the inventory is considered in “FAIR” condition with an average condition score of 3.01 / 5.

A breakdown of the overall asset inventory by condition and replacement value is shown in Table 40 and Table 41.

²² Culverts with a diameter or width greater than 3m are included as a bridge type structure and included in the analysis of that asset class.

Asset Condition by Type

Figure 55 - Condition of stormwater assets by crv



About 4% of the assets with an estimated replacement value of \$31.8M are of an age where they are considered "Past Due", or older than what a normal expected service lifecycle would be. This does not necessarily indicate that these asset no longer function, but it does indicate that within the short term future these assets may require replacement or significant rehabilitation to ensure continued long-term function in accordance with required service levels. Further to this, a total of \$338M worth of assets are considered in "Very Poor" or "Poor" condition. Combined with the assets in "Past Due" condition this represents a total of \$370M worth of assets may require replacement or rehabilitation in the short to mid-term future time period.

Table 38 - Condition of stormwater asset types by crv

	Past Due	Very Poor	Poor	Fair	Good	Very Good
stormwater Pipe (\$)	\$0	\$127,223,218	\$142,538,756	\$130,147,309	\$127,211,001	\$154,337,133
stormwater Pipe (%)	0.00%	18.67%	20.92%	19.10%	18.67%	22.65%
stormwater Channels (\$)	\$0	\$2,823,362	\$2,855,136	\$1,616,472	\$2,099,438	\$3,098,621
stormwater Channels (%)	0.00%	22.60%	22.85%	12.94%	16.80%	24.80%
stormwater Culvert (<3m Span) (\$)	\$0	\$4,706,696	\$3,896,341	\$3,955,005	\$6,098,655	\$4,513,620
stormwater Culvert (<3m Span) (%)	0.00%	20.31%	16.82%	17.07%	26.32%	19.48%

	Past Due	Very Poor	Poor	Fair	Good	Very Good
stormwater Oil And Grit Separator (\$)	\$11,224	\$886,662	\$314,260	\$224,471	\$303,036	\$359,154
stormwater Oil And Grit Separator (%)	0.53%	42.25%	14.97%	10.70%	14.44%	17.11%
stormwater Management Ponds (\$)	\$33,670,714	\$23,569,500	\$49,383,714	\$13,468,286	\$10,101,214	\$3,367,071
stormwater Management Ponds (%)	25.21%	17.65%	36.97%	10.08%	7.56%	2.52%
Totals (\$)	\$33,681,938	\$159,209,438	\$198,988,207	\$149,411,543	\$145,813,344	\$165,675,600
Totals (%)	3.95%	18.67%	23.33%	17.52%	17.10%	19.43%

Figure 56 - Condition of asset types, by crv

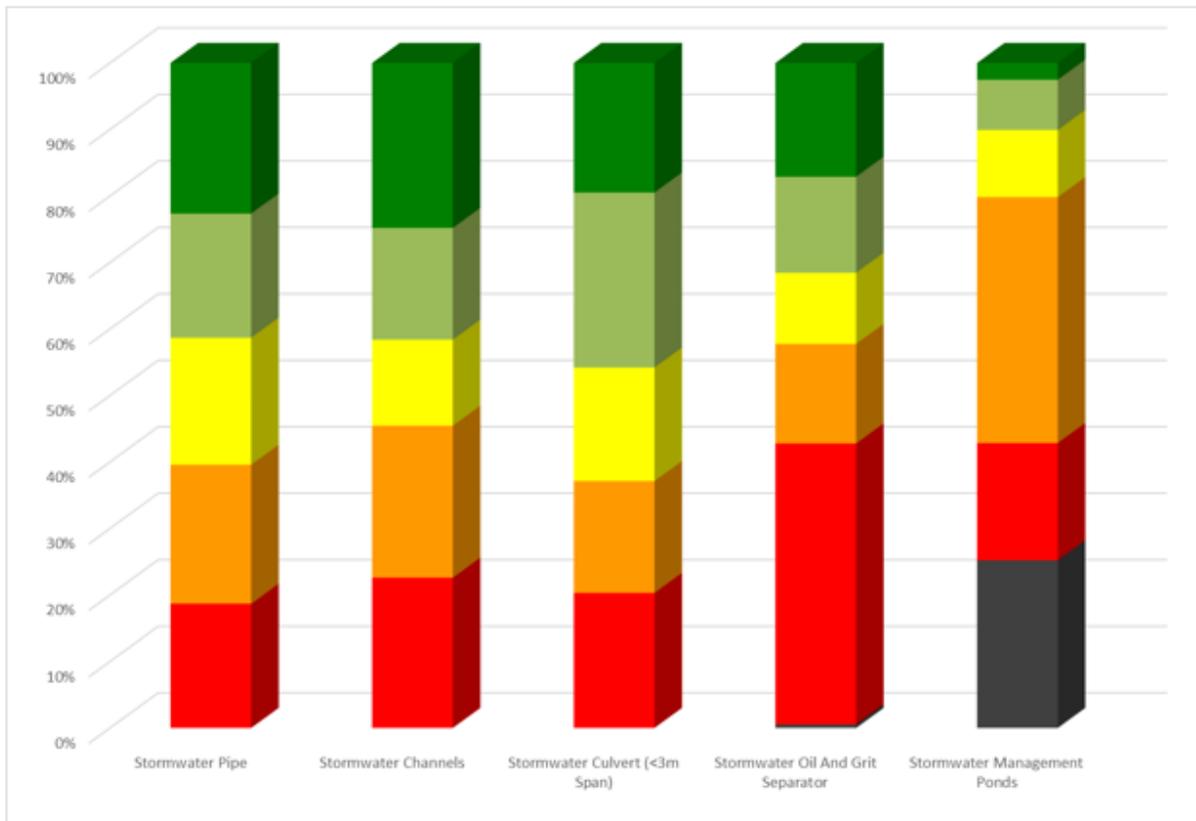
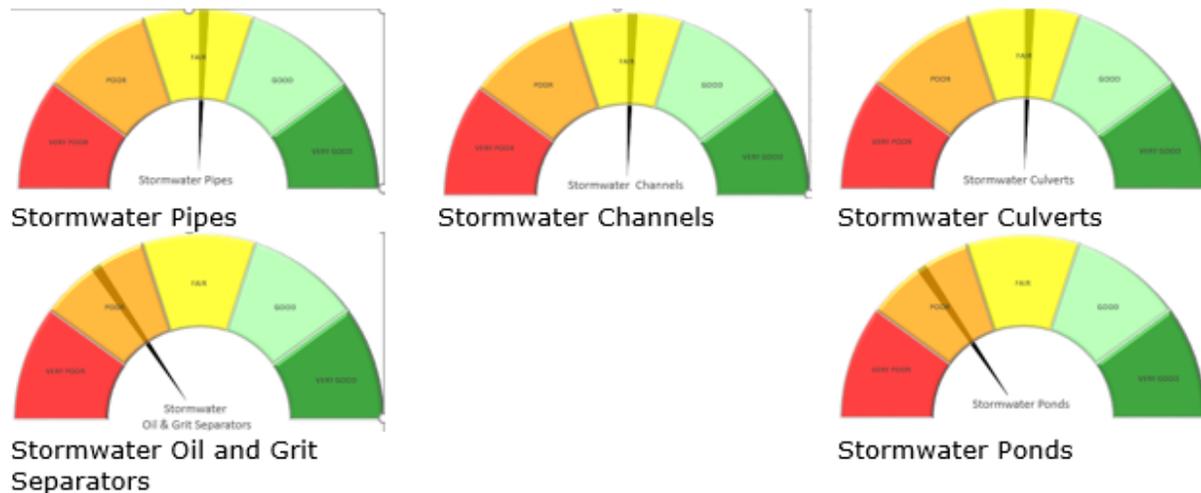


Figure 69 provides a visual image of the condition of the asset types based on CRV with the actual values listed in Table 47, while in Figure 72, the average condition of each asset type is displayed. With the exception of the stormwater Management Ponds, the asset conditions are relatively evenly distributed, implying that the assets are aging and degrading in condition per normal expectations. Stormwater management ponds are the only asset type with a significant number of the assets in “past due” condition. The reason for this is unknown, however, as will be shown in the next section, the estimated normal useful lifecycle for these asset types may be incorrectly estimated.

Figure 57 - Average condition of stormwater assets by type



The stormwater assets are all physical in nature, and as a result suffer from normal degradation in condition that are typical of physical assets. Typical deficiencies associated with age generally include:

- Degradation of materials due to aging (i.e. normal wear and tear)
- Insufficient capacity due to increased demand or load on the systems
- Degradation of materials due to external sources like tree root impact, poor workmanship etc.

As detailed quantitative condition information was not available it is not possible to review potential causes for degradation other than normal aging. It is to be expected though that some of the needed repair or rehabilitation work for the stormwater system will most certainly be due to the impacts of non-aging events or changes in the levels of service required compared to what the original levels of service required when the assets were first constructed.

Asset Ages

The average age of the stormwater assets is 34.37 years, however this value must be considered in the context of the different asset types in the category, compared to the typical expected useful lifecycle of each asset type. Stormwater pipes have a typical average useful life expectancy of about 78.4 years with the expected life of each pipe segment very dependent on the material each pipe segment is made of. With an average age of about 35 years the stormwater pipes are well within an expected useful lifecycle, which is matched with the resulting overall average condition described previously. The other minor linear asset types (culverts, oil and grit separators) are also on average of an age well below the typical useful lifecycle for these asset types.

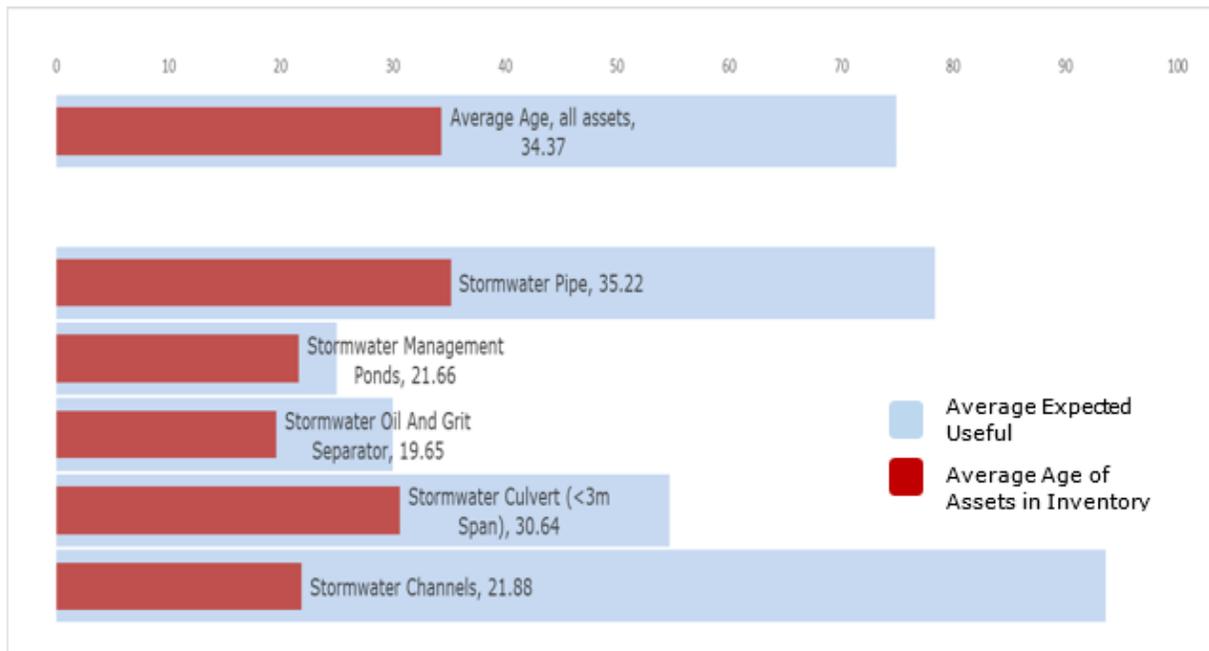
In summary this data represents an asset base that is on average aging normally, with no major points of concern beyond normal replacement and rehabilitation needs required.

The stormwater channels are also of an age where no concerns are identified with an average age of 21.88 years compared to an expected lifecycle of 93.6 years. The stormwater management ponds however do present an issue: the average age of the ponds is 21.66 years compared to an expected lifecycle of 25 years. In other words the ponds are on average 86.6% through an expected lifecycle, implying that within the 3-6 years significant work could be expected to ensure continued long term functionality of these important assets.

Table 39 - Average age of stormwater assets

Asset Type	Average Age	EUL (avg.)
stormwater Channels	21.88	93.60
stormwater Culvert (<3m Span)	30.64	54.68
stormwater Oil And Grit Separator	19.65	30.00
stormwater Management Ponds	21.66	25.00
stormwater Pipe	35.22	78.38
Average Age, all Assets	34.37	

Figure 58 - Average age of stormwater assets by class



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific assets, nor specific projects or actions required to correct any deficiencies - this is not the purpose of a high-level AMP.

City staff who have contributed information to the AMP have worked to identify specific asset needs and converted those needs to projects with identified costs for future work. Those future project costs have been included in this AMP, with the cooperation of the City Financial staff.

The future year forecast requirements were determined by identifying what the estimated replacement year for each asset is predicted to be following the criteria outlined in the Budget & Financial Needs Analysis section of this AMP beginning on page 31.

This includes the “past due” assets where the determined replacement year was 2020 or earlier – the replacement value for these assets has been added to the “backlog” sum. For the purposes of analysis the backlog value has been distributed over ten (10) years to be able to lessen the impact of trying to reduce the backlog at one time.

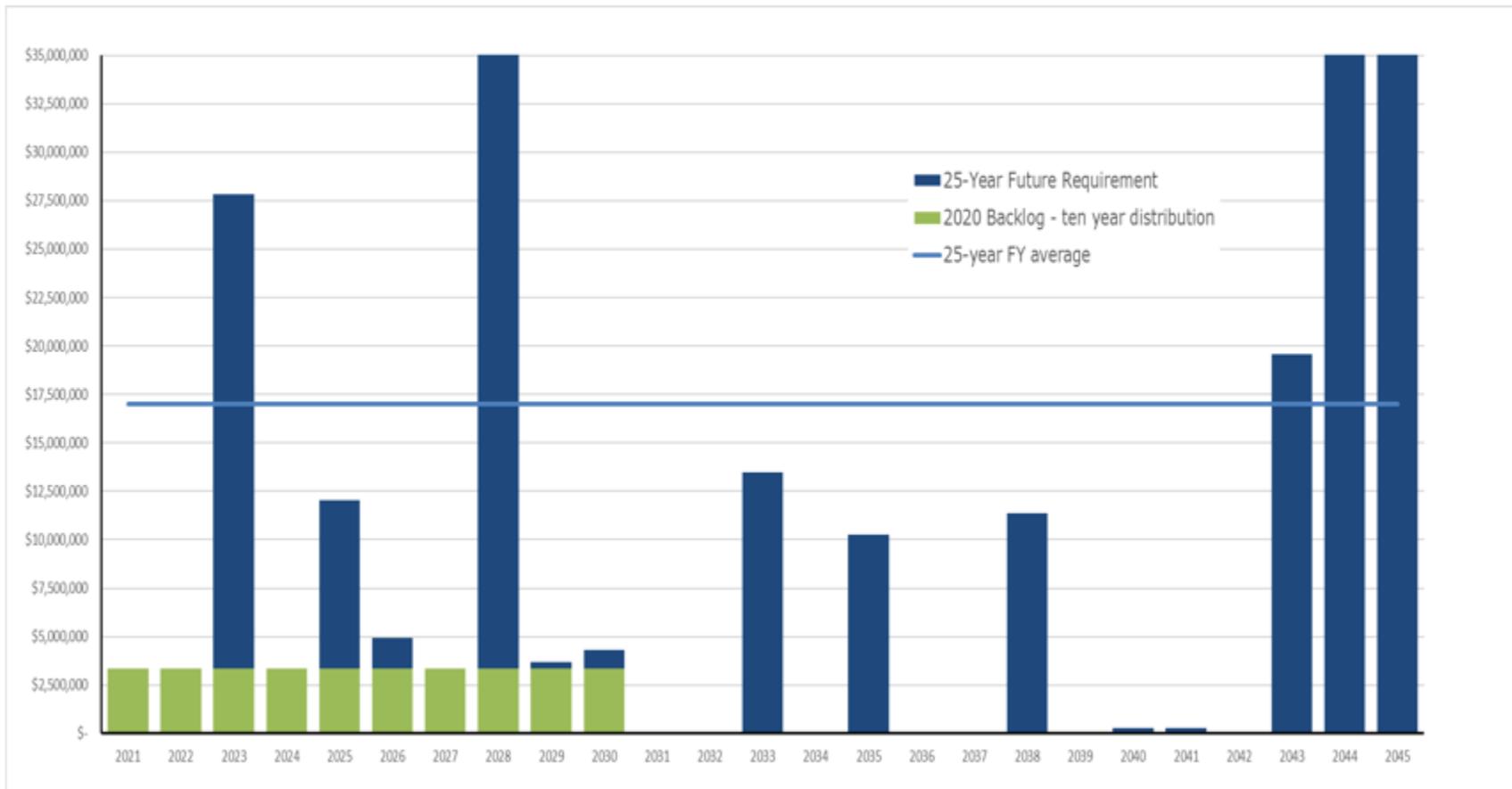
This information is summarized in the following table, and Figure 59.

Table 40 - 25-Year Forecast Requirements by RSL

2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	in Year
\$33,681,938	\$425,583,461	\$17,023,338	\$172,654,209	2028

Note that these values represent only the estimated asset replacement costs, and do not represent any other costs that may be required in future years such as non-infrastructure related studies, design and consulting fees or other.

Figure 60 - 25-Year replacement forecast for stormwater assets based on rated condition



Budget Analysis: Stormwater

The budget analysis encompasses the identified forecast annual requirements (based on current rated condition of the assets) plus the allowances for maintenance and expansion compared to the approved program of work funding as indicated in the 2021-2045 Capital Budget. An analysis including a contingency value was also completed.

A summary of the budget analysis is shown in Table 50 while a graph demonstrating the analysis results is shown in Figure 77.

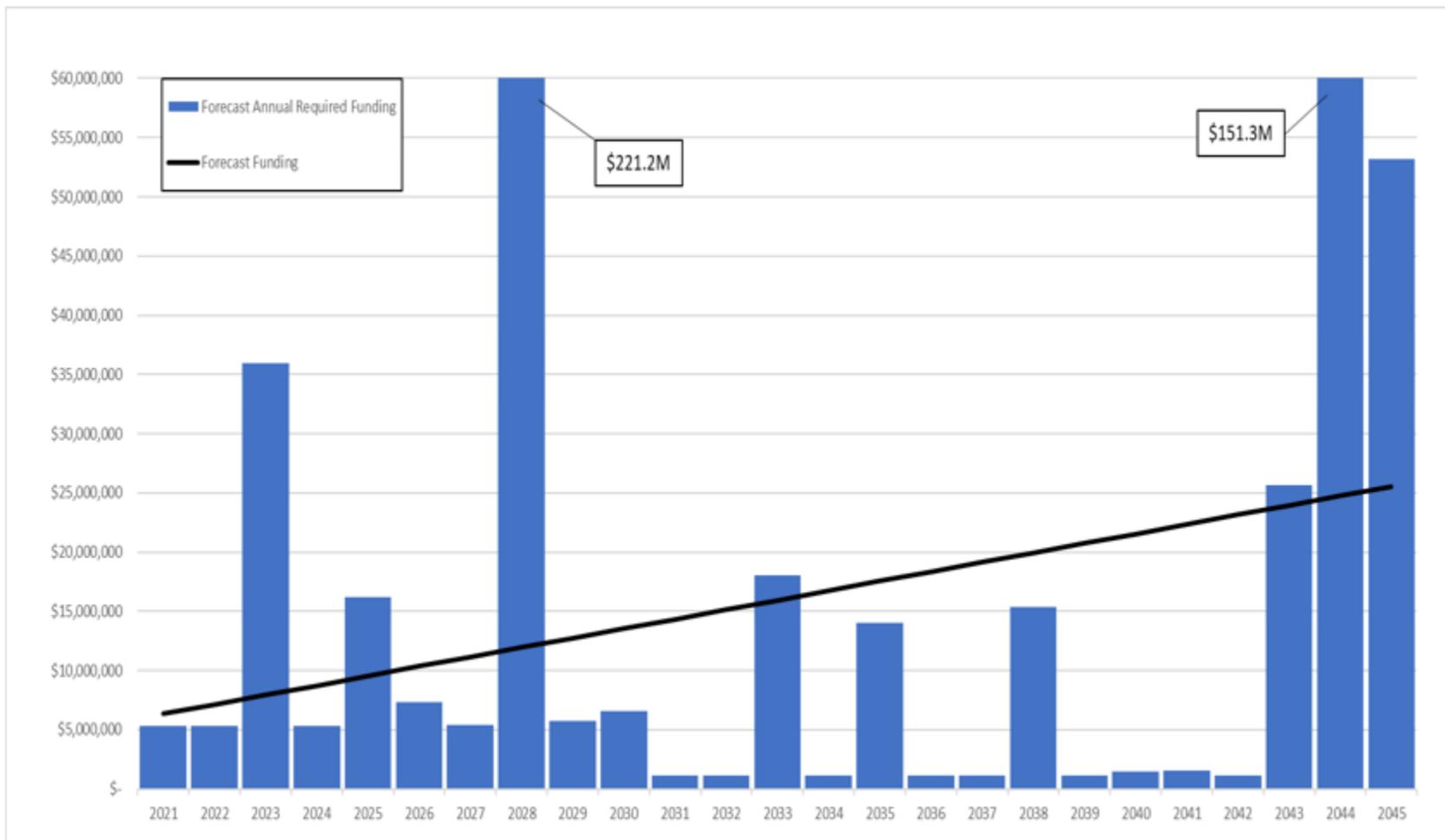
The analysis also shows that the stormwater assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$24.1M (including maintenance and growth).

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$8.2M.

Table 41 - 25-Year Financial Review Summary for Stormwater

Total 25-Year Requirements	\$603,188,459	Annual Average	\$ 24,127,538
Total 25-Year Funding	\$398,650,000	Annual Average	\$ 15,946,000
		Annual Average Funding Gap	\$ (8,181,538)

Figure 61 - 25-Year Financial Analysis for Stormwater



Levels of Service

Physical assets exist to provide a service to the residents of Guelph. To be able to understand if the assets are delivering that service in accordance with expectations a series of metrics have been developed to help City staff with this analysis. Furthermore, the Government of Ontario has defined a set of metrics which the City is required to measure and report on. Understanding these metrics, and evaluating the performance of the assets over time will help the City to continuously meet the requirements of the residents.

O.Reg Requirements

As previously discussed O/Reg. 588/17 defines assets in the “stormwater” category as one of the five core asset types with mandated Levels of Service (LoS) metrics which must be reported on by July 1, 2021. The metrics for stormwater are described in Table 52.

While City staff have begun efforts to measure the City asset performance against the indicated metrics in the O.Reg, that work remains ongoing, and is not ready to be included in the AMP at this time. Available information is included in the table where possible.

Table 42 - O.Reg LOS requirements for stormwater assets

Service attribute	Community levels of service (qualitative descriptions)	Technical levels of service (technical metrics)	
Scope	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.	<ol style="list-style-type: none"> 1. Percentage of properties in municipality resilient to a 100-year storm. 2. Percentage of the municipal stormwater management system resilient to a 5-year storm. 	<p>Staff reviewed these requirements but were unable to provide results in time for publication: to be able to answer the question will require a very detailed hydrological analysis. CAM staff will continue efforts to answer this question.</p>

City staff reviewed the O.Reg requirements but advised that to be able to answer the indicated question would require a very thorough hydrological analysis for the entire City. This data was not available at present, but efforts to develop in future years will be examined.

City Defined Metrics

In addition to the O.Reg Level of Service Metrics, municipalities have been encouraged to develop their own set of metrics that can be used to measure and understand the performance of the assets. In early 2018 the City of Guelph began efforts to define a Levels of Service Framework, however, as of May 2018 the work ended but was not completed. As part of the analysis of this AMP the LOS Framework was shared with City staff responsible for managing the stormwater assets. Many of the metrics identified in 2018 were considered not possible to answer in the short time available to prepare the AMP and so these will be addressed at a later date.

Sustainability Analysis

Funding for the stormwater assets is intended to be provided entirely from user fees (i.e. rate based) with the target funding levels determined partly based on the analysis completed in the AMP. The following table indicates the sustainable funding target in 2020, compared to what was determined in 2017.

Table 43 - Sustainable funding target analysis

Funding	2017 Estimate	2020 Estimate	\$ Change
	11,100,000	19,576,800	+76%

In 2017 the stormwater data was incomplete – there were about 530 records with descriptions representing major assets with no replacement value assigned, so in the sustainability analysis that year those missing records would not have been identified as an asset to be included. As discussed elsewhere, the majority of the data used in the 2020 AMP was sourced from the City GIS database which itself has been continuously updated. This has resulted in a refined and improved stormwater asset inventory.

The 2017 analysis of the status-quo condition of the stormwater assets was purely aged based, where in 2020 quantitative condition assessment data was available that improved the analysis, meaning the assignment of replacement work in future years is better clarified than it was in 2017.

There remain gaps in the stormwater data that require improvement, particularly with regards to the expected useful remaining lifecycle for some of the asset types,

as well as the replacement costs. A review of these values will be completed in the near future which will add further clarity to the funding analysis.

While the analysis shows that the sustainable funding target for stormwater assets has increased by 76%, In summary, the data quality in 2020 is better than 2017, and so the analysis can be considered more accurate.

Summary and Conclusion

The condition and ages of the stormwater assets are relatively equally distributed. This implies that the system assets are aging normally, and therefore regular periods and cycles of replacement and rehabilitation work can be expected in the future. Stormwater assets also typically have low maintenance requirements, and this also is represented in the analysis.

The financial review shows that there are major challenges with respect to funding the identified required work to sustain the system to its current level of functionality.

Recommendations

1. Continue improving asset data through concise centralized asset inventory
2. Address Stormwater Management Pond data to ensure accuracy with costing and lifecycles, this will be address through the Natural Asset Inventory Project.

8. Administration and Operations Facilities

Service Area: City of Guelph Administrative and Operations Facilities

Quick Facts

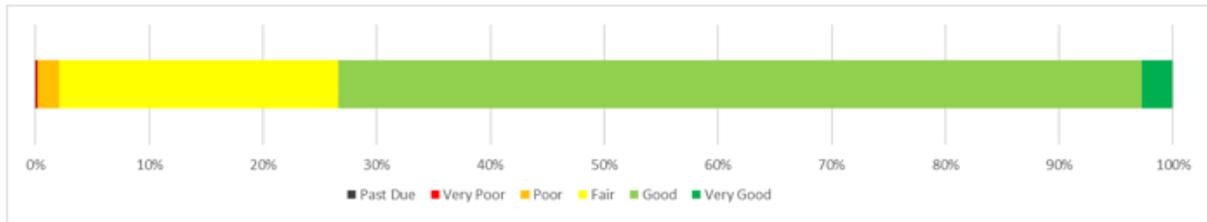
Table 44 - Overall Summary of Administrative and Operations Facilities

Corporate Administration	Replacement Cost
City Hall	\$78,219,459
City Hall Annex	\$3,245,320
Provincial Offences Courthouse	\$30,355,646
Others	\$8,164,142
Corporate Administration Total CRV	\$119,984,567
CITY OPERATIONS	
Public Works Operations 45 Municipal St.	\$13,873,398
Public Works Operations 50 Municipal Street	\$14,217,224
Others	542,240
City Operations Total CRV	\$28,632,862
COMMERCIAL	
Various	\$4,492,668
Total Administrative and Operations Facilities CRV	\$153,110,097
Identified 2020 Backlog	\$0
Data Quality: 40%	

Figure 62 - Overall condition of City administrative and operations facilities by crv



Figure 63 - Condition of City administrative and operations facilities assets by crv



State of the Infrastructure: City Administration and Operations Facilities

A city government, like all organizations, requires facilities from which staff can work to manage and implement the various city Services and operations. Additionally City residents require a central location where they can access these Services, and the City Council requires a formal place to host their meetings, which of course must be accessible to the residents.

Each of the various service delivery areas of the City of Guelph have their own facilities from which their respective operations can be delivered. There remain a set of facilities that are not part of one specific service area. The City has designated these remaining facilities in one of three categories:

City Administrative (City Hall and Annex, the Drill Hall and the Provincial Offences Courthouse)

City Operations (45 and 50 Municipal Street, each site with multiple buildings)

Commercial (Farmer's Market, Community Pottery Centre, The Boathouse)

The buildings located at these facilities range in age, style and function. The common denominator is that management of these facilities does not fall under a specific service area. For the purpose of the AMP, their needs are analyzed as a unique category

A single building is composed of hundreds or thousands of component and elements – assets in their own – , each of which has unique lifecycle needs and characteristics. This AMP is not intended to examine the detail of each of those components, but to examine the needs of the facilities at a high level. A BCA report for a specific building should provide the detail at the component and element level. A normal method of evaluating a building or facility is to use the "Facility Condition Index" (FCI)²³ defined as:

$$\text{FCI} = \frac{\text{\$deferred maintenance costs}}{\text{\$facility replacement costs}}$$

Given the format and arrangement of the data used, calculating the FCI for each facility was not possible. Instead, an average condition rating for the facility based on the condition of each identified component at that facility. This is not ideal, as certain component types are more critical than others and so should be weighted accordingly, but in the absence of other data this is the best method available.

²³ See https://www.assetinsights.net/Glossary/G_Facility_Condition_Index.html for more detailed background on the FCI

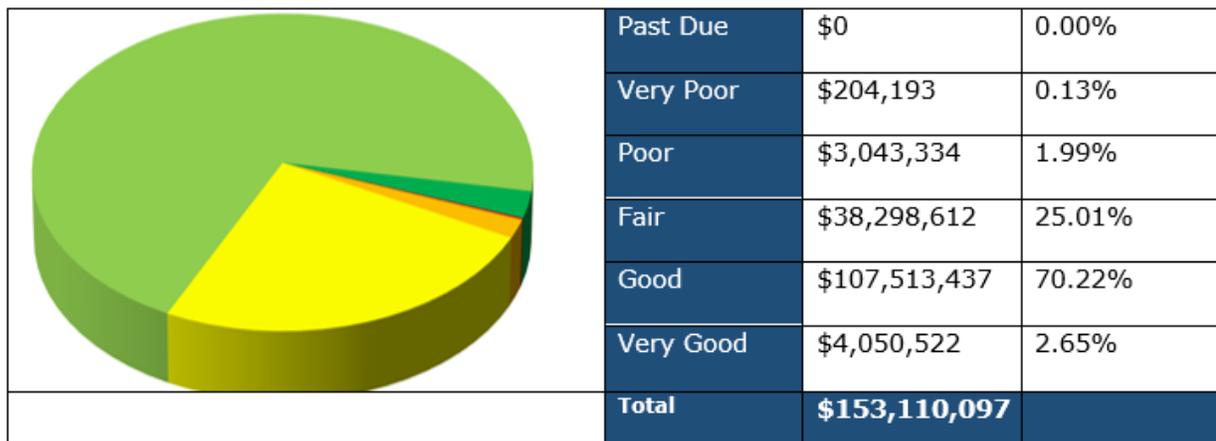
Buildings are unique among the different asset types owned by the City in that some building component types have lifecycles that are easy to predict, but tend to be shorter in time. These include major building components like roofs, HVAC equipment and interior finishes. Other components, like the structural assemblies and exterior finishes can have a lifecycle 75 years or beyond. As evidenced by some of the buildings in the City portfolio it is not uncommon for these components to last 150 years or longer with regular maintenance.

Overall, the buildings and facilities are generally considered just within the “good” condition range, with no major defects or needs identified, only normal lifecycle maintenance and rehabilitation needs. The average condition score for the City Administrative and Operations buildings was calculated to be 3.65 / 5.

Asset Condition by Type

A breakdown of the overall asset inventory by condition and replacement value is shown in Figure 81.

Figure 64 - Condition of administration and operations facilities by crv



More than 97% of the components that comprise the various facilities are rated in “fair” or better condition. This shows excellent maintenance practices in place given the age of many of the components. The above is a very broad analysis, and while it provides a general picture of the asset inventory, only by examining the assets on a per-type basis will a more effective picture of the state of the assets be presented.

The information in Figure 81 displays the condition rating of the facility type by CRV. This table and the corresponding chart clearly demonstrates that most of the components and elements comprising the facilities are in good working condition.

Table 45 - Condition of administration and operational facility assets by type

Category	Past Due	Very Poor	Poor	Fair	Good	Very Good
City Admin & Operations	\$0	\$169,232	\$1,904,226	\$26,868,106	\$87,129,488	\$3,913,515
% of total Category	0.00%	0.14%	1.59%	22.39%	72.62%	3.26%
Commercial	\$0	\$34,961	\$236,085	\$1,868,664	\$2,215,951	\$137,007
% of total Category	0.00%	0.78%	5.25%	41.59%	49.32%	3.05%
City Operations	\$0	\$0	\$903,023	\$9,561,842	\$18,167,997	\$0
% of total Category	0.00%	0.00%	3.15%	33.39%	63.45%	0.00%
Totals	\$0	\$204,193	\$3,043,334	\$38,298,612	\$107,513,437	\$4,050,522
% of Total	0.00%	0.13%	1.99%	25.01%	70.22%	2.65%

Figure 65 - Condition of administration and operation asset types by crv

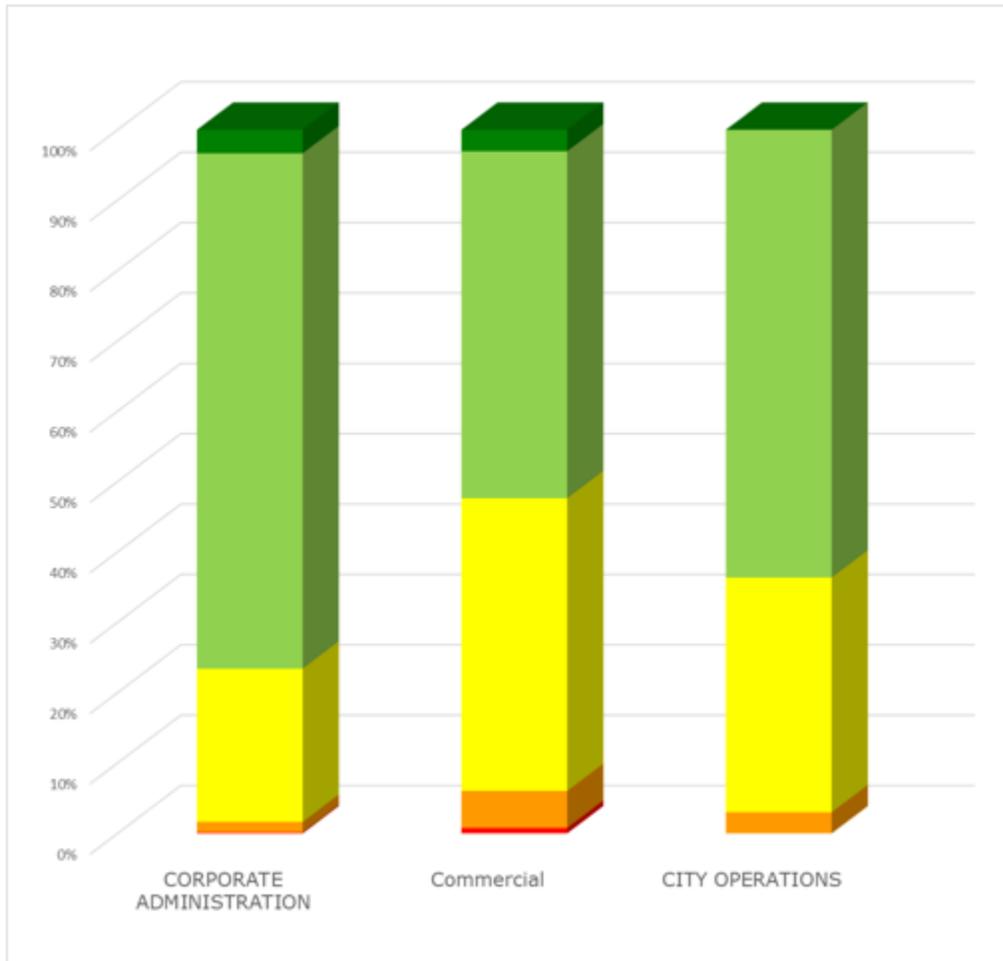


Figure 66 - Average condition of administrative and operations facilities assets by category



As demonstrated by indicators in Figure 84, all of the asset types within the Administrative and Operations Facilities Assets category have an average condition of “good”. This indicates that good maintenance and rehabilitation practices are in

place. Assets that comprise a facility are all physical in nature, and as a result suffer from normal degradation in condition that are typical of physical assets. Unlike some other asset categories the behavior of building and facility components is very well understood. Typical deficiencies that would be found are:

- Degradation of materials due to aging (i.e. normal wear and tear)
- Electro-mechanical failures
- Degradation of materials due to external sources like tree root impact, poor workmanship etc.

Another aspect that should be examined with regards to condition of the facility assets relates to their performance: are the facilities, and their inherent components continuing to perform to their original design function, and/or has the original design function changed requiring a change to the facility? For example, Building Code amendments or other legislative changes may require physical updates to a facility such as the inclusion of design features to ensure the entire facility is accessible to persons requiring assistance.

There is currently insufficient information in the asset data to address questions regarding the performance of the assets relative to their original and/or evolving functions. The types of changes required to address changing performance needs often require more resources than ensuring the physical condition of the asset is maintained. As the asset data continues to mature and become more complete it is intended that future iterations of the AMP will address the question of asset capability performance in more detail.

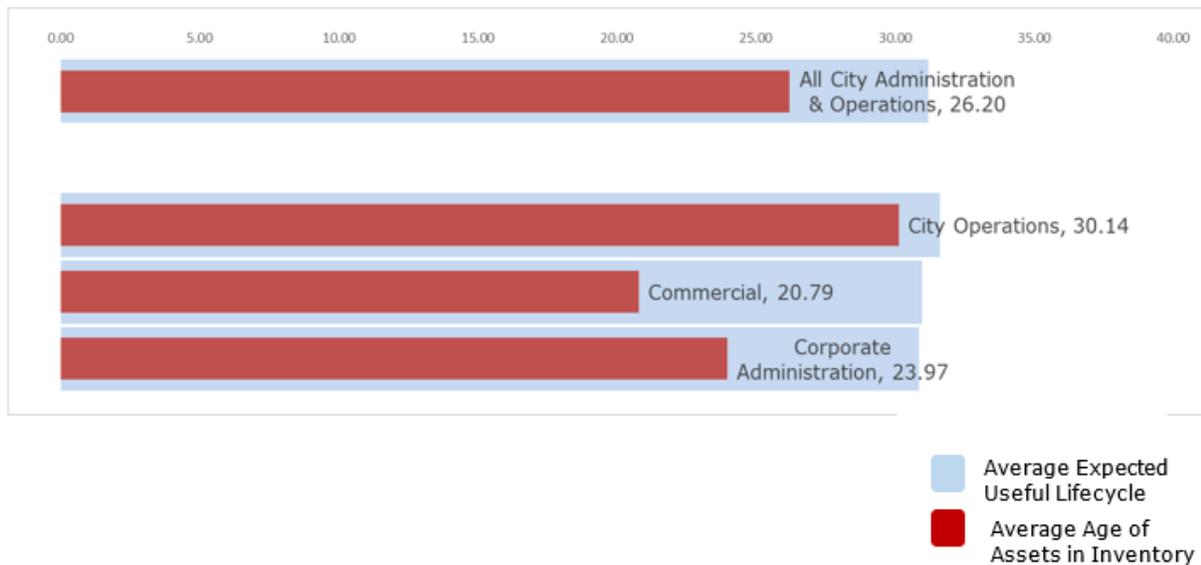
Asset Ages

The average age of the Administrative and Operations Facilities assets is slightly more than 24years, however this value must be considered in the context of the different asset types and components that comprise a facility or building, compared to the typical expected useful lifecycle of each asset type.

