AECOM

SAULT STE. MARIE

CITY OF SAULT STE. MARIE

FLEET ASSET MANAGEMENT PLAN

FINAL | 60735219 | June 2025

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AECOM: 2015-04-13

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
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Final	June 21st, 2024	Final Report – Fleet AMP		Christiaan Lombard	Project Manager
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List of Abbreviations

Abbreviation	Description
AM	Asset Management
AMP	Asset Management Plan
APUs	Auxiliary Power Units
CIBI	Canadian Infrastructure Benchmarking Initiative
CMMS	Computerized Maintenance Management System
CDES	Community Development and Enterprise Services
CNG	Compressed Natural Gas
CSD	Community Service Department
ePTO	electric Power Take-off
EV	Electric Vehicle
ESL	Expected Service Life
GIS	Geographic Information System
GNG	Green House Gas
HD	Heavy Duty
HEV	Hybrid Electric Vehicles
ICEs	Internal Combustion Engines
I&I	Inflow & infiltration
KPI	Key Performance Indicator
LD	Light Duty
LED	Light Emitting Diodes
LoS	Level of Service
MD	Medium Duty
MFIPPA	Municipal Freedom of Information and Protection of Privacy Act
OEM	Original Equipment Manufacturer
O&M	Operations and Maintenance
O. Reg.	Ontario Regulation
PEV	Plug-In Electric Vehicles
PWES	Public Works and Engineering Service
PW	Public Work
RSL	Remaining Service Life
SUV	Sports Utility Vehicle
TCO	Total Cost of Ownership
VEU	Vehicle Equivalent Unit

1 Introduction

AECOM Canada ULC (AECOM) was retained by The City of Sault Ste. Marie (the "City") to update the asset management plan developed in 2022 to comply with the third phase (Phase III) of the Ontario Regulation 588/17 (O. Reg. 588/17) requirements in respect to its core municipal infrastructure assets. The scope of work is outlined in AECOM's proposal dated September 20, 2024, and subsequent project correspondence.

1.1 Background

Sault Ste. Marie is a City located on the St. Mary's River, North of the United States of America, bordering on two of the Great Lakes with an estimated population of 73,368 (2016). The City provides a wide range of public services to their constituents, with the expectation from the public that these services are expected to function efficiently at a certain level. The provision of these services requires the management of the physical assets to meet desired service levels, manage risks, and provide long-term financial sustainability. These assets include, but are not limited to, roads, bridges, sidewalks, wastewater assets, stormwater management assets, landfills, fleets, buildings, and parks.

In accordance with the terms of reference for this assignment, it is understood that the City is proceeding with an asset management plan to comply with the third phase of the regulatory requirements in respect to its core and non-core municipal infrastructure assets, in accordance with O. Reg. 588/17, by July 1, 2025. The non-core assets to be covered in the scope, as defined by the regulation, include the City's protection services, solid waste, parks and cemetery, facilities, fleet, roadway appurtenances, and active transportation.

Scope and Objectives

In 2015, the City's first Asset Management Plan (AMP) was published. In 2019, by the City Council approval, the Strategic Asset Management (AM) Policy for the City came into effect. In 2022, the City published its core asset AMPs. Following that, the City developed the AMPs for its noncore assets in 2024.

Organizations that implement good AM practices will benefit from improved business and financial performance, effective investment decisions, and better risk management. Stakeholders can expect lower total asset life cycle costs, higher asset performance, and confidence in sustained future performance.

The AMPs capture the City's infrastructure assets and deliver a financial and technical roadmap for the management of the City's assets. The intent of this plan is to provide the means for the City to maximize value from its assets, at the lowest overall expense, while, at the same time, enhancing service levels for its residents.

The objective of Phase III is to update all the core and non-core AMPs to comply with the July 1st, 2025, deadline set by O. Reg. 588/17. Phase III will update the AMP by incorporating the latest asset information, with a focus on:

- Updating the current AMPs to integrate proposed Levels of Service (LoS).
- Defining the lifecycle activities and associated costs required to achieve those LoS.
- Identify the available funding and any funding shortfalls.
- Document the risk(s) of failing to meet the proposed LoS for all asset classes over a 10-year period.

This AMP is an update of the 2024 AMP for the City's Fleet and Equipment Assets, as shown in **Table 1-1**. Other core and noncore AMPs are presented under separate reports.

Table 1-1: In-Scope Fleet Assets

Asset Group	Department	Sub-Assets
Fleet	Public Works and Engineering Service (PWES)	Admin Fleet, Building Equipment Maintenance Fleet, Mechanical Fleet, Operational Fleet, Park Fleet, Traffic Fleet
	Community Development and Enterprise Services (CDES)	Arena Fleet, Cemetery Fleet, Transit Fleet
Equipment	Public Works and Engineering Service (PWES)	Operation Equipment
	Community Development and Enterprise Services (CDES)	Arena Equipment, Transit Equipment

The following elements are included within the scope of this AMP:

- Asset hierarchy, a summary of the asset inventory, including the replacement cost of the assets, the average age of the assets, the condition of the assets, and data gaps analysis (**Sections 2**).
- The City's level of service objectives, stakeholder identification, current LoS determined in accordance with the qualitative descriptions and technical metrics outlined in O. Reg. 588/17, proposed service levels, LoS forecast, and future demand drivers (**Section 3**).
- Asset lifecycle management strategies, lifecycle activities, and funding needs to achieve proposed LoS, risk of not meeting proposed LoS, available funding and funding gap, and alternative (non-financial) strategies to manage funding shortfall (**Section 4** and **Section 5**)

1.2 Asset Management Provincial Requirements

The O. Reg. 588/17 came into effect in 2018 and stipulates specific AM requirements to be in place within Ontario municipalities by certain key dates (**Table 1-2**). The development of this AMP is one of the steps to guide the City towards meeting the July 1st, 2025, deadline.

Table 1-2: O. Reg. 588/17: AM Planning for Municipal Infrastructure

Deadline Date	Regulatory Requirement
July 1st, 2019	All municipalities are required to prepare their first Strategic AM Policy.
July 1st, 2022	All municipalities are required to have an AM Plan for its entire core municipal infrastructure (i.e., water, wastewater, stormwater, roads, and bridges & culverts).
July 1st, 2024	All municipalities are required to have an AM Plan for infrastructure assets not included under their core assets.
July 1st, 2025	All AM Plans must include information about the LoS that the municipality proposes to provide, the lifecycle activities and associated costs needed to achieve those LoS, available funding, any funding shortfalls, and the risk of failing to meet the proposed LoS.

2 State of Infrastructure

Fleet assets are managed by the Fleet Management Division, which provides service for all the City's operational vehicles, public transit vehicles, public works, transit, and arena equipment, except those used by the City's Fire and Rescue and Police Service. Almost all other City departments utilize vehicles/equipment for their day-to-day operation and public service activities. Fleet Management is responsible for maintaining these fleet assets in a timely and efficient manner to support the continuous delivery of City services every day. Currently, the Fleet Management Division manages over 600 assets that range significantly in both complexity and value. Fleet Management Services provides all the licensing, registration, and insurance of the vehicles and maintains preventative maintenance activities.

The inventory of the fleet is a comprehensive catalogue detailing the quantity, condition, and specifications of these components within the City. By analyzing the inventory and assessing the data gaps, this section facilitates informed decision-making and strategic resource allocation, providing essential insights into the maintenance needs and financial requirements.

2.1 Asset Hierarchy

To fulfill the requirements of O. Reg. 588/17 and to pave the way for robust long-range asset management planning, the City requires a logically segmented asset breakdown structure (hierarchy) under the scope of this AMP. Achieving this requires a sufficiently granular classification of Fleet assets, enabling the identification of individual assets due for renewal. Striking the right balance is also crucial, as there is a fine trade-off between ensuring adequate granularity to provide essential information and avoiding excessive granularity that could make the effort to collect and manage information more burdensome than the usefulness derived from it.

The City has a wide range of fleet assets organized hierarchically. This breakdown of the infrastructure is derived from the way that assets are presented within the data sources, which indicates the program area's responsibilities and parent-child relationships within each asset type. In **Figure 2-1**, the hierarchy of Fleet is illustrated, showcasing four main categories: Public Work and Engineering Service (PWES) Fleet, Community Development and Enterprise Service (CDES) Fleet, Public Work (PW) Equipment, and Community Service Department (CSD) Equipment. Each category is further broken down into subcategories. This asset hierarchy establishes a logical indexing of the City's fleet assets, categorizing them into primary (parent) and secondary (child- and grandchild) assets. Such a structure forms the foundational framework for subsequent discussions and analysis, enabling the drill-down to a specific asset within the hierarchy to support maintenance planning or track costs at the asset level or higher levels.

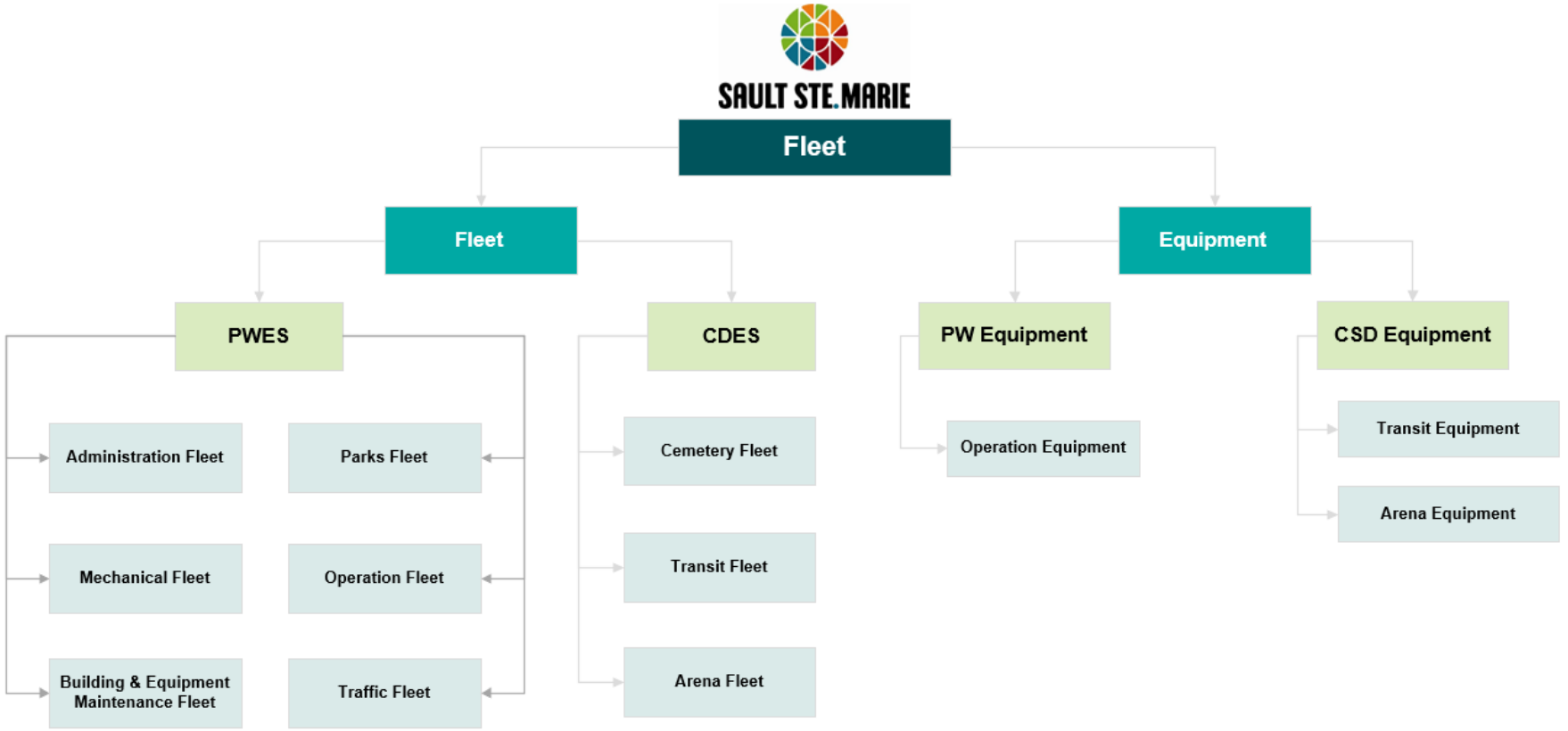

Figure 2-1: City of Sault Ste. Marie Fleet Asset Hierarchy

2.2 Current State of Assets

2.2.1 Asset Inventory

A completed fleet asset inventory is compiled based on the raw data provided by the City at the initial stage of the project, which was obtained from the following sources:

- Active Capital Assets 2021
- BUS LIST - As of Feb 2023
- Copy of Equipment Cemetery 2022
- Transit Capital 22 - Updated August 24, 2022
- FINAL 2023 UPDATE SSM Public Works Replacement Plan Workbook updated 2023-03-09.

Table 2-1 provides a summary of the fleet inventory for each asset category within the City's fleet assets. In total, the City fleet team manages 393 fleets and 202 equipment assets, serving different City service departments.

Table 2-1: Fleet Asset Inventory Summary

Asset Group	Departments	Asset Class	Quantity	Unit
Fleet	PWES Fleet	PW - Admin Fleet	4	Ea.
		PW - Building Equipment Maintenance Fleet	12	Ea.
		PW - Operation Fleet	198	Ea.
		PW - Mechanical Fleet	1	Ea.
		PW - Traffic Fleet	16	Ea.
		PW - Park Fleet	75	Ea.
	CDES Fleet	Arena Fleet	5	Ea.
		Cemetery Fleet	32	Ea.
		Transit Fleet	50	Ea.
Equipment	PW Equipment	PW - Operation Equipment	18	Ea.
	CSD Equipment	Arena Equipment	2	Ea.
		Transit Equipment	194	Ea.
Total Fleet			**393**	**Ea.**
Total Equipment			**214**	**Ea.**

2.2.2 Current Asset Replacement Value

The asset replacement value is the estimated cost that would be incurred to replace an existing asset with a new one of similar functionality, at current market prices. This value represents the monetary amount required to reproduce or procure an asset equivalent to the one being assessed. Examining the distribution of asset replacement values allows the City to comprehend which asset categories hold the highest value for both the City and the public.

The finalized asset replacement values were determined with the largest numbers of the following:

- Escalating the original asset purchase costs to 2025 dollars, by the average inflation rate of the past 10 years (2014-2024) at 2.11%.[1]
- Current replacement cost from the AECOM cost library and Mercury PWES Fleet Assessment Report[2].

The City's fleet assets are valued at approximately $70 million. **Table 2-2** presents the current replacement value of each asset category. The PW – Operation fleet account for the highest replacement value, which is approximately $31 million, followed by the Transit fleet, contributing to over $22 million. PW – Park fleet and Transit equipment are valued at approximately $5.3 million and $4.9 million, respectively. PW – Traffic fleet constitutes approximately $2.1 million. Note that all total replacement values are rounded to the nearest thousand.

Table 2-2: Fleet Current Replacement Value

Asset Group	Departments	Asset Class	Replacement Cost Range	Total Replacement Value (2025)
Fleet	PWES Fleet	PW - Admin Fleet	$28,000 - $51,000	$153,000
		PW - Building Equipment Maintenance Fleet	$11,000 - $228,000	$861,000
		PW - Operation Fleet	$9,000 - $717,000	$30,690,000
		PW - Mechanical Fleet	$51,000	$50,000
		PW - Traffic Fleet	$15,000 - $233,000	$2,102,000
		PW - Park Fleet	$9,000 - $380,000	$5,298,000
	CDES Fleet	Arena Fleet	$118,000 - $135,000	$614,000
		Cemetery Fleet	$9,000 - $221,000	$2,145,000
		Transit Fleet	$28,000 - $685,000	$21,825,000
Equipment	PW Equipment	PW - Operation Equipment	$9,000 - $154,000	$856,000
	CSD Equipment	Arena Equipment	$6,000 - $154,000	$156,000
		Transit Equipment	$3,000 - $125,000	$5,307,000
Total Fleet				**$63,738,000**
Total Equipment				**$6,319,000**
Total				**$70,057,000**

It is noted that the replacement costs are estimated based on the Class 4[3] cost estimation approach. These estimates are typically prepared with limited information, resulting in wide accuracy ranges. Class 4 estimates serve various purposes, including project screening, feasibility assessment, concept evaluation, and preliminary budget approval. They are utilized for detailed strategic planning, business development, project screening at more advanced stages, alternative scheme analysis, confirmation of economic and technical feasibility, and approval to proceed to the next stage. Typically, depending on the construction complexity of the project, relevant reference information, and other associated risks, the accuracy ranges for Class 4 estimates fall within the following bounds (could exceed based on various criteria):

- On the lower side, -10% to -20%
- On the higher side, +20% to +30%

It is also worth noting that the total replacement values are presented in inflated dollars and have been marked up by 5% to 30% for fleet assets, which accounts for market markup and any necessary service costs.