Table 46 - Administration and city operations facilities average ages

Class	Average Age	Average EUL
Corporate Administration	23.97	30.88
Commercial	20.79	30.97
City Operations	30.14	31.62
All City Administration & Operations	26.20	31.21

Figure 67 - Average age of administrative and operations facilities assets by class



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific assets, nor specific projects or actions required to correct any deficiencies - this is not the purpose of a high-level AMP. This information was collected as part of the 2018/19 BCA reports: for complete details of any facility or building those reports should be referenced.

City staff who have contributed information to the AMP have worked to identify specific asset needs and converted those needs to projects with identified costs for future work. Those future project costs have been included in this AMP, with the cooperation of the City Financial staff. A series of specific projects have been identified and included in the annual budget planning exercises.

The future year forecast requirements were determined by identifying what the estimated replacement year for each asset is predicted to be following the criteria outlined in the Budget & Financial Needs Analysis section of this AMP beginning on page 31.

This includes the “past due” assets where the determined replacement year was 2020 or earlier which in the case of the Administrative Facilities is not relevant.

Table 58 outlines the forecast asset replacement costs using the rated condition of the assets over a period of 25-years.

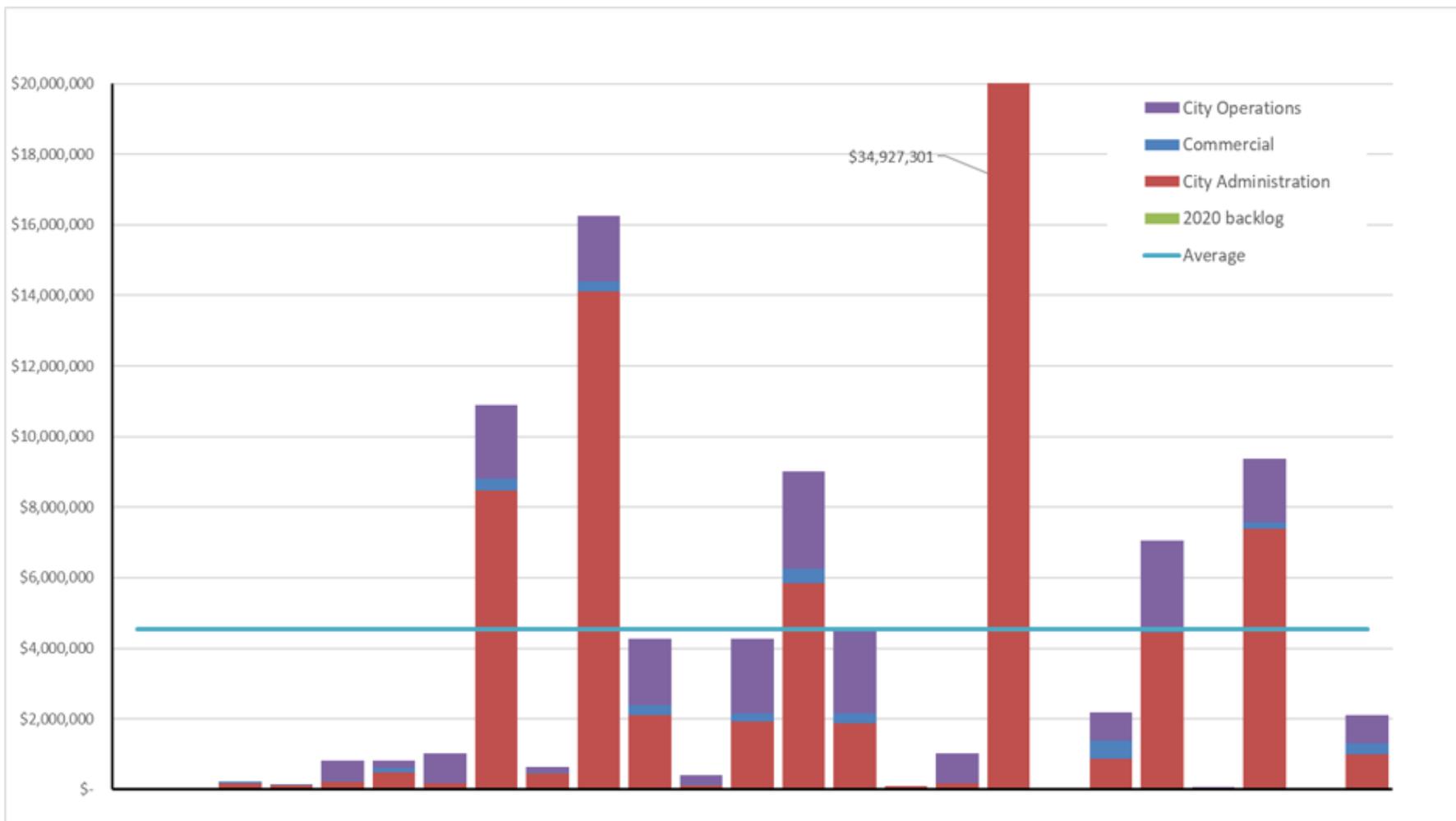
Table 47 - Administration and operations facilities forecast requirements by RSL

	2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	in Year
Corporate Administration	\$0	\$85,041,453	\$3,401,658	\$34,927,301	2038
Commercial	\$0	\$3,610,152	\$144,406	\$510,729	2040
City Operations	\$0	\$24,664,443	\$986,578	\$2,757,004	2034
Totals	\$0	\$113,316,048	\$4,532,642		

As shown in the table, a 25-year total forecast requirement of \$113.3M for an average of \$4.5M per year.

Note that these values represent only the estimated asset replacement costs, and do not represent any other costs that may be required in future years such as maintenance, non-infrastructure related studies, design and consulting fees or other. Major spikes in 2027 and 2045 are identified as large numbers of assets reach their expected useful lifecycles around those two years.

Figure 68 - Forecast future replacement costs based on asset remaining service life



Budget Analysis: Administration and Operational Facilities

The budget analysis encompasses the identified forecast annual requirements (based on current rated condition of the assets) plus the allowances for maintenance and expansion compared to the approved program of work funding as indicated in the 2021-2045 Capital Budget. An analysis including a contingency value was also completed.

A summary of the budget analysis is shown in the analysis also shows that the administration and operational facilities assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$10.6M (including maintenance and growth).

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$4.6M.

Table 51 while a graph demonstrating the analysis results is shown in Figure 52.

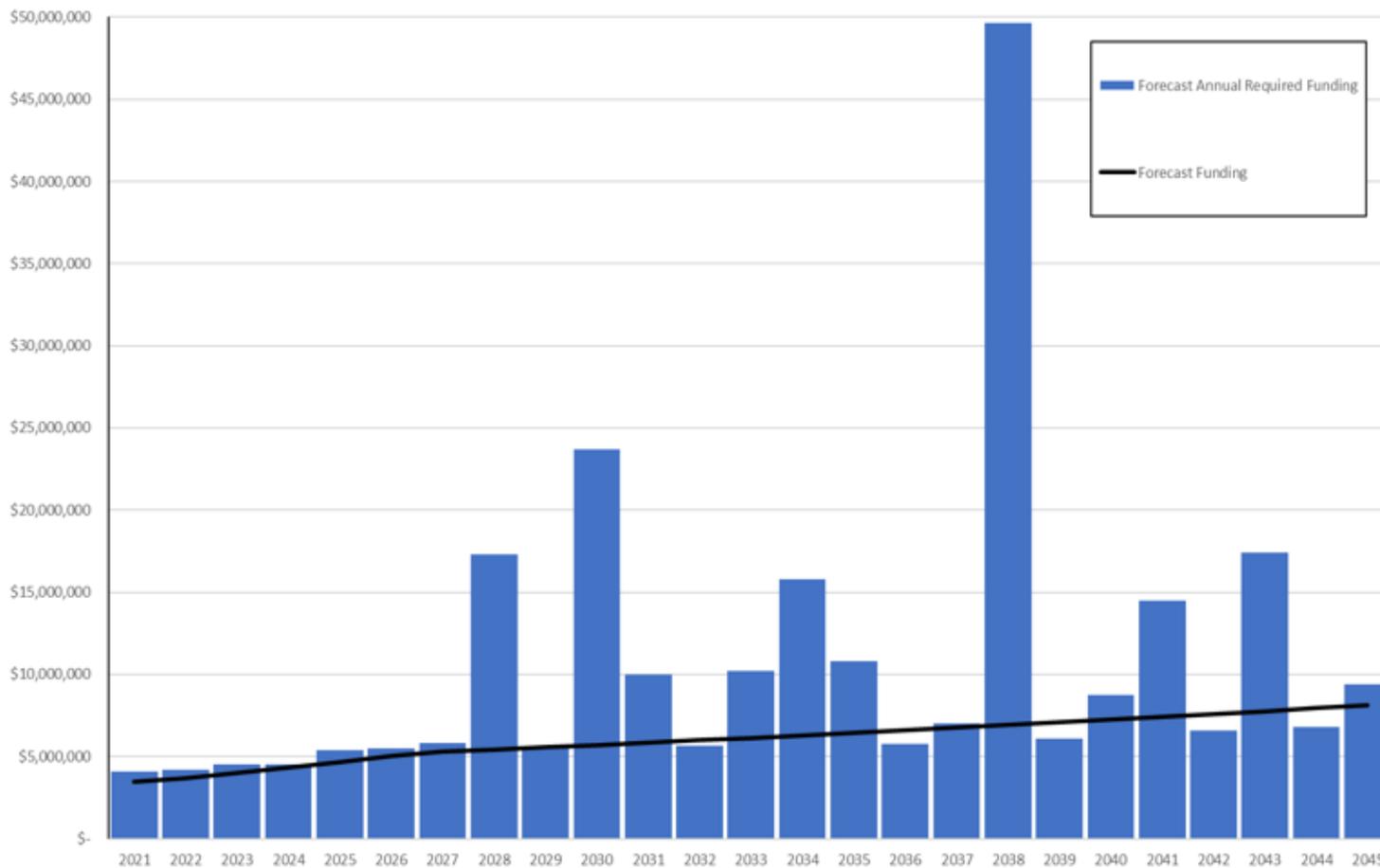
The analysis also shows that the administration and operational facilities assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$10.6M (including maintenance and growth).

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$4.6M.

Table 48 - 25-Year budget analysis

Total 25-Year Requirements	\$265,132,791	Annual Average	\$10,605,312
Total 25-Year Funding	\$151,450,938	Annual Average	\$ 6,058,038
		Annual Average Funding Gap	\$(4,547,274)

Figure 69 – 25-Year budget analysis



Levels of Service

Facilities and buildings exist to provide specific Services to staff and residents of the City of Guelph. This is often termed “functional capacity”. Understanding if the facilities continue to provide as service that meets their functional capacity is a process that requires regular review.

In early 2018 the City of Guelph began efforts to define a Levels of Service Framework, however, as of May 2018 the work ended but was not completed. As part of the analysis of this AMP the LOS Framework was shared with City staff responsible for managing the facility assets.

Administrative and Operations facilities are not considered one of the five “core municipal infrastructure assets” defined in O.Reg 588/17 and as such, the City has until July 2023 to finalize appropriate levels of service and functional capacity review. However, that work will begin earlier than that deadline.

Summary and Conclusion

According to the data available the City Administrative, Operations and Commercial facilities are in good condition, with evidence of regular maintenance and rehabilitation being performed.

What is not clear is if the facilities are meeting their intended functions to a satisfactory level. Answering this question will surely identify further needs that this AMP has not.

Recommendations

1. Detailed facility condition assessment plans were completed for the assets in this category, however the results of those recent studies, are still under review.
2. While detailed component and element level data for a facility is critical, at a whole city asset review it is too much info. More usable is summary data about each building so that decisions about a particular building can be reviewed in the wider context of the City needs. Unfortunately the BCA data available did not include this summary type info in a format that was easily useable. A follow-up report specific to the needs of the facilities that examines the broad needs of the facilities and not the specific details of the elements and components is recommended. This report could include an examinations of the capacity and functional performance of the facilities.

9. Parks, Recreation and Cultural Facilities

Service Area: Parks, Recreation and Cultural Facilities

Quick Facts

Table 49 - Quick Facts for Parks, Recreation and Cultural Facilities

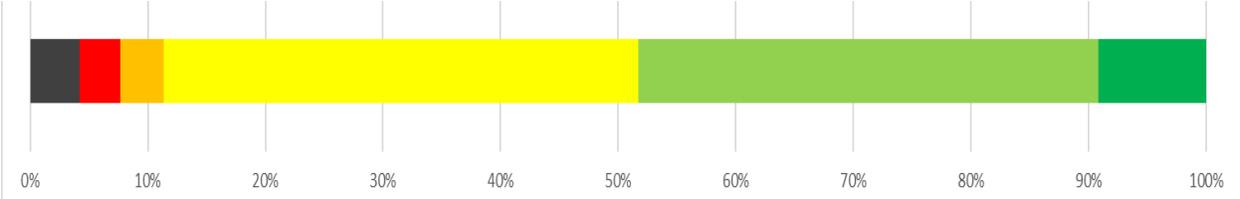
Subclass	Total # records	Total CRV
Library, Culture, Tourism and Community Investment	<ul style="list-style-type: none"> 12 facilities including the main Guelph Library, Sleeman Centre, River Run Centre, Guelph Civic Museum and others 	\$101,634,109
Recreation Facility	<ul style="list-style-type: none"> Centennial Arena, Evergreen Senior's Centre, Exhibition Arena, Lyons Leisure Outdoor Pool, Victoria Road Recreation Centre, West End Community Centre 	\$83,749,900
Parks	<ul style="list-style-type: none"> 113 identified parks or open spaces 	\$126,843,255
Park Building	<ul style="list-style-type: none"> 41 shelters, amenities, public washrooms or operations buildings 	\$14,513,350
Total		\$326,740,615
Identified 2020 Backlog		\$13,665,667

Data Quality: 33%

Figure 70 - Overall Condition of Parks, Recreation and Cultural Assets by \$CRV



Figure 71 - Condition of Parks, Recreation and Cultural Assets by CRV



State of the Infrastructure: Parks, Recreation and Cultural Facilities

As part of offering Services to encourage healthy living, the City of Guelph provides a variety of recreational facilities that residents can access. These includes swimming pools, arenas and gymnasiums as well as multi-purpose spaces for community groups. In combination with the facilities, the City manages many of the programs which take place at these locations.

In addition to the facilities for general use, larger venues such as the Sleeman Centre, a 5,000 seat sports and entertainment centre and the River Run Centre for performing arts are included in this category, along with smaller cultural facilities that showcase Guelph's heritage.

The larger central parks along Guelph's rivers, as well as the neighbourhood parks that are central to resident's daily lives are also represented. The variety of assets showcase the multiple activities that the City of Guelph provides its residents and in broad terms it is in generally fair to good condition. What is uncertain, and perhaps more important, based on the data available it is unknown if the Assets are performing to their intended functional levels of service.

The Parks, Recreation and Facility Assets include a broad spectrum of types that have been grouped into one of four sub-categories:

Parks: a total of 113 different City parks ranging in size from small neighbourhood parks to the larger well known City Parks. For the purposes of the AMP the indicated replacement prices include all of the features in the parks (roads and parking, playground equipment, fences, lighting, park furniture, signage etc.) but the actual value of the land is not included.

Park Buildings: 41 different facilities are included in this sub-category, including small park buildings for use by the public such as washrooms, concession stands and shade structures, as well as City operations buildings that support park management activities

Recreation Facility: 7 different facilities are included in this sub-category. These facilities provide a variety of recreation activities such as skating, swimming, and spaces for multi-use community activities

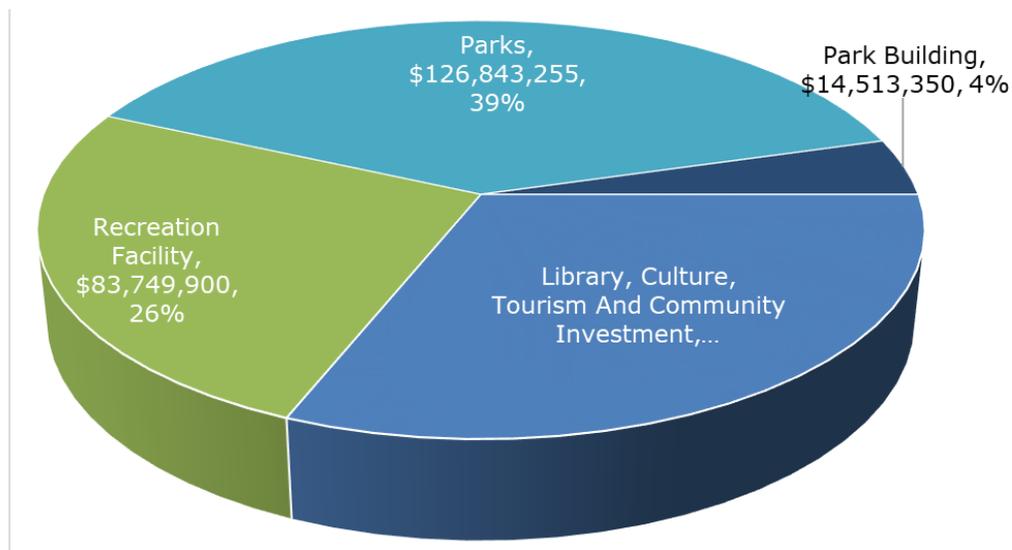
Library, Culture, Tourism and Community Investment: 6 different facilities are included in this sub-category, ranging from small heritage buildings and museums, to the Main Library and also the larger public buildings like Sleeman Centre and Riverrun Centre

While best efforts have been made to ensure that the data used in the analysis of the AMP is complete and accurate, there remain known issues. For example:

- A complete inventory of the various pathways and trails is not included in this AMP. The Guelph Trails Master Plan will have an updated inventory, and the next version of the AMP will incorporate that information
- It is unknown if all neighbourhood parks have been included in the dataset provided for the AMP analysis. Further review on this is required and within the short-term future this information will be updated in the corporate asset inventory
- An inventory and valuation of trees has been completed by the Parks Operations and Forestry staff and was included in the recent Urban Forest Management Plan. However, the data will not included in the Plan until 2024.
- A project to inventory and determine a value for natural lands and open spaces was scheduled to begin in early 2020, but due to issues with the COVID virus this project was delayed. It is scheduled to begin again late 2020 and the data will be available in the next version of the AMP

Figure 72 presents a graphic displaying the value of the different categories within the Parks, Recreation and Cultural Facilities category as is understood at this time.

Figure 72 - Sub-categories within the Parks, Recreation and Facility Asset Class by Replacement



Overall, the inventory is considered in "FAIR" condition with an average condition score of 3.5 / 5.

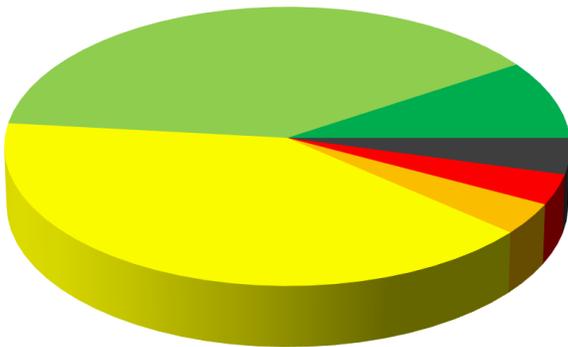
Asset Condition by Type

A breakdown of the overall asset inventory by condition and replacement value is shown in Table 50 below.

Table 50 - Condition of Parks, Recreation and Cultural Assets by CRV

Past Due	\$13,665,667	4.18%
Very Poor	\$11,460,196	3.51%
Poor	\$11,879,829	3.64%
Fair	\$131,907,403	40.37%
Good	\$127,823,255	39.12%
Very Good	\$30,004,266	9.18%
Total	\$326,740,618	

Figure 73 - Graphic Display of Condition of Parks, Recreation and Cultural Assets by CRV



Slightly more than 11% of the assets are considered in “poor” condition or worse, implying that those assets with an approximate replacement value of \$37M may require replacement or major rehabilitation within the short term future. Table 51 presents the condition of the assets in the category by type with the corresponding chart in Table 52 - Condition of Parks, Recreation and Cultural Asset Types, by CRV. The average condition scores per asset type are displayed in Figure 74

The majority of the assets – about 40% - are in “fair” condition, which can be broadly described as about mid-way through their expected service lifecycle. About 51% of the assets are considered in “good” or “very good” condition.

The above is a very broad analysis, and while it provides a general picture of the asset inventory, only by examining the assets on a per-type basis will a more effective picture of the state of the assets be presented.

Table 51 - Condition of Parks, Recreation and Facility Assets by Type

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Library, Culture, Tourism and Community Investment (\$)	\$11,521,885	\$10,990	\$470,721	\$21,267,414	\$63,177,058	\$5,186,041
Library, Culture, Tourism and Community Investment (%)	11.34%	0.01%	0.46%	20.93%	62.16%	5.10%
Recreation Facility (\$)	\$143,440	\$4,949,527	\$10,559,319	\$26,970,338	\$27,028,799	\$14,098,476
Recreation Facility (%)	0.17%	5.91%	12.61%	32.20%	32.27%	16.83%
Parks (\$)	\$0	\$5,228,382	\$526,687	\$79,866,163	\$30,502,274	\$10,719,748
Parks (%)	0.00%	4.12%	0.42%	62.96%	24.05%	8.45%
Park Building (\$)	\$2,000,342	\$1,271,296	\$323,102	\$3,803,487	\$7,115,123	\$0
Park Building (%)	13.78%	8.76%	2.23%	26.21%	49.02%	0.00%
Totals (\$)	\$13,665,667	\$11,460,196	\$11,879,829	\$131,907,403	\$127,823,255	\$30,004,266
Totals (%)	4.18%	3.51%	3.64%	40.37%	39.12%	9.18%

Table 52 - Condition of Parks, Recreation and Cultural Asset Types, by CRV

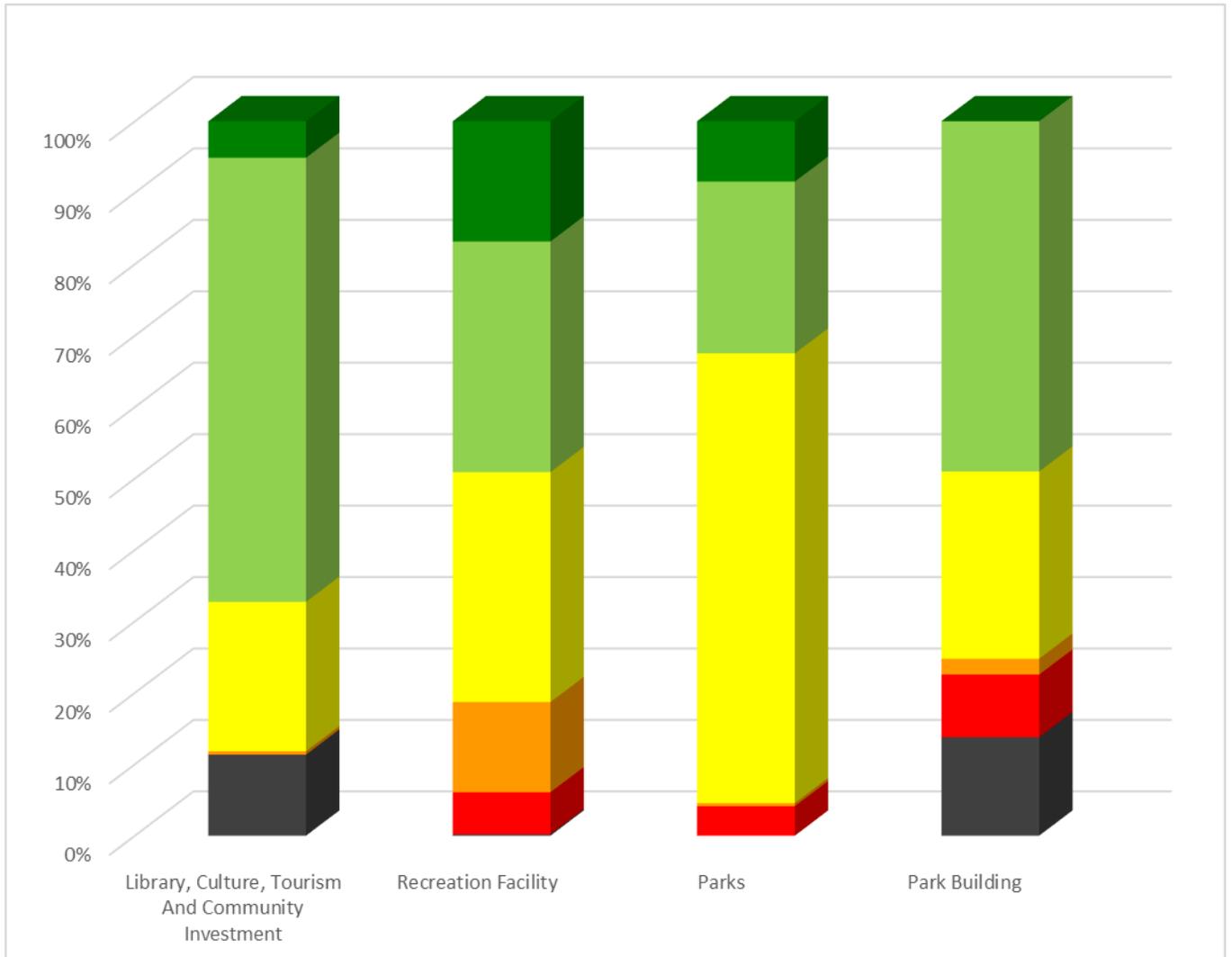
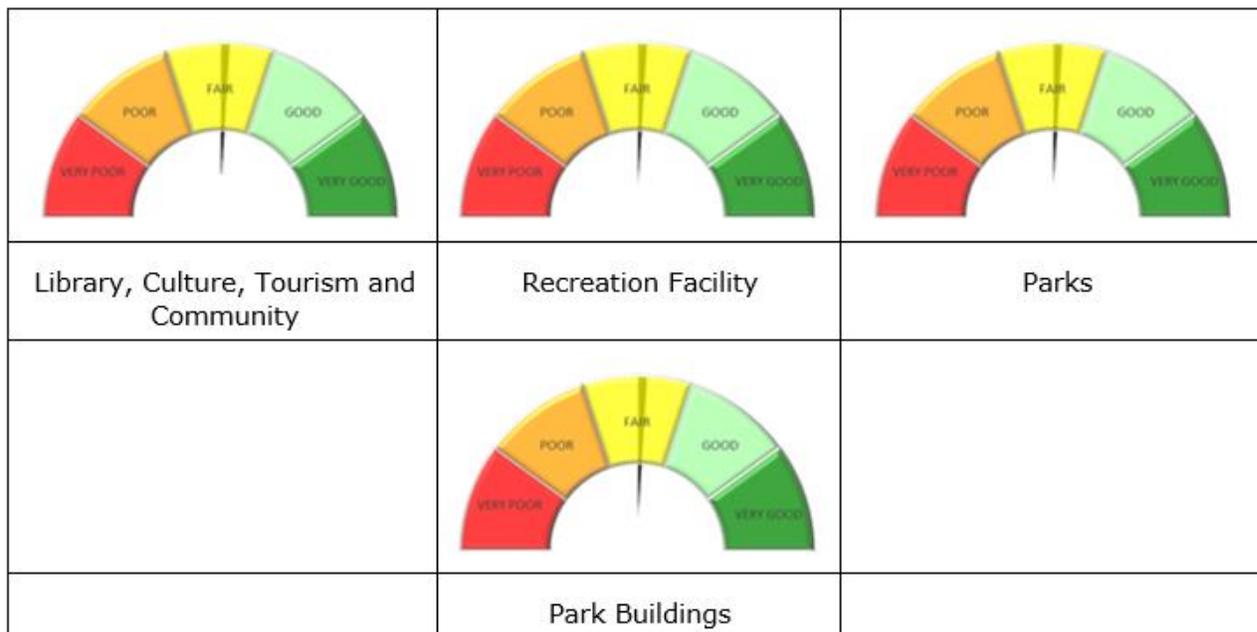


Figure 74 - Average Condition of Parks, Recreation and Culture Assets by Sub-Category



As demonstrated by indicators in Figure 74 the assets within each sub-category have an average condition of “fair”, except for the “culture, tourism and community” assets that have an average condition rating of “good”. This demonstrates adequate maintenance and rehabilitation is being performed to the assets.

- Degradation of materials due to aging (i.e. normal wear and tear)
- Electro-mechanical failures
- Insufficient capacity due to increased demand or load on the systems
- Degradation of materials due to external sources like tree root impact, poor workmanship etc.

Because a functional or capacity review was not available, it is not possible to review potential causes for degradation other than normal aging. It is to be expected though that some of the needed repair or rehabilitation work for the assets will most certainly be due to the impacts of non-aging events.

Asset Ages

The average age of the assets is slightly more than 23-years, however this value must be considered in the context of the different asset types in the category, compared to the typical expected useful lifecycle of each asset type.

As was discussed in relation to the City Administrative and Operations facilities, buildings are composed of hundreds of different components, each of which is

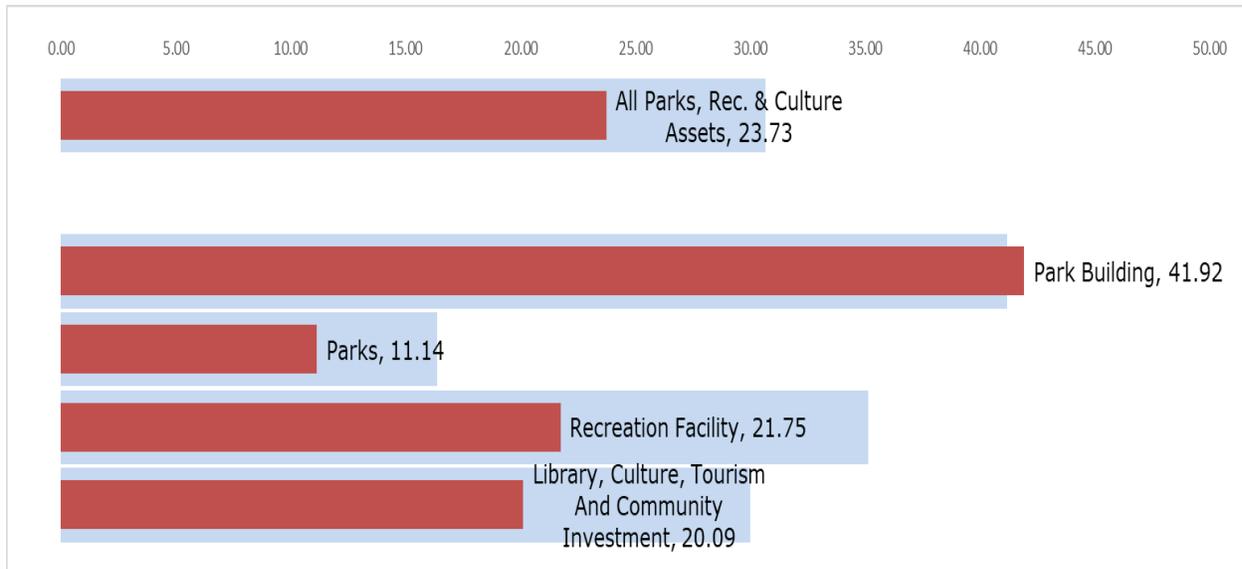
considered an asset on its own. And each of these components has a EUL that can range from a few years to 75-years or more. Therefore exploring the average age of the assets must be considered with caution.

The age of the various assets in the park facilities should also be considered individually. However, with less variety of components comprising a park, the average age can provide a good indicator of when rehabilitation of each park may be required. The average age of the Park Buildings is greater than what the average normal age is calculated to be, however, considering these are normally smaller buildings of simple design, this discrepancy is not considered a major issue. Attention should be given to the ongoing maintenance of these facilities however.

Table 53 - Average Age of Parks, Recreation and Cultural Assets

Asset Type	Average Age	EUL
Library, Culture, Tourism and Community Investment	19.11	30.01
Recreation Facility	22.65	35.02
Parks	11.14	16.36
Park Building	42.04	40.73
All Parks, Rec. & Culture	23.74	30.53

Figure 75 - Average Age of Parks, Recreation and Culture Assets by Sub-Category



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific assets, nor specific projects or actions required to correct any deficiencies - this is not the purpose of a high-level AMP. Those details can only be provided by the completion of detailed, asset specific condition plans.

City staff who have contributed information to the AMP have worked to identify specific asset needs and converted those needs to projects with identified costs for future work. Those future project costs have been included in this AMP, with the cooperation of the City Financial staff.

The future year forecast requirements were determined by identifying what the estimated replacement year for each asset is predicted to be following the criteria outlined in the Budget & Financial Needs Analysis section of this AMP beginning on page 66.

This includes the “past due” assets where the determined replacement year was 2020 or earlier – the replacement value for these assets has been added to the “backlog” sum. For the purposes of analysis the backlog value has been distributed over ten (10) years to be able to lessen the impact of trying to reduce the backlog at one time.

Figure 76 presents a graphical view of forecast asset replacement costs using the rated condition of the assets over a period of 25-years.

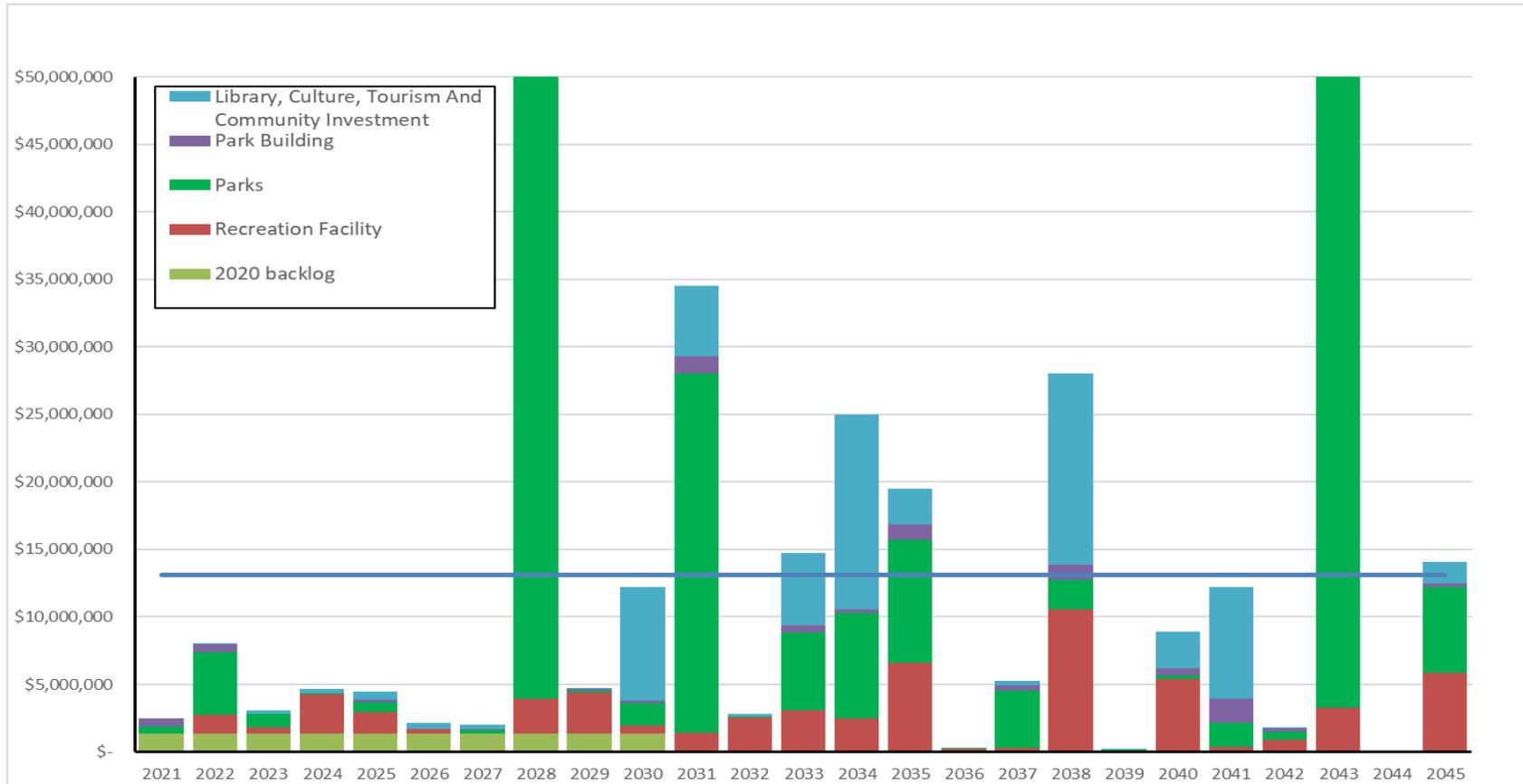
Table 54: 25-Year Financial Summary Parks, Recreation and Cultural Assets provides a summary of the values from this analysis. They do not correlate to the City budget, nor are they intended to. A number of other factors go into adapting

the asset information into workable projects besides simply the remaining estimated service lifecycle. The RSL analysis is intended to provide a preliminary potential needs analysis only.

Table 54 - 25-Year Financial Summary Parks, Recreation and Cultural Assets

	2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	in Year
Library, Culture, Tourism And Community Investment	\$11,521,885	\$70,358,462	\$2,814,338	\$14,438,643	2034
Recreation Facility	\$143,440	\$55,988,821	\$2,239,553	\$10,547,573	2038
Parks	\$0	\$191,701,898	\$7,668,076	\$59,347,247	2043
Park Building	\$2,000,342	\$10,346,927	\$413,877	\$1,750,986	2041
Totals	\$13,665,667	\$328,396,109	\$13,135,844		

Figure 76 - Forecast Future Replacement Costs based on Remaining Service Life



Note: the values in years 2028, 2031, 2034, 2038 and 2043 are significantly higher than the scale of the axis on this graph. The axis has been shortened for ease of viewing.

Budget Analysis: Parks, Recreation and Cultural Assets

The budget analysis encompasses the identified forecast annual requirements (based on current rated condition of the assets) plus the allowances for maintenance and expansion compared to the approved program of work funding as indicated in the 2021-2045 Capital Budget. An analysis including a contingency value was also completed.

A summary of the budget analysis is shown in Table 55 while a graph demonstrating the analysis results is shown in Figure 97.

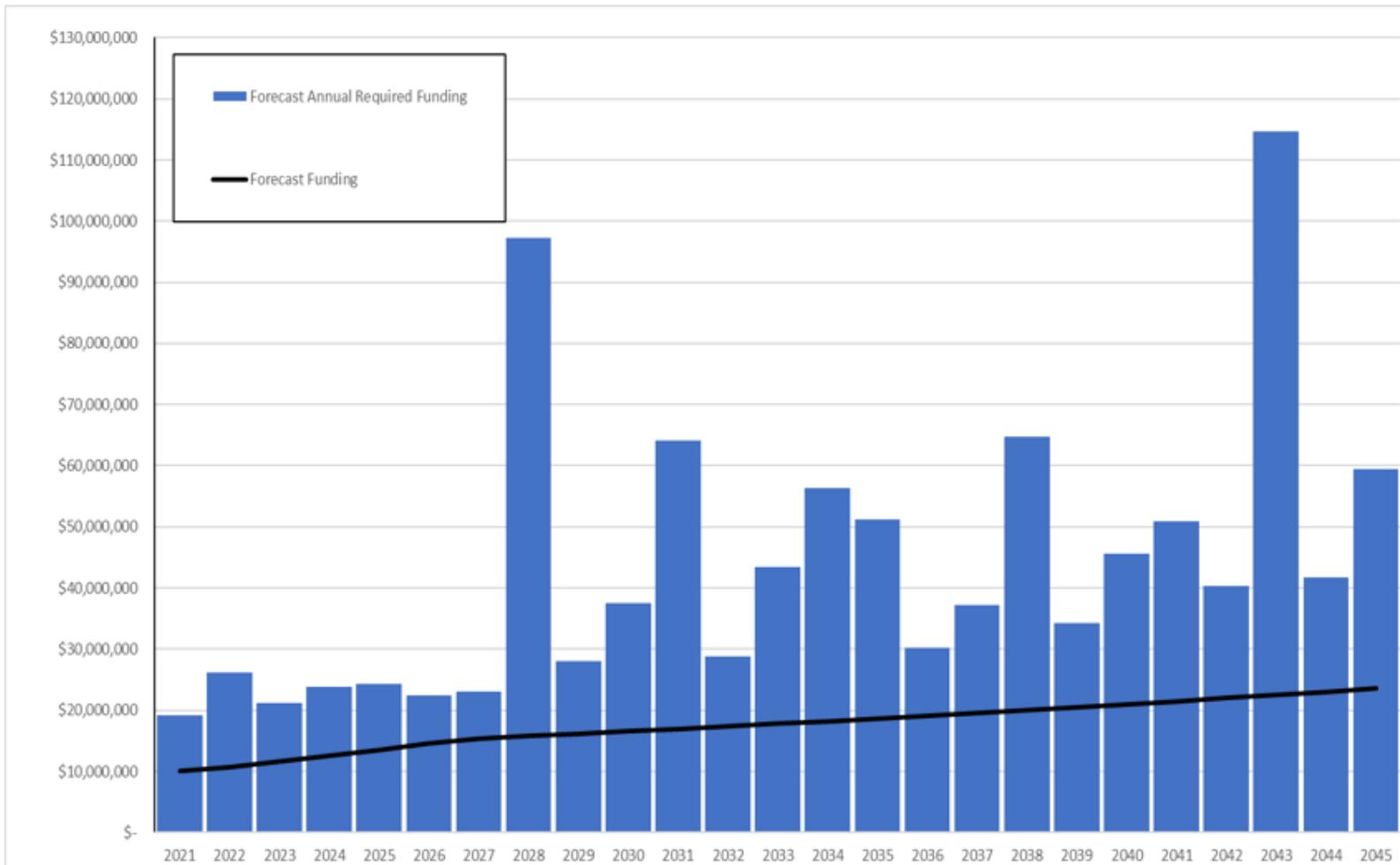
The analysis also shows that the parks, recreation and cultural assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$43.5M (including maintenance and growth).

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$25.9M.

Table 55 - 25-Year Financial Review - Parks, Recreation and Cultural Facility Assets

Total 25-Year Requirements	\$1,086,219,357	Annual Average	\$ 43,448,774
Total 25-Year Funding	\$ 438,913,087	Annual Average	\$ 17,556,523
		Annual Average Funding Gap	\$ (25,892,251)

Figure 77 - 25-Year financial summary for parks, recreation and culture assets



Levels of Service

Physical assets exist to provide a service to the residents of Guelph. To be able to understand if the assets are delivering that service in accordance with expectations a series of metrics have been developed to help City staff with this analysis. In early 2018 the City of Guelph began efforts to define a Levels of Service Framework, however, the final LOS definitions remain to be formulated. As part of the analysis of this AMP the LOS Framework was shared with City staff responsible for managing the Parks, Recreation and Cultural facility assets and these will be finalized in upcoming months.

As another point of consideration, parks, recreation and cultural facilities are not considered one of the five “core municipal infrastructure assets” defined in O.Reg 588/17 and as such, the City has until July 2023 to finalize appropriate levels of service and functional capacity review. However, it is recommended to complete that work well before the 2023 deadline.

Summary and Conclusion

Parks, Recreation and Cultural facilities provide services to the public that are well liked and popular, and contribute to the sense of a healthy City. From that perspective, these are essential facilities, even if they are not formally defined as such in the asset management legislation.

The data for the Parks, Recreations and Culture assets has been analyzed as best as possible, but there are known issues with the data that have not been clarified to the same level of detail as the other asset categories in this AMP. Planned work within the City Asset Management team and the staff directly responsible for the assets in this category will improve this in future versions of the AMP.

Despite these concerns and known faults in the data, the following recommendations can be made.

Recommendations

1. Detailed condition assessment studies are recommended for the Sleeman Centre, and the River Run Centre. These significant facilities each require a dedicated plan that identifies their status quo condition, and their future needs. These studies should include a functional capacity analysis to review if these facilities are of adequate size to continue to serve the City of Guelph. Due to the size and unique functional nature of each of these facilities it is beneficial to have these plans.
2. Many of the buildings included in the "Park Building" sub-category are small, with seasonal usage and low operating costs. It is recommended that a review of these assets would provide a fulsome understanding as to whether or not they are meeting the needs of the users and the community.
3. Incomplete data was available for pathways and trails and so the full needs of these assets are not included. City staff (Parks and GIS) are aware of the problems in the data and working to improve the status. The Guelph Trails Master Plan will include updated data and will be used in future reports.
4. The staff in the Parks and Recreation department have produced an inventory of the tree canopy within the City and are continuing to update and improve the work already done. This work demonstrates that the tree assets appreciate in value over time, and are an asset worth including in future asset management plans.
5. As described in the introduction to this section there are known missing assets that were not included in this AMP. As the asset management efforts at the City of Guelph continue to grow, this situation will improve.

10. Parking Infrastructure

Service Area: Parking Infrastructure

Quick Facts

Table 56 - Overall summary of parking infrastructure assets

Subclass	Total # records	Total CRV
Parking Garage	3 above grade multi-level parking facilities	\$58,245,499
Surface Parking	9 surface lots with user-pay equipment On-street parking with user-pay equipment	\$1,076,293
Signage	More than 1,200 signs of various types	\$197,369
	Total Replacement Value	\$59,583,107
	Identified 2020 Backlog	\$8,340,670

Data Quality: 67%

Figure 78 - Overall condition of parking infrastructure by CRV



Figure 79 - Condition of parking infrastructure assets by CRV



State of the Assets: Parking Infrastructure

Vehicle parking is a problem faced by every City and Guelph is no exception. Within the downtown core the City operates a mix of surface lots, on-street parking and parking garages. According to the City of Guelph Parking Master Plan for Downtown the total number of spaces is about 400²⁴ – a number that has not changed in many years.

The City owns and maintains:

- 3 above grade multi-level parking facilities – Market Parkade., East Parkade and West Parkade
- 9 surface lots with user-pay equipment – Arthur, Baker, East Surface, Elizabeth, Fountain, MacDonnell, Neeve, Norwich and Wyndham²⁵
- More than 1,200 signs of various types

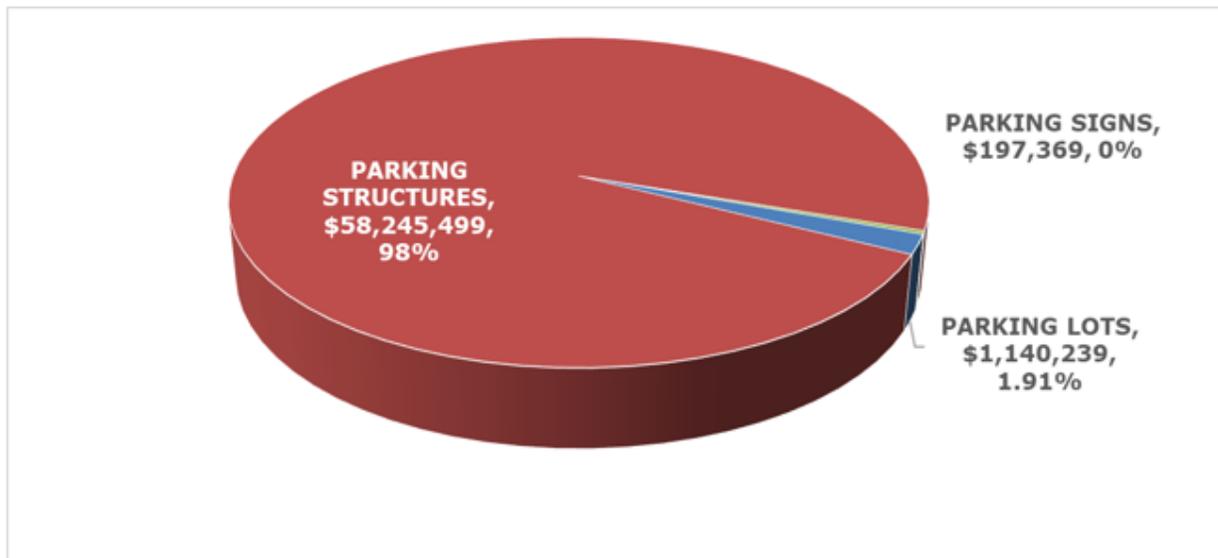
A breakdown of the replacement value of the assets by class is included in Figure 80.

The AMP considers only the physical needs of the assets, and not the capacity needs. However it is clear that any expansion of available parking capacity will have a related impact to the infrastructure value. Unfortunately at this time this value cannot be predicted.

²⁴ It is not clear if the 400 spaces includes the Wilson St. Parkade which was opened in 2019, after the Master Plan document had been prepared

²⁵ The calculated replacement value for the surface parking lots does not include the land purchase costs, only the physical Assets on the land

Figure 80 - Sub-categories within parking infrastructure by CRV

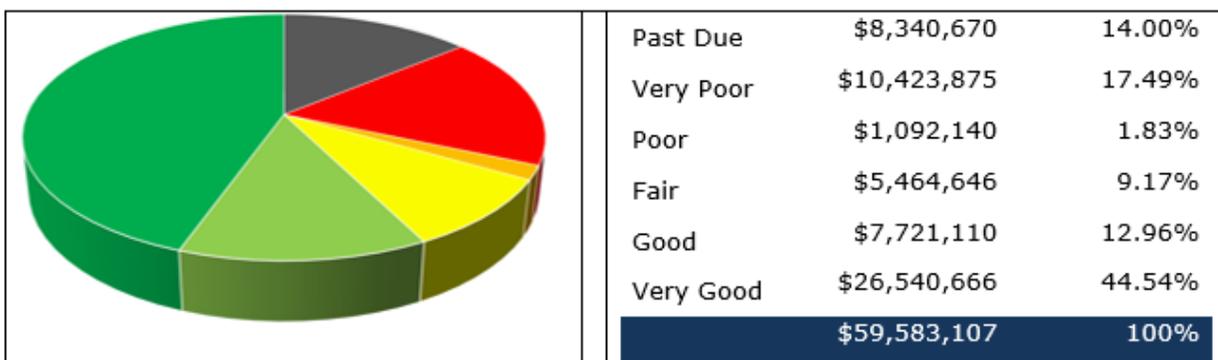


Overall, the inventory is considered in "FAIR" condition with an average condition score of 2.8 / 5.²⁶

Asset Condition by Type

A breakdown of the overall asset inventory by condition and replacement value is shown in Figure 81 - Condition of Parking Infrastructure Assets.

Figure 81 - Condition of parking infrastructure assets



²⁶ This score does not include signs – the large number of signs in the dataset compared to the low value of these items negatively affected the overall rating calculation.

The majority of the assets – about 67% - are in “fair” or better condition, which can be broadly described as about mid-way through their expected service lifecycle. This is largely due to the nearly brand-new Wilson St. Parkade. By reviewing Figure 60, the average condition rating for parking structures is in the “fair” range. Considering one of the three structures is nearly new, the implication is that the remaining two are on average likely in “poor” condition.

The above is a very broad analysis, and while it provides a general picture of the asset inventory, only by examining the assets on a per-type basis will a more effective picture of the state of the assets be presented.

Figure 61 provides a visual image of the condition of the asset types based on CRV with the actual values listed in Table 58.

Figure 82 - Average condition of parking infrastructure by category



Surface parking lots consist of an asphalt paved surface along with necessary stormwater drainage and other infrastructure. Traditionally parking lot surfaces do not receive the same level of attention as other asset types due to their relatively low-level of importance in the overall City inventory. Typical deficiencies that might be found include:

- Degradation of materials due to aging (i.e. normal wear and tear)
- Electro-mechanical failure of user-pay equipment

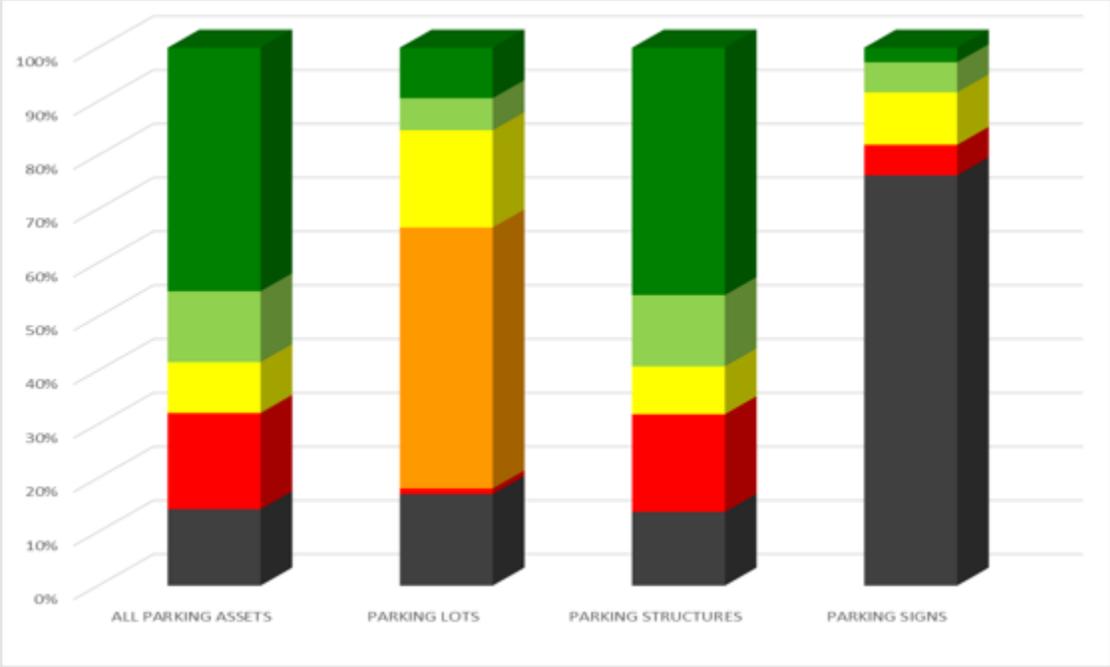
With nearly 75% of the assets comprising the surface parking lots rated in “fair” condition or worse there are very likely some significant deficiencies existing.

Because a functional or capacity review was not available, it is not possible to review potential causes for degradation other than normal aging.

Table 57 - Condition of parking infrastructure assets by type

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Parking lots (\$)	\$330,867	\$20,593	\$139,124	\$351,136	\$115,850	\$182,668
Parking lots (%)	29.02%	1.81%	12.20%	30.79%	10.16%	16.02%
Parking Structures (\$)	\$7,866,781	\$10,392,635	\$943,163	\$5,095,235	\$7,594,771	\$26,352,913
Parking Structures (%)	13.51%	17.84%	1.62%	8.75%	13.04%	45.24%
Parking Signs (\$)	\$143,021	\$10,647	\$9,853	\$18,275	\$10,488	\$5,085
Parking Signs (%)	72.46%	5.39%	4.99%	9.26%	5.31%	2.58%
Total (\$)	\$8,340,670	\$10,423,875	\$1,092,140	\$5,464,646	\$7,721,110	\$26,540,666
Total (%)	14.00%	17.49%	1.83%	9.17%	12.96%	44.54%

Figure 83 - Condition of asset types, by CRV



Asset Ages

The average age of the assets is about 13-years, however this value must be considered in the context of the different asset types in the category, compared to the typical expected useful lifecycle of each asset type.

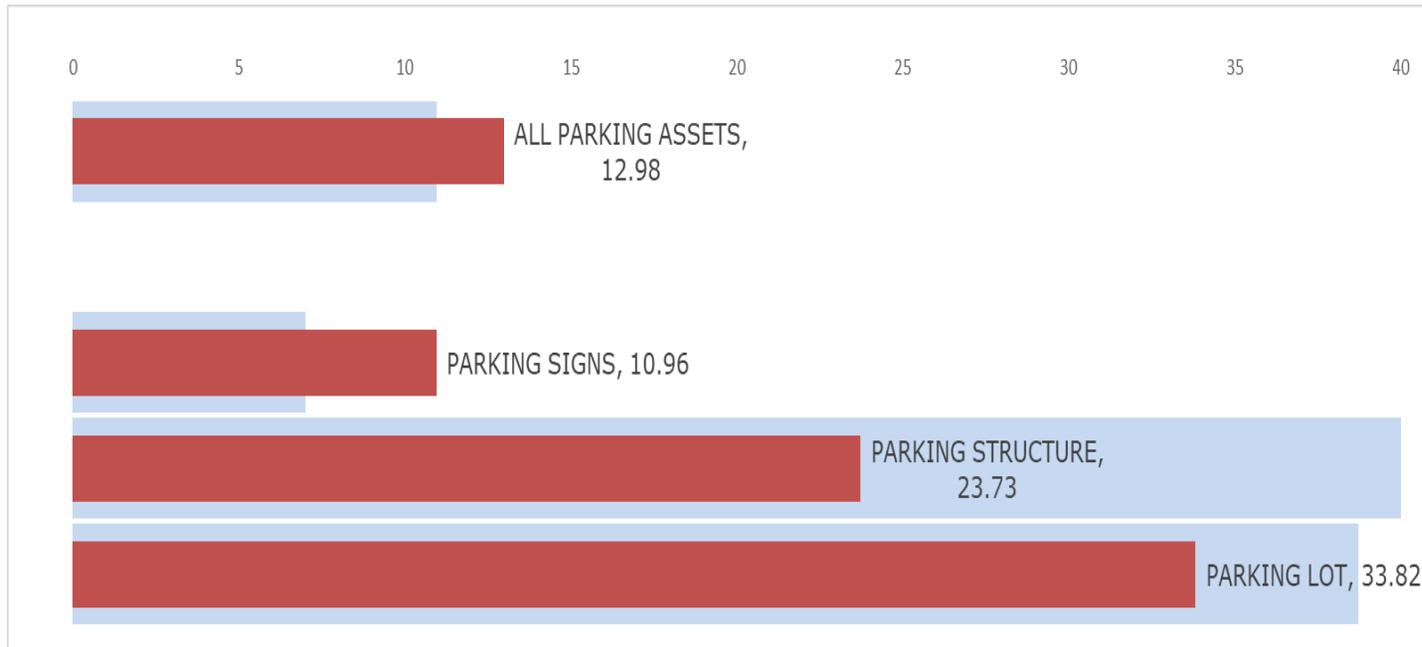
As was discussed in relation to the City Administrative and Operations facilities, buildings are composed of hundreds of different components, each of which is considered an asset on its own. Each of these components has a EUL that can range from a few years to 75-years or more. The same holds true of parking structures. Therefore exploring the average age of the assets must be considered with caution.

Though in some cases the age of the asset does not affect the condition, with Surface Parking lots, it is clear that there is a correlation in this case.

Table 58 - Average Age Parking Assets

Asset Type	Average Age	EUL
Parking LOT	33.82	38.73
Parking STRUCTURE	23.73	40.24
Parking SIGNS	10.96	7.00
ALL Parking assets	12.98	10.95

Figure 84 - Average age of parking assets by sub-category



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific assets, nor specific projects or actions required to correct any deficiencies - this is not the purpose of a high-level AMP. Those details can only be provided by the completion of detailed, asset specific condition plans.

City staff who have contributed information to the AMP have worked to identify specific asset needs and converted those needs to projects with identified costs for future work. Those future project costs have been included in this AMP, with the cooperation of the City Financial staff.

The future year forecast requirements were determined by identifying what the estimated replacement year for each asset is predicted to be following the criteria outlined in the Budget & Financial Needs Analysis section of this AMP beginning on 66.

This includes the "past due" assets where the determined replacement year was 2020 or earlier – the replacement value for these assets has been added to the "backlog" sum. For the purposes of analysis the backlog value has been distributed over ten (10) years to be able to lessen the impact of trying to reduce the backlog at one time. Table 59 provides a summary of the values from this analysis.

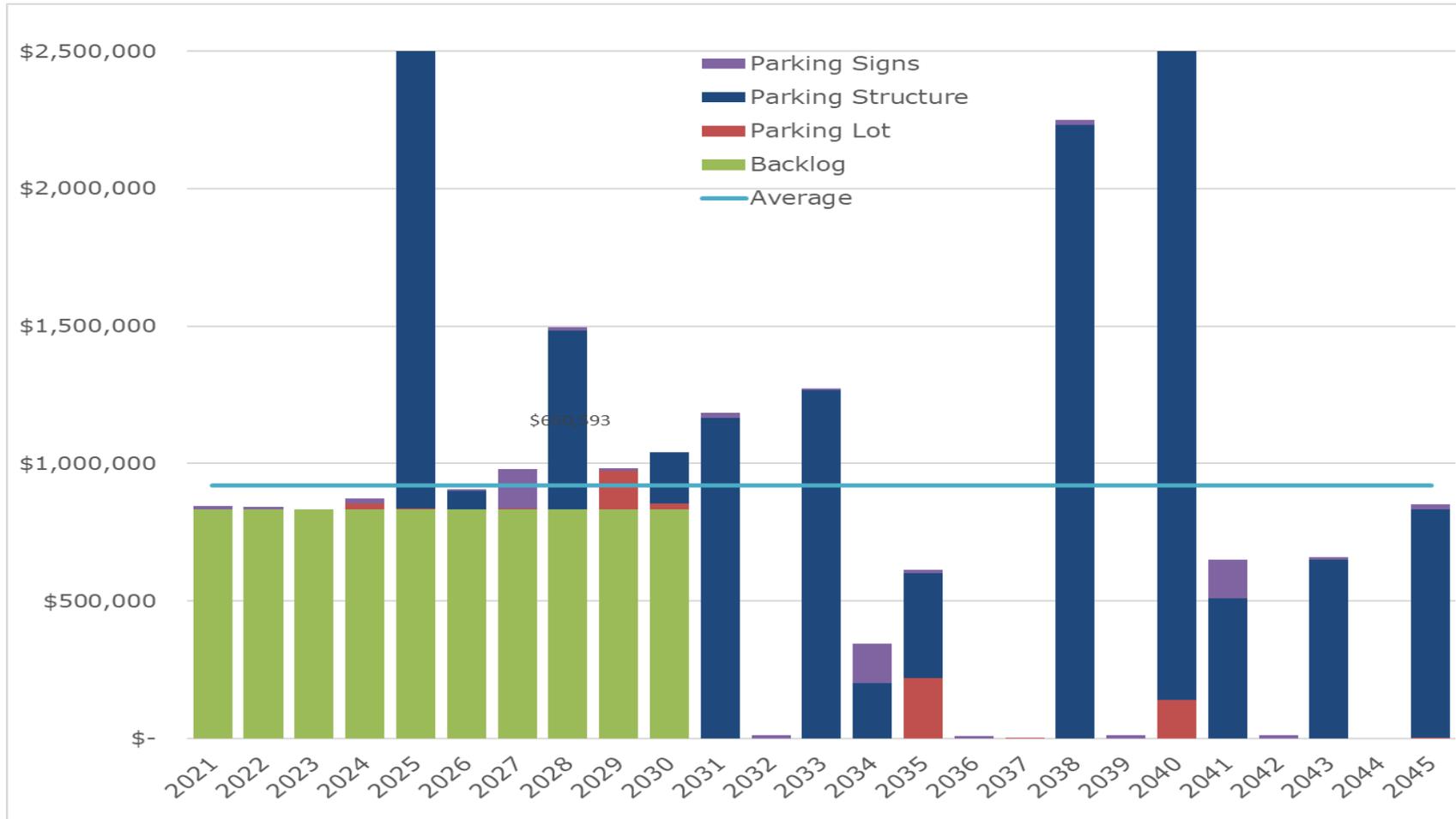
Table 59 - 25-year replacement requirements by RSL – Parking

	2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	in Year
Parking Lot	\$330,867	\$547,339	\$21,894	\$220,167	2035
Parking Structure	\$7,866,781	\$21,840,754	\$873,630	\$11,212,226	2025
Parking Signs	\$143,021	\$630,881	\$25,235	\$143,021	2027
Totals	\$8,340,670	\$23,018,974	\$737,249		

As shown in the table, an average annual forecast capital cost of about \$737k is predicted.

Note that these values represent only the estimated asset replacement costs, and do not represent any other costs that may be required in future years such as maintenance, non-infrastructure related studies, design and consulting fees.

Figure 85 - Forecast of future replacement costs based on asset remaining service life



Budget Analysis: Parking Infrastructure

Unlike other asset categories, the 25-year averages show an annual surplus of funding compared to requirements. This issue to three large spikes in approved spending in 2022, 2030 and 2033.

The budget analysis encompasses the identified forecast annual requirements (based on current rated condition of the assets) plus the allowances for maintenance and expansion compared to the approved program of work funding as indicated in the 2021-2045 Capital Budget. An analysis including a contingency value was also completed.

A summary of the budget analysis is shown in Table 60 while a graph demonstrating the analysis results is shown in Figure 86.

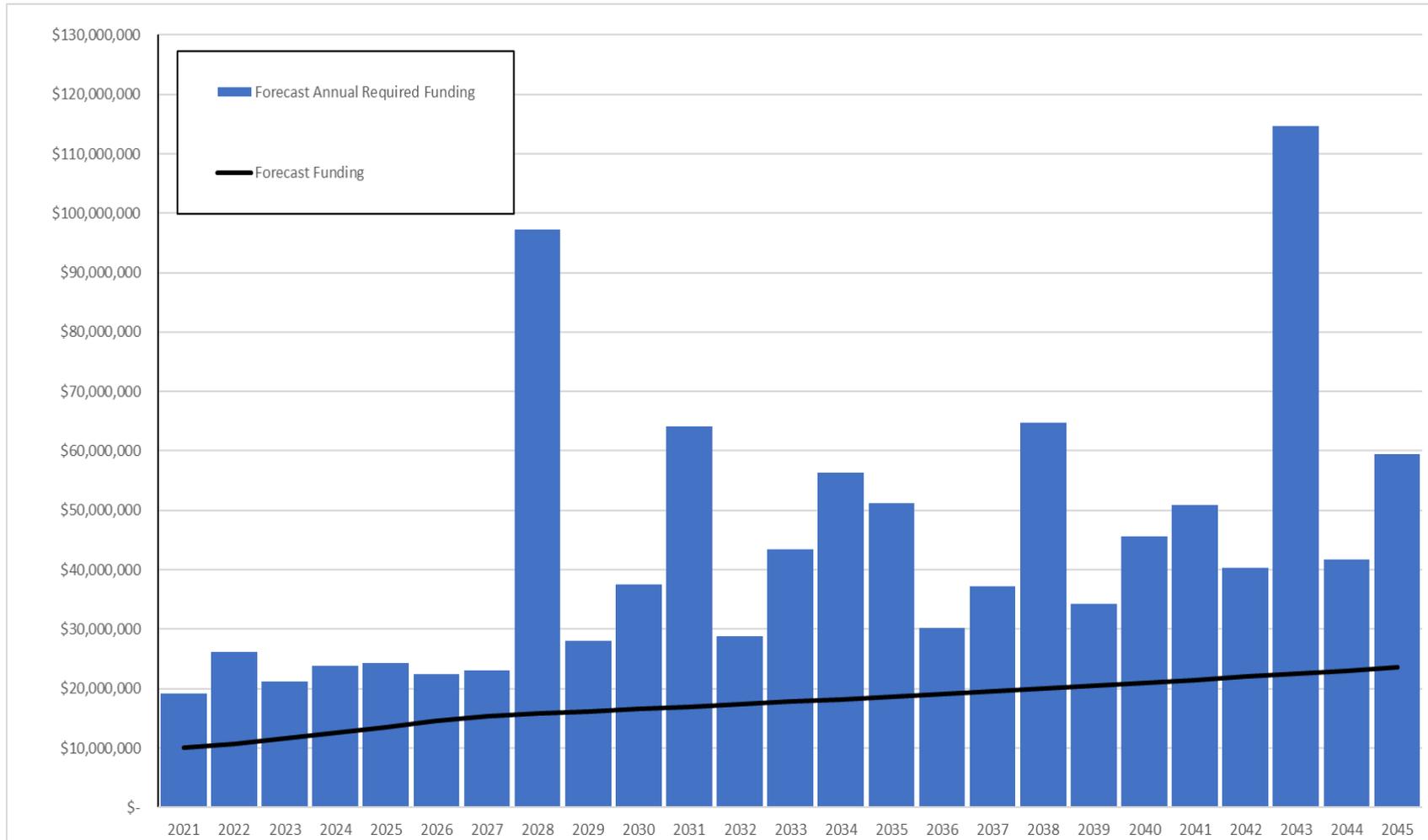
The analysis also shows that the parking assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$1.8M (including maintenance and growth).

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$391k.

Table 60 - 25 year financial review - Parking infrastructure

Total 25-Year Requirements	\$ 45,397,662	Annual Average	\$ 1,815,906
Total 25-Year Funding	\$ 35,625,000	Annual Average	\$ 1,425,000
		Annual Average Funding Gap	\$ (390,906)

Figure 86 - 25 year financial review - Parking infrastructure



Levels of Service

Physical assets exist to provide a service to the residents of Guelph. To be able to understand if the assets are delivering that service in accordance with expectations a series of metrics have been developed to help City staff with this analysis. In early 2018 the City of Guelph began efforts to define a Levels of Service Framework, however, as of May 2018 the work ended but was not completed. As part of the analysis of this AMP the LOS Framework was shared with City staff responsible for managing the parking assets. Due to time constraints and a lack of appropriate data it was not possible to complete a proper review of the levels of service.

As another point of consideration, parking facilities are not considered one of the five “core municipal infrastructure assets” defined in O.Reg 588/17 and as such, the City has until July 2023 to finalize appropriate levels of service and functional capacity review. However, it is recommended to complete that work well before the 2023 deadline.

Sustainability Analysis

Funding for the parking assets is intended to be provided mostly from user fees (i.e. rate based) with a small supplement from tax revenue, with the target funding levels determined partly based on the analysis completed in the AMP. The following table indicates the sustainable funding target in 2020, compared to what was determined in 2017.

Table 61 - Sustainable funding target analysis

Funding	2017 Estimate	2020 Estimate	\$ Change
	2,500,000	1,058,900	-58%

In 2017 the Market Parkade was not part of the City inventory (construction of the facility was underway) and the existing parking infrastructure was mostly estimated in very poor condition. The construction of the new parkade removed a significant percentage of the backlog and very poor assets, and has also created a situation where, because the garage is nearly brand new, for the next 15-20 years there should be reduced capital resources required to the portfolio, thus reducing the target for sustainable funding.

Maintenance needs will remain, and maintenance funding should be increased so that the infrastructure does not degrade at a greater rate than normal.

Summary and Conclusion

While the parking structures are on average in “good” condition, the surface parking lots require rehabilitation. The Parking Master Plan indicated that there is a capacity issue with parking in Downtown Guelph and so coordinating the timing of increasing the capacity with rehabilitation of the existing lots is a strategy that could be explored to be able maximize the funding impact.

Despite the overall good condition of the parking structures the West parkade has been assessed multiple times with mixed findings. Regardless of those findings, due to the age of the structure rehabilitation should be planned for within the 5-10 year timeframe.

Recommendations

1. A review of actual maintenance needs is recommended to improve the cost requirements analysis
2. This AMP considers only the physical needs of the assets, however, a review of the Parking Master Plan indicated that there are clear capacity issues with available parking spaces. While the master plan did provide some recommendations, it is not clear what the status of implementing those recommendations is at this time.
3. Discussions with parking staff indicated that two recent assessments of the West Parkade resulted in differing opinions on the elements of the structure, and the structure as a whole.

A further assessment is therefore recommended, along with an assessment of the East Parkade to properly identify the needs for these structures.

11. Transit Services

Service Area: Transit Services

Quick Facts

Table 62 - Quick facts - Transit services

Item	Quantity	CRV
Transit Facilities	2 buildings, 570 Bus Stops	\$19,271,307
Bus - Conventional	81 units	\$54,270,000
BUS - Mobility	14 units	\$2,762,000
Transit Vehicle - Other	9 vehicles and other miscellaneous equipment	\$441,000
	Total Replacement Value	\$76,744,307
	Identified 2020 Backlog	\$8,184,178

Data Quality: 73%

Figure 87 - Average condition of transit assets



Figure 88 - Condition of transit services facility assets by \$CRV

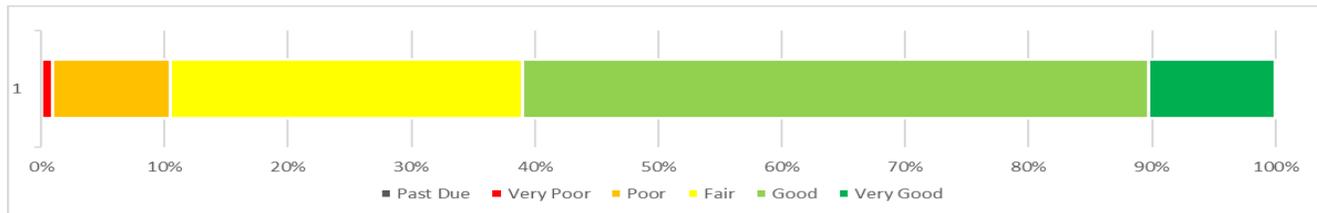
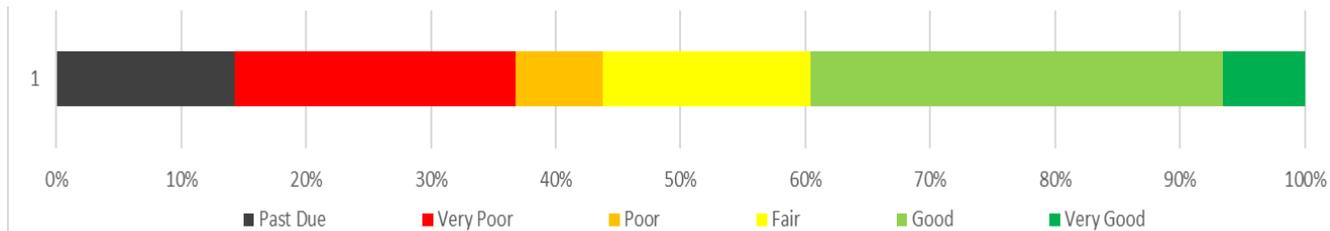


Figure 89 - Condition of transit services fleet assets by \$CRV



State of the Assets: Guelph Transit Services

Public transit is an increasingly popular service for residents, and in response to concerns about climate change the use of public transit is being further encouraged. Guelph transit operates several routes and maintains a fleet of low-floor passenger buses, as well as specialized vehicles for low-mobility users. To manage this fleet Guelph transit has a central Administrative and Garage building.

Guelph Transit is also responsible for the VIA Rail station facility which acts as a central, multi-mode transit hub for the City and the surrounding regional transit network.

For the purposes of the analysis the two sub-categories – facilities and fleet vehicles – will be evaluated separately due to the unique characteristics of each. Summaries of the forecast needs and budget analysis will be completed at the end of this section.

The AMP does not present specific deficiencies or project needs, but presents a high-level review of the state of the Transit Services assets and general needs that have been identified for the future.

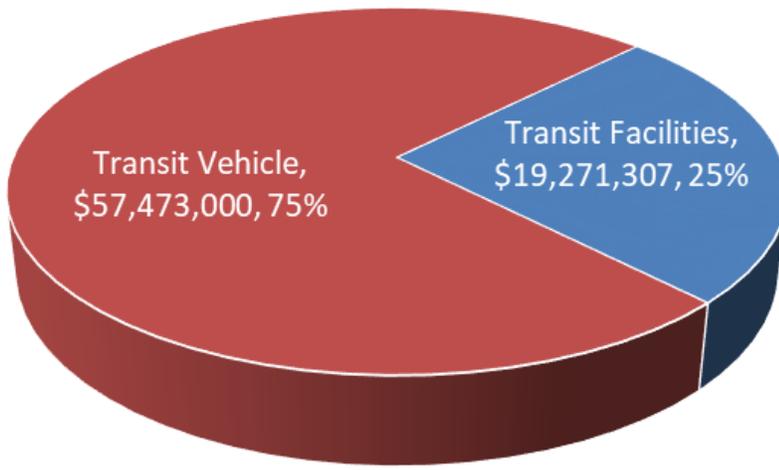
Transit Services Service Area Asset Types

The Transit Services assets can be broadly classified into two groups:

- Vehicles: conventional buses, specialized buses for persons requiring mobility assistance, and other vehicle types (such as supervisors vehicles or mechanics trucks), plus miscellaneous shop equipment
- Facilities: Guelph transit service has two primary buildings – the Transit Administration and Garage, and the VIA Rail station. In addition there are 570 bus stops – some with shelters, some without shelters.

The respective values of each group are identified in the figure below.

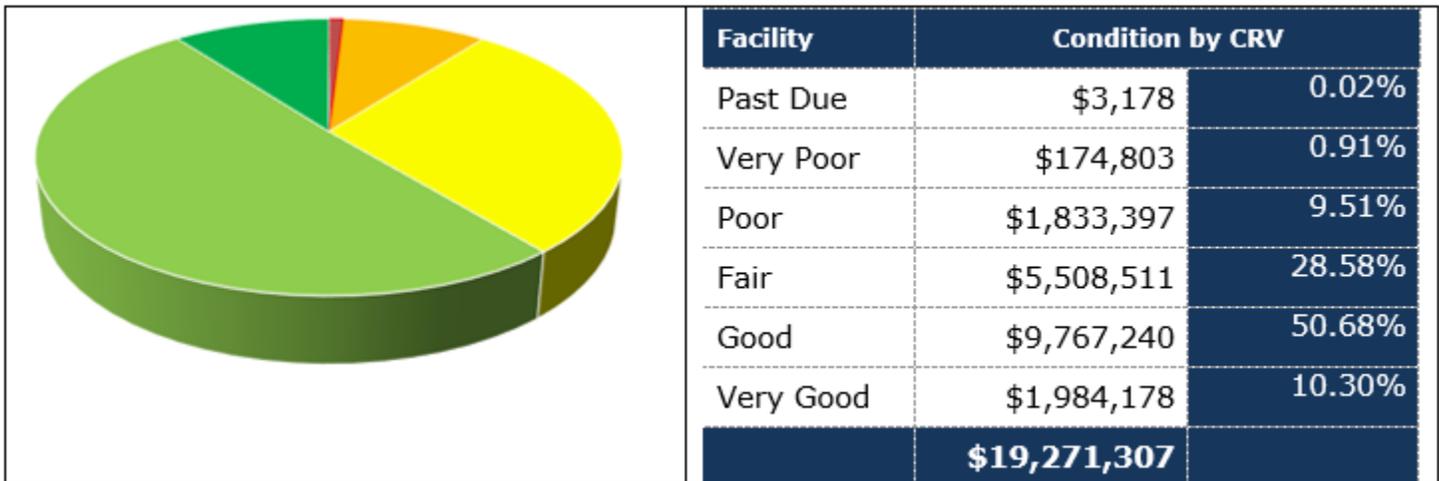
Figure 90 - Transit services asset types CRV



Asset Condition by Type

A breakdown of the overall asset inventory by condition and replacement value is shown in the figure below.