[1] Statistics Canada (Non-residential Building Construction Price Index), Altus Group Construction Cost Guide
[2] Mercury Associates, Inc. SSM Fleet Practices Review Final Report. Prepared for the City of Sault Ste. Marie, 19 July 2021, Retrieved in February 2024
[3] Association for the Advancement of Cost Engineering (AACE) International Recommended Practice No. 18R-97. Cost Estimate Classification System - As Applied In Engineering, Procurement, and Construction for the Building and General Construction Industries, 2020, Retrieved in February 2024

2.2.3 Age and Remaining Service Life

In practice, various assets will deteriorate at different rates and not necessarily linearly over time. However, it is pivotal to keep in mind the level of effort required to predict failure compared with the asset value. More sophisticated deterioration modelling may be warranted for very high-value assets, whilst the cost of deterioration modelling for low-value assets may very well exceed the replacement cost of the asset. The actual service life can vary significantly from the estimated service life (ESL). The latter is defined as the period over which an asset is available for use and able to provide the required LoS at an acceptable risk and serviceability (i.e., without unforeseen costs of disruption for maintenance and repair). In some instances, a variation in expected vs. actual service life is evident due to the following factors:

- **Operating conditions and demands**: Some assets are operated intermittently or even infrequently or are being operated at a lower demand than their designed capacity. Thus, the actual operating "age" of the asset is reduced.
- **Environment**: Some assets are exposed to very aggressive environmental conditions (e.g., corrosive chemicals), while other assets are in relatively benign conditions; thus, the deterioration of assets is affected differently.
- **Maintenance**: Assets are maintained through the refurbishment or replacement of components, which prolongs the service life of the asset.
- **Technological Obsolescence**: Some fleet and equipment assets can theoretically be maintained in long term, although considerations such as cost to maintain the asset, its energy efficiency, and the cost to upgrade to an updated technology that would result in cost savings are likely to render this approach uneconomical.

Initially, the average age was calculated based on the purchase and installation year of each individual asset. Then, based on the age of the asset and the ESL (collected from a State of Infrastructure Workshop with the City, and additional information provided by the City), the remaining service life (RSL) was calculated. It should be noted that in the case where age was higher compared to ESL, RSL was considered as zero.

Table 2-3 and **Figure 2-2** present the weighted average age, weighted average ESL, and remaining service life for various asset sub-categories within the City's fleet assets. The average age of the asset's ranges from 3 to 15 years, with average ESLs that vary from 4 to 20 years. It should be noted that PW - Mechanical Fleet, Arena Fleet, and Cemetery Fleet are the oldest in comparison with other assets, with less than 20% of the assets' estimated service life remaining. Overall, the fleet assets have surpassed 50% of their estimated service life, while the equipment assets have exceeded 80% of their expected service life.

Table 2-3: Fleet Asset Average Age, ESL, and Remaining Service Life

Asset Group	Departments	Asset Class	Weighted Average Age	Weighted Average ESL	Remaining Service Life
Fleet	PWES Fleet	PW - Admin Fleet	4	10	6
		PW - Building Equipment Maintenance Fleet	8	14	6
		PW - Operation Fleet	7	13	6
		PW - Mechanical Fleet	8	10	2
		PW - Traffic Fleet	7	12	5
		PW - Park Fleet	7	12	5
	CDES Fleet	Arena Fleet	9	10	1
		Cemetery Fleet	10	12	2
		Transit Fleet	6	10	4
Equipment	PW Equipment	PW - Operation Equipment	15	19	4

Asset Group	Departments	Asset Class	Weighted Average Age	Weighted Average ESL	Remaining Service Life
	CSD Equipment	Arena Equipment	15	20	5
		Transit Equipment	3	4	1

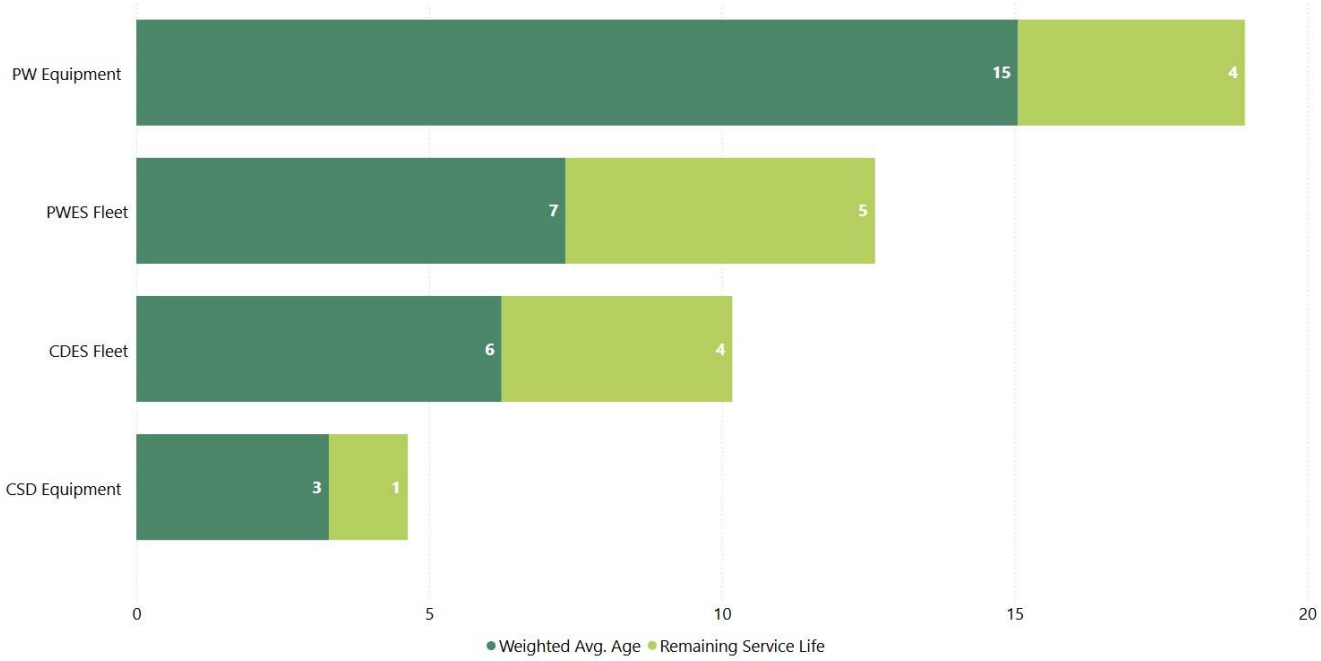

Figure 2-2: Fleet and Equipment Asset Weighted Average Age and Remaining Service Life

Figure 2-3 shows the installation profile of the City's PWES Fleet asset according to asset classes. Most of the current fleet and equipment assets were placed into service starting in 2010, with the exception of four PW – Operations equipment, three PW – Operations fleet vehicles, and one PW – Parks fleet vehicle, which were acquired between 2005 and 2009. Between 2010 and 2019, over $26 million worth of fleet assets were purchased, with more than $20 million allocated to PW – Operations fleets. During the same period, several PW – Parks fleet vehicles were also acquired and put into service. Since 2020, the City's fleet team has continued to update and expand its inventory, investing more than $12 million in capital expenditures, with over two-thirds directed toward PW – Operations fleets.

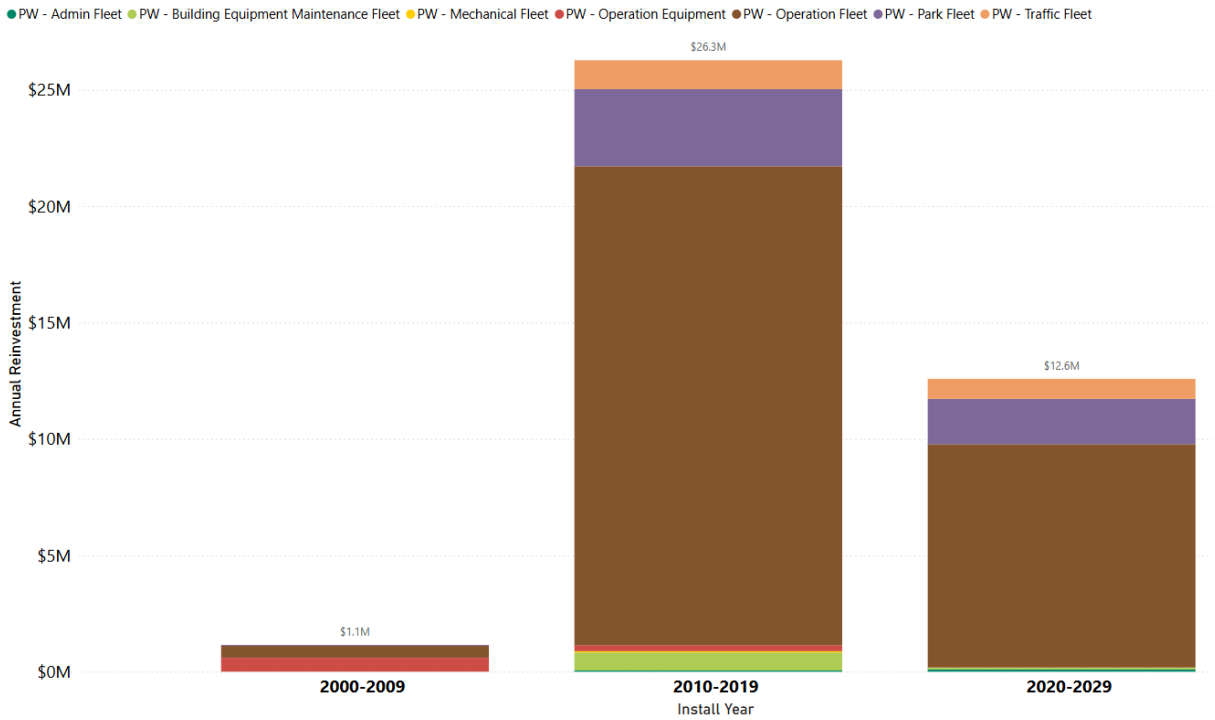

Figure 2-3: PWES Fleet and Equipment Installation Profile

Figure 2-4 shows the installation profile of the City's CDES Fleet according to asset classes. All current fleet and equipment assets have been placed into service since 2010. From 2010 to 2019, more than $14 million was invested in fleet acquisitions, with over $11 million dedicated to Transit fleets. During this period, most of the cemetery fleet vehicles were also purchased and deployed. Since 2020, the City's fleet team has continued to update and expand its inventory, investing nearly $15 million in capital expenditures, with more than two-thirds allocated to Transit fleets and nearly one-third to Transit equipment.

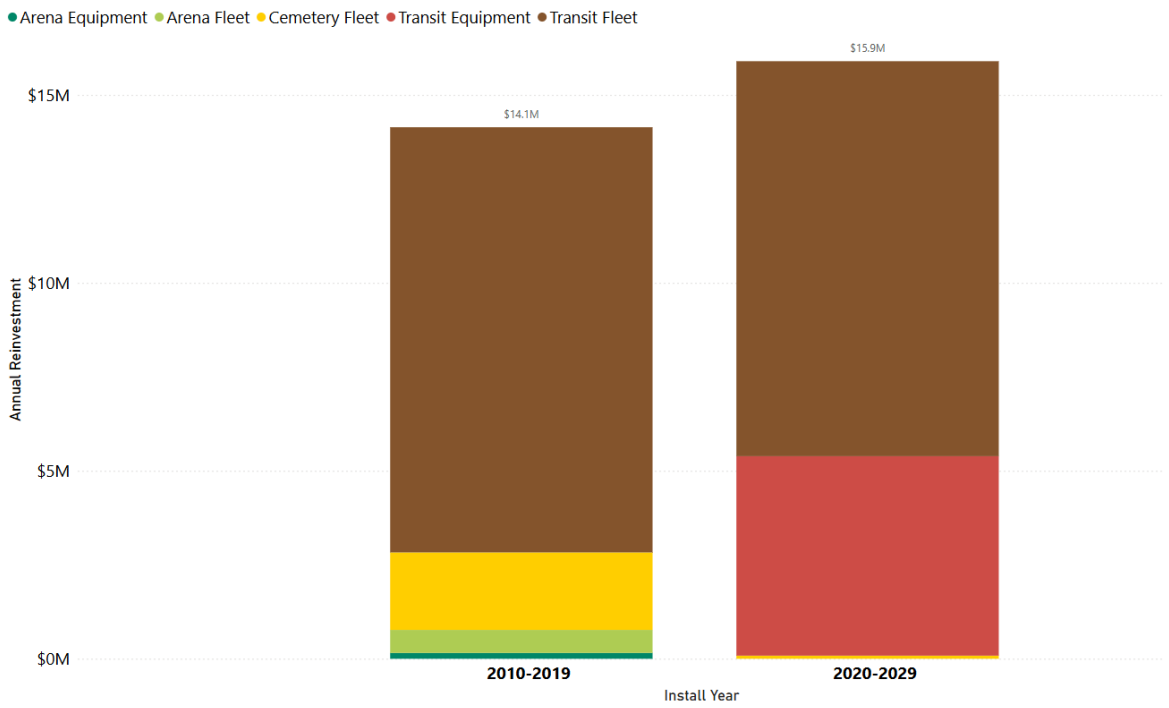

Figure 2-4: CDES Fleet and Equipment Installation Profile

2.2.4 Asset Condition

Regular condition assessments for fleet assets are recommended to monitor the condition and support the asset management decision. For other asset categories that do not have condition assessment results, the two-parameter Weibull distribution function was used to assess the current condition and to project the future condition of the City's fleet assets. The Weibull distribution has been used extensively in reliability studies and lifetime prediction models in industries ranging from automotive to oil & gas and provides a suitable distribution for this type of analysis.

The underlying premise of the Weibull-shaped deterioration is that while some assets fail prematurely due to severe conditions or improper installation, other assets are very long-lived and function well beyond their theoretical ESL. In order to perform a high-order network-level analysis, it was assumed that assets would fail (and require replacement) within a deterioration envelope/curve approximated by a Weibull probability distribution. The two-parameter Weibull cumulative distribution has two parameters for scale and shape, as set out in Equation [1]: The underlying premise of the Weibull-shaped deterioration is that while some assets fail prematurely due to severe conditions or improper installation, other assets are very long-lived and function well beyond their theoretical ESL. To perform a high-order network-level analysis, it was assumed that assets would fail (and require replacement) within a deterioration envelope/curve approximated by a Weibull probability distribution. The two-parameter Weibull cumulative distribution has two parameters for scale and shape, as set out in Equation [1]:

$$f(x;\alpha,\beta) = e^{-\left(\frac{x}{\beta}\right)^{\alpha}} \quad [1]$$

Where: x = Age
α = Shape parameter (or slope)
β = Scale parameter

A set of Weibull cumulative distribution functions were leveraged to simulate a set of deterioration curves for assets with different ESLs as shown in **Figure 2-5**.

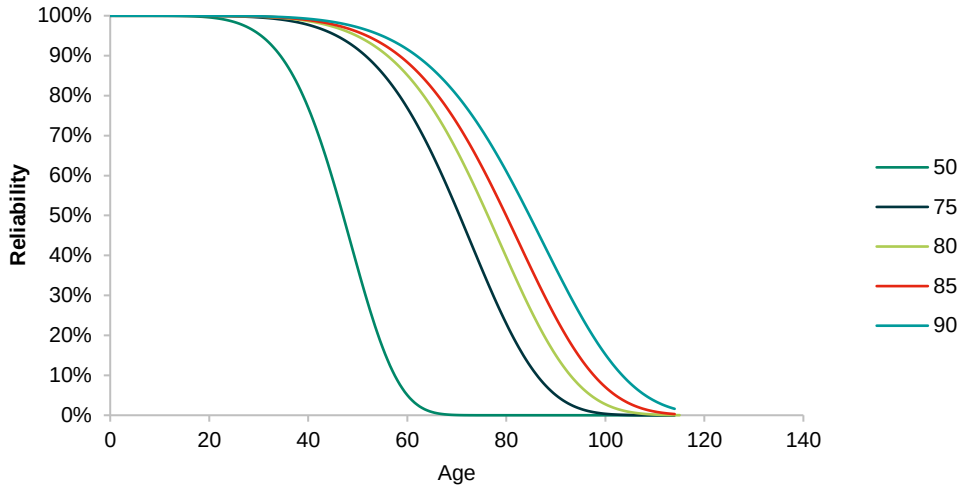

Figure 2-5: Asset Deterioration Curve Samples

The asset condition ratings were based on the five-point condition rating scale presented in **Table 2-4.**

Table 2-4: Condition Assessment Rating Details

Physical Condition Rating	Condition Description
1 - Very Good	The asset is new or in new condition, meets or exceeds all current standards of practice, shows no signs of deterioration, and is fully operable.
2 - Good	The asset has minimal signs of deterioration, generally meets all current standards of practice, and is fully operable.
3 - Fair	The asset may show moderate signs of deterioration, generally meets the current standard of practice, asset performance may decrease and cause service interruptions and is fully operable.
4 - Poor	The asset is approaching its end-of-life expectancy, shows significant signs of deterioration, major components may need to be rebuilt or replaced, may be functioning at an acceptable level is expected to deteriorate further.
5 - Very Poor	The asset is beyond its life expectancy, may no longer meet the current standard of practice, major component may no longer be serviceable, shows significant deterioration, functions at a limited capaCity, and may pose a safety hazard if used.

Table 2-5 and **Figure 2-6** summarize the condition grade of the City's fleet assets with associated replacement values. 4% of the assets are in very good condition, with a total replacement value of approximately $2.6 million, and 38% of the assets are in very poor condition, with a total replacement value of $26 million. Good condition accounts for 15% of the existing inventory, having a replacement value of around $10.5 million. Fair and poor condition assets make up 27% and 17%, respectively.