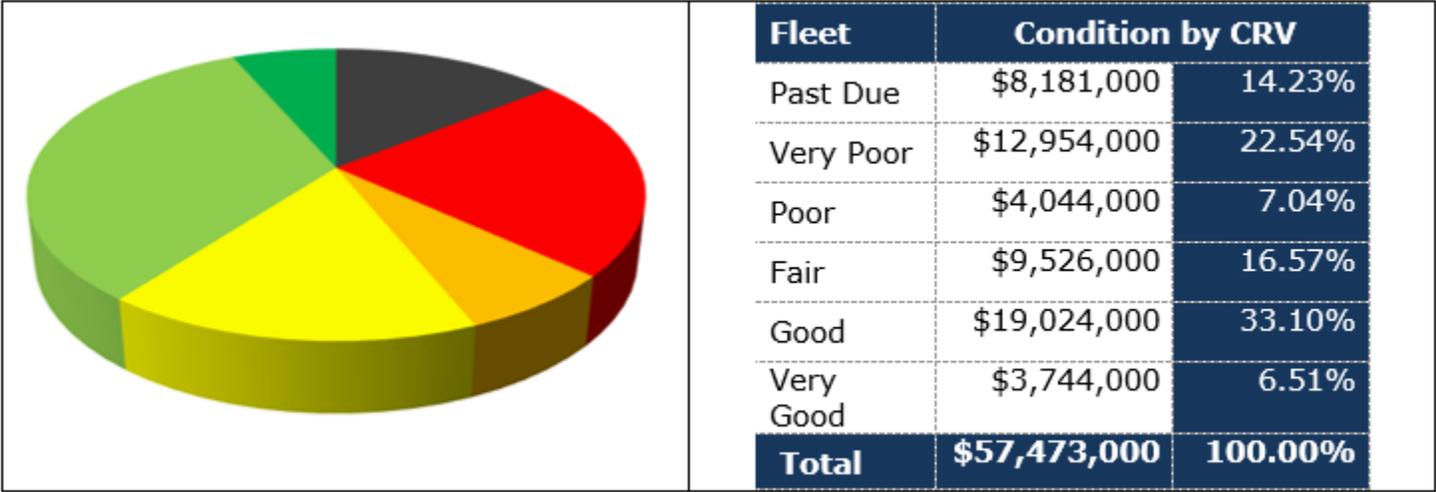
Figure 91 - Condition of transit services facility assets



As seen in Figure 91 and the accompanying figure the majority of the Transit Service facility Assets are in "fair" condition or better. This is consistent with the other City of

Guelph facilities and indicative of proper maintenance practices in place for the facilities. About 10% of the facility Assets are in "poor" condition or worse.

Figure 92 - Condition of transit services fleet assets



Within the Fleet category Conventional passenger buses comprise the majority of the fleet – totaling about 94% by CRV. These vehicles receive heavy use, being operated and accessed by members of the public seven days a week. About half of the fleet inventory is in "poor" condition or worse with 14% in "past due" condition. The reason for this is that vehicles have a relatively short lifecycle compared to other asset types (i.e. for the buses an expected useful lifecycle is 12 years), and according to the data provided for the AMP, the only method available to determine vehicle conditions was by using an age-based approach. Most of the existing fleet of vehicles are nearing or past their normal expected lifecycle. This does not imply that they are incapable of performing their duties – as discussed regarding other vehicle types in the City of Guelph inventory, it is normal that vehicles can remain in service beyond a normal expected life provided regular maintenance is performed.

According to information provided by Fleet Management and Transit Services staff each bus is replaced on about a 12-year cycle, and many of the assets indicated as "past due" in 2020 are planned for replacement in 2020 or 2021, so the concern with "past due" assets is minor because there are already established plans to address this point.

The above is a very broad analysis, and while it provides a general picture of the facilities inventory, only by examining the assets on a per-type basis will a more effective picture of the state of the assets be presented. This was done as part of the 2018-19 Building Condition Assessment Program – reports from that project can be referenced for more detail.

Table 63 - Asset type condition by CRV

	Past Due	VERY POOR	POOR	FAIR	GOOD	VERY GOOD
Transit Services Faculties	\$3,178 0.02%	\$174,803 0.91%	\$1,833,397 9.51%	\$5,508,511 28.58%	\$9,767,240 50.68%	\$1,984,178 10.30%
BUS - CONVENTIONAL	\$8,040,000 14.81%	\$12,730,000 23.46%	\$4,020,000 7.41%	\$7,370,000 13.58%	\$18,760,000 34.57%	\$3,350,000 6.17%
BUS - MOBILITY	\$0 0.00%	\$224,000 8.11%	\$0 0.00%	\$2,016,000 72.99%	\$188,000 6.81%	\$334,000 12.09%
Transit Vehicle - Other	\$141,000 31.97%	\$0 0.00%	\$24,000 5.44%	\$140,000 31.75%	\$76,000 17.23%	\$60,000 13.61%
Total Transit Services	\$8,184,178 10.66%	\$13,128,803 17.11%	\$5,877,397 7.66%	\$15,034,511 19.59%	\$28,791,240 37.52%	\$5,728,178 7.46%

Table 64 - Transit services assets: Condition by CRV

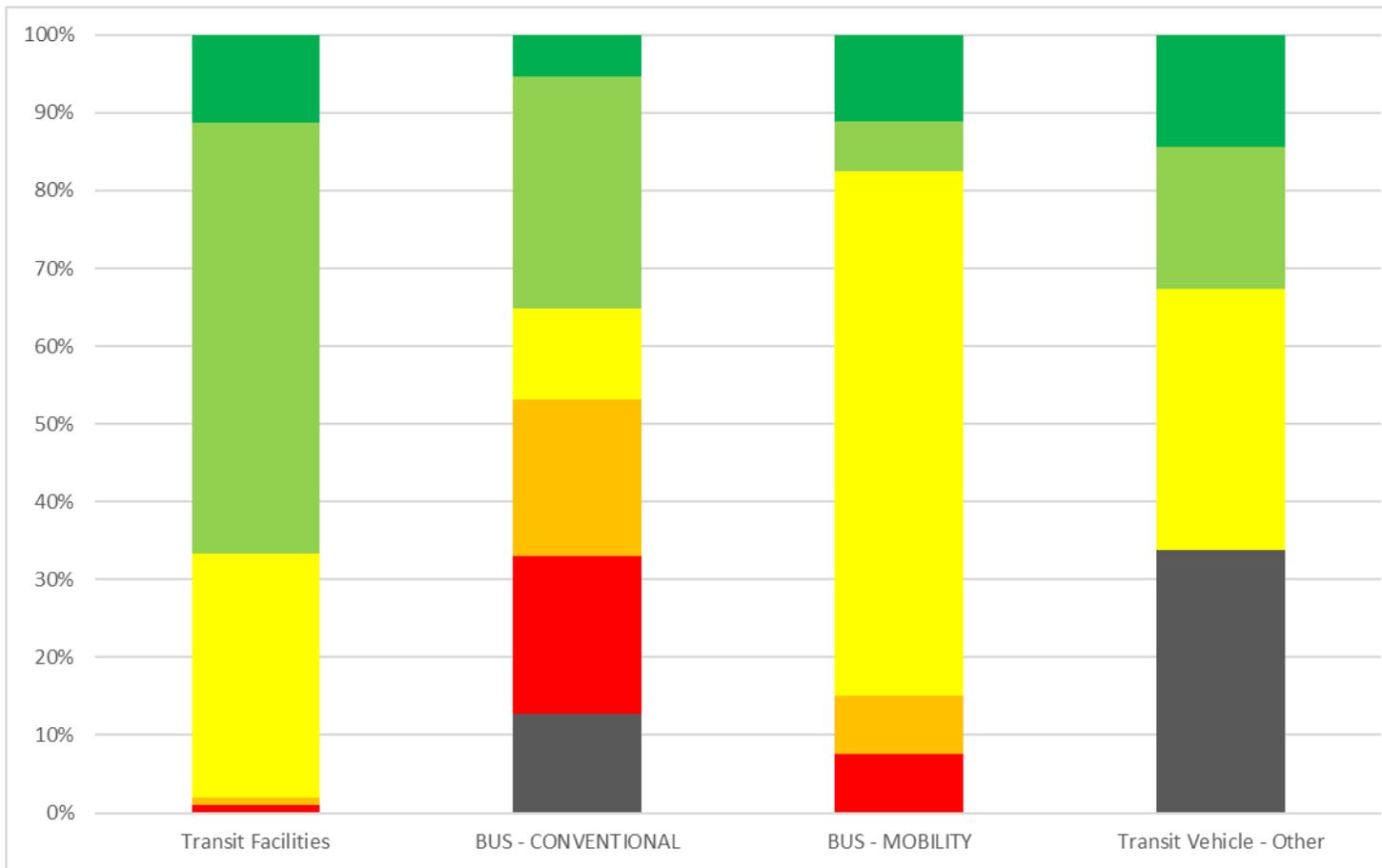
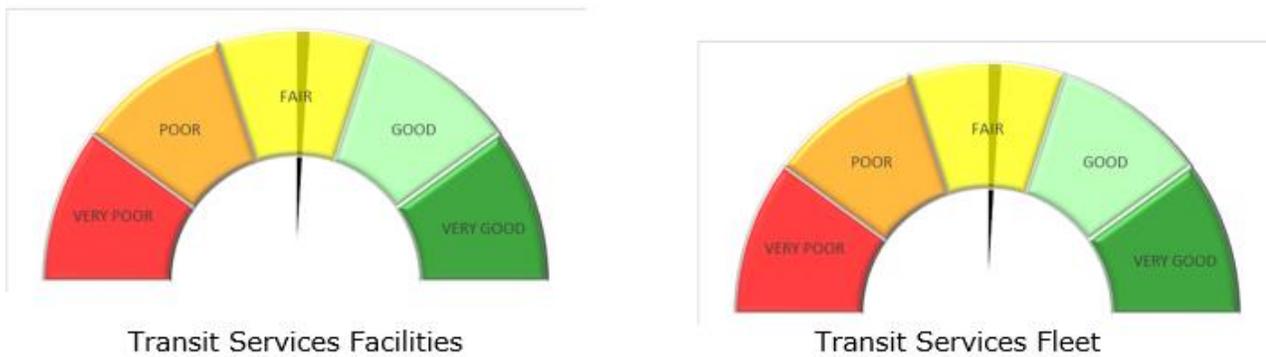


Figure 93 - Average condition rating of transit services assets



Asset Ages

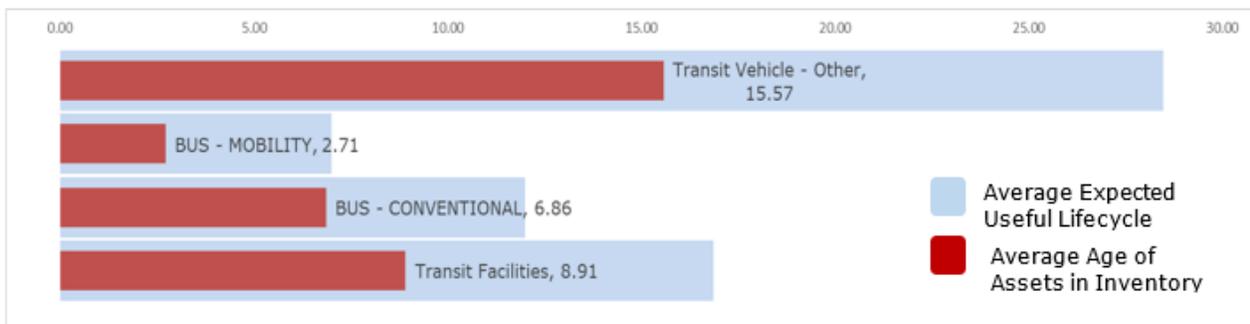
Facilities like those that make-up the Transit Services assets are comprised of multiple asset types, each with a unique expected lifecycle, ranging from very long (75+ years) to short (10+ years). The average age of the Transit Services Assets is within the expected useful age range.

The Transit Services fleet vehicle however are on average very near their expected useful life age – confirming their age-based condition identified above.

Table 65 - Average age of transit services facility assets

Asset Type	Average Age	EUL
Transit Facilities	8.91	16.86
BUS - Conventional	8.47	12.00
BUS - Mobility	8.00	7.00
Transit Vehicle - Other	15.82	28.47

Figure 94 - Average age of transit services assets by type



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific assets, nor specific projects or actions required to correct any deficiencies - this is not the purpose of a high-level AMP. These details can be delivered in asset specific management plans, or service area master plans.

City staff who have contributed information to the AMP have worked to identify specific asset needs and converted those needs to projects with identified costs for future work. Those future project costs have been included in this AMP, with the cooperation of the City Financial staff.

The future year forecast requirements for the facilities were determined by identifying what the estimated replacement year for each asset is predicted to be following the criteria outlined in the Budget & Financial Needs Analysis section of this AMP beginning on page 31.

This includes the "past due" assets where the determined replacement year was 2020 or earlier – the replacement value for these assets has been added to the "backlog" sum. For vehicles, only an age-based method was available to determine their condition, and so if the vehicle is considered "past due", its replacement data was re-set to 2020, and the sum of replacement values in 2020 was determined to be the backlog. For the purposes of analysis the backlog value has been distributed over ten (10) years to lessen the impact of trying to reduce the backlog at one time.

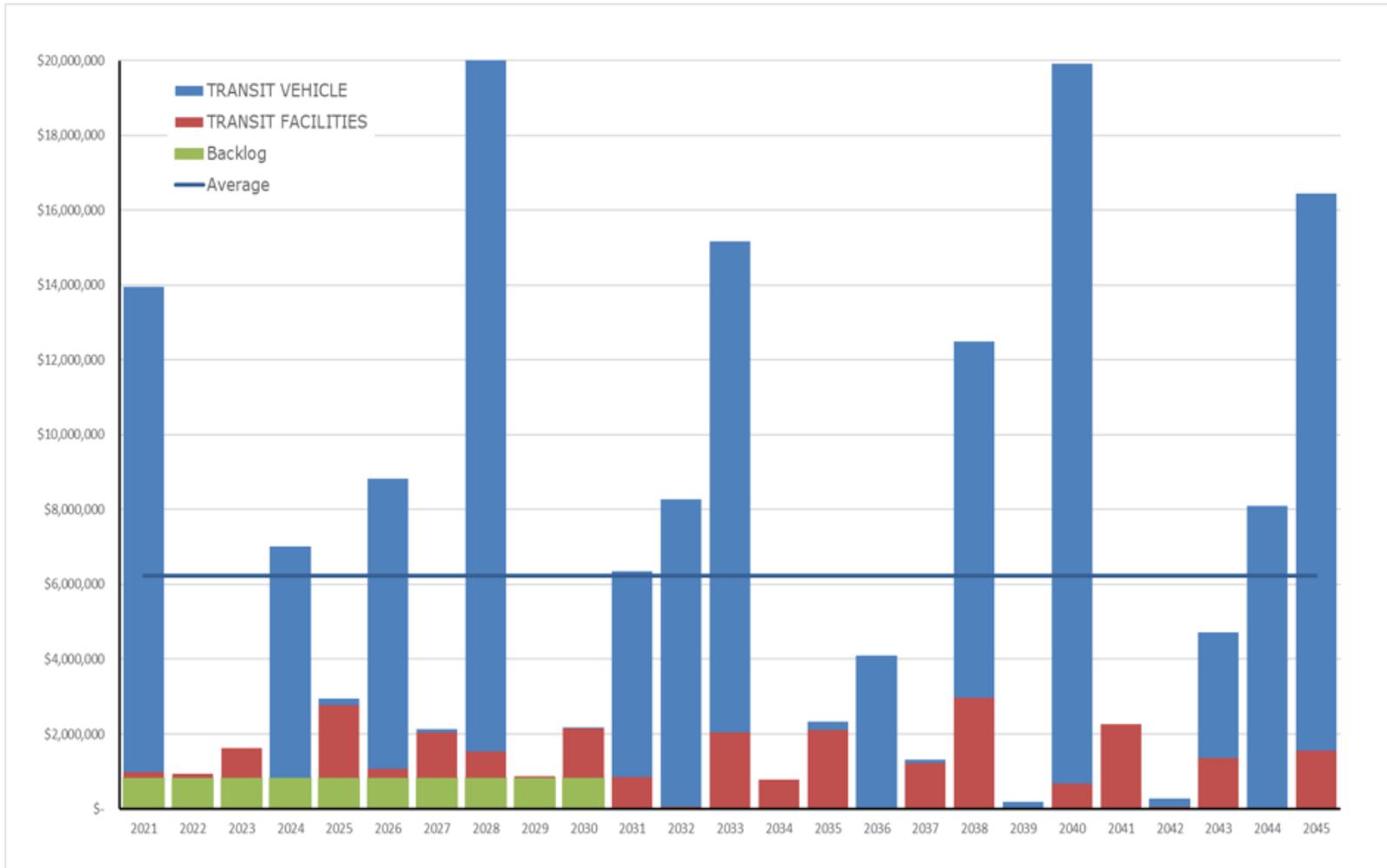
Figure 116 presents a graphical view of forecast asset replacement costs using the remaining service life of the assets compared to a normal expected useful service life for the asset types, over a period of 25-years.

Table 66 - 25-Year financial summary transit system assets

	2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	in Year
Transit Facilities	\$3,178	\$22,617,558	\$904,702	\$2,976,383	2038
Transit Fleet	\$8,181,000	\$133,037,000	\$5,321,480	\$19,231,000	2040
Totals	\$8,184,178	\$155,654,558	\$6,226,182.30		

Note that these values represent only the estimated asset replacement costs, and do not represent any other costs that may be required in future years such as non-infrastructure related studies, design and consulting fees or other.

Figure 95 - Forecast transit system future replacement costs based on asset remaining life



Budget Analysis: Transit Services

The budget analysis encompasses the identified forecast annual requirements (based on current rated condition of the assets) plus the allowances for maintenance and expansion compared to the approved program of work funding as indicated in the 2021-2045 Capital Budget. An analysis including a contingency value was also completed.

A summary of the budget analysis is shown in Table 79 while a graph demonstrating the analysis results is shown in Figure 72.

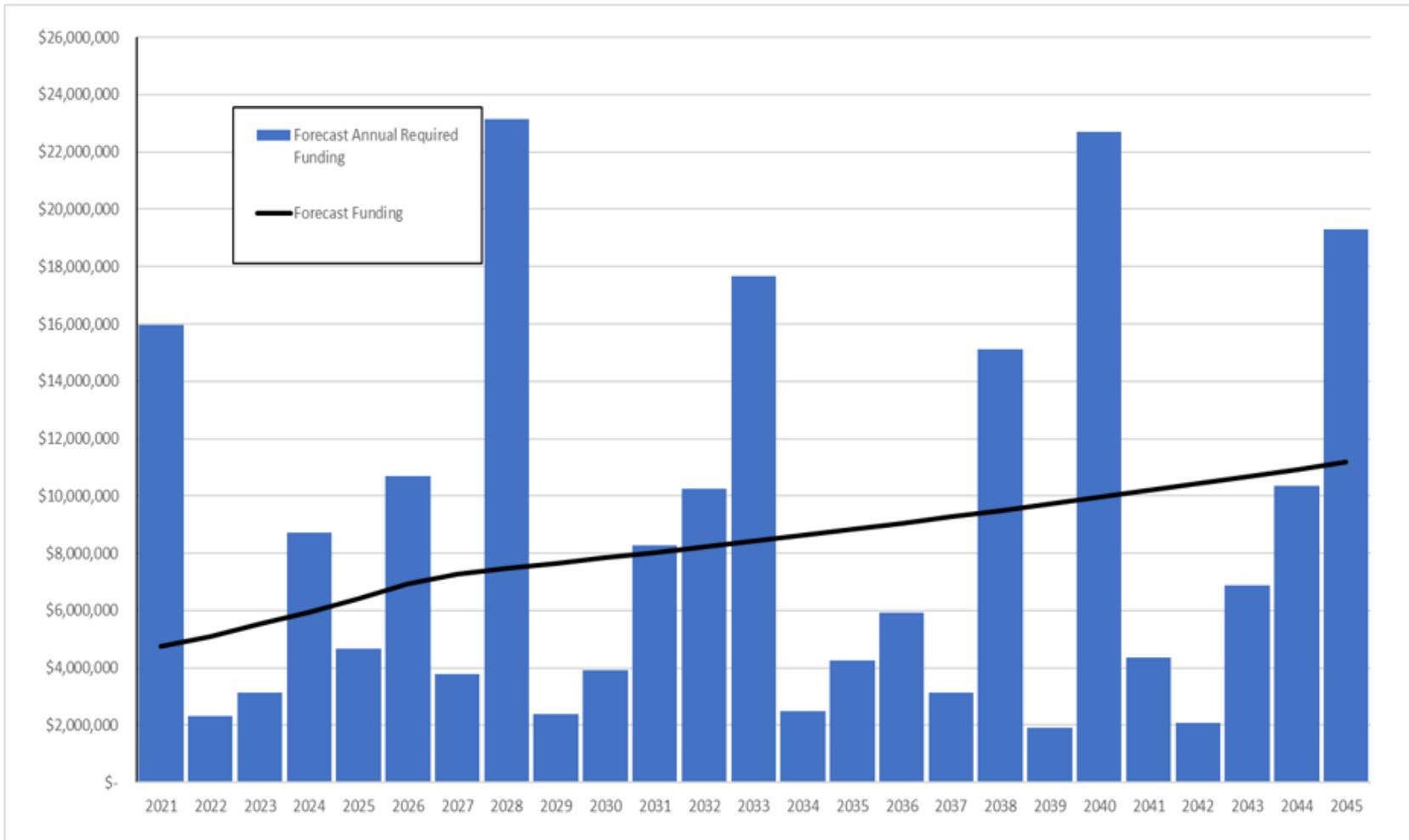
The analysis also shows that the transit system assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$8.5M (including maintenance and growth).

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$216k. However, in most years there is a forecast surplus.

Table 67 - 25-Year financial review transit services

Total 25-Year Requirements	\$ 213,438,271	Annual Average	\$ 8,537,531
Total 25-Year Funding	\$ 208,037,852	Annual Average	\$ 8,321,514
		Annual Average Funding Gap	\$ (216,017)

Figure 96 - 25-Year budget analysis for transit services system assets



Levels of Service

Physical assets exist to provide a service to the residents of Guelph. To be able to understand if the assets are delivering that service in accordance with expectations a series of metrics have been developed to help City staff with this analysis.

As with other service areas, in spring of 2018 efforts began to establish measureable criteria for levels of service. A draft framework was developed, but based on best information available and discussions with staff this framework was never finalized nor implemented.

The Transit Services assets are not considered one of the five “core municipal infrastructure assets” and so there are no mandatory level of service reporting requirements at this time. These are expected to be implemented in July 2023. In the interim, CAM staff will work in conjunction with Transit Services Management staff to finalize needed Levels of Service metrics, and related reporting processes.

Summary and Conclusion

The Transit Services class is a relatively small class of assets for the City of Guelph. This does not negate the importance of these assets.

In broad terms the Transit Services assets are in acceptable condition – the overall condition of the fleet assets is an indication of the age of the assets as opposed to a measure of functional performance. Fleet management provided information indicating that a vehicle replacement plan is in place.

The financial review indicates that the Transit Services is expected to have a healthy surplus in program of work funding compared to expected requirements.

Recommendations

1. Transit buses are scheduled to be replaced at regular intervals – this schedule should be adhered to as best as possible to maintain the long-term sustainability of the fleet

12. Corporate Fleet and Equipment

Service Area: Fleet Vehicles and Equipment

Quick Facts

Table 68 - Overall summary of fleet and equipment assets

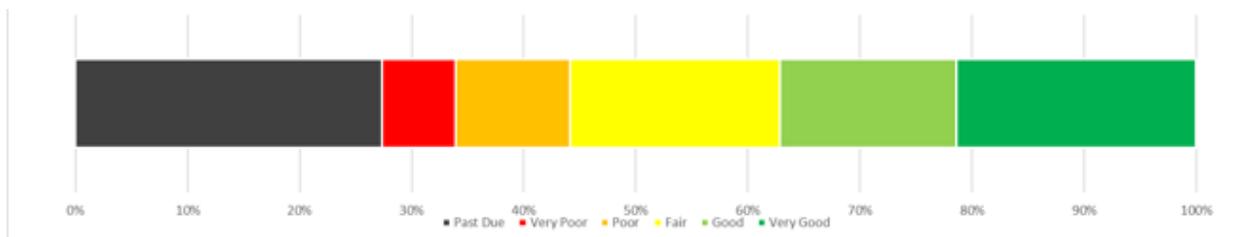
Item	CRV	Quantity
Fleet Vehicles	\$21,563,652,	329
Equipment	\$6,941,578	448 (records)
	Total Replacement Value	\$28,505,232
	Identified 2020 Backlog	\$5,955,266

Data Quality: 73%

Figure 97 - Average condition of fleet and equipment assets



Figure 98 - Condition of fleet and equipment assets by CRV



NOTE:

1. In this section "Fleet Vehicles" refers to vehicles in general use by the City of Guelph. Other Service Areas have vehicles within their inventory: Transit, Fire, Police, Paramedics and Solid Waste. Although Fleet Services manages some of the purchasing and inventory details for those vehicles, the requirements analysis for the vehicles dedicated to a service area are included in the overall analysis for those Services.

State of the Assets:

City staff, regardless of service area, often require the use of a vehicle to accomplish daily tasks. The Fleet Management staff coordinate the management and maintenance of a fleet of vehicles for this purpose. The types of vehicles range from typical small passenger vehicles to heavy equipment for construction operations.

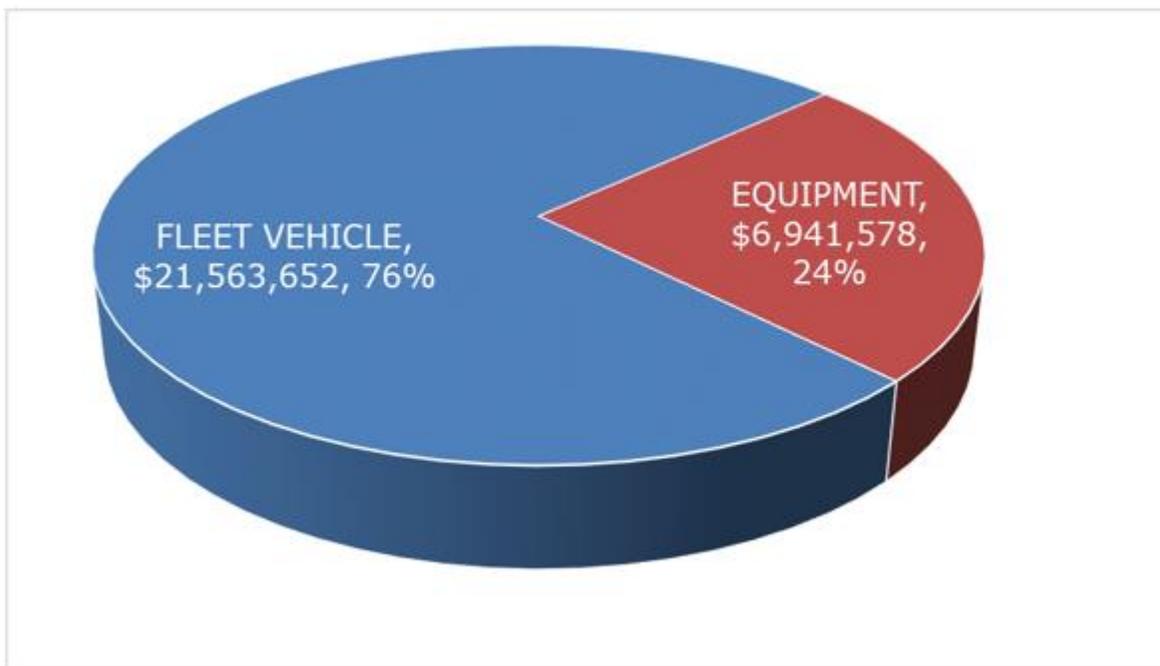
Likewise specialized equipment required for City operations – like grass cutters, jack hammers and mobile electronic signage – are also managed by the fleet operations staff.

The AMP does not present specific deficiencies or project needs, but presents a high-level review of the state of the Fleet & Equipment assets and general needs that have been identified for the future.

Fleet & Equipment Asset Types

The Fleet & Equipment Assets can be broadly classified into two groups. The respective values of each group are identified in the figure below.

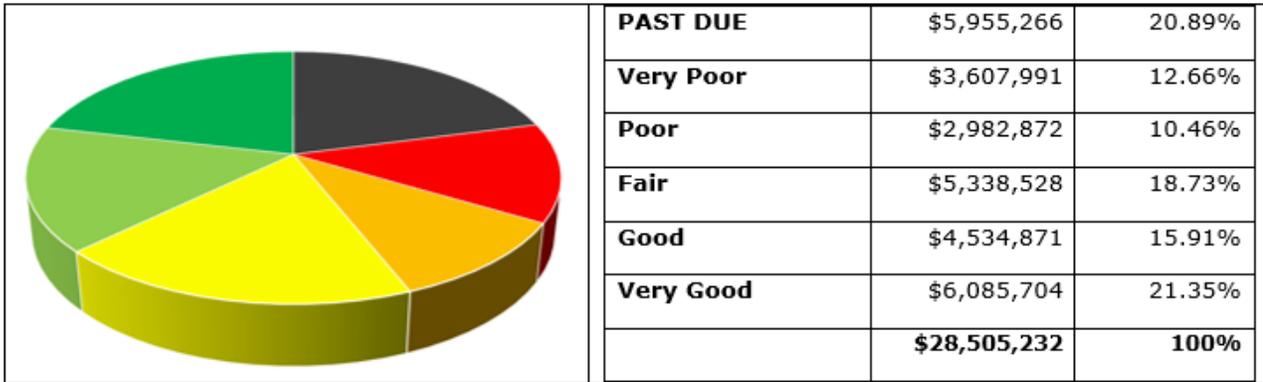
Figure 99 - Fleet and equipment asset types by CRV



Asset Condition by Type

A breakdown of the overall asset inventory by condition and replacement value is shown in the following table.

Figure 100 - Condition of corporate asset fleet and equipment assets by CRV



Vehicles and Equipment have shorter lifecycles than other asset types. As a result of this there are seldom quantitative condition ratings assigned to these types of assets due to their short lives, and in some cases low replacement values, and so the rated conditions are determined using only an age based approach. This tends to result in a condition distribution that is fairly even across the different categories as vehicles and equipment tend to be purchased in a cyclical pattern. Reviewing Figure 123, this pattern is somewhat apparent with the vehicles, although the percentage of assets in "past due" and "very poor" condition is almost 34% or about 1/3 of the total portfolio.

Noted during the analysis was that many of the vehicles rated in "past due" condition were indicated by Fleet Management Staff to have a planned replacement in 2020 or 2021 and it is a matter of the timing of this AMP compared to those replacement plans that result in the "past due" assets being equal to what has been determined.

Despite the ratings, as discussed with other vehicle types, a less than "fair" rating does not necessarily indicate that the asset is soon to be no longer functional. Provided that vehicles receive good maintenance they can remain in good working condition well beyond their expected normal lifecycles.

Table 69 - Condition of fleet and equipment assets by type

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Fleet Vehicle (\$)	\$4,542,980	\$3,006,369	\$1,955,610	\$4,441,641	\$3,772,037	\$3,845,015
Fleet Vehicle (%)	21.07%	13.94%	9.07%	20.60%	17.49%	17.83%
Equipment (\$)	\$1,412,286	\$601,620	\$1,027,262	\$896,887	\$762,833	\$2,240,690
Equipment (%)	20.35%	8.67%	14.80%	12.92%	10.99%	32.28%
Miscellaneous ²⁷ (\$)	\$0	\$2	\$0	\$0	\$1	\$0

²⁷ Within the data there are records that have been classified as "Miscellaneous" due to them missing essential data, and not being either a vehicle or equipment. These include: rental paddle boats, a mini train, and a carousel ride. No exact costing or age data was provided for these records, and so a proper analysis could not be done, but they are included for completeness

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Miscellaneous (%)	0.00%	66.67%	0.00%	0.00%	33.33%	0.00%
Totals (\$)	\$5,955,266	\$3,607,991	\$2,982,872	\$5,338,528	\$4,534,871	\$6,085,704
Totals (%)	20.89%	12.66%	10.46%	18.73%	15.91%	21.35%

Figure 101 - Fleet and Equipment Assets: Condition by CRV

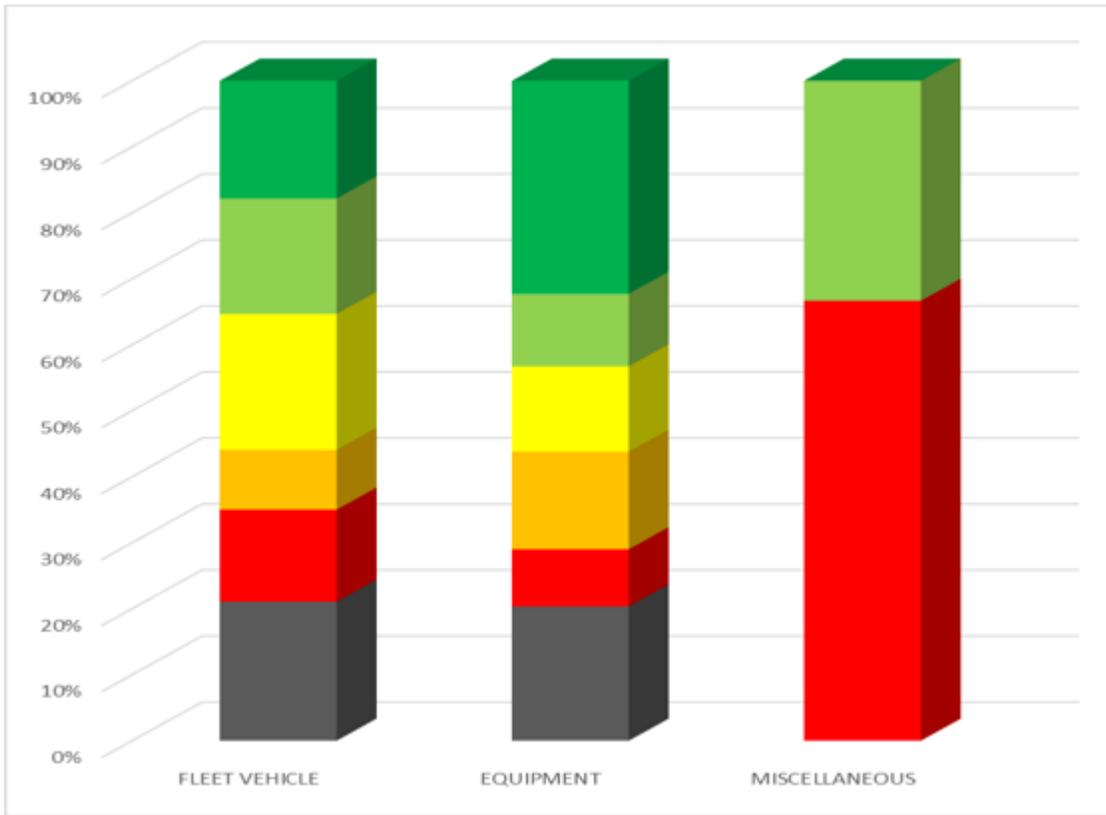


Figure 102 - Average condition rating of fleet and equipment assets

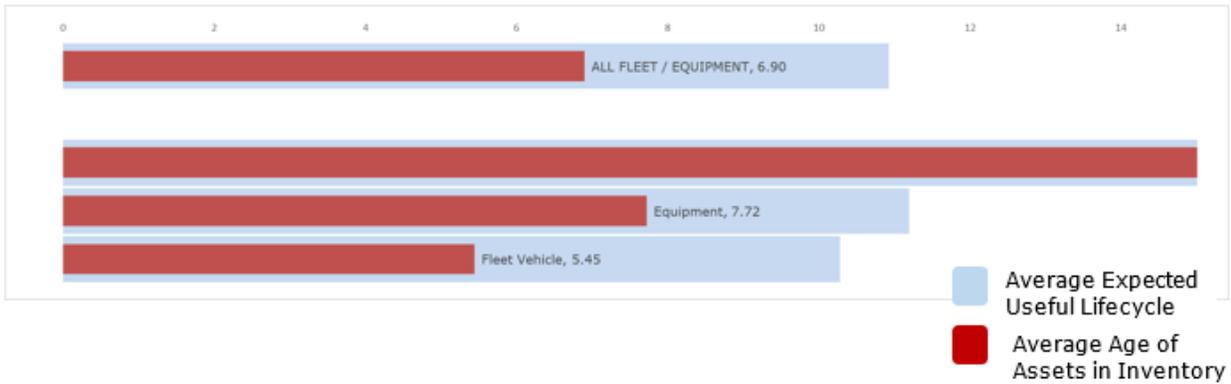


Asset Ages

Table 70 - Average age of fleet and equipment assets

Asset Type	Average Age	EUL
Fleet Vehicle	5.45	10.28
Equipment	7.72	11.20
MISCELLANEOUS	44.67	56.67
ALL FLEET / EQUIPMENT	6.90	10.93

Figure 103 - Average age of fleet and equipment assets by type



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific assets, nor specific projects or actions required to correct any deficiencies - this is not the purpose of a high-level AMP. These details can be delivered in asset specific management plans, or service area master plans.

The future year forecast requirements were determined by identifying what the estimated replacement year for each asset is predicted to be following the age-based criteria outlined in the Budget & Financial Needs Analysis section of this AMP beginning on page 31. Given the relatively short normal lifecycle of the assets in this category, the majority of the assets have more than one replacement planned over the next 25-years.

This includes the “past due” assets where the determined replacement year was 2020 or earlier – the replacement value for these assets has been added to the “backlog” sum. For the purposes of analysis the backlog value has been distributed over ten (10) years to be able to lessen the impact of trying to reduce the backlog at one time.

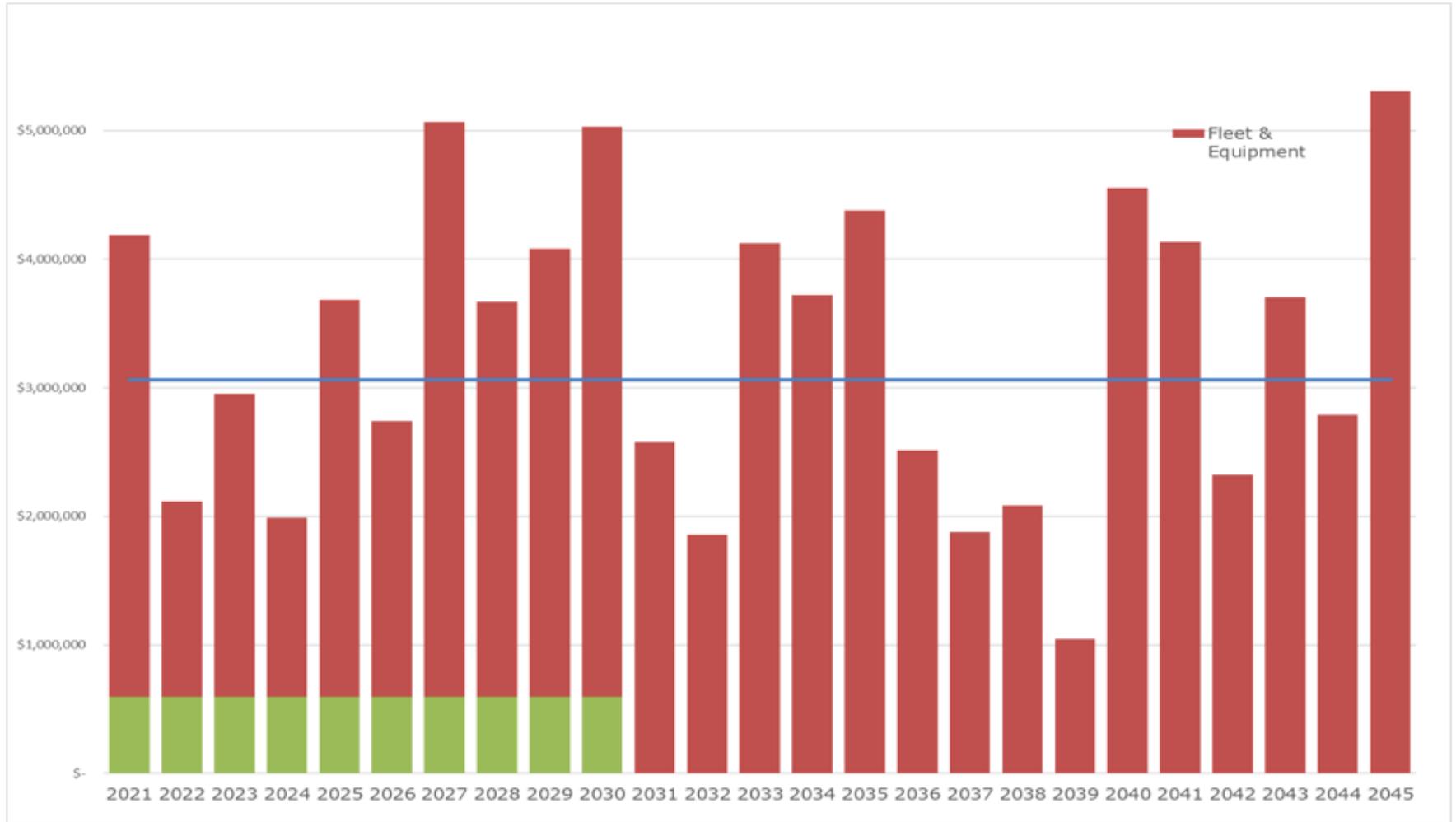
Figure 127 presents a graphical view of forecast asset replacement costs using the remaining service life of the assets compared to a normal expected useful service life for the asset types, over a period of 25-years.

Table 71 - 25-Year forecast replacement costs, fleet and equipment

	2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	in Year
Fleet Vehicle	\$4,542,980	\$60,315,251	\$2,412,610	\$4,136,411	2045
Equipment	\$1,412,286	\$16,241,025	\$649,641	\$1,725,293	2040
Totals	\$5,955,266	\$76,556,276	\$3,062,251		

Note that these values represent only the estimated asset replacement costs, and do not represent any other costs that may be required in future years such as non-infrastructure related studies, design and consulting fees or other.

Figure 104 - Forecast fleet and equipment future replacement costs based on asset remaining service life



Budget Analysis: Fleet and Equipment Assets

The budget analysis encompasses the identified forecast annual requirements (based on current rated condition of the assets) plus the allowances for maintenance and expansion compared to the approved program of work funding as indicated in the 2021-2045 Capital Budget. An analysis including a contingency value was also completed.

A summary of the budget analysis is shown in the analysis also shows that the transportation assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$4.2M (including maintenance and growth).

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$81k. In many years there is a forecast surplus.

Table 72 while a graph demonstrating the analysis results is shown in Figure 78.

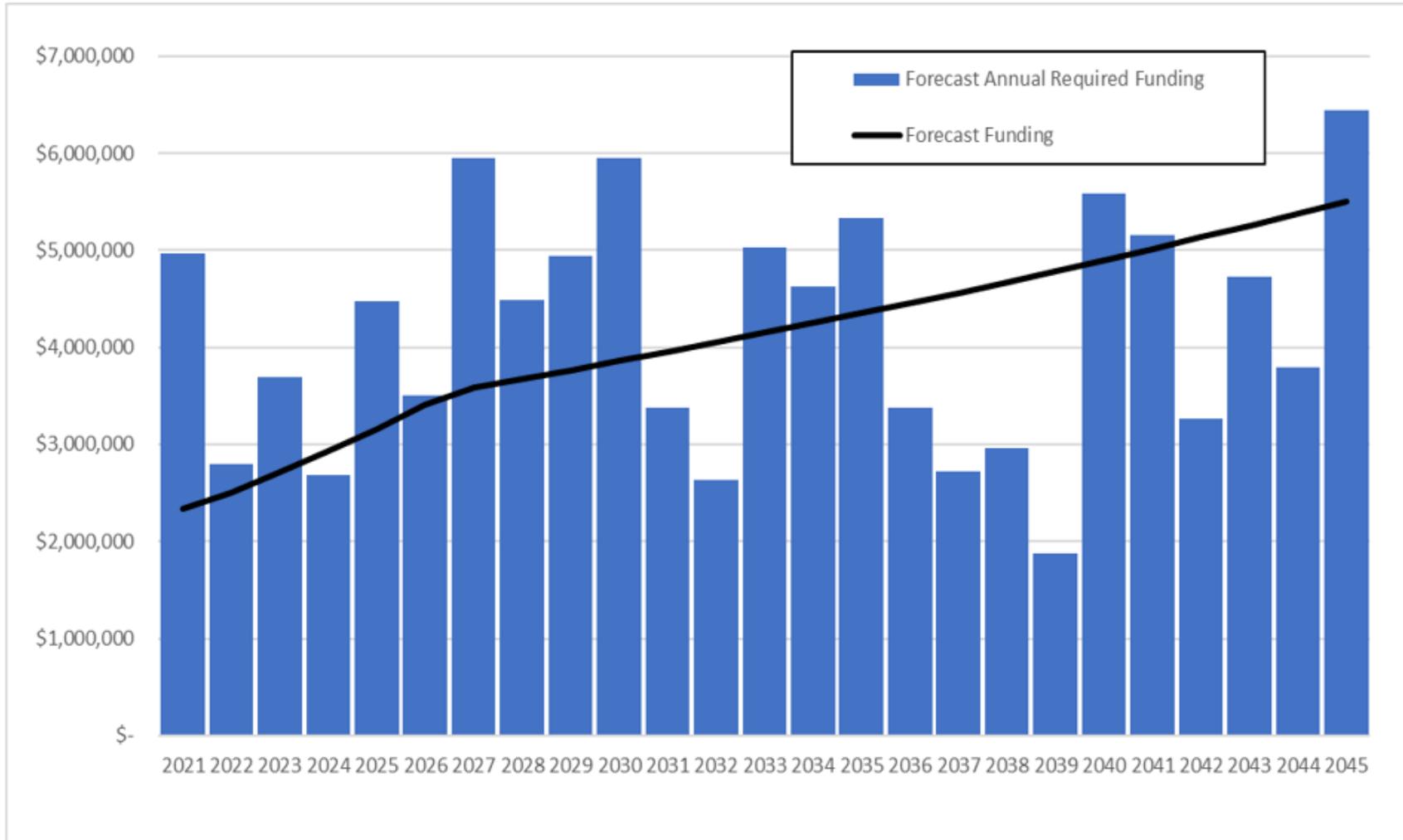
The analysis also shows that the transportation assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$4.2M (including maintenance and growth).

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$81k. In many years there is a forecast surplus.

Table 73 - 25 - Year summary financial review fleet and equipment

Total 25-Year Requirements	\$ 104,355,271	Annual Average	\$ 4,174,211
Total 25-Year Funding	\$ 102,320,189	Annual Average	\$ 4,092,808
		Annual Average Funding Gap	\$ (81,403)

Figure 105 - 25 -Year budget analysis for fleet assets



Levels of Service

Physical assets exist to provide a service to the residents of Guelph. To be able to understand if the assets are delivering that service in accordance with expectations a series of metrics have been developed to help City staff with this analysis.

As with other service areas, in spring of 2018 efforts began to establish measureable criteria for levels of service. A draft framework was developed, but based on best information available and discussions with staff this framework was never finalized nor implemented.

The Fleet & Equipment asset types are not considered one of the five “core municipal infrastructure assets” in O.Reg 588/17 and so there are no mandatory level of service reporting requirements at this time. These are expected to be implemented in July 2023. In the interim, CAM staff will work in conjunction with Fleet & Equipment Management staff to finalize needed Levels of Service metrics, and related reporting processes.

Summary and Conclusion

The Fleet & Equipment assets as a group comprise only a small percentage of the total asset inventory of the City of Guelph. This does not negate the importance of these assets however.

In broad terms the Fleet & Equipment assets are in acceptable condition – quantitative condition assessments are not provided for vehicles and so the overall “poor” rating of the fleet assets is an indication of the age of the assets as opposed to a measure of functional performance. As previously discussed vehicles often remain in good functional service beyond a theoretical end of service life. The City of Guelph fleet management staff have good preventive maintenance practices in place for the fleet, as well as a vehicle replacement plan.

Recommendations

1. Those assets identified as “miscellaneous” without essential data should be re-assessed and their details properly included in the inventory for future planning purposes.

13. Emergency Services: Fire Rescue, Police Services, Paramedic Services

Service Area: City of Guelph Emergency Services:

Fire Rescue, Police Services and Paramedic Services

Quick Facts

Table 74 - Overall summary of EMS assets by service area

Fire Rescue - Facilities	\$14,249,011	Five stations
Fire Rescue - Fleet	\$11,479,180	37 vehicles
Fire Rescue - Equipment	\$3,441,201	241 items
Fire Rescue - Total	\$29,169,393	
Fire Rescue - Identified 2020 Backlog	\$6,194,000	
Police Services - Facilities	\$31,054,124	Police HQ²⁸
Police Services - Fleet	\$2,423,800	73 vehicles
Police Services - Equipment	\$1,054,940	333 items
Police Services - Total	\$34,532,864	
Police Services - Identified 2020 Backlog	\$2,780,706	
Paramedic Services - Facilities	\$3,773,045	Seven Ambulance bases
Paramedic Services - Fleet	\$3,226,701	23 vehicles

²⁸ At the time of preparing this AMP, a new Guelph Police Services building is under construction: no data for that building is included within this report

Paramedic Services - Equipment - \$1,251,025 **246 items**

Paramedic Services - Total - \$8,250,771

Paramedic Services - Identified 2020 Backlog - \$3,740,601

EMS Total \$71,953,028

Total Identified Backlog: \$12,715,307

Note: the three Services share funding and management responsibility for the Claire Rd. Emergency Services Centre

Data Quality: Fleet (73%)
 Facilities (40%)

Figure 106 - Overall Condition of EMS Facility and Fleet Assets by CRV



Figure 107 - Condition of EMS facility assets by CRV

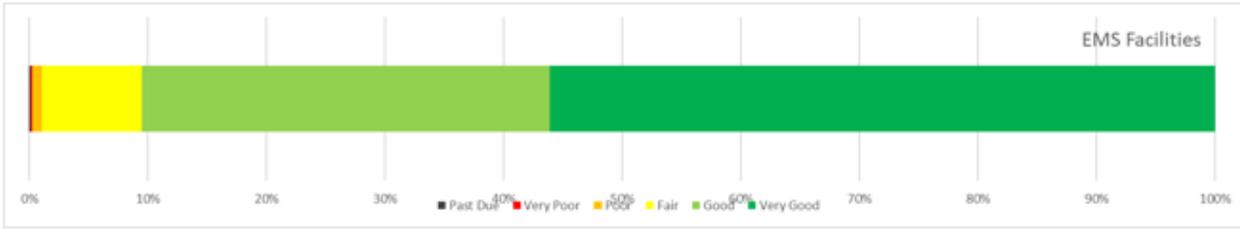
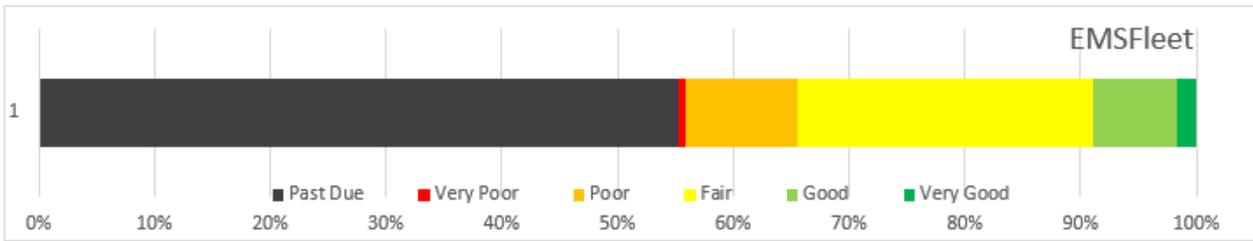


Figure 108 - Condition of EMS Fleet Assets by CRV



State of the Infrastructure

A modern city like Guelph protects its citizens with Police, Fire and Paramedic Services. These emergency Services (EMS) are essential to managing a safe city. The assets required by the EMS are specialized and unique. And within that inventory are two distinct sub-categories of assets, themselves with unique and distinct needs – buildings, and fleet assets (vehicles and equipment).

For the purposes of the analysis the two sub-categories will be evaluated separately due to the unique characteristics of each. Summaries of the forecast needs and budget analysis will be completed at the end of this section.

The AMP does not present specific deficiencies or project needs, but presents a high-level review of the state of the EMS system assets and general needs that have been identified for the future.

The EMS assets can be broadly classified into two groups:

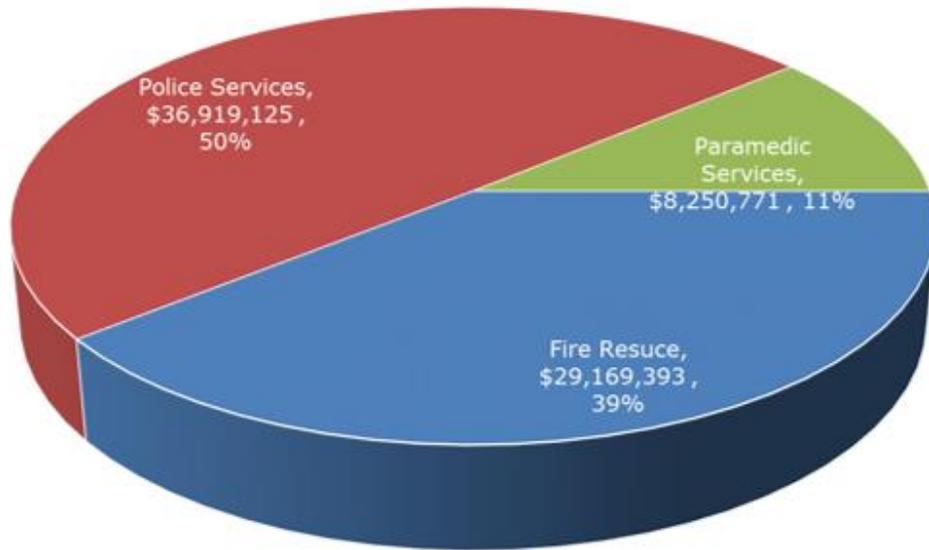
- Vehicles and Equipment: firefighting and rescue, police cruisers, ambulances and various support vehicles, plus the wide variety of equipment used by emergency Services staff like radios, fire-fighting gear, defibrillators and more
- Facilities: five fire stations, police headquarters, seven ambulance bases²⁹ and a shared Emergency Services Centre

EMS Assets by Service

The following chart outlines the breakdown of the total EMS asset inventory by Service.

²⁹ The Paramedic Services rents some facilities for ambulance bases in rural areas of Guelph-Eramosa: these are not included in the AMP

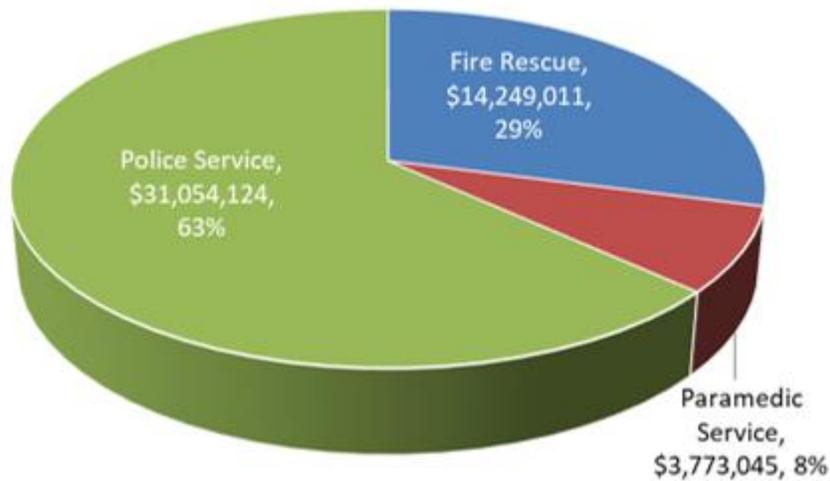
Figure 109 - EMS assets by service, by CRV



EMS Facilities

The chart in Figure 134 displays the breakdown of the EMS facilities only, by Service.

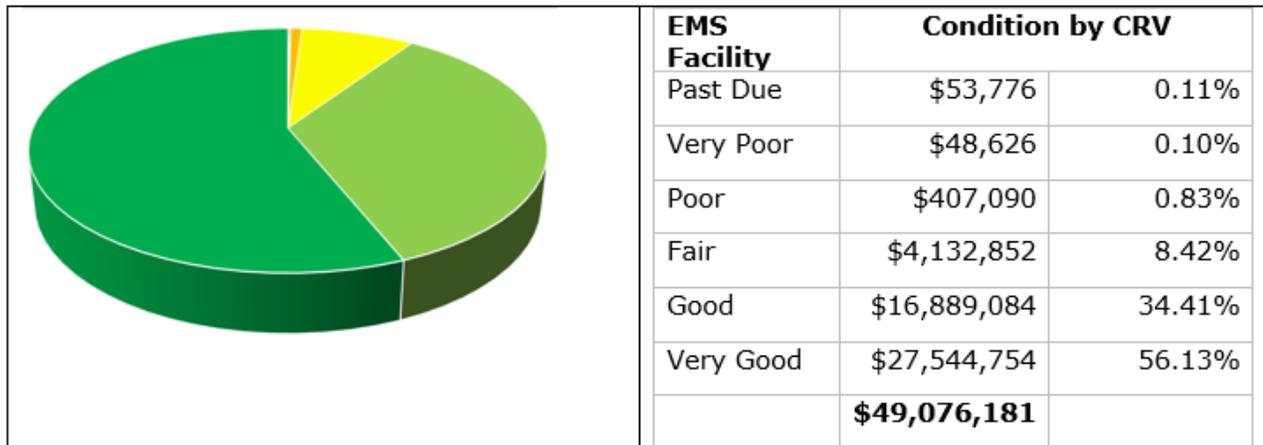
Figure 110 - Classification of EMS facility assets by CRV



Asset Condition by Type

A breakdown of the overall EMS facility asset inventory by condition and replacement value is shown in Figure 136: Condition of EMS Facilities by CRV.

Figure 111 - Condition of EMS facilities by CRV



As can be seen in the table and the accompanying graph the majority of EMS facility assets are in better than “fair” condition, with only very minimal values rated in “fair” or worse condition. This is indicative of well-maintained facilities. The condition rating does not take into account the functional suitability of the assets.

The above is a very broad analysis, and while it provides a general picture of the EMS Facilities inventory, only by examining the assets on a per-type basis will a more effective picture of the state of the assets be presented.

Figure 112 - Condition of EMS facilities

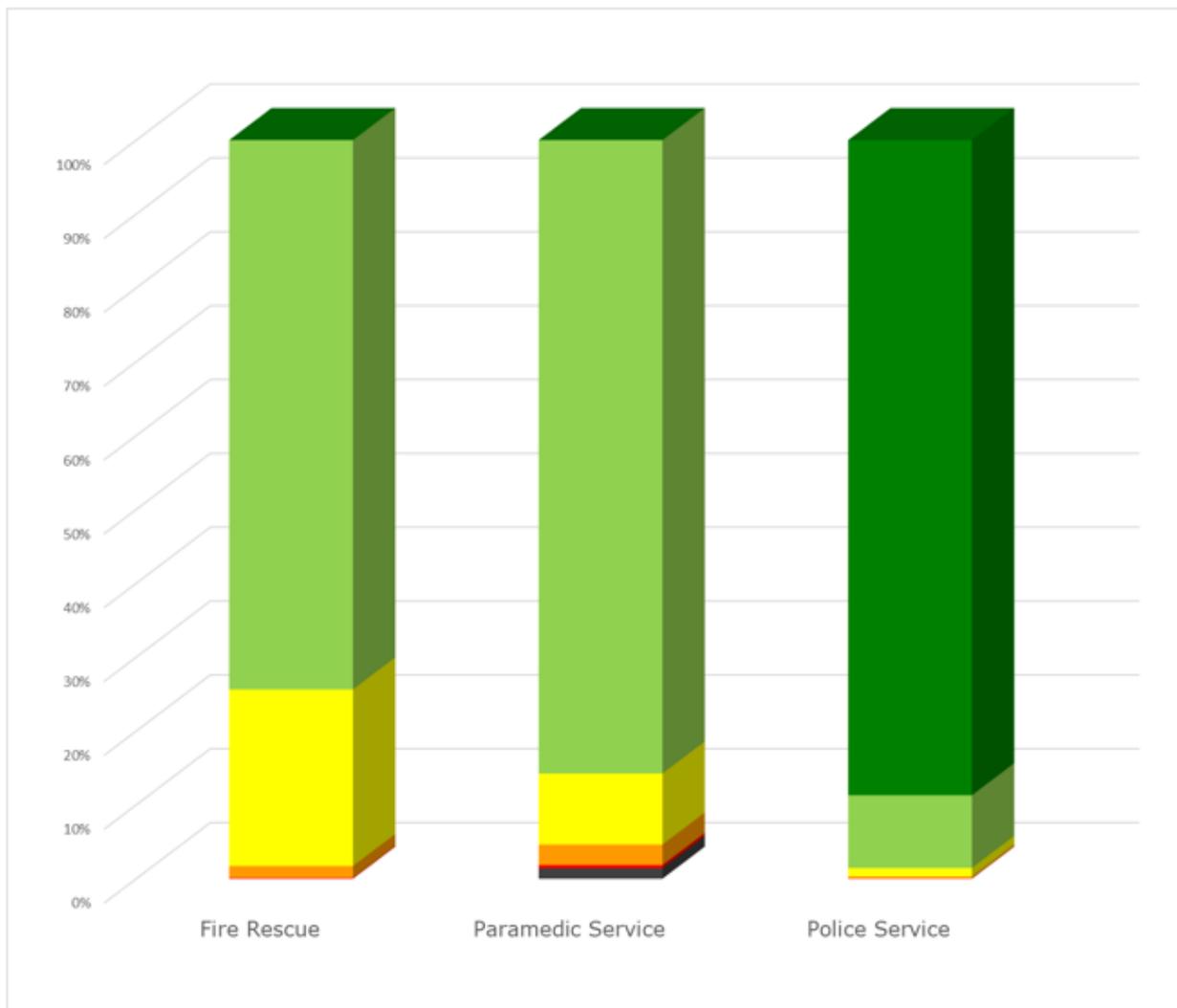


Table 75 - Condition of EMS facilities by type

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Fire Rescue (\$)	\$0	\$16,209	\$229,095	\$3,406,301	\$10,597,407	\$0
Fire Rescue (%)	0.00%	0.11%	1.61%	23.91%	74.37%	0.00%
Paramedic Service(\$)	\$53,776	\$16,209	\$104,396	\$363,275	\$3,235,389	\$1
Paramedic Service (%)	1.43%	0.43%	2.77%	9.63%	85.75%	0.00%
Police Service (\$)	\$0	\$16,209	\$73,599	\$363,275	\$3,056,288	\$27,544,753
Police Service (%)	0.00%	0.05%	0.24%	1.17%	9.84%	88.70%
Total (\$)	\$53,776	\$48,626	\$407,090	\$4,132,852	\$16,889,084	\$27,544,754
Total (%)	0.11%	0.10%	0.83%	8.42%	34.41%	56.13%

Figure 113 - Average condition rating of EMS facility types

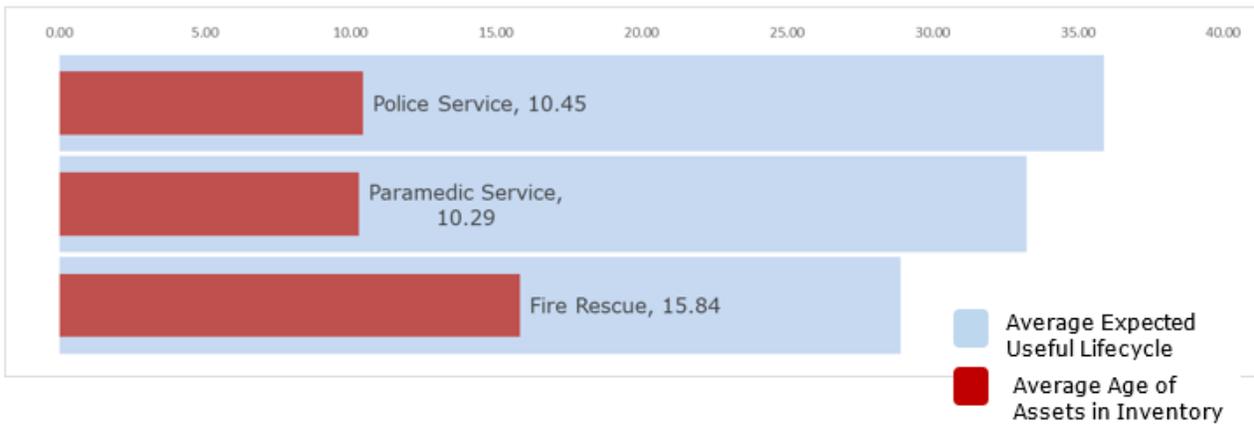


Asset Ages

Table 76 - Average age of EMS facility assets

Asset Type	Average Age	EUL
Fire Rescue	15.84	28.92
Paramedic Service	10.29	33.24
Police Service	10.45	35.89

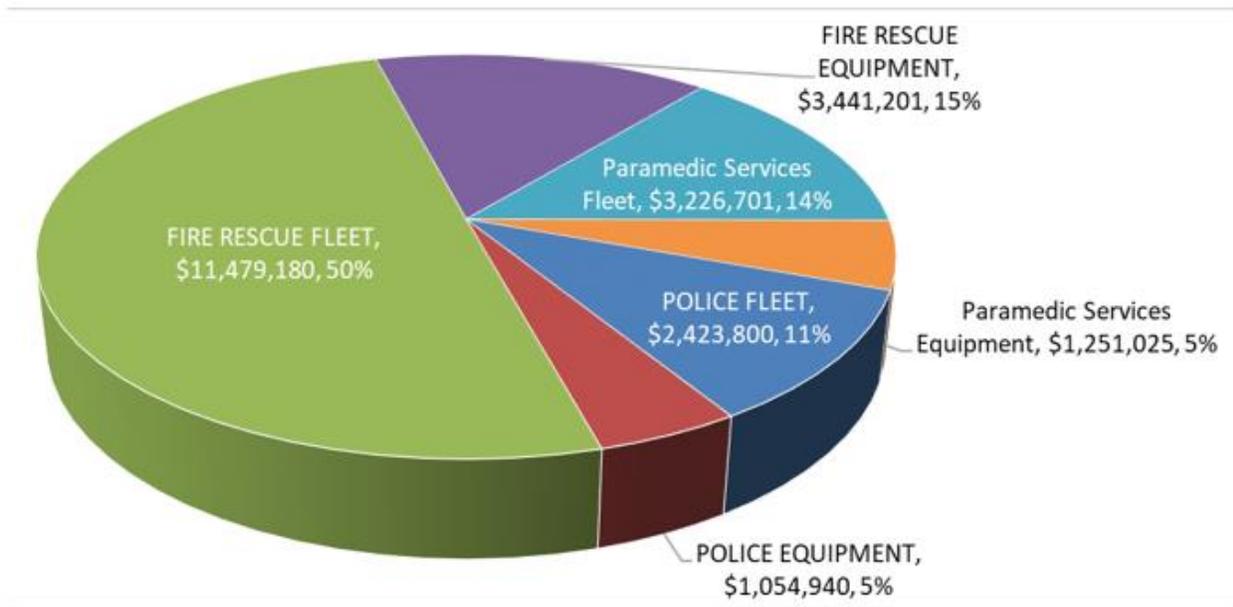
Figure 114- Average age of EMS facility assets by type



EMS Fleet

The distribution of EMS Facility assets is as shown in Figure 84. The distribution separates the vehicles from the equipment items.

Figure 115 - Classification of EMS Fleet Assets by CRV



Asset Condition by Type

A breakdown of the overall asset inventory by condition and replacement value is shown in Table 76 and Figure 142.

As clearly evident in the graph, a large percentage of the fleet and equipment assets are considered in "past due" condition. This is because the condition rating is based on age, not on actual physical condition. No quantitative condition info is available for these assets.

Vehicles and equipment tend to have relatively short expected normal lifecycles compared to other assets types (i.e. the time that passes between "very good" condition and "very poor" condition can be as short as 3-5 years), but can also remain in good functional service sometimes much longer than the theoretical normal lifecycle. The latter point is especially true with asset types that receive regular good maintenance, such as emergency service vehicles would do.

Likewise the City of Guelph Fleet Services provided a vehicle replacement plan that identifies planned replacements for many of the vehicles that are included in the "past due" condition.

Despite what would normally be considered condition ratings that are cause for concern, at this time the risks are considered small.

Figure 116 - EMS fleet/equipment assets by condition type

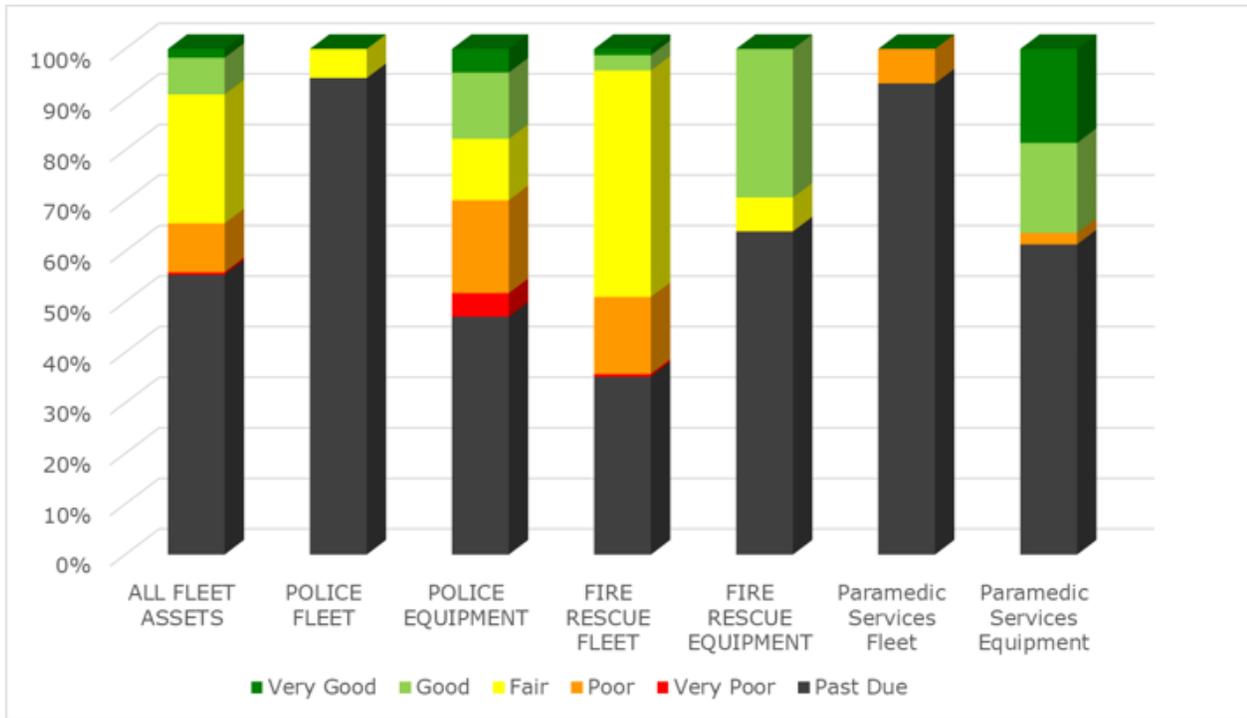
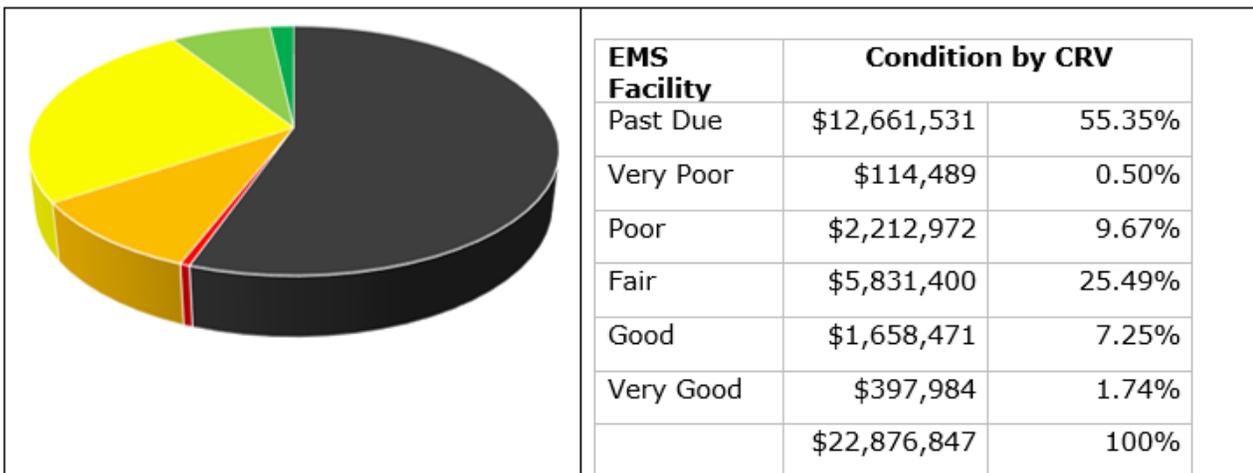


Figure 117 - Condition of EMS fleet and equipment assets



As seen in Figure 143 and the accompanying graph the majority of EMS facility assets are in better than "fair" condition, with only very minimal values rated in "fair" or

worse condition. This is indicative of well-maintained facilities. The condition rating does not take into account the functional suitability of the assets.

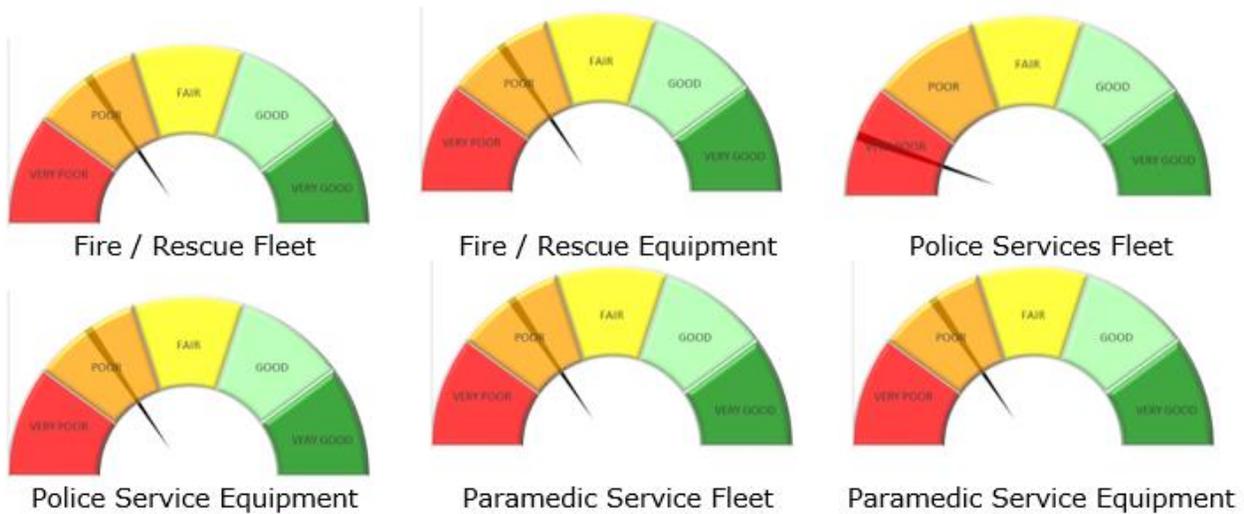
The above is a very broad analysis, and while it provides a general picture of the EMS Fleet and Equipment inventory, only by examining the assets on a per-type basis will a more effective picture of the state of the assets be presented.

Table 77 - Condition of EMS fleet and equipment assets by type

	Past Due	Very poor	Poor	Fair	Good	Very Good
Fire Rescue – Fleet (\$)	\$4,087,100	\$65,400	\$1,770,340	\$5,202,900	\$353,440	\$0
Fire Rescue – Fleet (%)	35.60%	0.57%	15.42%	45.32%	3.08%	0.00%
Fire Rescue Equipment (\$)	\$2,106,900	\$0	\$3,701	\$218,600	\$969,100	\$142,900
Fire Rescue Equipment (%)	18.35%	0.00%	0.03%	1.90%	8.44%	1.24%
Police Fleet (\$)	\$2,284,300	\$0	\$0	\$139,500	\$0	\$0
Police Fleet (%)	94.24%	0.00%	0.00%	5.76%	0.00%	0.00%

	Past Due	Very poor	Poor	Fair	Good	Very Good
Police Equipment (\$)	\$496,406	\$49,089	\$193,930	\$127,900	\$138,531	\$49,084
Police Equipment (%)	47.06%	4.65%	18.38%	12.12%	13.13%	4.65%
Paramedic Services Fleet (\$)	\$3,006,700	\$0	\$220,001	\$0	\$0	\$0
Paramedic Services Fleet (%)	87.37%	0.00%	6.39%	0.00%	0.00%	0.00%
Paramedic Services Equipment (\$)	\$680,125	\$0	\$25,000	\$142,500	\$197,400	\$206,000
Paramedic Services Equipment (%)	54.37%	0.00%	2.00%	11.39%	15.78%	16.47%
Overall Total (\$)	\$12,661,531	\$114,489	\$2,212,972	\$5,831,400	\$1,658,471	\$397,984

Figure 118 - Average condition rating of EMS fleet and equipment



Asset Ages

The average ages of the EMS Fleet and Equipment are displayed in Figure 87 and Table 75. Reviewing the graph it is clear that the average age of the assets is beyond the normal expected lifecycles for nearly all of the asset types - this is especially true for the Police Services Fleet, and helps explain why the asset category has a high percentage of assets in less than "good" condition.