Table 2-5: Fleet and Equipment Asset Condition Summary

Rank	Condition Rating	Replacement Value	% of Replacement Value
1	Very Good	$2,558,000	4%
2	Good	$10,467,000	15%
3	Fair	$18,877,000	27%
4	Poor	$11,578,000	17%
5	Very Poor	$26,574,000	38%
Total		**$70,054,000**	**100%**

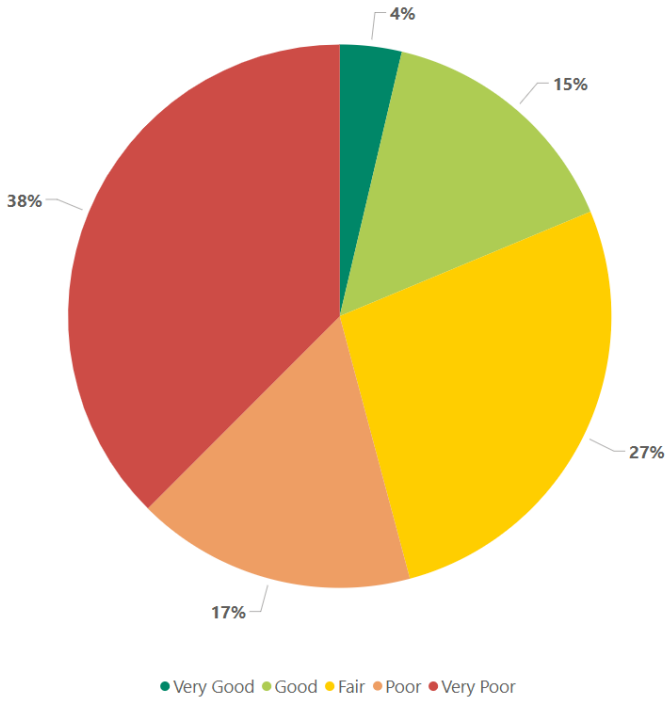

Figure 2-6: Fleet Asset Condition Summary Weighted by Replacement Value

Figure 2-7 shows the condition summary breakdown for each asset class, weighted by replacement value. For the PWES fleet, approximately one-fourth are in very good or good condition, representing a total replacement value of $10 million. Over $9 million worth of assets are in fair condition, while the remaining fleet, valued at nearly $21 million, is classified as being in poor or very poor condition, accounting for more than half of the total PWES fleet assets. All PW – Equipment assets are classified as being in very poor condition, primarily because their current service life exceeds their ESL.

For the CDES fleet, over 40% of the assets are in good or fair condition, with a total replacement value of $11 million. The remaining fleet—valued at nearly $14 million—is categorized as being in poor or very poor condition, representing more than half of the total CDES fleet assets. All CSD equipment is rated as fair or worse, with nearly 60% classified as being in poor or very poor condition.

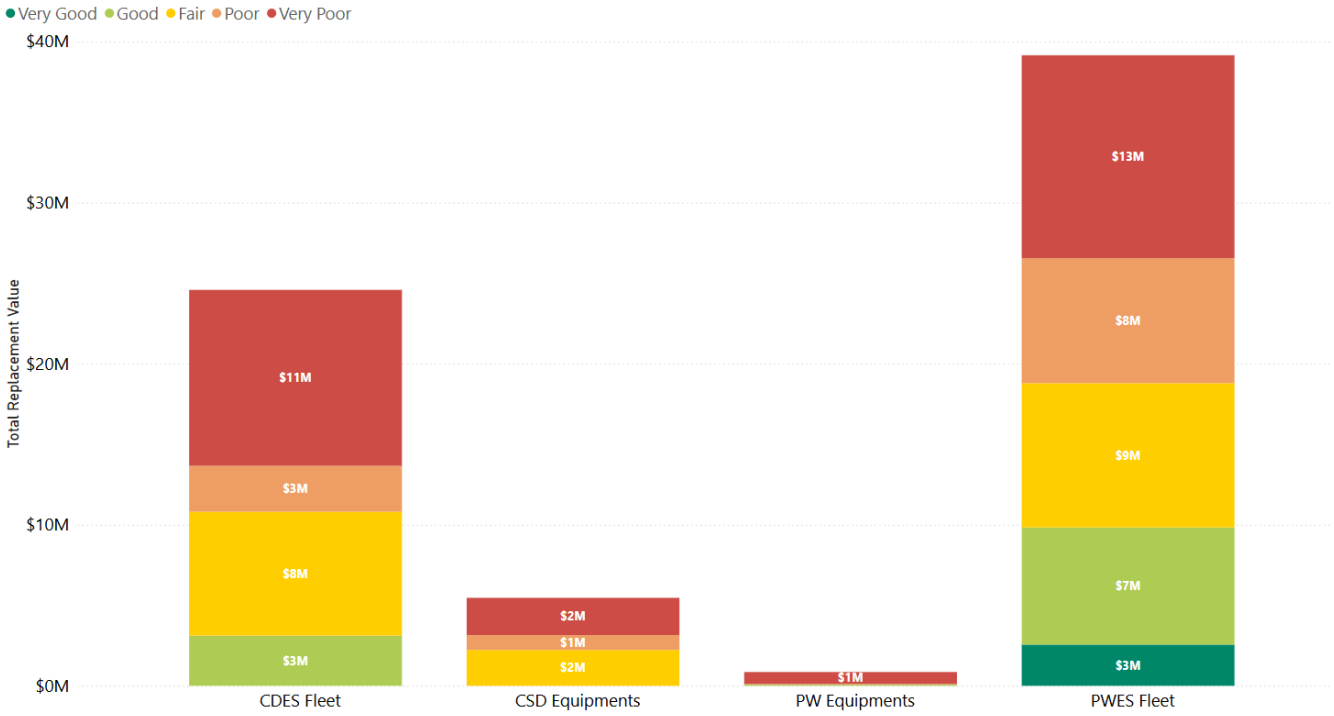

Figure 2-7: Fleet Condition Distribution Weighted by Replacement Value

2.3 Asset Data Gap Analysis

This section summarizes the current state of the City's asset data by assessing the quality of the asset inventory. Specifically, this section identifies existing data gaps, determines the overall confidence in the current asset data, and introduces good practices of data management.

2.3.1 Data Gap Observations

The City's fleet assets were previously stored across multiple spreadsheets. This project has successfully centralized the data into a single inventory. Additionally, it has addressed and filled gaps in key data, such as expected service life and replacement costs, achieving a 100% completeness rate. **Table 2-6** provides a summary of data completeness levels in the compiled fleet inventory across key data attributes. It is recommended that the City continue to work on filling any remaining gaps, ensuring a comprehensive and up-to-date database.

Table 2-6: Asset Data Completeness

Asset Group	Inventory Completeness (%)					
	Asset ID	Location	Install Date	Condition	Expected Service Life	Replacement Cost
Fleet	93%	78%	100%	100%	100%	100%

2.3.2 Data Confidence

The quality of asset data is critical to effective AM, accurate financial forecasts, and informed decision-making. For this reason, it is important to know the reliability of the information is for the State of Infrastructure analysis of the fleet assets. **Table 2-7** provides a description of the data confidence grades used to classify the reliability of the asset data. This can serve as a reference for the City to assess the quality of their asset data. A brief summary and explanation of the available data can be seen in **Table 2-8**. Overall, the Fleet asset inventory data is comprehensive in terms of the six key parameters required for the Asset management data analysis.

Table 2-7: Data Confidence Grading Scale

Confidence Grades	Description
A - Highly reliable	Data is based on sound records, procedures, investigations, and analysis, documented properly and agreed as the best method of assessment. The dataset is complete and estimated to be accurate ± 2%
B - Reliable	Data is based on sound records, procedures, investigations, and analysis, documented properly, but has minor shortcomings, for example, some of the data is old, some documentation is missing and/or reliance is placed on unconfirmed reports or some extrapolation. The dataset is complete and estimated to be accurate ± 10%
C - Uncertain	Data is based on sound records, procedures, investigations, and analysis which is incomplete or unsupported, or extrapolated from a limited sample for which grade A or B data are available. The dataset is substantially complete, but up to 50% data is extrapolated, and the accuracy is estimated ± 25%
D - Very Uncertain	Data is based on unconfirmed verbal reports and/or cursory inspections and analysis. The dataset may not be fully complete, and most data is estimated or extrapolated. Accuracy ± 40%
E - Unknown	None or very little data held.

Table 2-8: Asset Data Confidence

Asset Group	Inventory Confidence					
	Asset ID	Location	Install Date	Condition	Expected Service Life	Replacement Cost
Fleet	A	B	A	A	A	A

2.3.3 Data Management Practice

The asset data lifecycle is a sequence of stages that data goes through from its initial build (i.e., data capture and entry) to its eventual archival and/or deletion at the end of its useful life[4]. A clear definition and understanding of the organization's process for acquiring, storing, utilizing, assessing, improving, archiving, and deleting data (see **Figure 2-8**) will ensure good data management practices and help to sustain levels of data quality required to support AM activities.

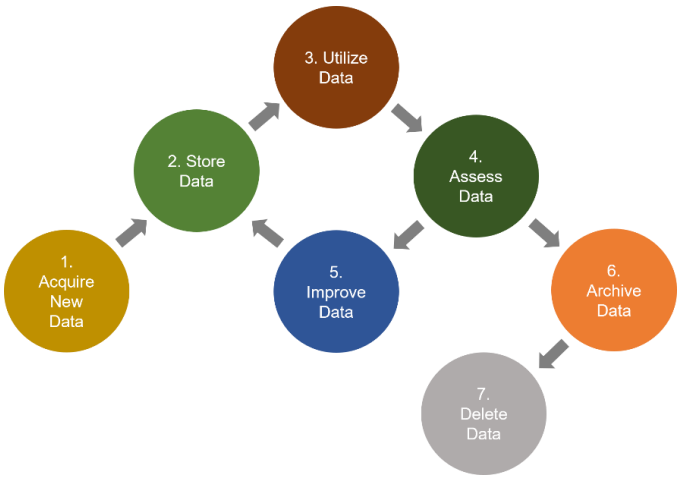

Figure 2-8: Asset Information Lifecycle

The seven key stages of the asset data lifecycle are described in more detail below:

[4] TechTarget Network (2020): Definition: Data Life Cycle

1. **Acquiring New Data**: The majority of new asset data arises from asset creation, refurbishment, and overhaul activities. New data may also come by way of inheritance or transfers from other business units, organizations, or third parties. As such, it is important to have clearly defined processes in place not only to add or update asset data but also to migrate and merge data from other sources.
    - New assets for the fleet should be consistently added to the inventory, and a minimum required data set defined to maintain inventory accuracy and reliability. The required data includes the new vehicle make, model, VIN, fuel type, original purchase price, purchase location, etc.
2. **Storing Data**: The way asset data is stored is an important consideration for overall data quality. Having a planned approach to data storage will inevitably reduce the likelihood of duplication and inconsistencies across datasets within the organization. Depending on the needs of the organization, this stage may involve procuring new software to adequately house the data, along with a data backup and recovery plan to ensure that the necessary data protection and privacy standards are met.
    - Assets are typically stored in either the CMMS (Computerized Maintenance Management System), or the maintained asset inventory spreadsheet. For fleet assets, typical information, including periodical kilometre reading, engine oil level, general vehicle condition, and last service dates, needs to be captured and maintained to be updated during the daily data management process.
3. **Utilizing / Analyzing Data**: This aspect of the asset information lifecycle is where users encounter the data to support data-driven activities within the organization. Data can be viewed, processed, edited, and published to allow users to access the data outside the organization. Critical data that has been modified should be fully traceable to maintain the integrity of the data. As such, it is important to communicate to the users why asset data is so important and how it is used to inform decisions within the organization.
    - Previously, the City conducted a fleet assessment regarding the PW fleets and certain analytical results supported the lifecycle activities decision-making.
4. **Assessing Data**: Assessing the data quality helps to determine the level of confidence in the information and ensures that decision-makers are making informed decisions based on the quality of data available to them. Moreover, it is important to fully understand the availability and quality of the asset data before issuing information publicly. Some of the results of data degradation, due to improper or a lack of assessment, may include:
    - Poor asset performance due to a lack of information and understanding of asset behaviour.
    - Non-compliance with statutory regulations or safety requirements.
    - Safety incidents due to risks not being identified or reported.
    - Asset failure due to gaps in maintenance planning.
5. **Improving Data**: Improving data quality involves establishing clear targets which are intended to be communicated widely across the organization. It is imperative that the organization understands the costs, benefits, and risks associated with any data improvements since the cost of the improvement may outweigh the overall benefit. It is also important to note that *more* data does not necessarily mean *better* data. It is very possible to collect data that does not add value to the organization. As such, it is critical that the organization aligns its data improvement targets with its AM objectives and considers the data-driven decisions staff need to make at the operational and strategic level, to ensure that the *right* data is being improved upon.
6. **Archiving Data**: Archiving data is the process of storing data that is no longer active or required, but is able to be retrieved in case it is needed again. Data that is archived is stored in a location where no usage or maintenance occurs. It is recommended that a data archive strategy exists within an organization in order to lay out the data archival requirements, which include the following factors:
    - Consider what data should be archived and articulate the reasons behind the archival decisions.
    - Examine any legal obligations pertaining to the retention of data records.
    - Determine the appropriate duration for retaining different categories of data records.
    - Evaluate the risks associated with the inability to retrieve specific data records.

- Specify the authorized individuals or entities who should have access to archived data records.
- Establish the expected timeframe for retrieving archived data records.
- Communicate these requirements across the organization to ensure staff understand why records are being archived, how they can access archived data records, and for how long archived data records can still be accessed.

7. **Deleting Data:** The deletion of data is the final component of the asset information lifecycle. Typically, within organizations, there is a resistance to permanently delete data, otherwise known as data “squirrelling”, due to the overall capacity of storing data increasing and the cost decreasing. However, within the organization’s data archive strategy, a retention period should be specified to indicate when data should be deleted, along with any processes to follow, such as obtaining prior authorization.

2.3.3.1 Current Data Management State

The City’s PWES Department staff are involved in fleet asset data management. The City’s fleet asset data is currently stored in Excel spreadsheets and reports. Currently, the City updates assets in the spreadsheet, and there may be a lag in obtaining and adding/updating data.

The City is following the mandate in records retention procedures for municipalities as per the Freedom of Information and Protection of Privacy Act (FIPPA) and the Municipal Freedom of Information and Protection of Privacy Act (MFIPPA).

2.3.3.2 Future Data Management State

The City will develop and implement a software strategy that helps streamline data management following this AMP. Eventually, the City plans to have a clear and efficient data management process and a comprehensive and robust asset inventory to support their AM decision-making. The implementation plan for data improvement is presented in **Section 6**.

3 Level of Service

3.1 Purpose

Level of Service (LoS) supports every aspect of the overall AM system. The objective of establishing clearly defined service levels is to help the City meet stakeholder values, achieve its strategic goals, make informed decisions, and implement effective asset lifecycle activities.

Documenting LoS is a proven practice that will enable the City to:

- Link corporate strategic objectives to customer expectations and technical operations.
- Balance customer needs and expectations while evaluating the effectiveness of operations and whether the right LoS is being provided at the right cost.
- Transition from an “Asset Stewardship” approach that focuses on making decisions based on maintaining assets in an acceptable condition to a “Serviceability” approach that is geared towards making decisions based on balancing the costs, risks, and goals for the LoS being provided by the City’s assets.
- Communicate the physical nature of infrastructure that the City owns and is financially responsible for, while promoting the use of LoS to enable effective consultation with stakeholders regarding alternative funding options according to desired LoS outcomes.
- Make recommendations on strategies that the City can take now to minimize future renewal costs while ensuring that adequate LoS can be delivered without burdening future generations.
- Assess internal (e.g., program changes) and external (e.g., climate change) factors that have the potential to impact the City’s ability to deliver services and how these factors may impact the LoS being provided.
- Implement a corporate continuous improvement program to further optimize AM across all service areas.

The O. Reg. 588/17 requires that all AMPs include the current and proposed LoS being provided, determined in accordance with the qualitative descriptions and technical metrics provided (see **Section 1.2**).

3.2 Objectives

Defining LoS objectives is important for drawing a line of sight between the City’s corporate objectives and the tangible asset performance outcomes. To do so, the LoS objectives must take into consideration stakeholder interests to develop asset performance measures that aim to meet the needs and expectations of the community. By doing this, the City will ensure that their assets are striving towards optimal performance, not only operationally, but economically, socially, and sustainably as well. Every stakeholder has certain interests in the service being provided, and in general, the City’s corporate objective is to lift up the community and build pride, and attract people (visitors, employers and employees). The City’s Comprehensive Background Report[5] (2021) for the New Official Plan outlined the overarching themes that reflect the City’s values, as shown in **Table 3-1**. Each overarching theme is also assigned a corporate service objective.

The development of the level of service targets should be aligned with these corporate objectives, which will be addressed in the next iteration of the AMP.

[5] City of Sault Ste Marie. 2021. Comprehensive Background Report.