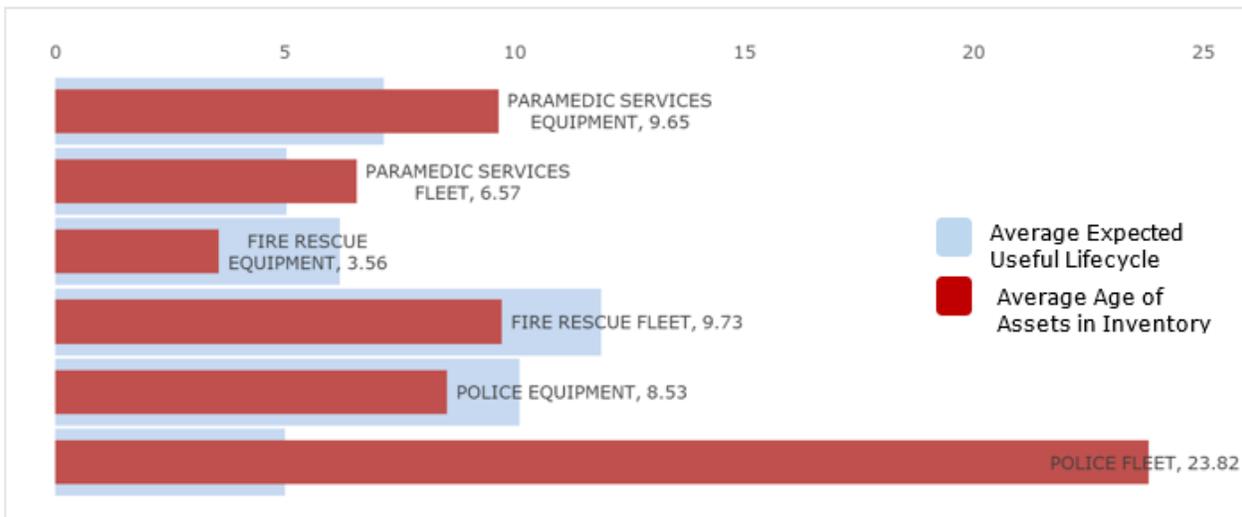
As previously discussed this does not necessarily indicate that the EMS assets are at risk of failure as vehicles can remain in service beyond what is considered a normal lifecycle with good maintenance practices. However, a deep review of the data shows that about 74% (54/73) of the Police Services fleet vehicles are more than 11 years old, with about 33% listed as being more than 30 years old. More review of the assets and the asset data is recommended to explore this situation.

Table 78 - Average age of EMS fleet and equipment assets

Asset Type	Average Age	EUL
Police Fleet	23.82	5.00
Police Equipment	8.53	10.11
Fire Rescue Fleet	9.73	11.89

Fire Rescue Equipment	3.56	6.20
Paramedic Services Fleet	6.57	5.04
Paramedic Services Equipment	9.65	7.15
Average Age of all EMS Fleet / Equipment	8.74	7.91

Figure 119 - Average age of EMS facility assets by type



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific assets, nor specific projects or actions required to correct any deficiencies - this is not the purpose of a high-level AMP. These details can be delivered in asset specific management plans, or service area master plans.

City staff who have contributed information to the AMP have worked to identify specific asset needs and converted those needs to projects with identified costs for future work. Those future project costs have been included in this AMP, with the cooperation of the City Financial staff.

The future year forecast requirements were determined by identifying what the estimated replacement year for each asset is predicted to be following the criteria outlined in the Budget & Financial Needs Analysis section of this AMP beginning on page 31.

This includes the "past due" assets where the determined replacement year was 2020 or earlier – the replacement value for these assets has been added to the "backlog" sum. For the purposes of analysis the backlog value has been distributed over ten (10) years to be able to lessen the impact of trying to reduce the backlog at one time

Fleet and equipment Assets, as discussed, tend to have shorter normal service lives, meaning within a 25-year period one asset may be replaced multiple times. The Fleet management staff provided a replacement plan for the vehicles, but only one replacement cycle was represented within the initial review. The method used for the final analysis accounted for multiple replacements when required.

Figure 88 presents a graphical view of forecast EMS Facility asset replacement costs using the rated condition over a period of 25-years, while Table 79 presents a similar review for the EMS Fleet assets. The graphs distinguish between each EMS service, but include the backlog as a summary for the EMS portfolio as a whole.

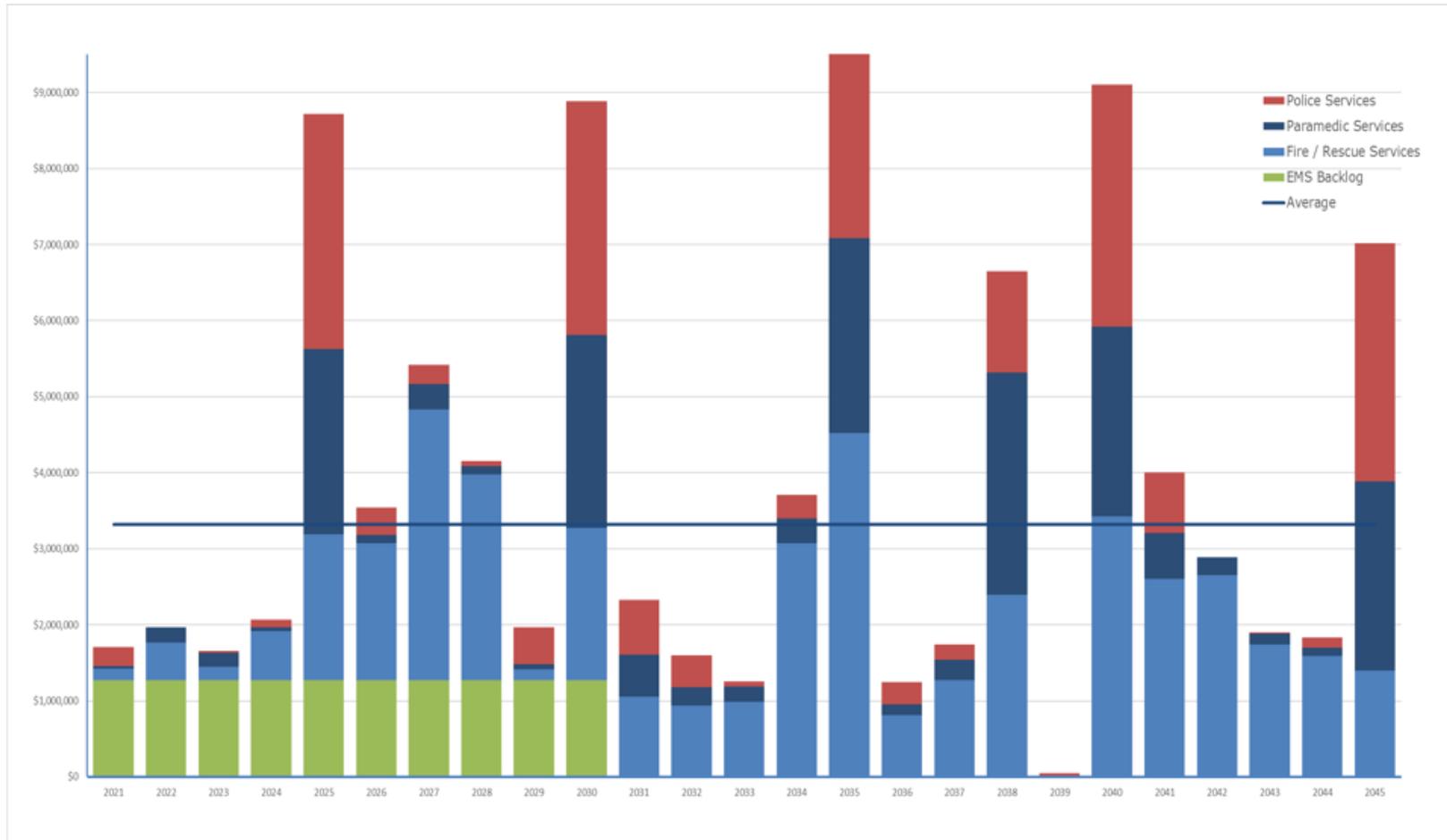
Table 79 - EMS assets financial requirements based on RSL

	2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	in Year
Fire / Rescue Facility	\$-	\$ 12,177,959	\$487,118	\$3,578,240	2035
Paramedic Facility	\$53,776	\$ 2,445,057	\$97,802	\$736,879	2038
Police Facility	\$-	\$ 4,432,437	\$177,297	\$2,821,962	2038
	\$53,776	\$ 19,055,453	\$762,218		
Fire Rescue Fleet	\$ 4,087,100	\$ 20,890,920	\$835,637	\$3,578,240	2035
Fire Rescue Equipment	\$ 2,106,900	\$ 8,985,705	\$359,428	\$1,317,100	2040
Police Fleet	\$ 2,284,300	\$ 12,119,000	\$484,760	\$2,284,300	2025
Police Equipment	\$496,406	\$ 2,842,003	\$113,680	\$227,054	2035
Paramedic Services Fleet	\$ 3,006,700	\$ 16,056,805	\$642,272	\$2,930,000	2025

Paramedic Services Equipment	\$680,125	\$ 2,938,674	\$117,547	\$523,000	2038
	\$ 12,661,531	\$ 63,833,107	\$ 2,553,324		
Totals	\$12,715,307	\$82,888,560	\$705,243		

Note that these values represent only the estimated asset replacement costs, and do not represent any other costs that may be required in future years such as non-infrastructure related studies, design and consulting fees or other.

Figure 120 - EMS assets 25-year forecast replacement needs



Budget Analysis: Fire, Police, Paramedic Services

All three EMS Services have predictable forecast needs due to the large numbers of vehicles in the inventory. However predicting the future prices of new specialty vehicles can be difficult for a number of reasons, and the values shown must be considered estimates. As with most other asset categories, the EMS Services forecast requirements outweigh the approved funding.

Each service area is forecast to experience funding gaps over the next 25-years, with the values shown in the table below.

Table 80 - 25-year financial review EMS assets

Fire and Rescue Services	\$172,951,343	Annual Average	\$6,918,054
Total 25-Year Requirements			
Fire and Rescue Services	\$56,207,438	Annual Average	\$2,248,298
Total 25-Year Funding			
	Fire and Rescue Services	Annual Average Funding Gap	\$(4,669,756)
Police Services	\$172,418,756	Annual Average	\$6,896,750
Total 25-Year Requirements			
Police Services	\$25,920,003	Annual Average	\$1,036,800
Total 25-Year Funding			

	Police Services	Annual Average Funding Gap	\$(5,859,950)
Paramedic Services	\$60,839,085	Annual Average	\$2,433,563
Total 25-Year Requirements			
Paramedic Services	\$28,656,026	Annual Average	\$1,146,241
Total 25-Year Funding			
	Paramedic Services	Annual Average Funding Gap	\$(1,287,322)

Figure 121 -25-year financial review for the fire department assets

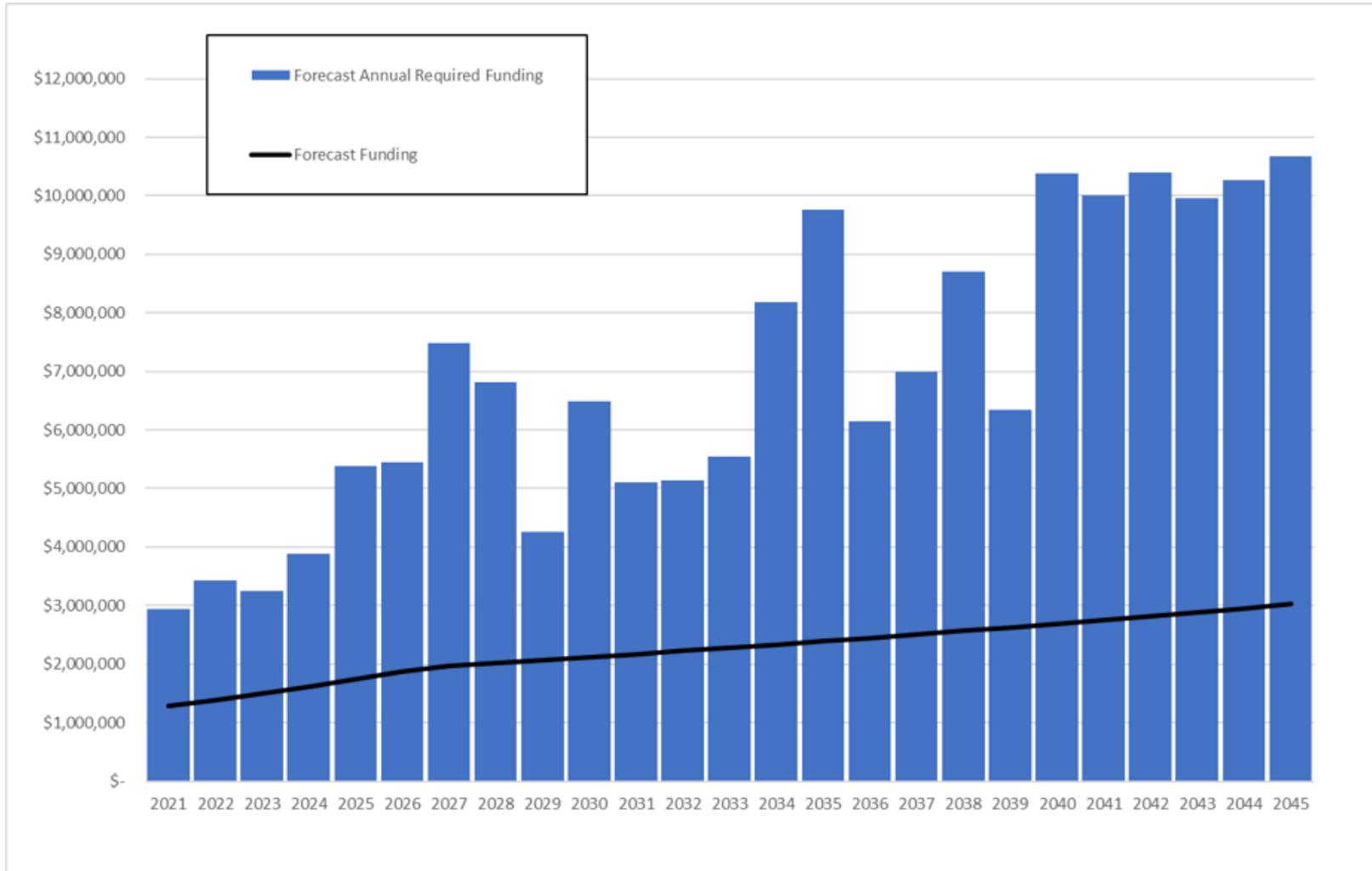


Figure 122 - 25-year financial review for police services assets

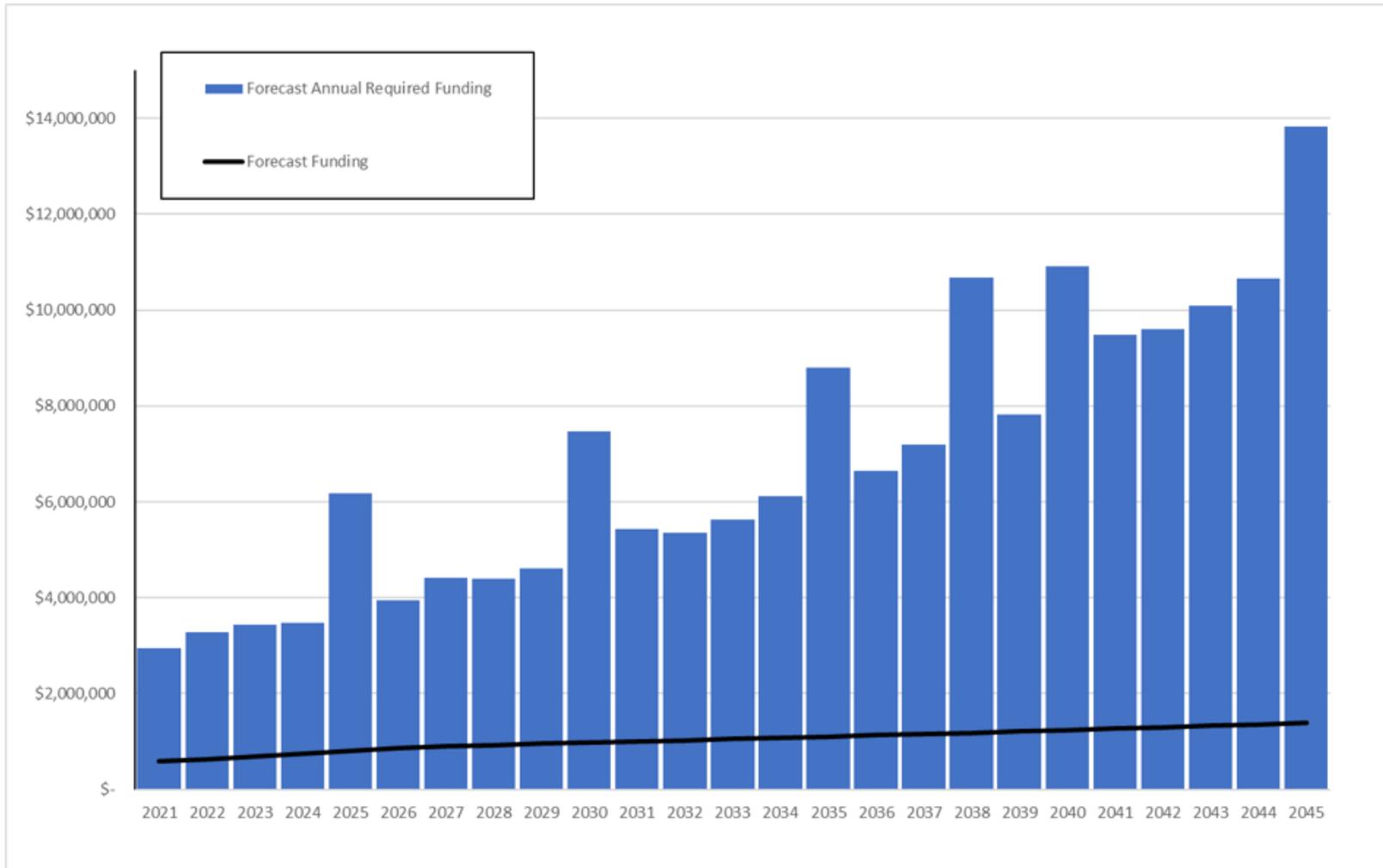
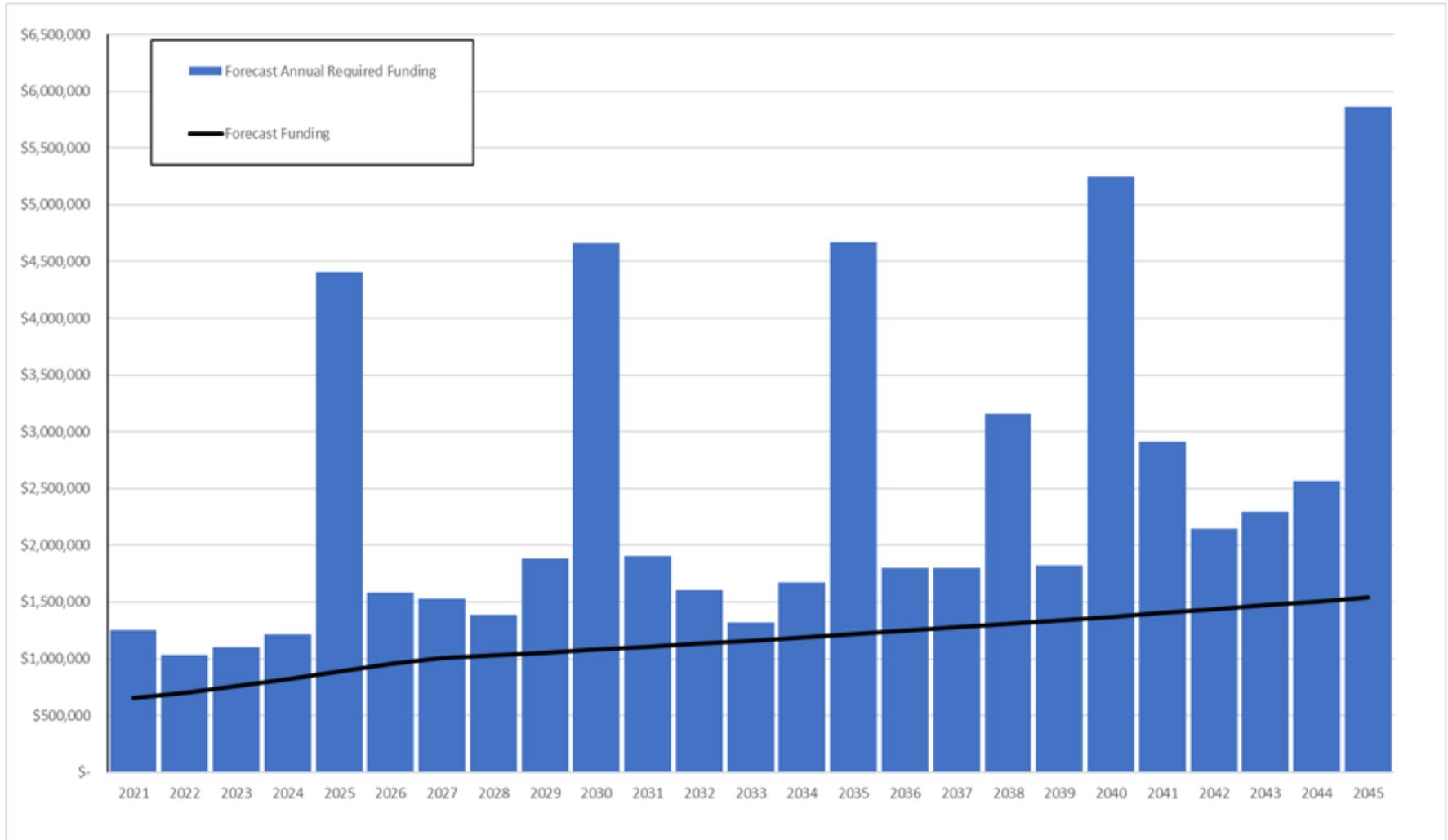


Figure 123 - 25-year financial review for paramedic service assets



Levels of Service

Physical assets exist to provide a service to the residents of Guelph. To be able to understand if the assets are delivering that service in accordance with expectations a series of metrics have been developed to help City staff with this analysis.

This AMP and the Levels of Service review is examining the physical condition of the assets only. But equally important is an understanding regarding whether the assets (and system as a whole) is adequately meeting the functional levels of service. For EMS organizations some examples of relevant functional service questions are:

- Is the emergency call response time adequate? i.e. are stations located in appropriate locations
- Is the entire geographic area of the City adequately covered?
- Do the vehicles and equipment meet all expectations for the Services they can provide?
- Etc.

The Paramedic Services commissioned a Paramedic Services Master Plan 2018-2022 to identify current issues and develop plans for future steps to mitigate any concerns. The Master Plan identified some actions, but it is unclear if any were implemented, or have been planned for implemented.

A new Guelph Police Services building is under construction and scheduled to be commissioned sometime within in 2021, and so it is assumed that any previous identified functional issues would have been corrected.

While no master plan for the Fire / Rescue Services was identified, information provided by staff indicates there are concerns with some of the features in the Main Fire Station (i.e. downtown) and that investigations have begun to identify a new location for this station. According to staff a potential new fire station project is being coordinated with the search for a new Main Library. The details of this work are beyond the scope of this AMP to examine further.

Summary and Conclusion

Despite a high percentage and replacement value of assets currently rated less than “fair” condition there are no indications that the City of Guelph EMS Services are at risk of not being able to continue to maintain their ability to deliver these essential Services. The majority of the assets with this condition rating are vehicles or equipment with relatively short theoretical normal useful lifecycles. With good maintenance practices vehicles can be kept in good working service beyond their normal service life.

The specialized equipment used by EMS staff is tested and inspected regularly, and malfunctioning equipment removed from service, limiting risk to residents.

Ambulances are unique vehicles, being required to be replaced every five years. The City of Guelph appears to follow this standard.

The Paramedic Services serve a wide geographic area and capacity and functional concerns regarding call response time are being addressed. A Paramedic Services Master Plan has been prepared and the recommendations in that plan being evaluated for potential implementation.

As with the other service areas, there is concern with the quality and completeness of the data available for use in managing the EMS assets. Improvements in the planning and forecasting for the asset needs can best be done by improving the data first.

Recommendations

1. Although vehicles can remain in good working condition beyond their normal expected useful lifecycles, the data indicates that the majority of the Police Services vehicles are 11-years old or more, with 33% recorded as more than 30 years old. This is well beyond normal and without further info causes concern. An investigation to resolve the Police fleet information is recommended.

14. Solid Waste Service

Service Area: Solid Waste Management Services

Quick Facts

Table 81 - Quick facts: Service area - Solid Waste Management Services

Waste Resource Innovation Centre (i.e. facility)	\$67,039,125	Multi-building site for collecting and managing solid waste
Solid Waste Management Fleet	\$4,149,416	15 vehicles
Total Replacement Value	\$71,188,541	
Identified backlog 2020	\$8,883,750	
Data Quality: 53%		

Figure 124 - Condition of Solid Waste Facility assets by \$CRV

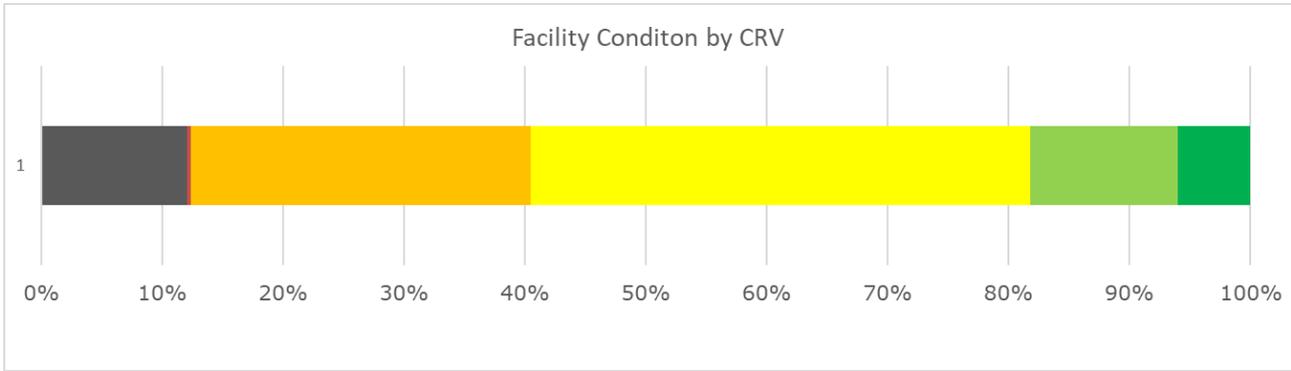
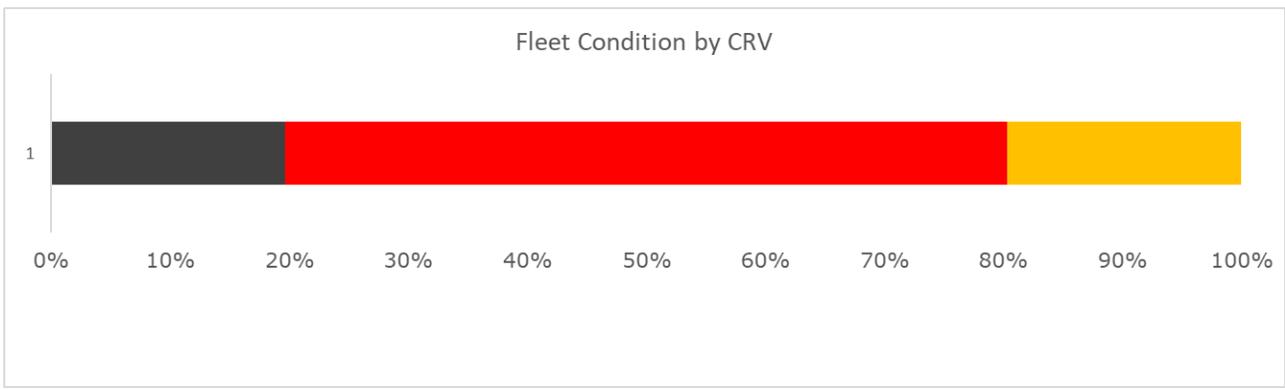


Figure 125 - Condition of Solid Waste fleet assets by \$CRV



State of the Infrastructure:

Waste management is a major issue for modern cities. The City of Guelph accomplishes this task internally using City staff to collect the waste which is delivered to a City managed waste management centre. Garbage and materials for recycling, including hazardous materials, are sorted at the site for proper safe disposal.

For the purposes of the analysis the two sub-categories – facilities and fleet vehicles – will be evaluated separately due to the unique characteristics of each. Summaries of the forecast needs and budget analysis will be completed at the end of this section.

The AMP does not present specific deficiencies or project needs, but presents a high-level review of the state of the Solid Waste Services Assets and general needs that have been identified for the future.

Solid Waste Service Area Asset Types

The Solid Waste assets can be broadly classified into two groups:

- Vehicles: Waste collection vehicles
- Facilities: The Guelph Waste Resource Innovation Centre includes multiple buildings. Information provided for each building included identification of the asset types and conditions of each asset.

The respective values of each group are identified in Figure 126 and Table 82

Figure 126 - Solid Waste asset types by CRV

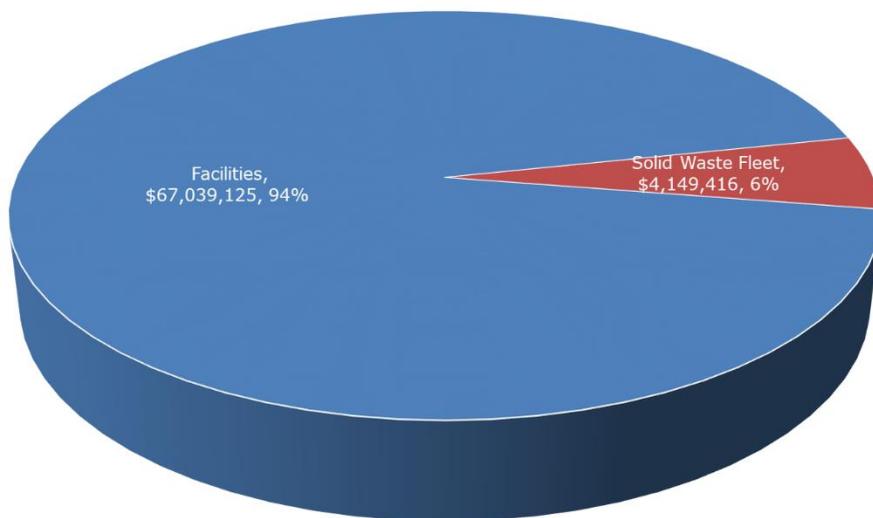


Table 82 - Solid Waste assets CRV by type

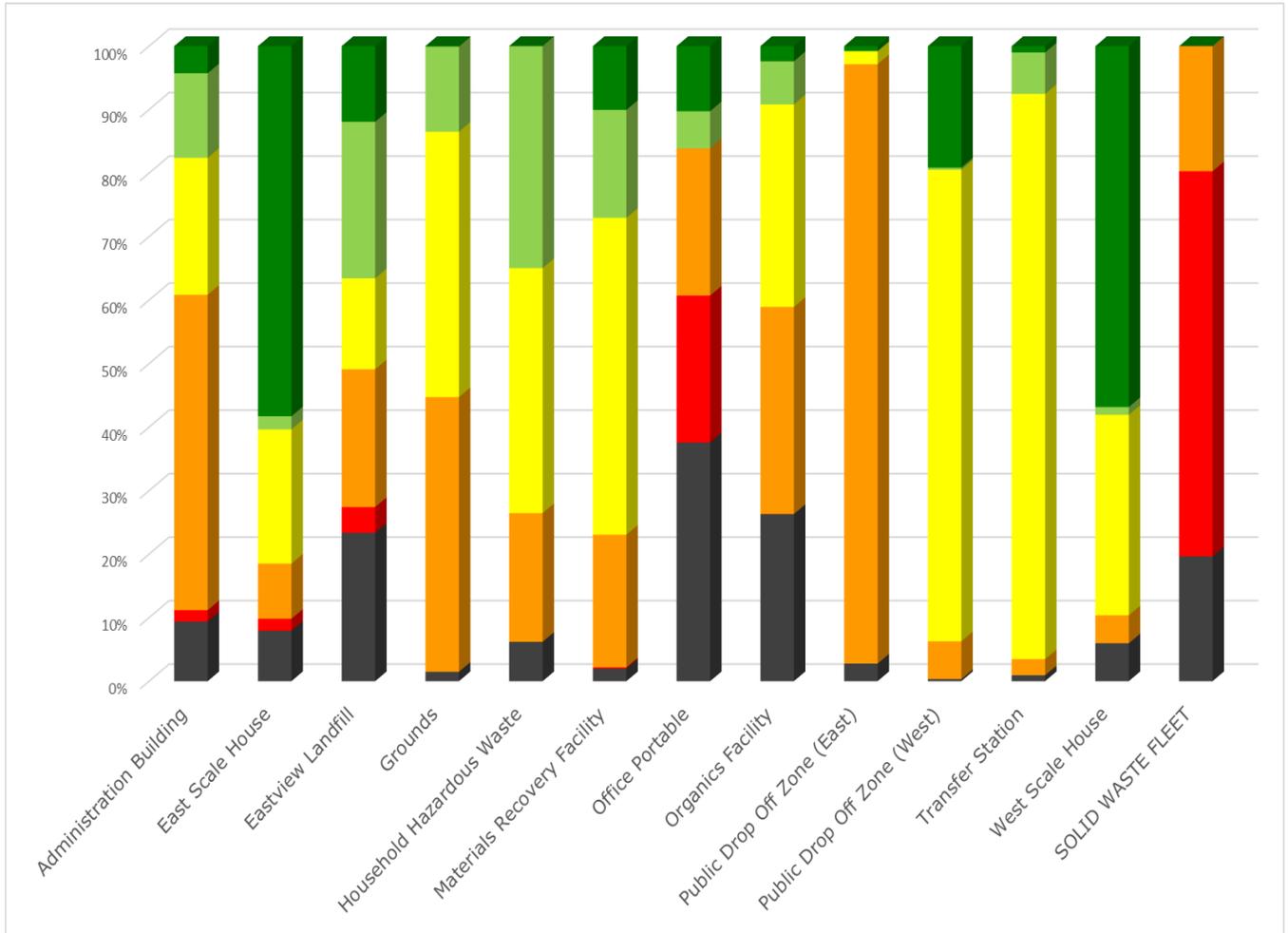
Waste Resource Innovation Centre (WRIC)

Administration Building	\$1,894,895
East Scale House	\$567,051
Eastview Landfill	\$2,749,030
Grounds	\$9,111,917
Household Hazardous Waste	\$376,357
Materials Recovery Facility	\$23,541,494
Office Portable	\$108,537
Organics Facility	\$24,648,683
Public Drop Off Zone (East)	\$133,857
Public Drop Off Zone (West)	\$321,002
Transfer Station	\$3,231,108
West Scale House	\$355,195
Total - Facilities	\$67,039,125
Solid Waste Fleet	\$4,149,416
Total Solid Waste Portfolio	\$71,188,541

Asset Condition by Type

A breakdown of the overall asset inventory by condition and replacement value is shown in the following two tables and their accompanying graphs.

Figure 127 - Solid waste assets: Condition by CRV



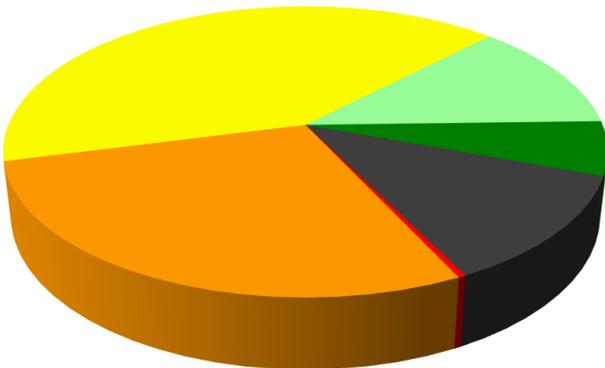
Asset Condition by Type – Waste Resource Innovation Centre Facilities

As seen in Table 83 and the accompanying graph in Figure 128 the majority of the WRIC assets are in "fair" condition or better. About 12% of the asset inventory by CRV is rated in "past due" condition, implying that these assets should have been replaced prior to 2020, and another 28% are rated in "poor" or "very poor" condition. No indications were provided that there are functional failures of these assets, however, in order to maintain the integrity of the WRIC planning should begin to mitigate any potential future risks from occurring if the assets fail.

Table 83 - Solid Waste Facility condition by CRV

PAST DUE	\$8,068,608	12.04%
Very Poor	\$232,240	0.35%
Poor	\$18,828,238	28.09%
Fair	\$27,711,312	41.34%
Good	\$8,190,539	12.22%
Very Good	\$4,008,186	5.98%
	\$67,039,125	100%

Figure 128 - Solid Waste Facility Assets condition by CRV graph



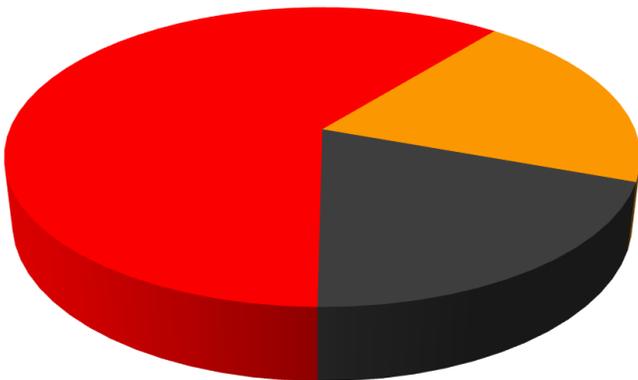
Asset Condition by Type – Fleet

As seen in Table 83 and the accompanying graph in Figure 129 the majority of the Solid Waste Assets are in “fair” condition or worse, with about 12% of the Assets described in “past due” condition. This is not necessarily indicating the assets are no longer performing their intended function – as is often the case with vehicles, they can remain in good functional service beyond a normal lifecycle. The fleet asset condition ratings are based on age only, and not a quantitative condition assessment, and so this is likely the case. Further, fleet management indicated that a ten-year replacement plan is in place, including the plan to replace some of the solid-waste fleet within the next two years.

Table 84 -Solid Waste fleet assets condition by CRV

Past Due	\$815,142	19.64%
Very Poor	\$2,516,840	60.66%
Poor	\$817,434	19.70%
Fair	\$0	0.00%
Good	\$0	0.00%
Very Good	\$0	0.00%
	\$4,149,416	100%

Figure 129 - Solid Waste fleet assets condition by CRV chart



The fleet Assets by contrast are overwhelmingly in “poor” or “very poor” condition. The reason for this is that vehicles have a relatively short lifecycle compared to other asset types, and according to the data provided for the AMP, the only method available to determine vehicle conditions was by using an age-based approach. Most of the waste collection vehicles are nearing or past their normal expected lifecycle. This does not imply that they are incapable of performing their duties – as discussed regarding other vehicle types in the City of Guelph inventory, it is quite normal that vehicles can remain in service beyond a normal expected life provided regular maintenance is performed.

The above is a very broad analysis, and while it provides a general picture of the facilities inventory, only by examining the assets on a per-type basis will a more effective picture of the state of the assets be presented. This was done as part of the 2018-19 Building Condition Assessment Program – reports from that project can be referenced for more detail.

Table 85 - Condition of Solid Waste assets by type

	Past Due	VERY POOR	POOR	FAIR	GOOD	VERY GOOD
Solid Waste Facilities	\$8,068,608 12%	\$232,240 0%	\$18,828,238 28%	\$27,711,312 41%	\$8,190,539 12%	\$4,008,186 6%
Solid Waste Fleet	\$815,142 19.64%	\$2,516,840 60.66%	\$817,434 19.70%	\$0 0.00%	\$0 0.00%	\$0 0.00%
Total Solid Waste Assets	\$8,883,750 12.52%	\$2,749,080 3.87%	\$19,645,672 27.68%	\$27,562,994 38.84%	\$8,116,380 11.44%	\$4,008,186 5.65%

Figure 130 - Average condition rating of solid waste assets



Asset Ages

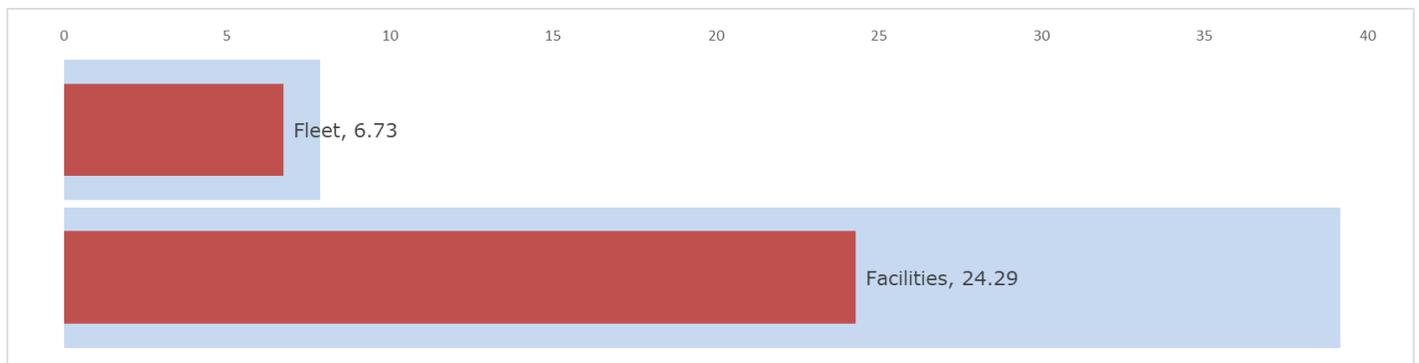
Facilities like those that make-up the Solid Waste assets are comprised of multiple asset types, each with a unique expected lifecycle, ranging from very long (75+ years) to short (10+ years). The average age of the Solid Waste assets is within the expected useful age range.

The solid waste fleet vehicle however are on average very near their expected useful life age – confirming their age-based condition identified above.

Table 86 - Average age of Solid Waste assets

Asset Type	Average Age	EUL
Facilities	24.29	39.18
Fleet	6.73	7.87

Figure 131 - Average age of Solid Waste assets by type



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific Assets, nor specific projects or actions required to correct any deficiencies - this is not the purpose of a high-level AMP. These details can be delivered in asset specific management plans, or service area master plans.

City staff who have contributed information to the AMP have worked to identify specific asset needs and converted those needs to projects with identified costs for future work. Those future project costs have been included in this AMP, with the cooperation of the City Financial staff.

The future year forecast requirements were determined by identifying what the estimated replacement year for each asset is predicted to be following the criteria outlined in the Budget & Financial Needs Analysis section of this AMP beginning on 45.

This includes the "past due" assets where the determined replacement year was 2020 or earlier – the replacement value for these assets has been added to the "backlog" sum. For the purposes of analysis the backlog value has been distributed over ten (10) years to be able to lessen the impact of trying to reduce the backlog at one time.

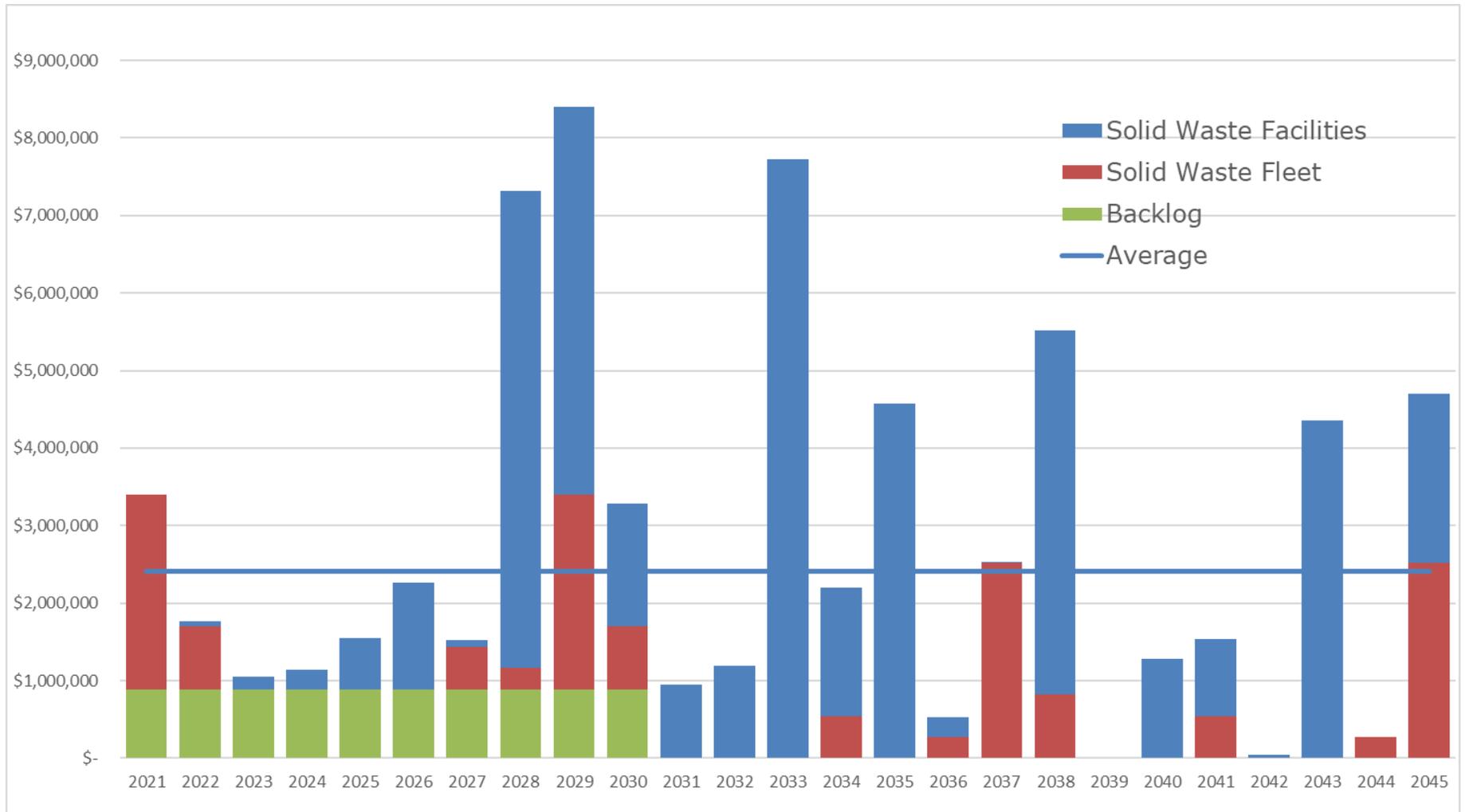
Figure 159 presents a graphical view of forecast asset replacement costs using the remaining service life of the Assets compared to a normal expected useful service life for the asset types, over a period of 25-years.

Table 87 - 25-year financial review summary Solid Waste assets

	2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	in Year
Solid Waste Fleet	\$815,142	\$14,965,088	\$598,604	\$2,516,840	2021
Solid Waste Facilities	\$8,068,608	\$45,242,529	\$1,809,701	\$7,722,744	2033
Totals	\$8,883,750	\$60,207,617	\$2,408,305		

Note that these values represent only the estimated asset replacement costs, and do not represent any other costs that may be required in future years such as non-infrastructure related studies, design and consulting fees or others.

Figure 132 - Forecast solid waste assets replacement costs based on asset remaining lifecycle



Levels of Service

Physical assets exist to provide a service to the residents of Guelph. To be able to understand if the assets are delivering that service in accordance with expectations a series of metrics have been developed to help City staff with this analysis.

As with other service areas, in spring of 2018 efforts began to establish measureable criteria for levels of service. A draft framework was developed, but based on best information available and discussions with staff this framework has not yet been finalized, and so is not ready for presentation.

The Solid Waste assets are not considered one of the five “core municipal infrastructure assets” in the O.Reg 588/17 and so there are no mandatory level of service reporting requirements at this time. These are expected to be implemented in July 2023. In the interim, CAM staff will work in conjunction with Solid Waste Management staff to finalize needed Levels of Service metrics, and related reporting processes.

Budget Analysis – Solid Waste

The budget analysis encompasses the identified forecast annual requirements (based on current rated condition of the assets) plus the allowances for maintenance and expansion compared to the approved program of work funding as indicated in the 2021-2045 Capital Budget. An analysis including a contingency value was also completed.

A summary of the budget analysis is shown in the analysis also shows that the solid waste management assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$6.4M (including maintenance and growth.

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$3.1M.

Table 101 while a graph demonstrating the analysis results is shown in Figure 97.

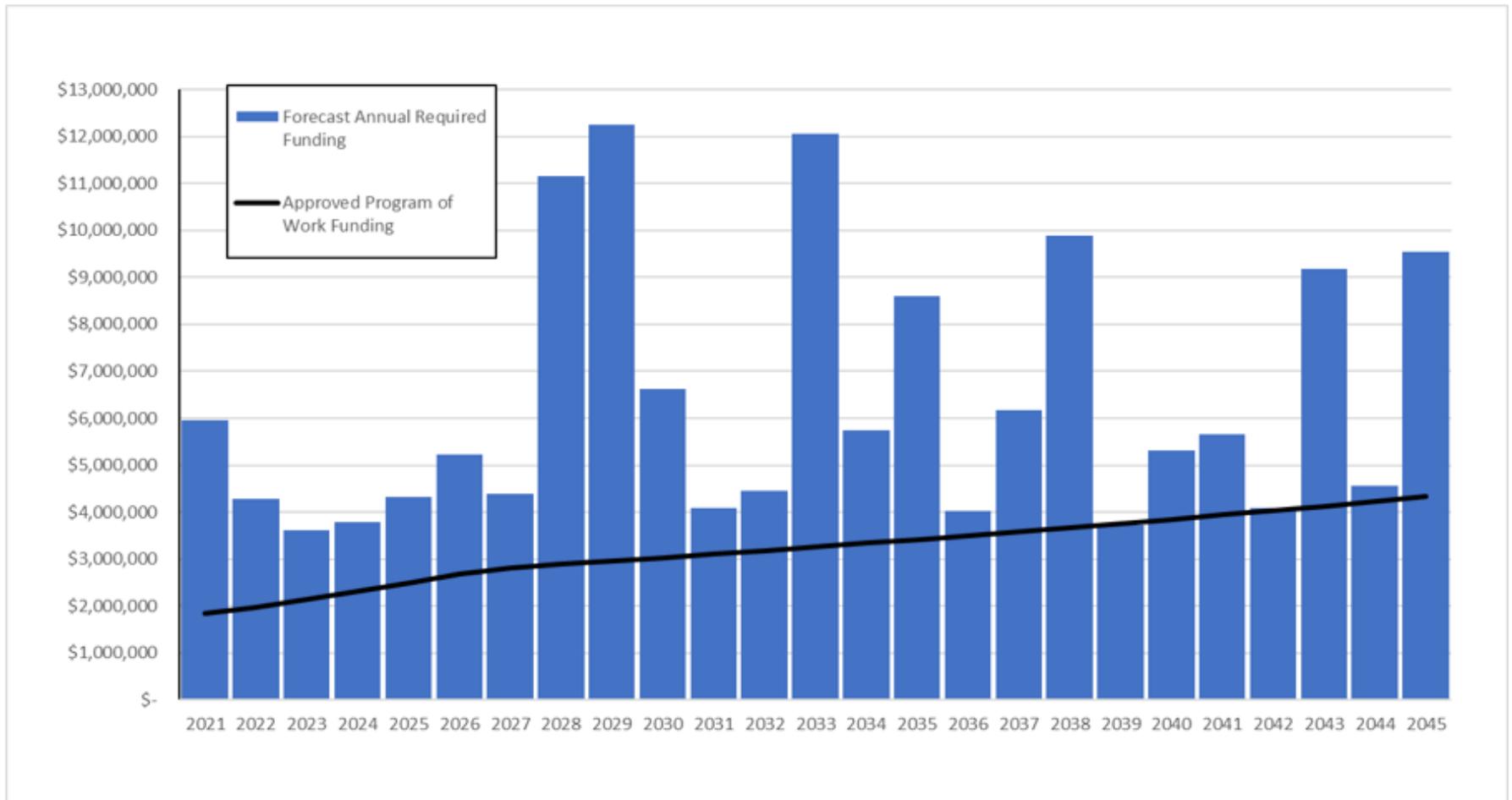
The analysis also shows that the solid waste management assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$6.4M (including maintenance and growth.

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$3.1M.

Table 88 - 25-Year financial review solid waste assets

Total 25-Year Requirements	\$158,667,437	Annual Average	\$ 6,346,697
Total 25-Year Funding	\$ 80,469,602	Annual Average	\$ 3,218,784
		Annual Average Funding Gap	\$ (3,127,913)

Figure 133 - 25-Year budget analysis for solid waste system assets



Summary and Conclusion

The Solid Waste class is a relatively small class of assets for the City of Guelph. This does not negate the importance of these assets.

In broad terms the solid waste assets are in acceptable condition – the overall “poor” rating of the fleet assets is an indication of the age of the assets instead of a measure of functional performance and as discussed a fleet replacement plan is in place to account for these needs.

The condition of the Waste Resource Innovation Centre facility could be broadly described as normal with different assets in different conditions but overall the facility remains functional. No indications of functional problems were provided, however, due to the overall value of the portfolio there is a steadily increasing maintenance requirement due to the size of the portfolio.

15. Information Technology Services

Service Area: Information Technology Assets

Quick Facts

Table 89 - Overall summary of information technology assets

Item	CRV	Quantity
Computer	\$2,819,131	1922
Computer Accessory	\$204,503	711
Display	\$334,639	1344
Mobile Device	\$402,781	980
Network Accessories	\$34,413	24
Network Cabling	\$623,847	83
Network Device	\$3,641,470	850
Power Device	\$503,360	394
Printer	\$664,675	312
Server Chassis	\$2,640,894	99
Storage Device	\$869,220	33
Telephony Equipment	\$347,910	1304
Meeting Room A/V	\$599,200	31
Software	\$5,414,225	25
Total Replacement Value	\$19,100,269	8112
Identified Backlog 2020	\$6,530,447	

Data Quality: 80%

Figure 134 - Average Condition of IT Assets

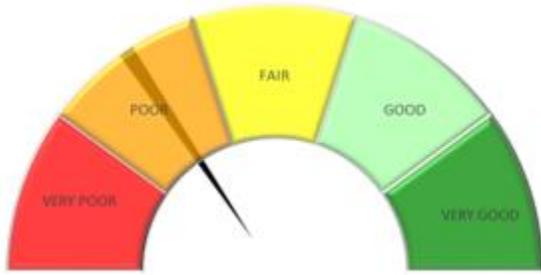


Figure 135 - Condition of IT Assets, \$CRV



State of the Assets: Information Technology

Information Technology assets are ubiquitous, being essential to nearly all Services, applications and functions that the City of Guelph is involved with. Despite having a relatively low value as a percentage of the entire City portfolio, without these assets many City Services would not be able to function. Asset types included in the portfolio include hardware and software.

The City Information Technology department has provided a recent inventory of the assets in use, and the forecast needs. IT assets are unique among other City assets for their very short lifecycles, and the trend among IT equipment and software providers to introduce new versions of existing products, and removing the existing products from their support chain. This can make predicting future needs a challenge as it is not possible to predict what a service provider will do in the future.

Another unique characteristic of IT products, particularly software, is the need for the City to pay annual service and license fees to continue to use the existing purchased products. These particular costs are considered operating costs, and are not directly identified in the AMP, but an allowance is provided for them.

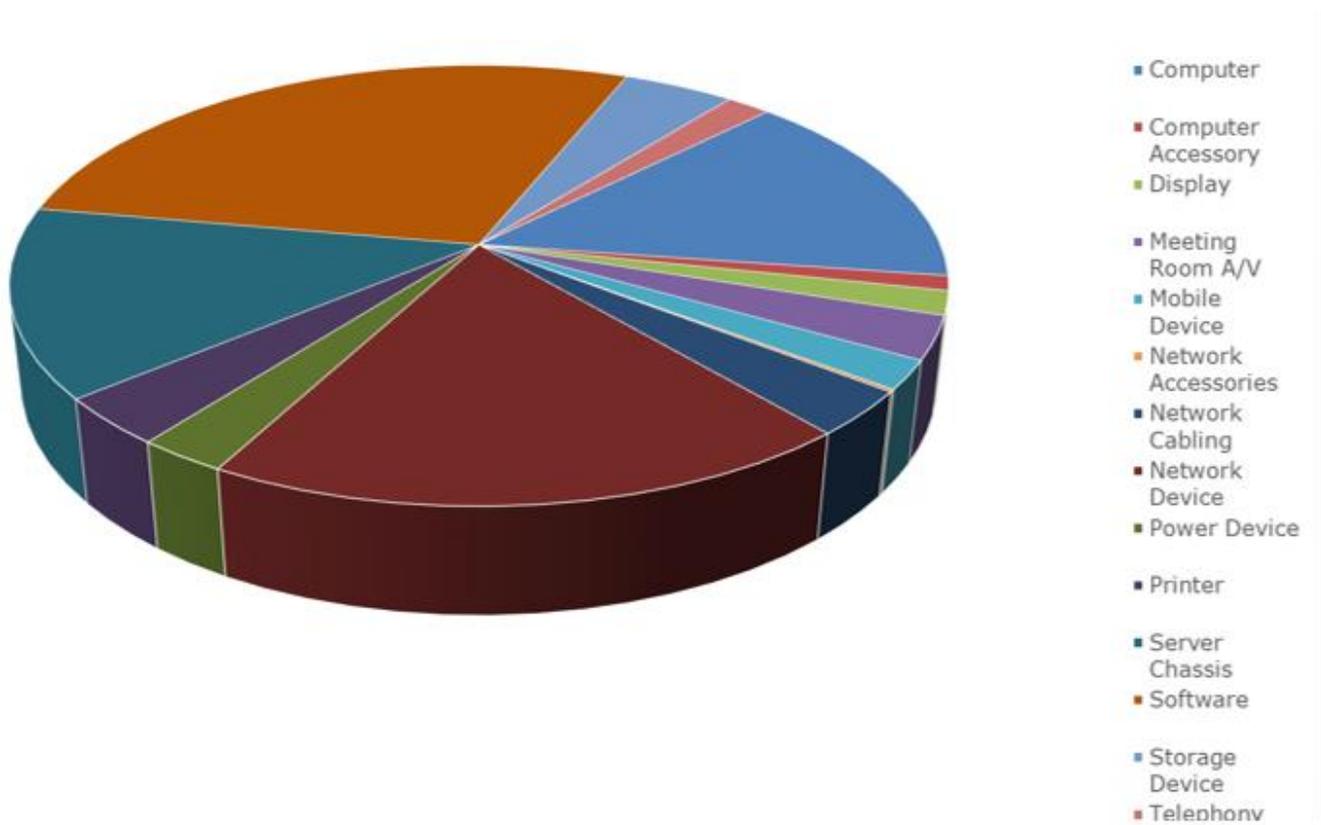
The AMP does not present specific deficiencies or project needs, but presents a high-level review of the state of the Information Technology assets and general needs that have been identified for the future. IT Department staff provided information on planned replacement dates and normal lifecycles for their assets, and this was used to generate a 25-year forecast costs plan.

Table 90 - IT Assets summary table by \$CRV

IT Sub-class	CRV	% of portfolio	Quantity
Computer	\$2,819,131	14.76%	1,922
Computer Accessory	\$204,503	1.07%	711
Display	\$334,639	1.75%	1,344
Meeting Room A/V	\$599,200	3.14%	31
Mobile Device	\$402,781	2.11%	980
Network Accessories	\$34,413	0.18%	24
Network Cabling	\$623,847	3.27%	83
Network Device	\$3,641,470	19.07%	850

Power Device	\$503,360	2.64%	394
Printer	\$664,675	3.48%	312
Server Chassis	\$2,640,894	13.83%	99
Software	\$5,414,225	28.35%	25
Storage Device	\$869,220	4.55%	33
Telephony Equipment	\$347,910	1.82%	1,304
Total CRV	\$19,100,269	100%	8,112

Figure 136 - Information technology asset types by CRV

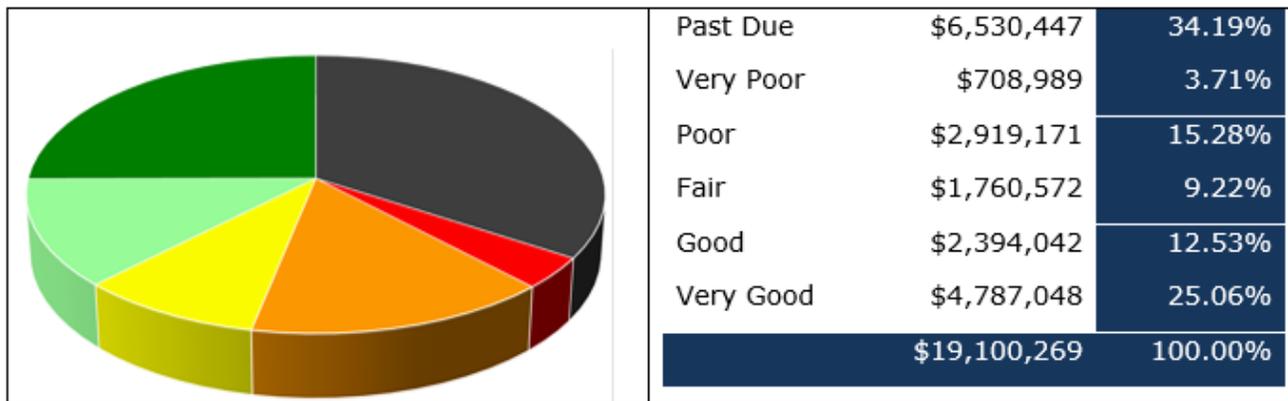


Asset Condition

Quantitative condition information about the IT assets was not provided – this is not the norm in the IT industry. Therefore an age-based approach to determining the condition of the IT assets was used where the rated condition is based on the age of the asset as a percent of its expected normal lifecycle. While evaluating the performance of an inventory by its condition is normal, with regards to IT assets this will not provide the best review of the inventory.

At a whole portfolio level, the condition and replacement value per condition is shown in the following table.

Figure 137 - Condition of IT assets by CRV



The above is a very broad analysis, and while it provides a general picture of the inventory, only by examining the assets on a per-type basis will a more effective picture of the state of the assets be presented. That level of detail is beyond the scope of this AMP.

Table 91 - Condition of IT assets by type

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Computer (\$)	\$810,387	\$0	\$610,577	\$339,873	\$438,054	\$620,241
Computer (%)	28.75%	0.00%	21.66%	12.06%	15.54%	22.00%
Computer Accessory (\$)	\$54,036	\$0	\$28,038	\$31,443	\$37,727	\$53,260
Computer Accessory (%)	26.42%	0.00%	13.71%	15.38%	18.45%	26.04%
Display (\$)	\$14,900	\$19,436	\$113,736	\$67,617	\$71,204	\$47,746
Display (%)	4.45%	5.81%	33.99%	20.21%	21.28%	14.27%

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Meeting Room A/V (\$)	\$0	\$123,200	\$84,000	\$84,000	\$0	\$308,000
Meeting Room A/V (%)	0.00%	20.56%	14.02%	14.02%	0.00%	51.40%
Mobile Device (\$)	\$222,986	\$0	\$71,127	\$879	\$76,619	\$31,171
Mobile Device (%)	55.36%	0.00%	17.66%	0.22%	19.02%	7.74%
Network Accessories (\$)	\$25,413	\$0	\$0	\$9,000	\$0	\$0
Network Accessories (%)	73.85%	0.00%	0.00%	26.15%	0.00%	0.00%
Network Cabling (\$)	\$623,847	\$0	\$0	\$0	\$0	\$0

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Network Cabling (%)	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Network Device (\$)	\$1,705,647	\$0	\$424,263	\$564,439	\$627,778	\$319,343
Network Device (%)	46.84%	0.00%	11.65%	15.50%	17.24%	8.77%
Power Device (\$)	\$235,023	\$0	\$71,220	\$79,667	\$45,772	\$71,679
Power Device (%)	46.69%	0.00%	14.15%	15.83%	9.09%	14.24%
Printer (\$)	\$146,820	\$198,863	\$49,895	\$32,669	\$208,623	\$27,804
Printer (%)	22.09%	29.92%	7.51%	4.92%	31.39%	4.18%
Server Chassis (\$)	\$725,314	\$0	\$344,833	\$181,953	\$278,794	\$1,110,000

	Past Due	Very Poor	Poor	Fair	Good	Very Good
Server Chassis (%)	27.46%	0.00%	13.06%	6.89%	10.56%	42.03%
Software (\$)	\$1,815,915	\$336,000	\$1,093,775	\$0	\$0	\$2,168,535
Software (%)	33.54%	6.21%	20.20%	0.00%	0.00%	40.05%
Storage Device (\$)	\$102,997	\$0	\$3,150	\$313,475	\$449,598	\$0
Storage Device (%)	11.85%	0.00%	0.36%	36.06%	51.72%	0.00%
Telephone Equipment (\$)	\$47,164	\$31,489	\$24,558	\$55,557	\$159,874	\$29,268
Telephone Equipment (%)	13.56%	9.05%	7.06%	15.97%	45.95%	8.41%
Total IT Inventory (\$)	\$6,530,447	\$708,989	\$2,919,171	\$1,760,572	\$2,394,042	\$4,787,048
Total IT Inventory (%)	34.19%	3.71%	15.28%	9.22%	12.53%	25.06%

Figure 138 - Information technology assets - condition by CRV

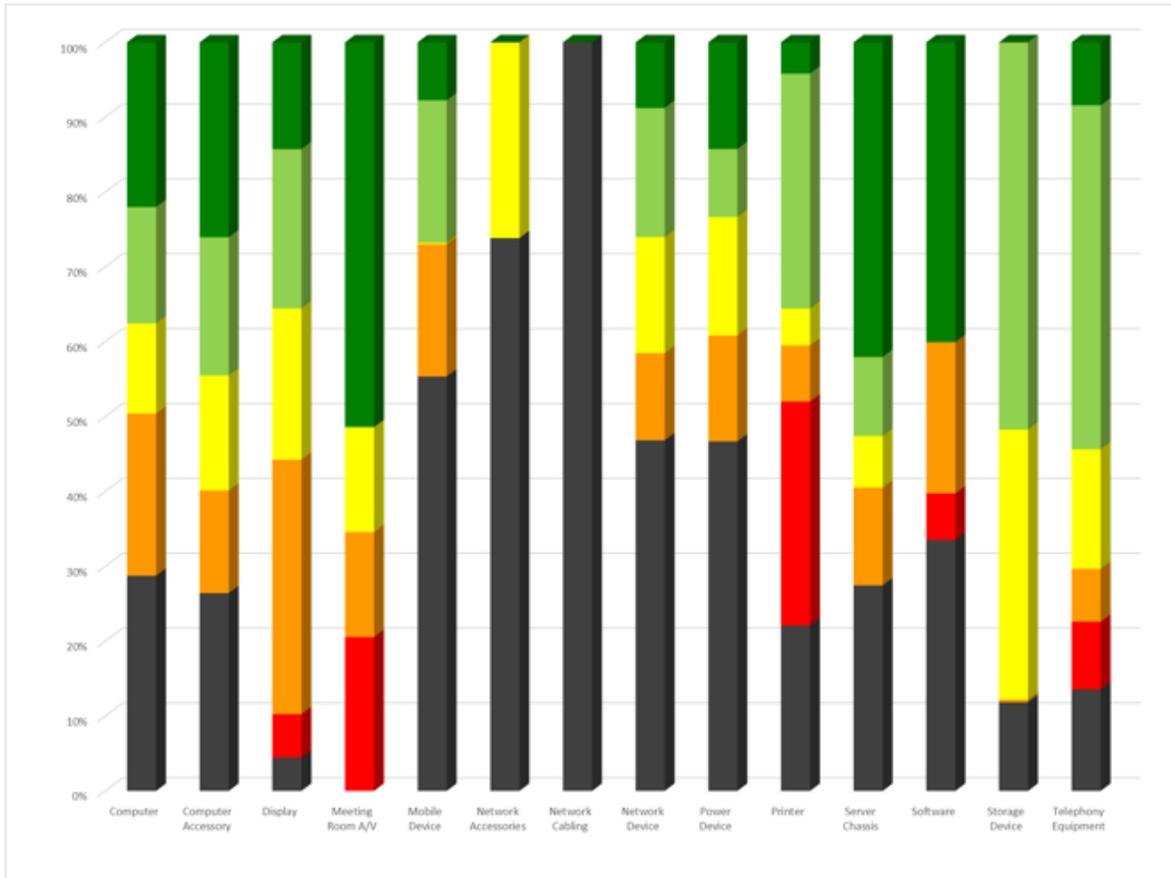
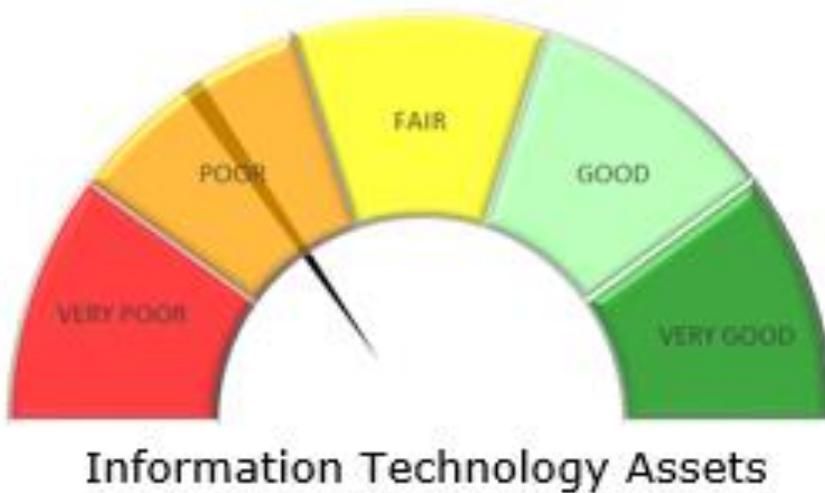


Figure 139: Average Condition Rating of Information Technology Assets



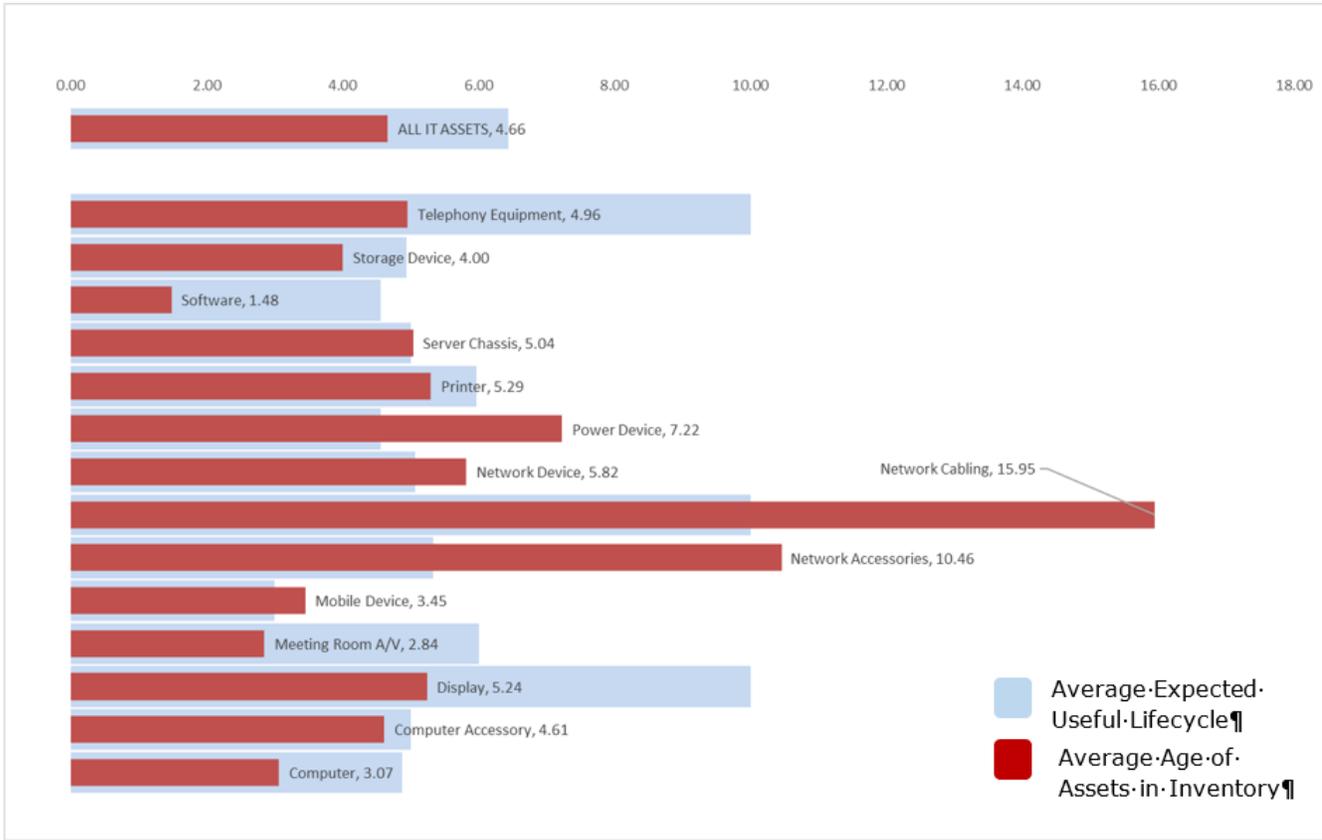
Asset Ages

As previously discussed IT assets tend to have much shorter expected lifecycles compared to other asset categories. As can be seen in **Error! Reference source not found.** the overall average expected lifecycle is 6.44 years, and the overall City IT inventory has a current average age of 4.66 years. Of particular interest to note is that "Network Cabling" is 50% older than an expected lifecycle, but the items in use remain functional.

Table 92: Average Age IT Assets

Sub Class	Average Age	EUL
Computer	3.07	4.87
Computer Accessory	4.61	5.00
Display	5.24	10.00
Meeting Room A/V	2.84	6.00
Mobile Device	3.45	3.00
Network Accessories	10.46	5.33
Network Cabling	15.95	10.00
Network Device	5.82	5.07
Power Device	7.22	4.56
Printer	5.29	5.97
Server Chassis	5.04	5.00
Software	1.48	4.56
Storage Device	4.00	4.94
Telephony Equipment	4.96	10.00
All IT Assets	4.66	6.44

Table 93: Average Age of Information Technology Assets by type



Future Year Forecast Replacement Costs

The data used in the analysis for this AMP does not include sufficient detail to identify needs of specific assets, nor specific projects or actions required to correct any deficiencies - this is not the purpose of a high-level AMP. These details can be delivered in asset specific management plans, or service area master plans.

City staff who have contributed information to the AMP have worked to identify specific asset needs and converted those needs to projects with identified costs for future work. Those future project costs have been included in this AMP, with the cooperation of the City Financial staff.

As described, the IT Department staff provided a purchase date, and an expected lifecycle for each asset. This information was used to generate a 25-year forecast cost analysis. Because of the source of the info, this forecast is considered to have a good level of accuracy. This same forecast was used to identify the value of assets that should have been replaced prior to 2020 because in theory, the asset is in service longer than a normal useful lifecycle for that asset type. The replacement values of these assets can be considered the "deferred maintenance" or "backlog" work.

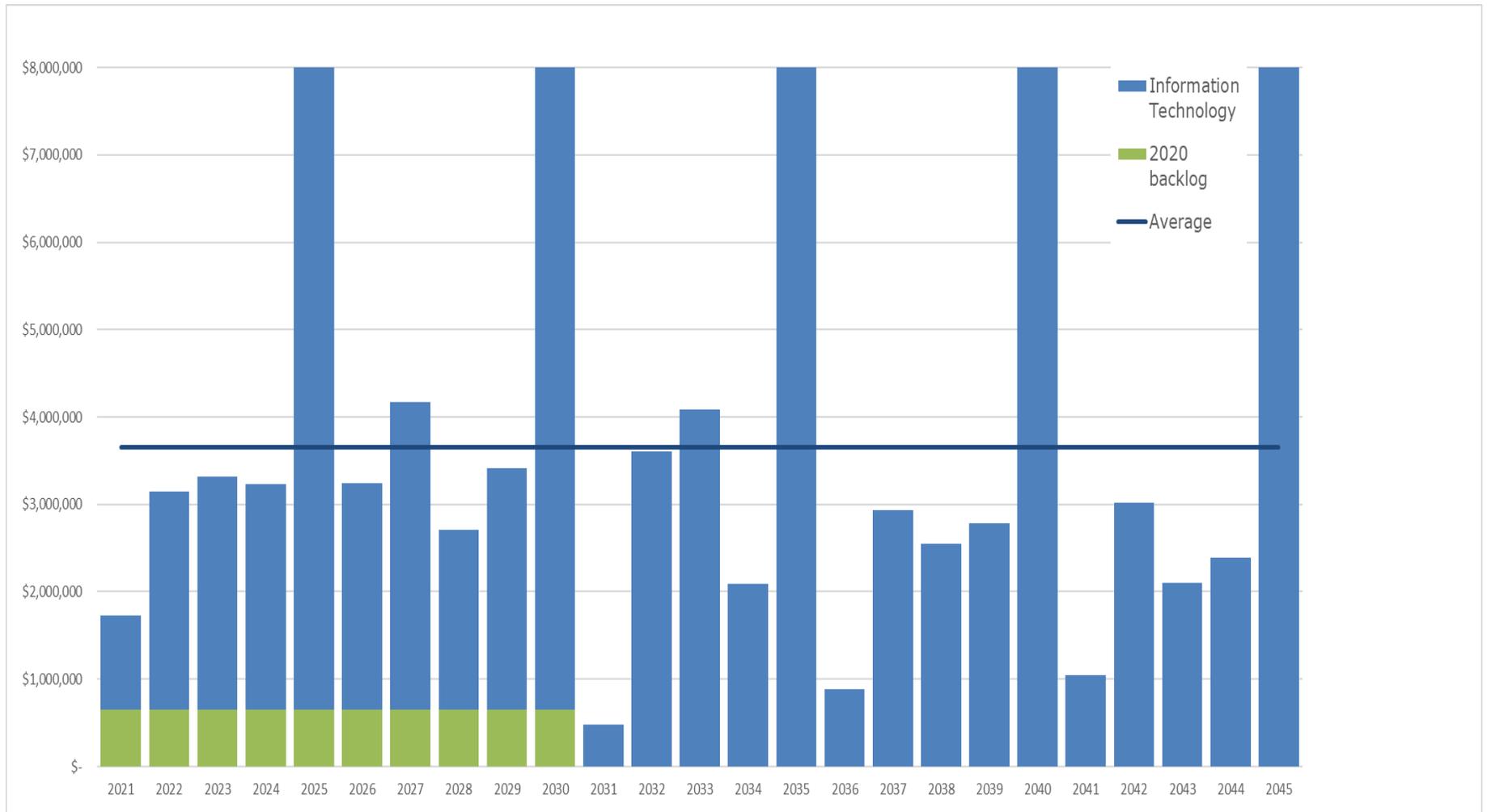
Error! Reference source not found. presents a graphical view of forecast asset replacement costs using the remaining service life of the assets compared to a normal expected useful service life for the asset types, over a period of 25-years.

Table 94: 25-Year Forecast Replacement Costs IT Assets

	2020 backlog	25-Year Total	25-Year Average	Annual Max forecast	in Year
IT Assets	\$6,530,447	\$91,445,492	\$3,658,219	\$10,106,392	2040

Note that these values represent only the estimated asset replacement costs, and do not represent any other costs that may be required in future years such as non-infrastructure related studies, design and consulting fees or other.