Table 3-1: The City's Overarching Themes and LoS Objectives

Overarching Themes	LoS Objective
Healthy Community	Supports healthy living, active transportation, access to passive and active recreation, social interaction and the creation of spaces that are comfortable, safe and accessible for all ages and abilities (the "8 to 80 Cities" concept).
Environmental Sustainability	Supports energy conservation and efficiency, improved air quality, reduced greenhouse gas emissions and climate change adaptation.
Integrated Mobility	Supports accessibility and choice of a diversity of transportation modes.
Sense of Place	Fosters a welcoming place for all that establishes the connection and provides a memorable experience to visitors.
Sustainable Growth	Stimulates reinvigoration of neighbourhoods to provide a complete range of housing, services, employment and recreation.
Economic Resiliency	Supports the growth and diversification of the City's economy.
Social Equity	Contributes to creating a welcoming and inclusive community, focusing on the removal of systemic barriers so that everyone has access to an acceptable standard of living and can fully participate in all aspects of community life.
Cultural Vitality	Celebrates the Sault's history, diverse communities and natural and cultural heritage, with the Downtown as the Sault's core destination for arts and culture.

3.3 Stakeholder Identification

A stakeholder is any person or organization that can affect, be affected by, or perceive themselves to be affected by a decision or an activity. Stakeholder analysis is the process of understanding stakeholder needs, expectations and perceptions relative to the stakeholder's level of interest and level of influence over the organization. The organization typically engages with their stakeholders to:

- Establish which activities or services matter most.
- Understand their risk appetite and risk threshold.
- Understand their willingness to pay for services.

Stakeholders can take many forms and may be internal (i.e., staff, Council) or external (i.e., the public, regulatory agencies, suppliers, neighbouring municipalities, etc.) to the organization. The following groups were identified as key stakeholders for fleet service at the LoS workshops. This is not intended to be an exhaustive list; however, the following groups provide a good starting point for the City to move forward to the next stage.

- Residential Customers
- Industrial, Commercial & institutional (ICI) Customers
- Regulatory Agencies
- Neighbouring Municipalities
- Environmental Groups
- Internal City Departments
- School Boards and Post Secondary Institutions
- Social Services

3.3.1 Legislated and Regulatory Requirements

Fleet assets are critical to the City's ability to provide essential services to the community and to protect the health and safety of the public. As such, key legislative requirements exist for the City's infrastructure assets, which ensure that minimum requirements are met and standards are in place that promote a high quality of life (i.e., clean drinking

water and safe roads, etc.). A sample of key Federal and Provincial legislated requirements is outlined below in **Table 3-2**. Monitoring and development programs relevant to fleet assets are also listed.

Table 3-2: Legislated and Regulatory Requirements

Federal	Provincial
• Motor Vehicle Safety Act • Canadian Environmental Protection Act, 1999 (CEPA) • Federal Sustainable Development Act	• Highway Traffic Act • Ontario's Drive Clean Program • Ontario Public Service Green Fleet Directive • Environmental Assessment Act • Ontario Regulation 231 – Transit Projects and Metrolinx Undertakings • Environmental Protection Act • Ontario Regulation 85 – End of Life Vehicles • Commercial Vehicle Operating Registration (CVOR) • Bus driver licensing through Ontario Drive Test Centres

3.4 O. Reg. 588/17 Levels of Service Metrics

Currently, O. Reg 588/17 only identifies levels of service metrics for core assets. Several key LoS performance measures have been identified for fleet assets through consultation and workshops with City staff. **Table 3-3** presents a summary of the City's fleet service level metrics.

Table 3-3: Fleet Levels of Service Metrics

Asset Category	Service Values	O. Reg 588/17 LoS Performance Measure	Unit	Current LoS Performance (2025)	LoS Comments
Fleet - PWES	Environment & Sustainability	Number of Vehicles that are Electric or Hybrid	#	TBD	• The City's goal for GHG reduction is net zero by 2050[6]. The Public Work is currently working on setting an achievable target. • The City aim to allocate additional funding to enhance infrastructure for EVs.
Fleet - PWES	Environment & Sustainability	Total Annual Fuel Volume Used for Vehicles	Litres	TBD	• Conversion of the light-duty vehicle to electrical or hybrid will reduce the annual fuel consumption.
Fleet - PWES	Quality & Reliability	% of Vehicles and Equipment Past Their Optimum Service Life	%	TBD	• Mercury Associates, Inc. completed a comprehensive Public Works fleet report in 2021, which identified vehicles that had surpassed their optimal service life and provided recommendations for replacement budgets and schedules. However, the recommended budget has not yet been met. • The primary factors used to determine if vehicles and equipment have exceeded their optimal service life are physical age and overall condition. • As vehicles and equipment age, maintenance costs and frequency increase, which can negatively affect operational efficiency.
Fleet - PWES	Quality & Reliability	Total Idle Time for Front Line Vehicles	Hours	TBD	• Many cities are aiming to make their service vehicles idle-free in order to reduce greenhouse gas emissions. • In certain situations, some service vehicles may need to idle at the roadside due to operational requirements. • Strategies such as fleet electrification, monitoring vehicle idle times, and updating internal operating procedures are effective ways to minimize vehicle idling. • The City is currently in the process of tracking service vehicle idling data (adding engine trackers) and developing an achievable LoS key performance indicator (KPI).
Fleet - PWES	Quality & Reliability	Mileage or Hours per Vehicle	Hours or km / Vehicle	TBD	• Maintaining a younger and less-utilized fleet results in lower maintenance costs and improved operational performance, which depends on implementing a realistic and effective replacement program. • Heavy equipment and heavy-duty vehicles are more expensive to purchase and maintain, and their absence has a greater operational impact. Vehicles with consistently high maintenance costs should be prioritized for replacement.
Fleet - PWES	Quality & Reliability	Total Repairs per Vehicle	$ Cost / Vehicle	TBD	• Increased repair costs are necessary to maintain service levels; however, these additional expenses are drawn from the overall Public Works budget, which may adversely affect funding for other services. • In response, Council has raised spending, but the current funding still falls short of requirements.

[6] City of Sault Ste. Marie. Greenhouse Gas Emissions Reduction Plan. City of Sault Ste. Marie, n.d., https://saultstemarie.ca/City-Services/City-Departments/Community-Development-and-Enterprise-Services/FutureSSM/Environment/Greenhouse-Gas-Emissions-Reduction-Plan.aspx. Accessed 26 Apr. 2025.

Asset Category	Service Values	O. Reg 588/17 LoS Performance Measure	Unit	Current LoS Performance (2025)	LoS Comments
					• Newer vehicles often come with higher repair costs due to advanced technologies and more expensive components. Electric vehicles will require battery replacements after several years of service.
Fleet - Transit	Access & Capacity	Total Transit Ridership per Year	# Boardings	• 2 million riders per year transit ridership needs • 1.8 million riders per year transit ridership capacity	• Historically, annual ridership demand has increased, largely driven by a rise in international students. However, beginning in September 2025, the influence of international students on ridership may decline. • To address this ridership demand, potential actions include expanding the bus fleet and workforce, as well as introducing programs to promote transit education and awareness.
Fleet - Transit	Quality & Reliability	Average Age of Fleet in Years	Age (Years)	5.7 years, excluding the para-buses (smaller buses with specific accessibility features for people with disabilities)	• The rising costs of purchasing new buses and maintaining the fleet may lead to future funding challenges. • The current transit study aligns with the goals of the 2050 plan, but this is dependent on fully electrifying all buses. • There are still technological limitations associated with adopting fully electric buses. • Upgrades to existing infrastructure will also be required to support full fleet electrification.
Fleet - Transit	Quality & Reliability	Total Annual Fuel Consumption	Litres	TBD	• One objective is to reduce the mileage accumulated by each transit vehicle, which will help maintain a newer and more easily serviceable fleet. • Actions to achieve this goal include reviewing and optimizing service routes for greater efficiency.
Fleet - Overall	Quality & Reliability	Percentage of assets in Fair or Better Condition	%	44%	• As older vehicles reach the end of their service life, they are either replaced or repurposed, which may lead to an increase in the overall percentage of assets classified in fair condition.

3.5 Proposed Levels of Service

Establishing LoS targets is an important part of continual improvement and performance management. Without targets, it is difficult to ascertain whether goals are being met, or the extent of the gap if they are not. Incorporating targets into the City's LoS Framework helps to ensure that targets are reasonable, aligned with customer expectations, and evaluated on an objective basis by considering cost-benefit trade-offs.

One of the key challenges in setting targets in a municipal environment is that they can often become biased and/or politically motivated. Therefore, it is important to review LoS targets with internal and external stakeholders, especially the customers who will be impacted the most by changes in service delivery. An important aspect of evaluating LoS targets is determining how willing the user is to pay for the service. Regulatory requirements are an exception; however, they only provide the minimum service standard. Cost is still an important parameter to consider when assessing the merits of service improvements. To deal with the financial realities, it is necessary to:

- Calculate how much the service costs based on current LoS.
- Determine the lifecycle activities and cost associated with varying the LoS.
- Assess the customers' willingness to pay.

It is important that any targets set be realistic and achievable. O. Reg. 588/17 requires AMPs to include proposed levels of service by July 1, 2025.

A summary of the City's fleet service level metrics is presented in **Table 3-5**. Each metric was indicated with its current trend and proposed trend for the next 10 years, represented by legends, taking into account the nature of the measure, data availability, and whether the trend impacts positively or negatively on the proposed LoS. The LoS trend legends are described in **Table 3-4**.

Table 3-4: LoS Trend Legend

Symbol	Name	Description
	Positively Increasing	KPI is improving steadily over time, showing progress toward goals.
	Positively Stable	KPI is at a strong, desirable level and consistently maintained.
	Positively Decreasing	KPI is improving as lower values indicate better performance.
	Negatively Increasing	KPI is worsening over time, signaling a need for corrective action.
	Negatively Stable	KPI remains poor with no improvement or further decline.
	Negatively Decreasing	KPI is declining in a way that reflects worsening performance.

Table 3-5: Fleet Current and Proposed Levels of Service

LoS #	Service Area	LoS Measure	Unit of Measure	LoS Category	Current Performance	Performance Trend		Lifecycle Activities to Meet Proposed LoS (Positive Trend) / to Mitigate the Impact of the Proposed LoS (Negative Trend)	Budget Impact to Meet Proposed LOS	Risk of Not Meeting Proposed LoS
						Current	Proposed			
1	Fleet - PWES	Number of Vehicles that are Electric or Hybrid	#	Customer	See **Table 3-3**	↑	↑	• Conduct a detailed fleet inventory and usage analysis to identify suitable vehicles for electrification based on duty cycles, mileage, and replacement timelines. • Develop a long-term vehicle replacement and electrification roadmap aligned with GHG reduction targets. • Prioritize the procurement of electric or hybrid vehicles during replacement cycles. • Standardize specifications that include electric or hybrid models and promote vendor partnerships that support transition efforts. • Invest in scalable charging infrastructure at municipal facilities. • Update preventive maintenance schedules and procedures to match EV technology (e.g., less frequent brake service, no oil changes). • Phase out tools and inventory exclusive to internal combustion engines (ICEs). • Establish environmentally responsible decommissioning and recycling practices for ICE vehicles. • Explore circular economy practices such as battery reuse or resale partnerships.	High	• Not meeting fleet electrification targets undermines the City's GHG reduction commitments, possibly jeopardizing its Climate Action Plan or other environmental strategies. • Future legislation may mandate zero-emission fleet targets. Failure to transition early could result in legal or policy non-compliance. • Many federal and provincial grants or subsidies (e.g., for EVs or charging stations) require active transition efforts. Delays may result in lost financial support. • Continued reliance on internal combustion engine (ICE) vehicles exposes the City to fuel price volatility, carbon taxes, and higher long-term maintenance costs. • Postponing charging infrastructure investment can result in operational bottlenecks and logistical challenges once EV adoption is eventually required.
2	Fleet - PWES	Total Annual Fuel Volume Used for Vehicles	Litres	Technical	See **Table 3-3**	→	↓	• Analyze fleet utilization to eliminate underused or oversized vehicles. Replace with smaller, fuel-efficient models where possible. • Integrate fuel economy and emissions performance into vehicle procurement specifications. • Prioritize replacing aging internal combustion engine (ICE) vehicles with hybrids or EVs to directly reduce fuel dependency. • Keep engines, tires, and drivetrains in peak condition to improve fuel efficiency (e.g., timely oil changes, air filter replacement, proper tire inflation). • Implement and enforce anti-idling policies across all departments with automated idle shutdown systems where applicable. • Replace aging, inefficient vehicles before they become fuel-cost burdens; use Total Cost of Ownership (TCO) to guide timing. Identify and phase out vehicles with the poorest fuel performance metrics.	High	• Continued high fuel consumption leads to increased operating expenses, especially with fluctuating fuel prices and escalating carbon taxes. • The City could miss out on funding or rebates tied to fuel reduction or sustainability performance targets. • Fuel consumption correlates directly with emissions. Failure to reduce usage may hinder GHG reduction targets and broader climate action goals. • Delayed replacement or optimization keeps high-consumption, high-maintenance vehicles in service longer, reducing reliability and increasing downtime. • A fuel-dependent fleet is more vulnerable to supply shocks or fuel price surges, disrupting essential services like public works or emergency response.
3	Fleet - PWES	% of Vehicles and Equipment Past Their Optimum Service Life	%	Technical	See **Table 3-3**	↑	↑	• Focus replacement on high-risk assets that have the greatest impact on safety, service delivery, or regulatory compliance (e.g., emergency vehicles, frontline public works units). • Implement detailed inspections to determine true condition and functionality rather than relying solely on age, allowing some assets to remain in service safely. • Increase the frequency of preventative maintenance (PM) for aging assets to delay failure and optimize performance. • Refurbish or rebuild key components (e.g., hydraulics, drivetrains) on high-value units to extend life at a lower cost than full replacement. • Consolidate and share underused assets across departments to reduce the total fleet size and defer replacements. • Dispose of low-utilization or non-critical assets to reduce maintenance burdens and reallocate savings to extend critical assets • Apply for provincial/federal asset renewal grants. • Use lease-to-own or service-based contracting models for critical assets where full capital outlay is not feasible.	High	• Older assets are more prone to mechanical failures, leading to service interruptions in snow clearing, waste collection, emergency response, and other essential operations. • Key services may be delayed or unavailable if critical fleet/equipment (e.g., fire trucks, plow vehicles, utility trucks) fail during peak demand. • Aging vehicles with outdated safety features or deteriorating systems increase the risk of workplace accidents and public safety incidents. • Operating beyond the designed lifecycle could expose the City to liability for equipment failure-related damages or injuries, and increased insurance premiums. • Maintenance costs for aging assets often increase exponentially, straining operating budgets and diverting funds from capital renewal. • Older vehicles are typically less fuel-efficient, undermining GHG reduction efforts and increasing fuel costs.

LoS #	Service Area	LoS Measure	Unit of Measure	LoS Category	Current Performance	Performance Trend		Lifecycle Activities to Meet Proposed LoS (Positive Trend) / to Mitigate the Impact of the Proposed LoS (Negative Trend)	Budget Impact to Meet Proposed LOS	Risk of Not Meeting Proposed LoS
						Current	Proposed			
								• Establish a consistent baseline of replacements annually to avoid sudden surges in backlogged needs.		
4	Fleet - PWES	Total Idle Time for Front Line Vehicles	hrs	Technical	See **Table 3-3**	↑	↓	• Establish enforceable idle time thresholds (e.g., no idling beyond 3 minutes), with exemptions for safety or operational reasons. • Integrate idle time reduction targets into departmental KPIs and fleet sustainability goals. • Include automatic engine shut-off systems, hybrid-electric power take-off (ePTO), or auxiliary power units (APUs) in procurement specifications. • Choose appropriately sized vehicles so heavy-duty units aren't used for light tasks that encourage excessive idling. • Train drivers to recognize unnecessary idling and apply best practices (e.g., shut down during loading, meetings, breaks). • Monitor real-time engine idling, trip durations, stop/start cycles, and identify high-idle vehicles, routes, or operators.	Low	• Excessive idling consumes fuel without providing service, leading to unnecessary fuel expenditures and straining the operating budget. • Idling accelerates engine wear and increases the frequency of oil changes, filter replacements, and emissions system repairs, without contributing to productive vehicle use. • Long idle periods increase engine hours disproportionately to mileage, shortening the usable life of vehicles and increasing replacement needs. • Idling is a direct source of unnecessary emissions, undermining the City's climate action and sustainability goals. • Idle vehicles can be perceived by the public as a wasteful or irresponsible use of taxpayer-funded resources.
5	Fleet - PWES	Mileage or Hours per Vehicle	Hr or km / Vehicle	Technical	See **Table 3-3**	↑	↑	• Review utilization data to identify overused and underutilized units. Reassign workloads to ensure even distribution of mileage and operating hours. • Use historical trends and service forecasts to plan asset deployment in a way that avoids overburdening specific vehicles. • Shift from mileage-based to hour-based preventive maintenance for high-use vehicles (e.g., heavy equipment, plow trucks) to better reflect actual wear. • Create a shared-use vehicle pool for departments with intermittent needs to reduce pressure on frontline assets. • Prioritize robust, high-mileage-capable models when replacing frontline vehicles expected to see extensive use. • Prioritize replacement of vehicles projected to exceed lifecycle thresholds, especially those with compounding maintenance costs.	High	• Overused vehicles are more likely to experience mechanical failures, especially if maintenance cannot keep pace with wear. • Components like engines, transmissions, brakes, and tires degrade faster with excessive use, leading to rising short-term costs. • Lack of mitigation results in more frequent unplanned service calls, which are often more expensive and disruptive than scheduled maintenance. • Vehicles accumulate usage faster than planned, resulting in earlier end-of-life, reduced resale value, and more frequent replacement needs. • Heavily used and poorly maintained vehicles are more prone to safety failures (e.g., brake issues, steering faults), increasing accident risk for drivers and the public. • Key services like snow removal, road repair, water service, or bylaw enforcement may be compromised if vehicles are unavailable when needed.
6	Fleet - PWES	Total Repairs per Vehicle	$ Cost / Vehicle	Technical	See **Table 3-3**	↑	↓	• Ensure vehicles are suited to their duty cycles (e.g., heavy-duty trucks for high-load operations) to avoid overuse and premature failure. • Minimize model variation to streamline parts inventory, reduce training needs, and lower service complexity. • Follow OEM-recommended intervals for fluids, filters, brakes, and drivetrains to prevent breakdowns. • Incorporate inspections and component testing (e.g., battery checks, wear analysis) to catch issues early and reduce major repair needs. • For frontline or off-road equipment, schedule maintenance based on engine hours rather than mileage to better match wear patterns. • Spread workload across the fleet to prevent a few vehicles from absorbing most of the wear and requiring more repairs. • Eliminate underutilized or redundant vehicles so resources can focus on maintaining the most productive and necessary units. • Use checklists and digital work orders to ensure consistent, high-quality repairs and avoid rework. • Use total cost of ownership (TCO) analysis to identify when ongoing repairs exceed the cost of replacement. • Track repair histories to identify and prioritize the removal of vehicles with chronic, costly issues.	High	• Without effective repair cost control, the operating budget will face year-over-year increases, reducing funds available for fleet renewal or service enhancements. • Excessive spending on aging vehicles diverts funds from more strategic investments like fleet electrification, technology upgrades, or new vehicle procurement. • More frequent and costly repairs lead to longer out-of-service times, reducing fleet availability for critical services (e.g., roads, utilities, emergency response). • Poorly maintained or repeatedly repaired vehicles may experience cascading mechanical failures, reducing their overall productivity and life expectancy. • Repeated repairs can mask deeper issues, increasing the risk of unexpected breakdowns and potential accidents.

LoS #	Service Area	LoS Measure	Unit of Measure	LoS Category	Current Performance	Performance Trend		Lifecycle Activities to Meet Proposed LoS (Positive Trend) / to Mitigate the Impact of the Proposed LoS (Negative Trend)	Budget Impact to Meet Proposed LOS	Risk of Not Meeting Proposed LoS
						Current	Proposed			
7	Fleet - Transit	Total Transit Ridership per Year	# Boardings	Customer	2 million riders per year transit ridership needs 1.8 million riders per year transit ridership capacity	↑	→↓	• Analyze ridership patterns, service usage, and community needs to adjust routes, frequency, and service hours in alignment with actual demand. • Replace underused fixed-route services in low-density areas with flexible, app-based or dial-a-ride options using smaller vehicles. • Introduce smaller, fuel-efficient buses or cutaways for low-ridership routes to reduce fuel and maintenance costs while maintaining coverage. • Align future bus purchases with ridership projections to avoid over capacity and underused large buses. • With lower usage, prioritize strong preventive maintenance programs to safely defer capital replacements and maximize existing asset value. • Shift underused buses to school, shuttle, or special event services where applicable to improve utilization rates. • Track ridership, route performance, and vehicle utilization to continuously adjust service levels and fleet deployment. • Model the cost-per-passenger-kilometre to identify high-cost, low-ridership routes for rationalization or redesign. • Market public transit as a sustainable, convenient, and affordable alternative to personal vehicles, especially as fuel prices and environmental concerns rise. • Use scenario-based planning in your Fleet Asset Management Plan to address fluctuating demand over the next 10–20 years.	High	• Maintaining fixed-route services with declining ridership results in higher cost-per-passenger, reducing cost-efficiency and increasing the subsidy burden per rider. • Continued operation or replacement of large buses on underused routes can result in asset underutilization and poor return on investment. • Reduced farebox revenue from fewer riders creates budget gaps, which may require additional taxpayer subsidies or service cuts. • Vehicles may be underused, yet still require routine maintenance, inspections, insurance, and storage, inflating lifecycle costs without delivering proportional service value. • Without a strategic response, reductions in service could harm seniors, low-income residents, students, or others who rely on public transit for essential mobility. • Failure to implement alternatives like on-demand transit may leave outlying areas disconnected, further accelerating population decline. • Poor ridership performance without proactive adaptation may weaken the City's case for receiving future grants or operational subsidies.
8	Fleet - Transit	Average Age of Fleet in Years	Age (Years)	Customer	5.7 Years	↓	→	• Plan and fund vehicle replacements on a multi-year cycle to avoid age spikes or backlog. Even replacement rates maintain a balanced fleet profile. • Analyze the optimal replacement point for each vehicle type (based on age, mileage, repair costs, and downtime) to justify and prioritize replacements. • Extend asset life safely with regular PM focused on key components (e.g., drivetrain, suspension, electrical systems) to maintain performance in older units. • Identify vehicles in "good" condition beyond their planned age that can be safely retained and staggered for later replacement. • Secure predictable, annual capital funding to support even replacement, avoiding reactive bulk purchases or gaps due to fluctuating budgets. • Align fleet size and vehicle type with actual ridership to avoid keeping underutilized buses that skew fleet age upward. • Use consistent bus models to streamline parts, training, and service, helping maintain older buses more cost-effectively. • Invest in buses with proven longevity and low lifecycle costs, particularly for high-use routes. • Remove assets with excessive repair costs or reliability issues, even if technically younger, to improve average fleet condition and performance.	High	• Older buses are more prone to mechanical failures, leading to missed trips, delayed service, and lower on-time performance. • Aged vehicles spend more time in maintenance, reducing the number of buses available for daily operation and potentially leading to service cancellations. • Older transit buses often require more frequent, complex, and costly repairs. Parts may become obsolete or harder to source, driving up repair costs. • Excessive time spent on aging units reduces maintenance staff productivity and capacity to focus on preventative care for newer units. • Deferring replacements causes a backlog and can lead to a "capital spike" where many vehicles must be replaced at once, stressing budgets. • Frequent service disruptions or older, less comfortable buses may lead to negative public perception, reducing ridership further.
9	Fleet - Transit	Total Annual Fuel Consumption	Litres	Technical	See **Table 3-3**	→	↓	• Establish fuel consumption KPIs (e.g., litres per 100 km, fuel per passenger-km) and track them monthly by vehicle and route. • Redesign routes and schedules to reduce idling, congestion, and overlapping trips, focusing on direct, high-demand corridors. • Prioritize the procurement of hybrid or battery-electric buses to replace diesel units, especially on high-use or stop-and-go routes.	High	• Fuel is one of the largest operating expenses in transit. Continued high consumption places pressure on the operating budget, especially during fuel price surges. • Excessive fuel spending may force cutbacks in other areas such as fleet renewal, staff training, or service expansions. • Transit fuel consumption is a major contributor to municipal greenhouse gas (GHG) emissions. Not reducing it jeopardizes the City's climate action commitments.

LoS #	Service Area	LoS Measure	Unit of Measure	LoS Category	Current Performance	Performance Trend		Lifecycle Activities to Meet Proposed LoS (Positive Trend) / to Mitigate the Impact of the Proposed LoS (Negative Trend)	Budget Impact to Meet Proposed LOS	Risk of Not Meeting Proposed LoS
						Current	Proposed			
								• Use smaller, more fuel-efficient vehicles (e.g., cutaways or minibuses) on routes with consistently low ridership. • Install systems that report on harsh driving, speeding, and excessive idling, and use data to coach staff and improve performance. • Identify and repair vehicles with unusual fuel consumption, often a sign of mechanical inefficiency. • Use automatic shutdown systems or driver protocols to limit fuel waste during layovers or service pauses. • Evaluate future vehicle procurement decisions using total cost of ownership (TCO), factoring in lifetime fuel savings.		• Federal or provincial programs may impose emission reduction benchmarks. Failing to meet them can lead to penalties or disqualification from funding programs. • Higher fuel use may be linked to poor maintenance, aggressive driving, or inefficient routes—all of which contribute to accelerated asset degradation and service unreliability. • A fleet overly dependent on diesel fuel may be more vulnerable to supply disruptions or market fluctuations. • Fuel efficiency and emissions performance are key criteria for many provincial/federal transit funding programs (e.g., Zero Emission Transit Fund, ICIP).
10	Fleet - Overall	Percentage of assets in Fair or better Condition	%	Technical	44 %	↓	↓	• Strictly follow OEM-recommended maintenance intervals (e.g., oil changes, inspections, filters) to slow asset deterioration. • Use diagnostics, fluid analysis, or sensor data (e.g., telematics) to catch mechanical issues before they lead to serious condition degradation. • Combine physical condition with risk and criticality to prioritize renewal decisions more effectively. • Create a rolling capital replacement schedule to maintain a consistent flow of fleet upgrades and avoid replacement backlogs. • Rotate vehicles more evenly across departments to prevent condition decline in high-use units. • Retire older, low-value assets that consume maintenance resources without providing significant operational value. • Leverage asset management systems to identify early signs of deterioration and support condition forecasting. • Use alerts to initiate inspections or temporary removal from service for rehabilitation before further decline. • Apply for asset renewal programs that support GHG reduction, public safety, or transit modernization. • For non-core vehicles, leasing may provide access to newer assets while deferring capital investment.	High	• Poor-condition vehicles are more prone to unexpected breakdowns, reducing availability for frontline services such as public works, utilities, bylaw enforcement, and transit. • Inability to deliver essential services on schedule—especially during emergencies (e.g., snow clearing, fire response)—can have cascading impacts on community safety and trust. • Poor-condition assets require frequent, costly repairs that strain operating budgets and maintenance staff capacity. • Spending on assets near the end-of-life yields diminishing returns, diverting funds from higher-priority renewals. • Poor-condition vehicles may have compromised systems (e.g., brakes, steering, suspension), increasing the risk to staff and the public. • Vehicles in poor condition may fail safety inspections or violate provincial standards, leading to legal exposure or forced decommissioning. • Deferred renewals can result in a "bow wave" effect where many assets need replacing, simultaneously overwhelming capital budgets. • Some grants and infrastructure programs require minimum condition thresholds. A deteriorating fleet could disqualify the City from funding. • Persistent poor condition scores can lead to scrutiny from the Council, auditors, and funding agencies, reducing support for long-term initiatives.

Performance Trend Legend:

↑ Positively Increasing	→ Positively Stable	↓ Positively Decreasing	↑ Negatively Increasing	→ Negatively Stable	↓ Negatively Decreasing

3.6 2025-2034 10-Year Levels of Service Forecast

Considering the City's characteristics, growth projections, and strategic objectives, the proposed performance trend for each LoS metric for the next 10 years is projected and outlined in **Table 3-6**. This table indicates whether each measure is expected to trend upward, downward, or remain stable, taking into account the nature of the measure, data availability, and whether the projected trend impacts positively or negatively on the proposed level of service.

Table 3-6: 2025-2034 10-Year Levels of Service Forecast

LoS #	Service Area	LoS Measure	Unit of Measure	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	Proposed Trend	Basis for Forecast
1	Fleet - PWES	Number of Vehicles that are Electric or Hybrid	#	Positively Increasing										↑	• Evolving market trends • Targeting net-zero greenhouse gas (GHG) emissions by 2050 • Growing investment in charging infrastructure
2	Fleet - PWES	Total Annual Fuel Volume Used for Vehicles	Litres	Positively Decreasing										↓	• Increasing adoption of electric and hybrid vehicles • Phasing out older, high fuel-consuming vehicles
3	Fleet - PWES	% of Vehicles and Equipment Past Their Optimum Service Life	%	Negatively Increasing										↑	• Budget constraints limit the replacement of older fleet units.
4	Fleet - PWES	Total Idle Time for Front Line Vehicles	hrs	Positively Decreasing										↓	• Organization-wide enforcement of an idle-free policy • Continued growth in the use of electric and hybrid vehicles
5	Fleet - PWES	Mileage or Hours per Vehicle	Hr or km / Vehicle	Negatively Increasing										↑	• Increased vehicle usage resulting from a higher number of retired vehicles.
6	Fleet - PWES	Total Repairs per Vehicle	$ Cost / Vehicle	Positively Decreasing										↓	• A portion of aging vehicles with high maintenance costs is scheduled for replacement.
7	Fleet - Transit	Total Transit Ridership per Year	# Boardings	Negatively Maintain or Decrease										→↓	• Declining ridership driven by a downward population trend
8	Fleet - Transit	Average Age of Fleet in Years	Age (Years)	Positively Maintain										→	• Older vehicles are replaced when they are in poor condition or have reached the end of their service life.
9	Fleet - Transit	Total Annual Fuel Consumption	Litres	Positively Decreasing										↓	• An increasing number of hybrid and electric buses will be acquired to replace aging units.
10	Fleet - Overall	Percentage of assets in Fair or better Condition	%	47% for PWES fleets 45% for CDES fleets				Negatively Decrease						↓	• Budget constraints limit the replacement of older fleet units.

Performance Trend Legend:

↑ Positively Increasing	→ Positively Maintain	↓ Positively Decreasing	↑ Negatively Increasing	→ Negatively Maintain	↓ Negatively Decreasing

3.7 Future Demand Drivers

Demand management is a critical component of managing the desired LoS in a sustainable manner, now and into the future. Understanding demand drivers enables the City to proactively develop effective, long-term strategies that are suitable for the City's unique political, environmental, social, and technological landscape.

A summary of factors identified from the LoS workshop that would impact fleet service levels includes, but are not limited to, the following:

- Technology – The integration of advanced vehicle systems, data analytics, and automation is reshaping operational efficiency and service expectations.
- Electrification – The transition to electric and hybrid vehicles requires changes in procurement, infrastructure, and maintenance practices.
- Energy and Demand Management – Managing fuel use, vehicle deployment, and operational hours to reduce consumption and emissions while maintaining service reliability.
- Funding Level – The availability and stability of financial resources will directly affect the City's ability to renew, expand, or modernize its fleet.
- Climate Change – Environmental considerations, such as extreme weather events and emissions reduction targets, are influencing fleet design, deployment, and resiliency planning.

On November 2, 2021, the City's Planning Division released the Comprehensive Background Report for updating the Official Plan. The City's Official Plan guides local decision-making on land use, development, and public infrastructure over the next 20 years. The City's population is expected to reach 80,000 people by 2031, and 83,300 people by 2036. Employment is projected to grow by approximately 6,000 jobs, from 31,000 jobs in 2016 to 36,900 jobs in 2036.

When additional assets to accommodate this population and employment growth are introduced to the City's portfolio, additional human resources, training and funding are required to maintain and operate and renew or replace those assets. O. Reg. 588/17 requires municipalities by July 1, 2025, to estimate capital expenditures and significant operating costs to achieve the proposed LoS and accommodate projected increases in demand caused by population and employment growth. This includes the estimated capital expenditures and significant operating costs related to new construction and / or to upgrade existing municipal infrastructure assets. This has been addressed in **Section 5.4**.

4 Asset Management Strategies

4.1 Asset Lifecycle Management Introduction

Asset lifecycle management focuses on the specific activities that should be undertaken during all phases of the asset lifecycle. Considering the entire asset lifecycle ensures that the City makes sound decisions that take into account present and future service delivery needs.

The overarching goal of lifecycle management is to maximize the long-term benefits and services that the City's assets deliver while minimizing the associated costs and risks in the long run. Every asset has a lifecycle cost, which is the total cost of all activities undertaken throughout its service life. Part of the purpose of the AM planning process is to fully understand and predict the long-range financial requirements for the City's infrastructure, facilitating planning and resource management in the most cost-effective manner possible. **Figure 4-1** illustrates how costs typically accumulate over an asset's life. It is worth noting that the ongoing operations and maintenance, renewal & replacement, and disposal costs accumulate up to many multiples of the initial acquisition costs. As such, it is important to fully understand the entire lifecycle costs before proceeding with asset acquisition.