Figure 140: Forecast IT Assets Future Replacement Costs based on Asset Remaining Service Life



Budget Analysis – Information Technology

A summary of the budget analysis is shown in **Error! Reference source not found.** while a graph demonstrating the analysis results is shown in **Error! Reference source not found.**

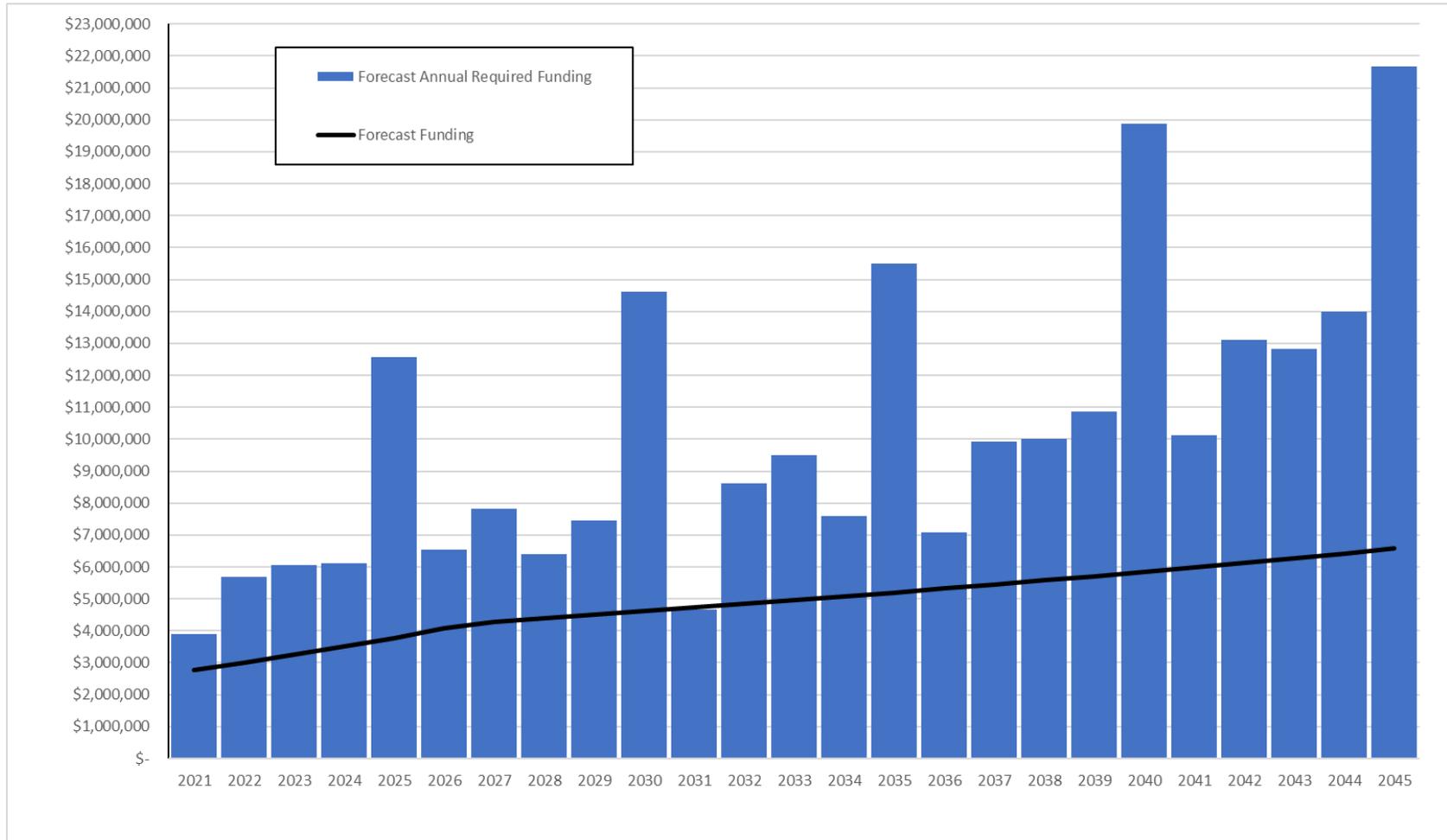
The analysis also shows that the information technology assets have forecast replacement or renewal needs that fluctuate year to year with a 25-year annual average of about \$10.1M (including maintenance and growth).

The forecast funding – including capital and allowances for maintenance and growth - falls short of the forecast requirements in most years, with a 25-year average annual funding gap of \$5.2M.

Table 95: 25-Year Financial Summary IT Assets

Total 25-Year Requirements	\$ 252,544,415	Annual Average	\$ 10,101,777
Total 25-Year Funding	\$ 122,233,534	Annual Average	\$ 4,889,341
		Annual Average Funding Gap	\$ (5,212,435)

Figure 141: 25-Year Financial Summary IT Assets



Levels of Service

Physical assets exist to provide a service to the residents of Guelph. To be able to understand if the assets are delivering that service in accordance with expectations a series of metrics have been developed to help City staff with this analysis.

As with other service areas, in spring of 2018 efforts began to establish measureable criteria for levels of service. A draft framework was developed, but based on best information available and discussions with staff this framework was never finalized nor implemented.

The Information Technology assets are not considered one of the five “core municipal infrastructure asset” types in the O.Reg 588/17 and so there are no mandatory level of service reporting requirements at this time. These are expected to be implemented in July 2023. In the interim, CAM staff will work in conjunction with Information Technology assets Management staff to finalize needed Levels of Service metrics, and related reporting processes.

Summary and Conclusion

The Information Technology assets class is a relatively small class of assets for the City of Guelph. This does not negate the importance of these assets however.

In broad terms the Information Technology assets are in acceptable condition – the overall “poor” rating of the assets is an indication of the age of the assets as opposed to a measure of functional performance. IT management provided information indicating that a multi-year replacement plan is in place ensuring that the IT infrastructure supporting the City operations continues in an effective manner.

However, technology changes are often forced upon consumers, and that combined with short lifecycles means the City of Guelph must maintain good planning for future IT needs.

16. Other Corporate Assets

Other Corporate Assets

The following asset types do not meet the traditional definition of an asset but nonetheless form a part of the City inventory. Each has unique challenges to not only manage day-to-day, but to identify the needs for that management in an AMP.

Most of the following information was compiled for the 2017 AMP, and because of varying reasons minimal actions have occurred to move beyond what was identified for these assets at that time.

In the coming months the CAM team intends to move forward on activities related to the asset types below and future AMPs will include more tangible information and requirements identification for them.

Land

The City of Guelph owns land for the City parks, roadway rights of ways, and the locations where City facilities are sited.

Land is managed differently than conventional assets as it exists in perpetuity with no defined lifecycle period, and no typical lifecycle activities. Applying value to land is difficult as it is never replaced, so determining a replacement cost such as would be done for other asset types is not straightforward. The most typical way to assign a value to a land parcel is by using current real estate market values which can fluctuate without pattern, and are dependant on too many factors to include in this AMP. Land with identified contamination can be assigned a value that represents the cost to remediate the contamination, but those can be difficult to estimate as the costs depend on the timing of the remediation. Other land parcels may incur costs for things like fencing or signage, but these should be included in the asset category to which they belong.

Nevertheless, the land still needs to be managed by the City. As part of this AMP, an inventory of City owned land parcels was not reviewed. Future efforts of the CAM team will include integrating the land inventory more directly with the remainder of the asset inventory.

Table 96: Land Inventory

Asset System	Asset Class	Value	Quantity	Units
Land	Park Land	TBC*	175	ea.
	General Land	TBC*	2,092	ea.
	Contaminated Sites	\$27,728,500**	38	ea.

Notes

* To be confirmed –

** Estimated 2017 remediation cost for sites that are known to be contaminated or potentially contaminated based on the history and usage of the site.

Contaminated Sites

There are at least 43 City owned properties, roads and/or right-of-ways that are known to be contaminated or potentially contaminated based on the historical usage/former activities at these sites (e.g. as former industrial or commercial uses or historical landfill sites)³⁰.

As of December 2017, of the 43 sites, only 15 sites have some degree of environmental information on them, such as Phase One Environmental Site Assessments (ESA); Phase Two ESAs; and other Investigative Studies. These 15 sites were identified and accounted for under the Public Sector Accounting Board (PSAB) Standard- PS 3260- Liability for Contaminated Sites.

Assigning value to these sites has not been done, because like land parcels, it does not have a defined useful lifecycle, and will never be replaced. However, the environmental monitoring and clean-up activities on these sites require capital investment, and do have set lifecycles where the activities start and end, or change over time. Capital funding for these activities has been approved in the 2021-2045 Capital Plan. The types of activities this funding is applied to are outlined in the following table.

Table 97: Activities Required on Contaminated Sites.

Planned Action	Current Activity Notes	Opportunity
Non-infrastructure solutions	<ul style="list-style-type: none"> • Site investigations and monitoring. 	<ul style="list-style-type: none"> • Remediation/risk assessment
Maintenance activities	<ul style="list-style-type: none"> • Site monitoring and inspections on a case by case basis 	<ul style="list-style-type: none"> • Risk management measures; monitoring and inspections; repairs of monitoring wells, site security etc.
Renewal/rehabilitation activities	<ul style="list-style-type: none"> • Site monitoring and inspections on a case by case basis 	<ul style="list-style-type: none"> • Repair and replacement (monitoring wells, site security etc.)
Replacement activities	<ul style="list-style-type: none"> • Site monitoring and inspections on a case by case basis 	<ul style="list-style-type: none"> • Potential redevelopment of the sites
Disposal activities	<ul style="list-style-type: none"> • Site monitoring and inspections on a case by case basis 	

³⁰ This information is from the 2017 AMP.

Planned Action	Current Activity Notes	Opportunity
Expansion activities	<ul style="list-style-type: none"> • Site monitoring and inspections on a case by case basis 	

Records (Digital and Non-Digital)

In addition to physical assets, the City of Guelph is managing Digital and Non-Digital Records with the same level of thoroughness as the other asset categories. These records are essential to enabling the City services to function. At this time the inventory information is limited identifying, reporting and assigning a value to these types of assets is a unique challenge different from infrastructure asset types.

Managing data about digital and non-digital records is a specialized activity that until now is not commonly included in a City's asset management plan, though there logical reasons that make this a good idea. While this idea was presented in the 2017 AMP, little action has progressed on this activity since then, and at this time there is nothing new to report except what was presented in that first AMP.

The CAM team will work in conjunction with the appropriate City staff in other departments on this activity.

Table 98 - Digital records assets

Level 3	Quantity	Unit
By-Laws	5,844	ea.
Internet Sites	TBC*	ea.
Intranet Sites	TBC*	ea.
Shared Drives	TBC*	ea.
E-mail Accounts	TBC*	ea.
E-mail Archives	TBC*	ea.
Shared Drives	TBC*	ea.

MyDocuments (personal drives)	TBC*	ea.
Hard Drives	TBC*	TB
External Devices	TBC*	ea.
Externally Hosted Servers	TBC*	ea.
ECM	TBC*	ea.

Table 99 - Physical records

Level 3	Quantity	Unit
By-Laws	20,432	ea.
Employee Filing Cabinets	TBC*	ea.
Record Centre (decentralized basement storage)	TBC*	ea.
Offsite Storage	TBC*	ea.

17. Asset Management at the City of Guelph – Next Steps

Areas for Improvement

Through the process of completing this AMP document the following themes repeated themselves:

Enterprise Asset Management

1. Asset data should be included in, and managed by, a central City wide asset inventory register. This will help ensure currency of the data, implement standards, and ease the future analysis needs.
Data files for different asset categories used a different hierarchy (see below), but also did not refer to the same asset type using the same terminology. For example: In the “Administrative Facilities” dataset – intended to include data related to City owned buildings – none of the assets are clearly identified as a “building”. The terms “commercial” or “Civic buildings” are used – these are building types and the data would be improved by adjusting the hierarchy. Furthermore, within the “Culture and Recreation” dataset, there are no records clearly identified as a “building”. The terms “community centre”, “recreation centre” and others are used. Again, these are types of buildings. Similar situations were found in datasets for other asset types.
The broad descriptions given to the asset categories refer to the service area for which the asset provided functionality. Terms used to describe “asset category” include, “Culture and Recreation”, “Emergency Services”, “Water”, “Wastewater” etc. These are not descriptions of a tangible, physical item, therefore are not assets, but instead these are terms that describe the function of an asset and thus should be considered an “attribute”.
2. A more integrated relationship between the current asset conditions, remaining service lifecycles and future replacement or major rehabilitation needs is required so that the asset future needs and resources can be more readily and easily predicted, resulting in easier and more accurate long term planning for the City.
Establishing and adhering to standards that follow database best practices lay the foundation for successful long-term data management and quality, which in turn will improve the City’s ability to plan long-term infrastructure needs.
3. Multiple copies and versions of data.
When beginning the analysis of the asset data, it was discovered that for all asset categories, multiple versions of datasets were found in different locations on the City IT network. With no clear metadata (see below) detailing the data,

extensive work was required to pre-examine all the datasets prior to deciding which version to use for the final analysis.

Multiple copies of data is problematic and leads to confusion, in turn contributing to lessened confidence in the data used for analysis. The implementation of a central asset inventory and register would help eliminate this problem.

4. Concern with 3rd party (i.e. Consultant) provided information.
Staff from multiple service areas, in combination with CAM staff, identified concerns with the accuracy of information being provided by 3rd party contractors engaged by the City of Guelph. This includes overall asset replacement costs as well as costs to correct or mitigate identified issues with the assets. The general consensus is that the provided costs are too low. In some service areas there was also concern that some basic asset attributes were incorrectly or poorly identified.

As an example, using the available data that was considered most accurate by those who reviewed it, the average price for a City of Guelph vehicle bridge was calculated at about \$2.3M, which is considered very low compared to modern construction costs.

In some cases City staff advised to ignore 3rd party data due to known concerns or doubts with the quality of the data. This refers to data that was included in the files stored on the City Network.

5. Differing data structure in different service areas.
As seen through the AMP, there are fourteen (14) separate major asset categories identified in the City of Guelph inventory. The asset data for these categories was provided to CAM in the form of a separate file (or multiple files) for each category. Reviewing these files it was observed that there were differences in how the data files for each category were organized, even to the asset data hierarchy in use for each service area.
The resulting work that was required to consolidate the multiple files into a single format that would allow whole portfolio level analysis was significant. Establishment of a City data standard would help alleviate this, and would allow an improved ability to complete future analysis and reports.

6. Lack of "metadata".
The term metadata can be generally defined as "data about data". That is, where was the information sourced from, when was it produced, what methods were used to obtain it, who manages it etc.
At the start of the preparation of the 2020 AMP there was almost no background information found by CAM staff that answered these questions. Service area staff were also not always aware where the data for their assets was originally developed from.
This situation reduced the confidence level in the data, and therefore the confidence in the accuracy of any analysis and forecasting generated using the data.

It is essential that the provenance of the data be clearly understood so that data integrity and confidence is maximized across the City organization. This is even more important when considering that staff changes occur and so the person who originally created and managed a dataset may no longer be responsible for doing so.

7. Data for O.Reg 588/17.

As discussed in the Transportation (roads and bridges), Water, Wastewater and Stormwater sections O.Reg 588/17 defines clear requirements for what and how the City of Guelph is required to measure functional levels of service (LoS). In most cases the current data structure in place within the City asset information sources does not allow an easy method to be able to do this. Some of the required metrics will involve moderately complex analysis, and this in turn will require the City asset data to be structured differently than it presently is. As part of the recommendations to implement a central asset inventory with a defined data table structure the O.Reg requirements should be considered as a requirement to address.

8. Use of Excel files instead of a database tool.

While excel can be an effective data analysis tool for small datasets, the total number of records analyzed across the City of Guelph AMP was in the range of 90,000 records. This caused performance issues in the analysis due to the limitations of Excel.

Further, though possible, it is not easy to establish data standards and rules for naming conventions or hierarchies and other database functions that improve the quality of data, and simplify reporting. Excel files work well when one person manages them, but in the case of managing corporate information where many people may be required to manage different parts of the data, there are inherent deficiencies in using Excel for this purpose. Excel also has limited data security and back-up functions.

9. The capital budget and the data used in the production of the budget should be synchronized with the central asset registry so that the asset information can directly impact budget decisions and planning.

10. Improved processes for identifying required maintenance budgets (as a % of the asset replacement value, or otherwise) is required to improve the AM planning and identification of asset needs. As discussed, the percentages of the total replacement values used to predict future maintenance needs are based on historical budget allowances for maintenance, and are not necessarily the true needs. Traditionally many organizations face a situation where true maintenance needs are not properly funded and without further information it is not clear if the maintenance values being used in this AMP to determine future requirements are truly required maintenance, or simply the value of funding for maintenance that was approved leaving a gap between needed and approved.

Appendices

Appendix A: 2018 Strategic Asset Management Policy

CORPORATE POLICY AND PROCEDURE



POLICY	Strategic Asset Management Policy
CATEGORY	Corporate
AUTHORITY	All Departments
APPROVED BY	City Council
EFFECTIVE DATE	May 07, 2018
REVISION DATE	April 05, 2018

Alternative formats are available as per the Accessibility for Ontarians with Disabilities Act by contacting the Manager of Corporate Asset and Project Management at 519-822-1260.

TERMS AND Definitions

For consistency, terminology in all official asset management documents shall be consistent with ISO 55000:2014(E) – International Standard for Asset Management³¹.

For the purposes of this document, the following definitions apply:

³¹ ISO/IEC. (2014). *ISO International Standard ISO/IEC 55000:2014(E) – Asset management – Overview, principles and terminology*. Geneva, Switzerland: International Organization for Standardization (ISO).

TERM	DEFINITION
Asset	<p>An Item, thing or entity that has potential or actual value to an organization.</p> <p>Note: Value is the importance, worth, or usefulness of something. Potential value is the value of the asset that is contingent on the occurrence of stated assumptions.</p>
Asset Management	Coordinated activity of an organization to realize value from assets.
Asset Management Plan	Documented information that specifies the activities, resources, and timescales required for an individual asset, or a grouping of assets, to achieve the organization's asset management objectives.
Asset Management System	The people, processes, tools and other resources involved in the delivery of asset management.
Asset System	Set of assets that interact or are interrelated.
Corporate Asset Management	The application of asset management principles at a corporate level to maximize consistency among diverse asset groups. Corporate asset management creates efficiency by harmonizing service levels and business processes wherever possible.
Lifecycle	Stages involved in the management of an asset.

TERM	DEFINITION
Level of Service	Parameters or a combination of parameters, which reflect social, political, environmental and economic outcomes that the organization delivers.

Background

The City of Guelph is responsible for provision of a diverse array of services which are dependent on over \$4 billion in assets. An integral component of ensuring reliable service is creating an effective approach to managing existing and future municipal assets. Effective asset management aims to manage assets in a way that balances levels of service, risk, and cost effectiveness throughout the entire asset lifecycle. Ultimately, adopting effective and comprehensive asset management strategies across the organization will support the long term sustainability and efficiency while maintaining levels of service.

The City produced its first Corporate Asset Management Policy in 2013, which detailed the City’s key objectives for asset management, and established a baseline that Guelph has continued to build on. In the summer of 2016, the Corporate Asset Management division was formed to coordinate the development and advancement of the City’s Corporate Asset Management system.

POLICY STATEMENT

This policy details the principles and general framework for a systematic and coordinated approach to asset management in order to achieve the organization’s asset management objectives, guided by the Corporate Administrative Plan 2016-2018.

Scope of the asset management system

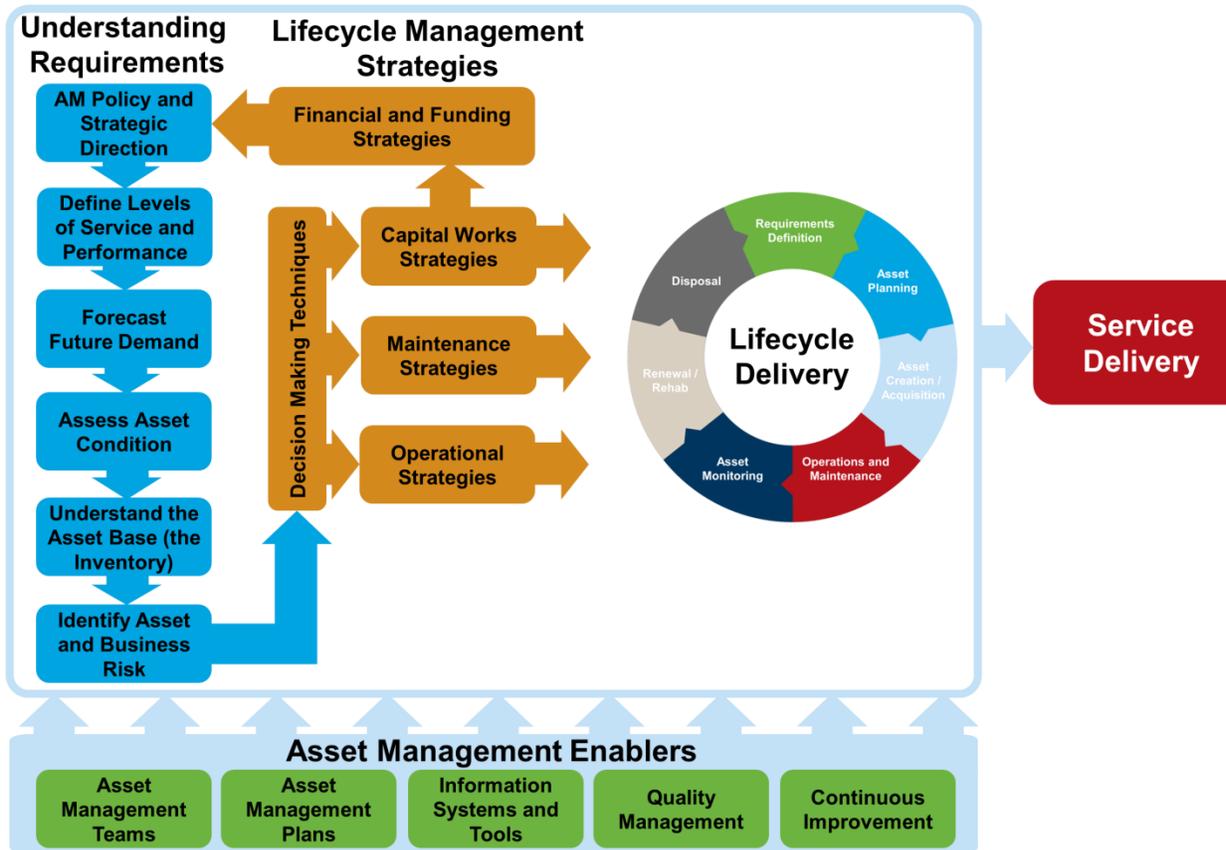
Components of the Asset Management System

The City’s asset management system can be categorized into the key processes and resources shown within **Figure**. The asset management processes include:

- **Functional Processes:** The processes involved in understanding and defining requirements, and asset lifecycle management strategies; and

- **Enabling Processes/Resources:** The supporting processes and resources that make the functional processes possible.

Figure 1. The Asset Management Process



Key Documents in the Corporate Asset Management System

The Asset Management System will incorporate the development and implementation of several documents. The key documents within the City’s asset management system are depicted in Figure 2, and described in sections below.

Figure 2. Key Documents in the Asset Management System



Strategic Asset Management Policy

The Asset Management Policy shall guide the overall direction of the asset management system, providing clear direction as to the appropriate focus and level of asset management practice expected. It shall establish the key principles, overall mission and goals for the program, and be guided by the Organizational Strategic Plan and the Corporate Administrative Plan.

Asset Management Strategy

The Asset Management Strategy documents the intended approach by which the assets and other resources will be used to achieve the agreed upon objectives within the agree Policy framework. It provides clear direction, overall intentions and rationale. In addition, the asset management strategy identifies the organizational readiness to achieve the objectives, including identification of barriers and appropriate implementation plans to overcome the barriers.

Corporate Asset Management Plan

The Corporate Asset Management Plan shall detail the intended asset management programs at a corporate level to allow the City to understand and target service levels and the asset portfolio's capability to meet those requirements. This plan shall be developed to meet the requirements of the Building Together – Guide for Municipal Asset Management Plans,³² and the guidelines within the International Infrastructure Management Manual, 2015.³³

Asset management plans are also to be developed based on consideration of principles outlined under section 3 of the Infrastructure for Jobs and Prosperity Act, 2014, and be informed by:

- An understanding of current and future asset condition, needs and costs,
- An understanding of risks and the City's ability to manage risks relating to assets, including disaster planning and any required contingency planning;
- Accessibility standards and other related standards;
- Changing demographics, including population growth or decline; and
- Ontario's land-use planning framework, including any relevant policy statements issued under subsection 3 (1) of the Planning Act, any provincial plans as defined in the Planning Act and the municipality's official plan.

As part of asset management planning, the following considerations are to be included:

- The actions that may be required to address the vulnerabilities that may be caused by climate change to the municipality's infrastructure assets, in respect of such matters as:
 - Operations, such as increased maintenance schedules;
 - Levels of service; and
 - Lifecycle management.
- The anticipated costs that could arise from the vulnerabilities described above;
- Adaptation opportunities that may be undertaken to manage the vulnerabilities described above;

³² *Infrastructure Ontario (2016) Building Together – Guide for Municipal Asset Management Plans. Ottawa, Canada. Queen's Printer of Ontario.*

³³ *IPWEA (2015) International Infrastructure Management Manual. North Sydney, Australia. IPWEA.*

- Mitigation approaches to climate change, such as greenhouse gas emission reduction goals and targets; and
- Disaster planning and contingency funding.

Assets in the asset management plan are not to be subject to a capitalization threshold, and are to be included based upon judgement of whether the asset has value to the organization. The capitalization threshold applied in the municipality's tangible capital asset policy is \$10,000.

Asset management plans shall identify activities to be undertaken, with consideration of the full lifecycle of assets, for at least the ten years following the preparation of that plan or update. In addition, they will document key assumptions made within the plan. Asset management plans are to be updated at no longer than 4 year intervals.

Asset Portfolio Management Plans

Asset Portfolio Management Plans shall be specific, targeted plans developed through collaboration with the departments who manage each aspect of the asset lifecycles and service. These plans shall further refine the Corporate Asset Management Plan to allow a customized, targeted plan that best supports the daily functions, service and demand levels, and anticipated needs for that asset system. The asset system plans will detail budget requirements and projects that will feed into the City's overall budget.

Relationship between Asset Management Plans, Budgets and Financial Plans

The outcomes and background data generate through the development of the asset management plans shall form the basis for infrastructure-related long-term financial plans. During the annual budgeting process, projects and funding levels shall be reviewed against the background data and results of the asset management plans. The City's asset management planning should be aligned with any of the following financial plans:

- Financial plans related to the City's water assets including any financial plans prepared under the Safe Drinking Water Act, 2002.
- Financial plans related to the City's wastewater assets.

Asset Management Mission, goals and principles

Asset Management Mission

Our mission is to protect and enhance the quality of life in Guelph by making the best possible decisions regarding our assets in a way that provides targeted levels of service and manages risk in a cost-effective manner throughout the entire asset lifecycle.

Asset Management Goals

- Provide levels of service that meet expectations and ensure a high quality of life for the community through:
 - Defining levels of service in consultation with stakeholders;
 - Evaluating and communicating the cost of providing the service; and
 - Quantifying the impacts of decisions on service.

- Managing risks through:
 - Understanding risk exposure;
 - Understanding potential vulnerabilities to climate change;
 - Establishing the organization's risk appetite;
 - Developing risk management strategies;
 - Implementing appropriate condition assessment, inspection, and performance evaluation strategies for all relevant assets; and
 - Implementing appropriate climate change adaptation and mitigation strategies.

- Demonstrating sustainable, full lifecycle planning through:
 - Quantifying and tracking the full lifecycle costs for assets;
 - Ensuring budgets are supported by asset management practices; and
 - Bridging the gap between capital and operational budgets.

- Ensuring accountability, transparency and engagement through:
 - Documenting asset management business processes;
 - Publicising asset management documents such that they are accessible to all stakeholders; and
 - Developing stakeholder engagement strategies to ensure that internal and external stakeholders are able to participate, influence, and contribute to asset management initiatives, where appropriate.

Guiding Principles

The City of Guelph strives to provide exceptional municipal service and value. Asset management at the City is to be guided by the following principles:

Service excellence: Achieving quality and showing results.

- Adopt a whole-organization, all asset approach to asset management that holistically considers the interdependencies between asset systems and services throughout their full lifecycle;
- Meet and comply with all relevant legislation, regulatory and statutory requirements and with other requirements to which the organization subscribes;
- Corporate asset management documents are derived from, and be consistent with, the organizational strategic plan, council shared agenda, long-term municipal goals, organizational policies, budgets, financial plans, and the organization's overall risk management framework;
- Asset management documents are communicated and made available to all relevant stakeholders, including contracted service providers, where there is a requirement that these persons are made aware of their asset management-related obligations; and
- Approach asset management from a collaborative, cross-disciplinary perspective while also regularly engaging with relevant stakeholders to maximize value from the assets and services.
- Provide opportunities for municipal residents and other interested parties to provide input into the municipality's asset management planning.
- Coordinate planning for asset management, where municipal infrastructure assets connect or are interrelated with those of other municipalities, neighbouring municipalities or jointly-owned municipal bodies.

Financial stability: Managing our resources to achieve maximum public value.

- Ensure that asset management principles are applied to tangible and intangible assets, and that value is considered holistically, in aspects such as financial, social (quality of life, community wellbeing, heritage) and environmental.
- Develop and implement an evidence-based, systematic approach to asset management that is transparent and customer-centric;
- Optimize asset decisions based on lowest lifecycle cost, acceptable risk levels and desired levels of service to allow for long-term planning that will enhance service and sustainability while also ensuring resilience and adaptability; and
- Provide an annual update to Council on asset management planning progress, factors affecting the ability to meet commitments outlined in the plan, and a strategy to address any shortcomings.

Innovation: Modernizing our services and how we work.

- Integrate asset data systems where possible to minimize duplication of effort and improve overall information confidence;
- Strive for asset management practices, processes and capabilities to be in-line with current industry best practices;
- Commitment to continual improvement in asset management, the asset management system, asset management maturity, and asset management performance;
- Performance monitoring and benchmarking internally and against other similar organizations;
- Implement and periodically review asset management documents, objectives, and requirements to ensure that they remain relevant and consistent with the organizational plans and other relevant organizational policies; and
- Annual internal reviews and an independent audit of the asset management system at no longer than 5 year intervals.

Review Period

The policy is to be reviewed by the Asset Management Steering Committee annually, and following any changes in regulatory requirements, or updates to the Corporate Strategic Plan or Corporate Administrative Plan.

City Staff shall report to Council on asset management progress and on or before July 1 in each year. The annual review must address:

- The City's progress in implementing its asset management plan;
- Any factors impeding the City's ability to implement its asset management plan; and
- A strategy to address the identified factors.

Roles & Responsibilities

Council

- Approve the strategies and plans as proposed by the Corporate Asset Management Division by a resolution passed by the City Council;
- Serve a representatives of stakeholder and community needs; and
- Approve funding for both capital and operating budgets associated with Asset Management through the annual budget.

Executive Team and Executive Lead

- Review and approve documents and strategies proposed by the Asset Management Steering Committee, where the implications are organization-wide or external;
 - Endorse every asset management plan and policy;
 - Participate in the process of aligning asset management strategies and plans with organizational strategies and objectives; and
 - Communicate the vision of asset management at a corporate level, encourage engagement with the processes, and provide the guidance necessary to ensure alignment and integration across the organization.
-

Corporate Asset Management Steering Committee

- Provide corporate support for asset management;
- Coordinate financial, strategic planning, information technology and asset management activity;
- Establish policies and practices that ensure uniformity of approach across the organization;
- Encourage information sharing and collaboration across departments;
- Provide a corporate pool of asset management expertise that can build capability in areas of lower experience;
- Provide input and direction to Corporate Asset Management work plans to ensure consistency with other initiatives;
- Establish and peer review asset management policies, practices, plans, and other related documents;
- Disseminate Steering Committee information within their department where necessary;
- Champion the asset management process within the respective department;
- Ensure organization-wide accountability for achieving and reviewing corporate asset management goals and objectives;
- Coordinate with other related steering committees where required; and
- Lead the effective implementation of corporate asset management initiatives.

Corporate Asset Management Division

- Liaise with other departments in service areas relating to asset management, including convening asset management teams (specific to each service area), and ensuring project work is consistent with asset management objectives;
- Liaise with external stakeholders in relation to asset management matters;

- Develop an overall corporate asset management policy, strategy, and confirm the implementation plan/resource requirements;
- Coordinate the development of asset management plans and facilitate peer reviews;
- Coordinate asset management improvement programs including writing briefs for asset management improvement projects and preparing, monitoring and reporting on the overall asset management planning budgets;
- Carrying out selected asset management improvement tasks as appropriate;
- Lead the development of asset inventories, condition assessments, risk assessments and related asset management initiatives in line with industry best practices;
- Work with asset management information systems staff to ensure systems development and functionality meets asset management needs; and
- Continuous improvement of the City's Asset Management capabilities.

Asset System Working Groups and Service Providers

- Provide input on needs of department, current status of assets, and current levels of service;
- Support and comply with data collection requirements related to their areas of expertise;
- Participate in the development of the Asset Management Work Plans pertaining to their areas of expertise; and
- Participate in the regular review of all documentation, data, and asset measurement tools to ensure continued relevance and applicability of existing policies and practices as pertains to their area of expertise.

Residents, Stakeholders and Customers

- Participate in public information sessions, and stakeholder engagement initiatives, where possible;
- Provide feedback related to levels of service, service experience, and service expectations; and
- Notify the City, via appropriate means, when service deficiencies or failures are observed.

Persons responsible for asset management planning

Executive Lead

Deputy Chief Administrative Officer

Infrastructure, Development and Enterprise Services

Phone: 519-822-1260

Email: engineering@guelph.ca

Corporate Asset Management Sponsor

General Manager/City Engineer

Engineering and Capital Infrastructure Services

Phone: 519-822-1260

Email: engineering@guelph.ca

Corporate Asset Management

Manager of Corporate Asset and Project Management

Engineering and Capital Infrastructure Services

Phone: 519-822-1260

Email: assets@guelph.ca

Contact Information

For more information about this policy, or questions related to asset management at the City, please contact:

Manager of Corporate Asset and Project Management,

City of Guelph

1 Carden St, Guelph, ON, N1H 3A1

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Email: assets@guelph.ca

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The preparation of this plan was carried out with assistance from the Government of Canada and the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

Appendix B: Definitions and Terminology

Table B-100: Asset Management Terminology

Asset	An Item, thing or entity that has potential or actual value to an organization.
Asset Management	Coordinated activity of an organization to realize value from assets.
Asset Management Plan	Documented information that specifies the activities, resources, and timescales required for an individual asset, or a grouping of assets, to achieve the organization's asset management objectives.
Asset Management System	The people, processes, tools and other resources involved in the delivery of asset management. Management system for asset management whose function is to establish the asset management policy and asset management objectives. The asset management system is a subset of asset management.
Asset Portfolio	Assets that are within the scope of the asset management system.
Asset System	Set of assets that interact or are interrelated.
Asset Type	Grouping of assets having common characteristics that distinguish those assets as a group or class.
Capability	Measure of capacity and the ability of an entity (system, person or organization) to achieve its objectives. Asset management capabilities include processes, resources, competences and technologies to enable the effective and efficient development and delivery of asset management plans and asset life activities, and their continual improvement.
Competence	Ability to apply knowledge and skills to achieve intended results.

Condition	A description of the state of an asset with regards to its appearance, quality and/or working performance. Refer to Error! Reference source not found. for a description of the condition definitions used within this AMP
Continual Improvement	Recurring activity to enhance performance.
Core Asset	<p>According to O.Reg 588/17 the assets that service the following five functions are to be considered Core assets for the purpose of asset planning</p> <p>Roads</p> <p>Bridges</p> <p>Water Treatment</p> <p>Wastewater Treatment</p> <p>Stormwater Management</p>
Corporate Asset Management	The application of asset management principles at a corporate level to maximize consistency among diverse asset groups. Corporate asset management creates efficiency by harmonizing service levels and business processes wherever possible.
Corrective Action	Action to eliminate the cause of a nonconformity and to prevent recurrence.
Critical Asset	Asset having potential to significantly impact on the achievement of the organization's objectives.
Current Replacement Value (CRV)	The cost to replace the asset with a new version of that asset that provides the same function, meets the same target service levels (or in the case of a building is the same size and function) and is built according to modern standards. Usually expressed in current year dollar value.
Effectiveness	extent to which planned activities are realized and planned results achieved

Expected Useful Lifecycle (EUL)	The length of time in years that an asset is expected to be able to provide effective service or meet expected performance targets
Intangible Assets	Non-physical assets, such as leases, brands, digital assets, use rights, licenses, intellectual property rights, reputation or agreements.
Level Of Service (LOS)	Parameters, or a combination of parameters, which reflect social, political, environmental and economic outcomes that the organization or asset delivers.
Lifecycle / lifecycle planning	<p>The different stages involved in the management of an asset. These include:</p> <ul style="list-style-type: none"> Needs identification Planning / design Acquisition / construction Operating and maintaining while in use Modification or upgrade (i.e. rehabilitation) Disposal / demolition <p>The lifecycle stages are normally expressed in the form of a continuous cycle emphasizing the need for sound planning</p>
Management System	Set of interrelated or interacting elements of an organization to establish policies and objectives and processes to achieve those objectives.
Net Book Value	The original cost of an asset, less any accumulated depreciation, accumulated depletion, or accumulated amortization, and less any accumulated impairment. The value at which a company carries an asset on its balance sheet.
Objective	Result to be achieved. An objective can be strategic, tactical or operational and can relate to different disciplines (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product and process. In the context of asset management systems, asset management objectives are set

by the organization, consistent with the organizational objectives and asset management policy, to achieve specific measurable results.

Organization	Person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its objectives
Organizational Objective	Overarching objective that sets the context and direction for an organization's activities. Organizational objectives are established through the strategic level planning activities of the organization.
Organizational Plan	Documented information that specifies the programmes to achieve the organizational objectives
Performance	Measureable result. Performance can relate either to quantitative or qualitative findings. Performance can relate to the management of activities, processes, products (including Services), systems or organizations. For the purposes of asset management, performance can relate to assets in their ability to fulfil requirements or objectives.
Policy	Intentions and direction of an organization as formally expressed by its top management
Predictive Action	Action to monitor the condition of an asset and predict the need for preventive action or corrective action
Preventive Action	Action to eliminate the cause of a potential nonconformity or other undesirable potential situation.
Process	Set of interrelated or interacting activities which transform inputs into outputs.
Remaining Service Lifecycle (RSL)	The length of time in years that an asset is expected to be able to continue to meet expected service levels or meet expected performance targets
Requirement	Need or expectation that is stated, generally implied or obligatory.
Risk	Effect of uncertainty on objectives. Risk is often expressed in terms of a combination of the consequences of an event

(including changes in circumstances) and the associated “likelihood” of occurrence.

Service Area Master Plan	A planning document specific to one service area or group of assets that highlights the current state of those assets and future capital needs or projects.
Stakeholder	Person or organization that can affect, be affected by, or perceive themselves to be affected by a decision or activity. A “stakeholder” can also be referred to as an “interested party”.
Strategic Asset Management Plan	Documented information that specifies how organizational objectives are to be converted into asset management objectives, the approach for developing asset management plans, and the role of the asset management system in supporting achievement of the asset management objectives.
Tangible Capital Asset	Physical asset, typically equipment, inventory and property, owned by the organization.
Top Management	Person or group of people who directs and controls an organization at the highest level
Whole Life Costing	The practice of using forecast costs through all stages of an asset’s expected useful lifecycle when completing financial analysis (from planning / design, acquisition/construction, operating & maintenance, mid-life rehabilitation, disposal/demolition

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