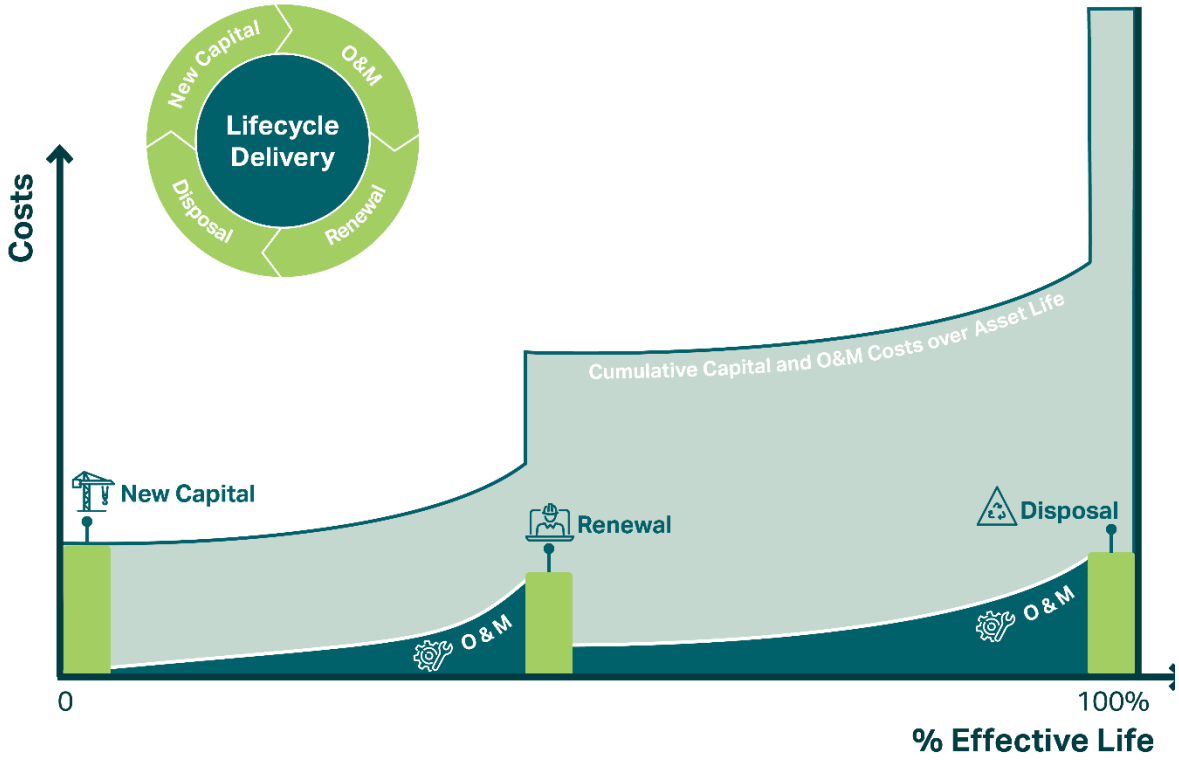

Figure 4-1: Lifecycle Cost Accumulation Over Asset Life

Asset lifecycle management strategies are typically organized into the following categories.

1. **Asset Acquisition / Procurement / Construction**: Acquisition includes expansion activities and upgrading activities to extend services to previously unserved areas or meet the demands of growth and functional requirements. When acquiring new assets, the City should evaluate credible alternative design solutions, considering how the asset will be managed at each of its lifecycle stages. AM and full lifecycle considerations for the acquisition of new assets include, but are not limited to, the following:
    - Growing demands for public service and public transit.

- The asset's operability and maintainability.
- Supply chain considerations.
- Adaptation to climate change.
- Staff skill and availability to manage the asset.
- The manner of the asset's eventual disposal.

2. **Asset Operations and Maintenance (O&M)**: As new assets are commissioned, the City assumes the responsibility of operating and maintaining the asset according to O&M standards to ensure its safety and reliability. The operations staff provides the necessary day-to-day support for operating the assets. Maintenance expenses include periodic preventive maintenance to ensure that the infrastructure can provide reliable service throughout the life of the asset and corrective maintenance that is required to repair defective assets as needed. Inadequate funding for O&M will adversely impact the lifespan of assets. The number of O&M resources required in any period is a function of the current inventory of infrastructure and the total O&M needs for each asset. As the inventory of infrastructure grows, total O&M requirements will also increase.

3. **Renewal and Replacement:** The third aspect of full lifecycle costing pertains to the renewal and replacement of assets that have deteriorated to the point where they no longer provide the required service. Renewal or rehabilitation costs may be incurred during the life of an asset where an investment is made to improve its condition and/or functionality, for example, overhaul the equipment and vehicle engines. Replacement activities are expected to occur once an asset has reached the end of its useful life, and renewal is no longer a viable option.

4. **Decommissioning and Disposal:** There will inevitably come to a point in time when an asset must be removed from service, and depending on the type of asset, there may be significant costs associated with its decommissioning and disposal. Factors that may influence the decision to retire an asset include changes leading to non-compliance, the inability of the asset to handle increased LoS, technological advances rendering the asset obsolete, the cost of retaining the asset exceeding the benefits gained, the current risk associated with the asset's failure becoming intolerable, assets negatively impacting service delivery or negative impacts on the environment (e.g., old buses are unsafe for delivering services), or assets no longer suitable for their original purpose (e.g., the old police cars are not suitable for patrol services, but still reliable for light-duty public service).

Normally, major costs that may be incurred during disposal and decommissioning derive from the environmental impact of the disposal and, if required, the rehabilitation and decontamination of land. However, some cost savings may be achieved through the residual value of the asset or by exploring alternative uses for the asset. In all cases, it is important to consider disposal and decommissioning as the strategy employed has the potential to attract significant stakeholder attention. For that reason, the costs and risks associated with disposal and decommissioning should be equally considered in the City's capital investment decision-making process.

4.2 Asset Acquisition Strategies

The City's motivations for acquiring fleet assets are multifaceted. Firstly, there is a compelling need to accommodate the expanding service scope, fueled by the growing workload and demand on public services. Furthermore, the increasing population and diversity have added to these demands. Recognizing the crucial role of data accuracy, the City also acknowledges the necessity for an advanced fleet management system.

Electrification is predicted to have minimal impact on waste generation but will impact the waste collection fleet and the fueling costs. The City's fleet asset acquisition strategies are also strongly driven by the federal regulations[7] and their Greenhouse Gas (GHG) Emissions Reduction Plan[8].

- **Federal plans embrace EV**: Regulations published by the Federal Government in 2023 laid out plans to phase out passenger vehicles powered only by gasoline or diesel in 2035. As these vehicles are replace the City should be mindful of the increased maintenance and purchase costs of Hybrid Electric Vehicles (HEV) and Plug-In Electric Vehicles (PEV).
- **Green house gas emission reduction plan**: During the first stage of the plan, the City conducted a GHG inventory study, revealing that 56% of the City's GHG emissions were generated by vehicle fleet and equipment. Therefore, the transition to a green fleet is an importation consideration when acquiring fleet assets.

Table 4-1 summarizes the acquisition activities associated with the City's fleet assets.

Table 4-1: Acquisition Activities for Fleet Assets

Asset Group	Activities Undertaken by the City	Notes
Fleet	• Fleet and equipment acquisition. • Electric vehicle (EV) charging station construction. • Compressed natural gas (CNG) fueling station construction. • Garage and maintenance shop upgrade. • Advanced fleet information management system.	• Guided by the financial assessments, the City primarily opts for asset purchases rather than leasing. However, in order to address peak demand during certain seasons, the City also engages in occasional seasonal rentals. • The City has initiated a pilot project since 2011 for implementing EVs and EV charging stations. The project's scope includes: • 1 pick-up truck. • 2 EV units for transit (approved but not yet purchased). • 1 EV Zamboni. • Vehicle chargers at Wastewater Treatment Plants.

As shown in **Table 4-1**, many of the City's acquisition activities are associated with green transformation. In general, the shift towards a green fleet represents a significant change that will require increased capital investments in the short term. This is particularly evident in the substantial funding needed for developing and establishing the supporting infrastructure. Although the initial capital expenditure may pose financial challenges, the long-term benefits of reduced environmental impact and enhanced sustainability make it a worthwhile investment for the community's future well-being. **Table 4-2** summarizes the impact of green fleet acquisition activities on the City's capital expenditures.

Table 4-2: The Impact of Green Fleet Acquisition Activities on The City's Capital Expenditures

Activities	Impact on Capital Expenditures
Green fleet acquisition	• Pro: Lower sales tax compared to conventional vehicles. • Pro: Federal and Provincial rebates and grants available (still in the early stage). • Con: High acquisition costs compared to the standard gasoline vehicles. • Con: Limited availability for the heavy-duty vehicles and specialized equipment. • Con: Relatively longer waiting times. • Con: Highly rely on the stability and availability of the electricity grid.
Green infrastructure investment (EV charging stations, CNG fueling stations, etc.)	• High construction costs. • High costs are associated with the garage and maintenance shop upgrade.

[7] Transport Canada. (2024, January 22). Canada's Zero-Emission vehicle sales targets. Retrieved from Transport Canada.
[8] City of Sault Ste. Marie. (2024). Greenhouse Gas Emissions Reduction Plan. Retrieved from City of Sault Ste. Marie.

4.3 Asset Operations and Maintenance Strategies

Effective O&M of assets is crucial for sustainable performance and longevity. Managing O&M costs involves developing comprehensive strategies that optimize resource utilization while ensuring asset reliability. Proactive maintenance schedules and condition monitoring can help identify potential issues before they escalate, reducing unplanned downtime and minimizing repair costs. Implementing energy-efficient technologies and best practices in fleet AM also contributes to cost-effectiveness over the asset's lifecycle. **Table 4-3** summarizes the O&M activities associated with the City's fleet assets.

Table 4-3: O&M Activities for Fleet Assets

Asset Group	Activities Undertaken by the City	Notes
Fleet	• Car washing. • Regular safety inspection. • Service (Oil change) per 300 hours of service. • Oil sampling. • Exhaust emission testing. • Tire pressure check. • Tire rotation and replacement. • Car repair and parts replacement. • Fuel consumption and EV battery charging. • LED light replacement. • Driver training and education. • Fleet information system and server maintenance.	• The City has established a maintenance budget for spare parts acquisition, with the flexibility to utilize the capital budget for major expenses. • The City has a separate budget for car insurance, distinct from the legal budget. • The City may contract out services as needed, while transit services are handled on-site by their staff. Transit services include: • Use high-quality lubricants. • Use stainless steel components. • All buses are taken off the road every six months and subjected to a complete mechanical inspection.

With the green fleet transformation, the City may also need to consider O&M activities specifically for EVs. With less or no consumption of fossil fuel, the amount of greenhouse gas emissions would be significantly reduced. In addition, EVs have fewer moving parts, resulting in reduced wear and tear and, therefore, lower maintenance expenses. While EVs still require periodic maintenance, such as brake system checks and battery inspections, the absence of complex engine components often leads to a more cost-effective O&M profile. Furthermore, the lower reliance on fossil fuels for power contributes to potential long-term savings, offering an economic incentive for the adoption of EVs in the context of operational sustainability and efficiency. However, after certain years of use or every 100-120 thousand kilometres driven, the batteries will depreciate significantly to reduce the effective mileage range, and the subsequent battery replacements will induce a large expenditure, which might take up to 20% to 30% of the total vehicle purchase cost.

4.4 Renewal and Replacement Strategies

Renewal often involves upgrading or refurbishing existing assets to extend their lifespan, while replacement entails acquiring new assets. The costs associated with these activities include not only the direct expenses of acquisition but also indirect costs such as downtime during the transition, training for new technologies, and potential disposal or recycling costs.

Similar to the acquisition of fleet assets, the City's decision to renew and replace fleet assets is driven by a variety of factors. Changes in service scope, increased workload, and growing population and diversity can necessitate the replacement of vehicles with larger capacity or upgraded features. As the current fleet ages and becomes obsolete, the need for renewal becomes imperative to maintain operational efficiency and meet evolving demands. Additionally, a strategic shift towards environmental sustainability may prompt the replacement of conventional vehicles with a green fleet, aligning with the City's commitment to reducing its environmental impact. These drivers collectively guide the strategies for fleet asset renewal and replacement, ensuring that the fleet remains modern, efficient, and aligned with evolving operational requirements.

4.5 Decommissioning and Disposal Strategies

Effective asset decommissioning and disposal are integral components of strategic AM. As the City's fleet assets approach the end of their lifecycle or become obsolete, a systematic approach to their removal and decommissioning is essential. This process involves careful planning, environmental considerations, and adherence to the City's regulatory requirements. **Table 4-4** summarizes the decommissioning and disposal activities associated with the City's fleet assets.

Table 4-4: Decommissioning and Disposal Activities for Fleet Assets

Asset Group	Activities Undertaken by the City	Notes
Fleet	• Sell the old vehicles for residual values. • Trade in the old vehicles for new ones. • Repurpose the vehicles. For example, retired police cars can be used as service cars. • Vehicle scrapping.	• The decommissioning process is conducted by the Shop Clerk and mechanic, and the asset is marked as "Inactive" in the system. • Assets are traded in to offset the cost of new acquisitions. • Due to age and poor condition, some assets are sold for scrap metal.

4.6 Risk Associated with Lifecyle Activities

In the context of AM, risk is defined as the consequence or impact of uncertainties on AM objectives. These uncertainties span a spectrum of events, including financial market fluctuations, unexpected asset failures, changes in regulatory environments, and other factors capable of influencing the performance or condition of assets. Risk management, developed to handle uncertainties in a systematic and timely manner, is a practical framework that ensures thoughtful decision-making and protects the achievement of goals. The risk management process generally follows a series of steps, as outlined in **Table 4-5**.

Table 4-5: Key Steps in the Risk Management Process

Step	Description
Establish the context	• Define the scope of the risk management process and the objectives that the City seeks to achieve through effective risk management. • Consider the City's internal and external factors and understand stakeholder expectations.
Risk identification	• Identify potential risks that could impact the City's AM objectives.
Risk analysis	• Utilize qualitative or quantitative analysis methods to assess risks.
Risk evaluation	• Evaluate the likelihood and impact of identified risks. • Prioritize risks based on their criticality.
Risk treatment	• Develop strategies to reduce the likelihood and impact of identified risks. • Implement preventive measures to address potential issues proactively. • Establish contingency plans for managing risks that cannot be eliminated.
Monitor and review	• Regularly update risk assessments to reflect evolving circumstances. • Develop KPIs and monitoring tools to track the effectiveness of risk treatment strategies. • Learn from the City's past experiences and continuously improve risk management strategies.

Over the course of an asset's service life, the accelerating rate of deterioration with age poses inherent risks, inevitably leading to a corresponding increase in maintenance costs. **Figure 4-2** illustrates a general asset deterioration curve. This trend becomes particularly pronounced in the final phase of the asset's service life, where the cost of maintenance experiences a rapid escalation, highlighting the financial risks associated with prolonged neglect. This phenomenon underscores the critical importance of preventive maintenance in the early stages of an asset's service life. By addressing risks proactively during these initial periods, the potential financial burden tied to accelerated deterioration in later stages can be effectively mitigated.

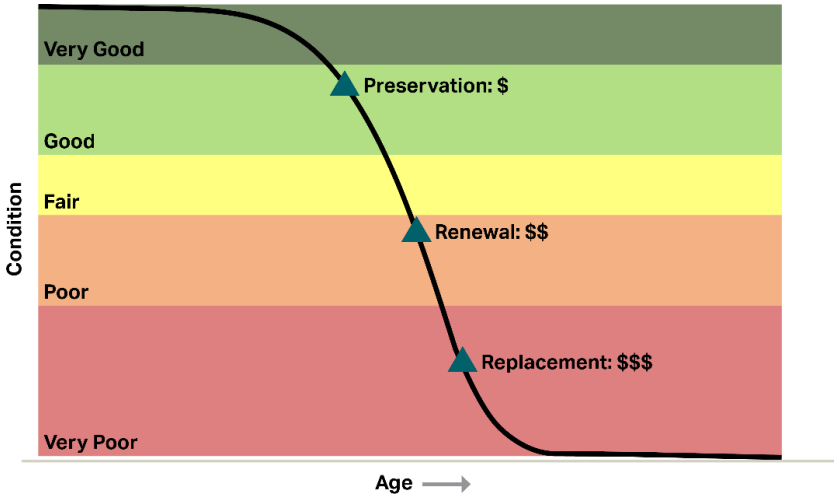

Figure 4-2: Asset Deterioration Curve and Renewal Costs

Beyond the general guidance, the City's approach to risk management should be tailored to their overarching goals, financial resources, and willingness to tolerate uncertainties. It is important to note that failure to meet the proposed LoS also poses several risks, including fines or penalties imposed by government authorities, asset failure, and increased service disruption. To help shape the City's risk management process, AECOM recommends taking into account the following key considerations:

1. **Supply Chain Disruptions**:

   The automotive industry has been hit the hardest by supply chain disruptions during the COVID-19 pandemic. A critical issue has been the semiconductor shortage, resulting in fewer options, higher prices, and extended waiting times for delivery since then. Consequently, the City may face increased costs when purchasing new vehicles.

2. **Environmental Requirements**:

   In the City's GHG Emissions Reduction Plan, the City has initiated the transition to purchasing only vehicles that are highly efficient, run on zero-carbon and renewable energy fuels, and support transportation electrification opportunities. This aligns with the Canadian Federal Government's target for all federally financed bus purchases to be zero-emission.

3. **Risks Associated with Developing City's Electrical Vehicle Fleets**:

   Despite the environmental benefits, there are several risks associated with developing EV fleet, such as:

   - Potential supply chain vulnerabilities and high upfront costs: in the current market, electrical vehicles would spend an average of 20% to 30% more in purchasing compared to similar gasoline or diesel models. And due to the high demand, the delivery time the electrical vehicles might take up to 2 to 6 months for some popular or specialized models. They might impact the service efficiency and productivity of the City's fleet team.
   - Limited Heavy-duty Engineering EV and Specialized Equipment: the major car vendors in the current market have not offered lots of electrical alternatives for heavy-duty electric engineering vehicles and specialized equipment, such as the pick-up truck at Class 5 commercial grade (equivalent to Ford F450).
   - Significant Investment in Charging Infrastructure and Maintenance Facilities: the productivity of the EV fleet team highly depends on the development of the charging infrastructure. The City needs to invest to deploy its exclusive or additional public charging station to ensure the service vehicles can be charged timely and adequately. Furthermore, EVs have different maintenance requirements compared to traditional vehicles, which means the current service facilities need to be upgraded accordingly and the fleet operators need to be trained to maintain the EVs effectively.
   - Range Anxiety: the charging time for a common electric vehicle might take up to 1.5 to 3 hours, depending on the battery size and electric power. The mileage range per charge could vary from 200 kilometres to 500 kilometres, based on the vehicle's running temperature and duties performed (cold temperature and high-speed driving reduce the battery efficiency). In this case, an enhanced vehicle charging plan needs to be conducted by the service planner to maximize the vehicle's efficiency and prepare for any potential breakdown due to insufficient power.
   - Uncertainties Regarding Battery Lifespan: The battery might depreciate significantly after 8-10 years or every 120 thousand to 150 thousand kilometres of running. The lifespan becomes shorter in a more frequent usage or in cold territories. The battery replacement can incur a significant capital expenditure, taking up to 20 to 40% of the original purchasing price, and will cause a certain level of service interruption.
   - Reliability Concerns: Mechanical breakdowns and software glitches for the EVs are expected, especially considering some EV products in the markets are immature in mechanical reliability and software stability, a lack of long-term testing and improvement. Substantial expenditures and major service breakdowns might happen due to this circumstance.
   - Unqualified EV Manufacturers: some newcomers in the EV manufacturing industry are facing uncertain futures resulting from financial crises, rising interest rates, and supply shortages. Company bankruptcy or suspension of manufacturing certain models of the vehicle might become an uncertainty to the City's fleet team, with the risk of vehicles out-of-commissioning due to a lack of parts and services.

5 Funding Need Analysis

Financial forecasting and capital planning are a critical element in ensuring the efficient and sustainable management of infrastructure. This involves estimating future financial needs and developing a strategic plan to secure the necessary funding for the maintenance, renewal, or expansion of assets. By accurately forecasting financial requirements and implementing a well-structured capital plan, the City can not only ensure the long-term viability of their infrastructure systems but also effectively manage costs, reduce environmental risks, and protect public health.

The financial projections presented in the subsequent sections provide visualizations of the results from the financial model, considering two scenarios: **Scenario 1** considers like-for-like replacement, while **Scenario 2** considers green fleet expansion. The subsequent sections are structured as follows:

Section 5.1 summarizes historical capital and O&M expenditures, along with budget forecasts for the next 10 years (2025–2034).

Section 5.2 outlines the assumptions used in the financial model to guide reinvestment and replacement decisions for each fleet subcategory and estimates the annual funding requirements over the 10-year period. The projected levels of service over this period are also presented.

Section 5.3 presents the capital expansion funding needs to accommodate the future growth.

Section 5.4 presents the full funding needs for the next 10 years, including capital, O&M, and disposal costs for both like-for-like and green fleet expansion.

Section 5.5 summarizes the risk of funding gaps and **Section 5.6** explores possible funding sources and alternative strategies to support the fleet asset management lifecycle activities.

5.1 Capital and Operating Budget

Based on the review of the budget documents provided by the City, including:

- Summary Capital Budget - 2020 to 2024
- Long Term Financial Plan Model - Final Client Version

This section presents the annual average budgets allocated for capital replacement as well as operations and maintenance.

5.1.1 Capital Budget - Historical Expenditure and Future Forecast

The City has budgeted $3.6 million for PWES fleet replacements and $3.8 million for CDES fleet replacement for the years 2020–2024, as summarized in

Table 5-1. The historical capital expenditure reflects the momentum of recurring asset replacement and the actual funding level approved by the Council.

Table 5-1: Capital Budget Forecast

Asset Class	Department	Sub-Category	5-Year Annual Average
Fleet	PWES	Admin Fleet, Building Equipment Maintenance Fleet, Mechanical Fleet, Operation Fleet, Park Fleet, Traffic Fleet, Operation Equipment	$3,600,000
	CDES	Arena Fleet, Cemetery Fleet, Transit Fleet, Arena Equipment, Transit Equipment	$3,850,000

5.1.2 Operating Budget - Historical Expenditure and Future Forecast

5.1.2.1 Vehicle Equivalent Unit

The concept of Vehicle Equivalent Units (VEUs) is used in fleet management to determine staffing and cost requirements for vehicle maintenance. It represents a way to aggregate different types of vehicles within a fleet into a common unit measurement. In this case, the average annual O&M costs per vehicle equivalent unit (VEU) are applied to estimate the O&M costs needed for each fleet asset. According to other municipal studies in Canada and the U.S.A., the cost per Vehicle Equivalent Unit (VEU) range corrected for inflation is $2,300 to $3,900[9]. Generally, the newer of the vehicles, the fewer O&M costs are required.

The average maintenance and repair cost per VEU for the City of SSM's fleet is $5,456/VEU in 2021. AECOM inflated the benchmarking cost into 2025 dollars and the cost breakdown is presented in **Table 5-2**.

Table 5-2: Maintenance and Repair Benchmarking Cost Per VEU

Maintenance Cost Item	Cost per VEU
In-house Labour	$3,177
Sublet Repair Service	$1,042
Parts	$1,921
Total Cost Per VEU	**$6,141**

The VEUs for a regular automobile (sedan) equals one, and the vehicles under other class categories have different VEU values depending on their size, function, and duty level compared to the regular automobile. **Table 5-9** summarizes the VEUs/unit and the maintenance and repair cost per class category.

Table 5-3: VEUs/Unit and the Maintenance and Repair Cost Per Class Category

Class Category	VEU(s)/Unit	Annual Maintenance and Repair Cost (Per Unit)
Transit Bus	7.50	$46,056
HD Truck	6.46	$39,659
MD Truck	4.50	$27,633
Off-Road and Construction	4.44	$27,265
Grounds Equip	1.76	$10,808
Material Handling	1.76	$10,808
LD Truck	1.63	$10,010
Van	1.50	$9,211
Automobile	1.00	$6,141
SUV	1.00	$6,141
Carts	1.00	$4,606
Large Equipment	0.80	$4,606
Trailer	0.74	$4,539
Attachments	0.64	$3,955
Mounted	0.40	$2,456

[9] Mercury Associates Inc. (2021): SSM Fleet Practices Review Final Report

Class Category	VEU(s)/Unit	Annual Maintenance and Repair Cost (Per Unit)
Stationary	0.40	$2,456
Equipment-Small	0.30	$1,842
Miscellaneous Equipment	0.20	$1,228
Equipment-Testing	0.20	$1,228
Steamer	0.20	$1,228
Transit Equipment	0.20	$1,228

5.1.2.2 Future 10-Year O&M Funding Forecast

The O&M funding needs are totalized based on the maintenance cost/vehicle summarized in **Table 5-3. Table 5-4** and **Figure 5-1** show the O&M funding forecast for the next 10 years from 2025 to 2034. The annual average forecasted O&M funding need is $7.8 million over the next 10 years in inflated dollar value.

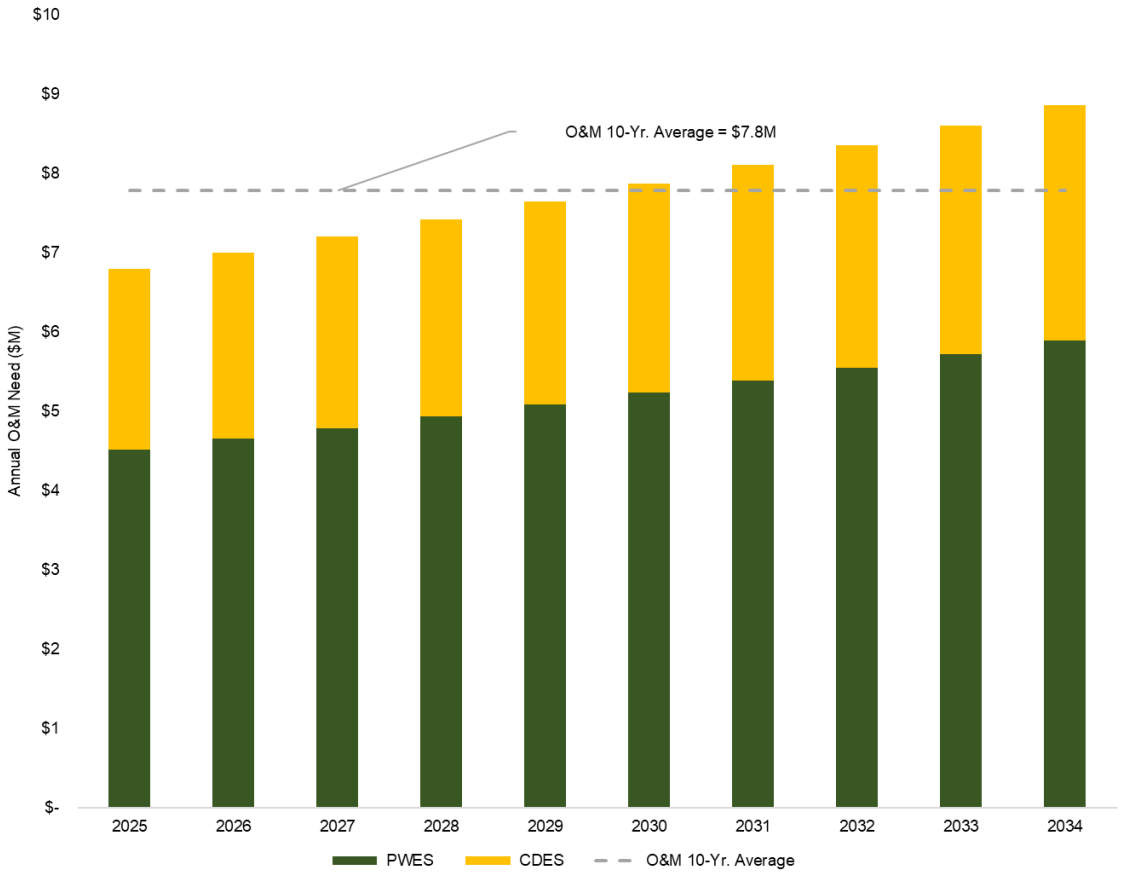

Figure 5-1: Fleet 10-Year O&M Forecast

The detailed 10-year O&M budgets for fleet assets are presented in **Table 5-4** in inflated dollar values.

Table 5-4: Fleet 10-Year Total and Annual O&M Budget

O&M Category	Annual Average Budget	10-Year Total
PWES Fleet	$5,173,000	$51,730,000
CDES Fleet	$2,610,000	$26,097,000
Total	**$7,783,000**	**$77,827,000**

5.2 Capital Reinvestment Funding Needs Analysis

This section outlines the capital funding scenarios analysis approach, assumptions, and presents service level trends regarding asset condition under various budget scenarios.

5.2.1 Lifecycle Model Approach and Assumptions

The lifecycle analysis was performed using a Power BI model, integrating key asset attributes such as asset inventory, age, expected service life, replacement values, and condition data to develop theoretical asset replacement cycles. The analysis also incorporates condition assessment results for PW fleets. A financial dashboard was developed to effectively visualize and communicate the lifecycle modelling outcomes.

The annual reinvestment needs for the fleet assets were determined based on their age and ESL in years in inflated dollar values and are based on the following assumptions:

- **Base year**: the base year used is 2025. Any historic asset valuations have been inflated using the experienced inflation rate.
- **Analytical period**: the analysis period for capital reinvestment needs is from 2025 to 2034, and the analysis period for full funding needs is from 2025 to 2034.
- **Incorporation with Mercury Analysis Results**: for the Public Work fleets covered in the Mercury Fleet Assessment Report[11], the lifecycle replacement schedule is aligned with the recommendation from that report.
- **Cost markup for Like-for-Like Replacement**: 5% markup applied to account for required service charging and dealership markups.
- **Cost markup for Green Fleet Expansion**: 30% markup applied to account for the price increase of the EV or hybrid vehicles compared to the original fossil fuel vehicles.
- **Backlog Smooth-out**: replace assets that are in Very Poor condition and have already exceeded their ESL, depending on their designated replacement year (Designated Replacement Year = Asset Install Year + Estimated Service Life), The backlog replacements were planned to be allocated within the first four years of the analysis period, determined by applying the following logic:
  - If the designated asset replacement year is between 1996 and 2005, they will be replaced on 2025-06-01.
  - If the designated asset replacement year is between 2006 and 2015, they will be replaced on 2026-01-01.
  - If the designated asset replacement year is between 2016 and 2019, they will be replaced on 2027-01-01.
  - If the designated asset replacement year is between 2020 and 2024, they will be replaced on 2028-01-01.
- **Inflation rate**: the inflation rates adopted for the financial model are presented in **Table 5-5**. The inflation for 2025 and later years is determined based on the City's input.

[11] Mercury Associates Inc. (2021): SSM Fleet Practices Review Final Report

Table 5-5: Inflation Rate [12]

Year	Inflation Rate
2023	7.1%
2024	6%
2025 - 2034	2%

- **O&M Funding Needs**: The annual operation and maintenance (O&M) funding needs are estimated by applying the Vehicle Equivalent Unit (benchmarking O&M cost/VEU) methodology and escalated with the inflation rate of 2% for the next 20 years.
- **Asset Disposal Funding Needs**: The annual disposal and decommissioning (disposal) funding needs are forecasted by annual capital reinvestment needs multiplied by the disposal rate, which is 1% in this exercise.
- The costs numbers are rounded to the nearest $1,000.

5.2.2 Budget Scenarios Settings

Table 5-6 outlines the budget scenario settings used in the model for fleet assets. Scenario 1 (S1) represents a "Do Nothing" approach with zero expenditure. Scenario 2 (S2) reflects an ideal, unconstrained budget scenario, where the City is able to replace assets at the end of their service life as needed. Scenario 3 (S3) is continuing the City's historical budgeting approach (2020-2024) and considers that the assets in the poorest condition and with the highest replacement values will be prioritized annually for renewal. However, the model is designed to accommodate additional budget scenarios in the future as more budget information is provided.

Table 5-6: Fleet Budget Scenarios

Scenario	Description	Budgets
S1 Do Nothing	Spend Nothing	$0
S2 Unlimited Budget	Replace assets at the end of life	Unlimited
S3 Limited Budget	Evaluating the City's proposed budgets and considering that the assets in the poorest condition and with the highest replacement values will be prioritized annually for renewal.	$3.6 million for PWES Fleet $3.8 million for CDES Fleet

5.2.3 Fleet Budget Scenarios & 10-Year Service Level Forecast: Like-for-Like Replacement

This section presents the budget scenario results and the 10-year service level forecast for fleet assets.

5.2.3.1 PWES Fleet Assets Funding Needs

In the unconstrained budget scenario (S2), the City's PWES Fleet assets require an average annual capital reinvestment of $4.0 million (in inflated dollar values) from 2025 to 2034, as presented in **Figure 5-2**. This is equivalent to a total of approximately $39.5 million over the next 10-year period. A significant portion of this funding is allocated to the replacement of the PW – Operations Fleet, averaging $3.0 million annually, with peak spending projected in 2027 at $3.6 million. Another key contributor is the PW – Parks Fleet, requiring approximately $549 thousand per year, also reaching its highest expenditure in 2027 ($1.4 million).

[12] Past inflation data obtained from NRBCPI using the non-residential; yearly result taken from an average of quarterly results. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810027601

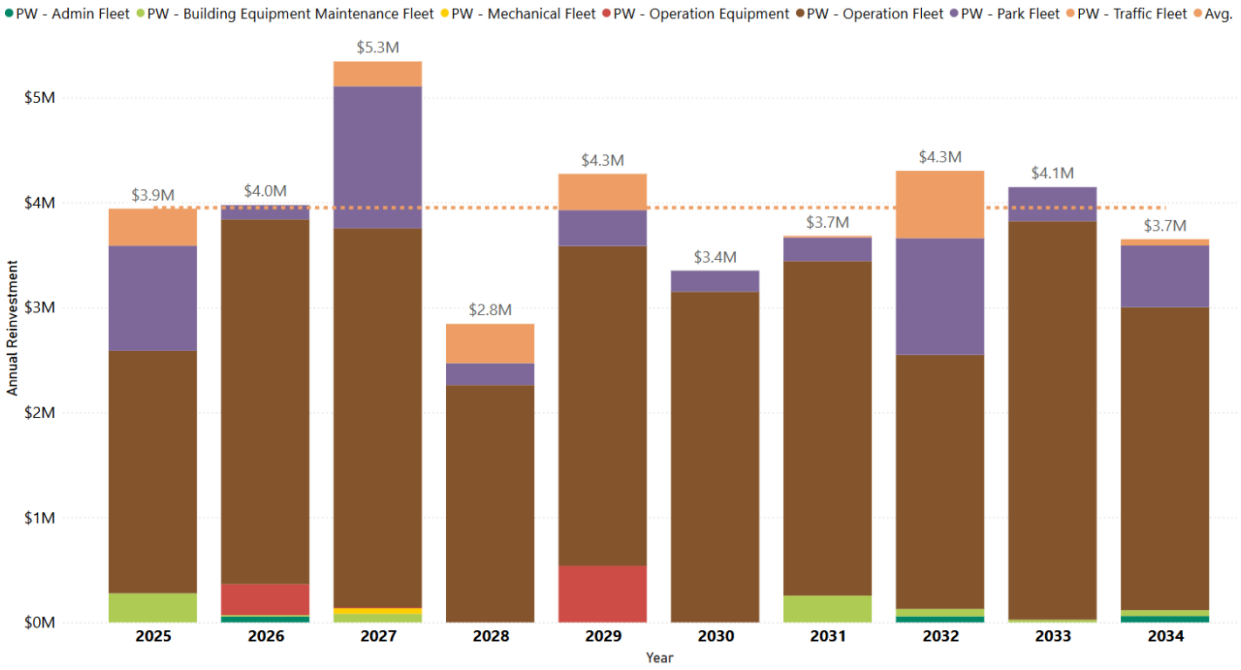

Figure 5-2: 10-Year Capital Reinvestment Funding Needs for PWES Fleet Assets (Like-for-Like) – Unlimited Budget Scenario

The detailed 10-year reinvestment needs for the fleet are presented in **Table 5-7** in inflated dollar values.

Table 5-7: PWES Fleet 10-Year Total and Annual Average Reinvestment Need (Like-for-Like)

Asset Category	Annual Average Need	10-Year Total
PW - Admin Fleet	$18,000	$180,000
PW – Building Equipment Maintenance	$78,000	$780,000
PW – Mechanical Fleet	$6,000	$60,000
PW – Operation Fleet	$3,014,000	$30,140,000
PW – Park Fleet	$549,000	$6,490,000
PW – Traffic Fleet	$203,000	$2,030,000
PW – Operation Equipment	$85,000	$850,000
Total	**$3,953,000**	**$39,530,000**

5.2.3.2 PWES Fleet Assets 10-Year LoS Trend Forecast

Figure 5-3 presents the projected condition of fleet assets under the two funding scenarios over the 10-year analysis period. Currently, 47% of PWES fleet assets are in fair or better condition.

Under Scenario S1 – Do Nothing, the proportion of assets in fair or better condition declines to just 0.15% by 2034. In contrast, under Scenario S2 – Unlimited Budget, which equates to an average annual reinvestment of $4.0 million, the percentage of assets in fair or better condition improves to 57%. Under Scenario S3, with a constrained annual budget of $3.6 million over the next 10 years, the proportion of assets in fair or better condition is projected to decline to 52%. Given that the City's projected future budget of $3.6 million is reasonably sufficient, overall asset conditions are expected to slightly improve compared to the current levels. This underscores the importance of strategic reinvestment planning to optimize asset performance within the available funding constraints.

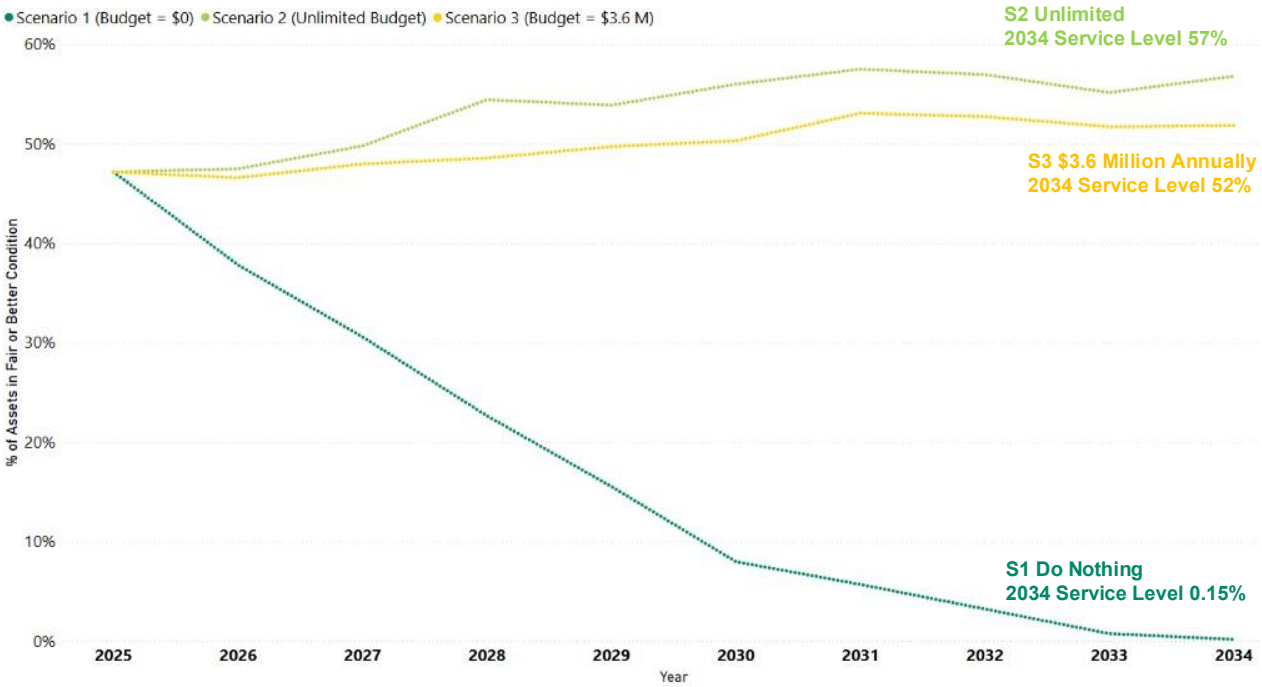

Figure 5-3: PWES Fleet Assets Levels of Service Trend for All Budget Scenarios (Like for Like)

Figure 5-4 illustrates the projected condition distribution of PWES fleet assets from 2025 to 2034 under the constrained budget scenario (S3), with $3.6 million capital reinvestment budget annually. Over the 10-year period, the proportion of assets in very good condition remains relatively low, fluctuating between 6% and 16%, while those in good condition range between 13% and 18%. Notably, assets in fair condition make up approximately 18–24% throughout the period. The most significant concern is the persistently high percentage of assets in poor and very poor condition, which together comprise nearly 50% of the fleet by total replacement value in all years. Specifically, very poor assets alone account for 30–34% from 2025 to 2034, with minimal improvement over time. This trend suggests that although the $3.6 million budget may be sufficient to prevent further degradation, it is not enough to substantially improve overall fleet condition. Strategic reinvestment planning will therefore be essential to prioritize critical assets and optimize lifecycle outcomes within budget constraints.

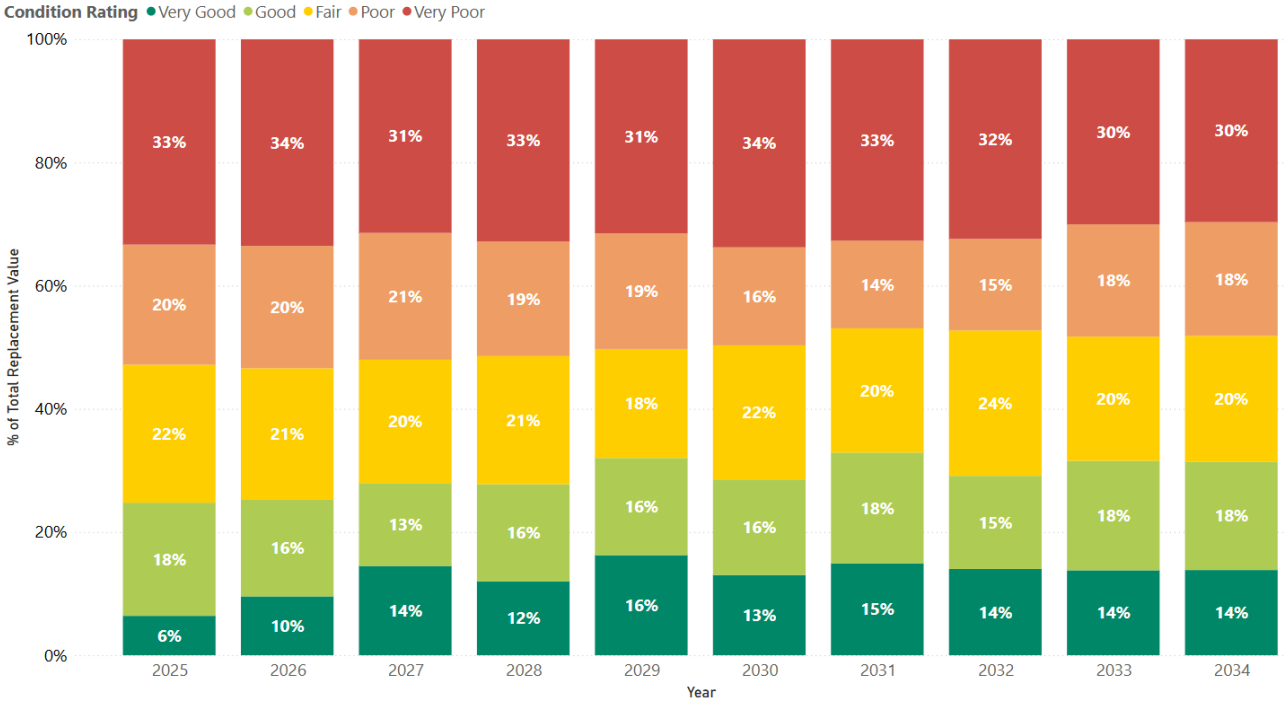

Figure 5-4: PWES Fleet Assets Condition Projection under Scenario 3 - $3.6 Million Annually (Like for Like)

5.2.3.3 CDES Fleet Assets Funding Needs

In the unconstrained budget scenario (S2), the City's CDES Fleet assets require an average annual capital reinvestment of $4.0 million (in inflated dollar values) from 2025 to 2034, as presented in **Figure 5-5**.

This is equivalent to a total of approximately $40.1 million over the next 10-year period. A significant portion of this funding is allocated to the replacement of the Transit Fleet, averaging $2.4 million annually, with peak spending projected in 2031 at $8.8 million. Another key contributor is the transit equipment, requiring approximately $1.3 million per year, reaching its highest expenditure in 2027 ($3.2 million).

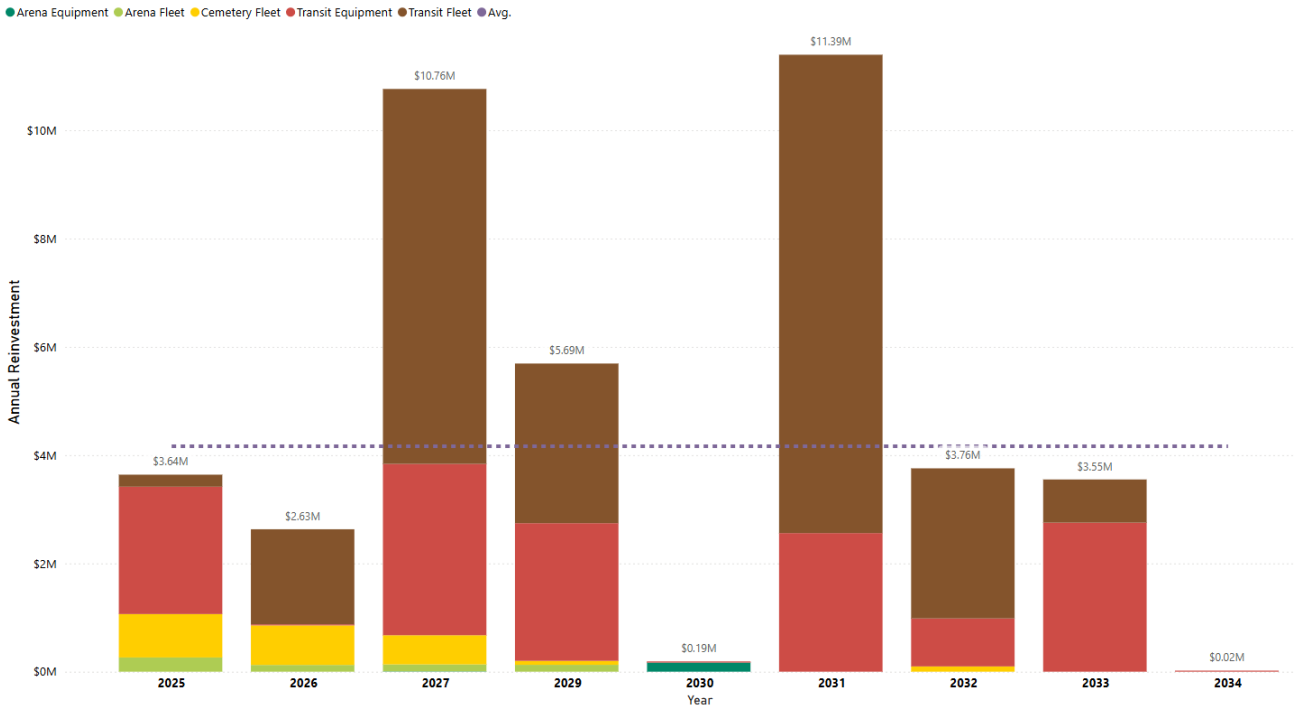

Figure 5-5: 10-Year Capital Reinvestment Funding Needs for CDES Fleet Assets (Like for Like) – Unlimited Budget Scenario

The detailed 10-year reinvestment needs for the fleet are presented in **Table 5-11** in inflated dollar values.

Table 5-8: CDES Fleet 10-Year Total and Annual Average Reinvestment Needs (Like-for-Like)

Asset Category	Annual Average Need	10-Year Total
Arena Fleet	$65,000	$650,000
Cemetery Fleet	$224,000	$2,240,000
Transit Fleet	$2,426,000	$24,260,000
Arena Equipment	$18,000	$180,000
Transit Equipment	$1,432,000	$14,320,000
Total	**$4,165,000**	**$41,650,000**

5.2.3.4 CDES Fleet Assets 10-Year LoS Trend Forecast

Figure 5-6 presents the projected condition of fleet assets under the two funding scenarios over the 10-year analysis period. Currently, 45% of the CDES fleet assets are in fair or better condition.

Under Scenario S1 – Do Nothing, the proportion of assets in fair or better condition declines to just 0% by 2034. In contrast, under Scenario S2 – Unlimited Budget, which equates to an average annual reinvestment of $4.01 million, the percentage of assets in fair or better condition improves to 57%. Under Scenario S3, with a constrained annual budget of $3.8 million over the next 10 years, the proportion of assets in fair or better condition is projected to decline to 40%. Given that the City's projected future budget of $3.8 million is sufficient to maintain the overall asset conditions at current levels. This underscores the importance of strategic reinvestment planning to optimize asset performance within the available funding constraints.

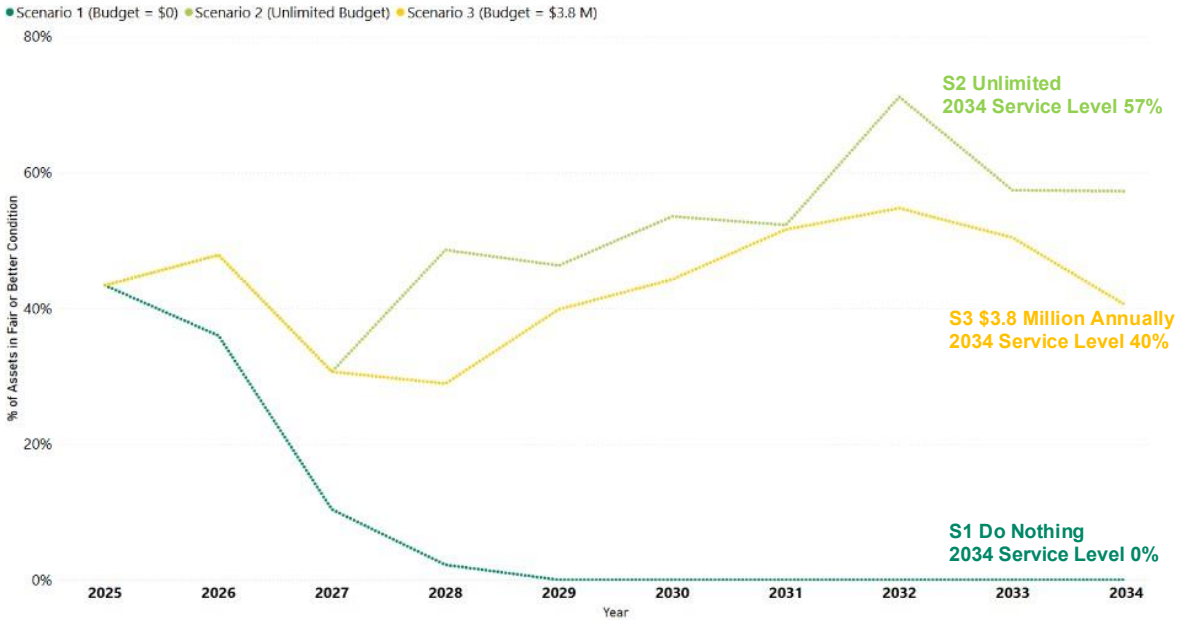

Figure 5-6: CDES Fleets Assets Levels of Service Trend for All Budget Scenarios (Like for Like)

Figure 5-7 illustrates the projected condition distribution of CDES fleet assets from 2025 to 2034 under the constrained budget scenario (S3), with $3.8 million capital reinvestment budget annually. Over the 10-year period, the proportion of assets in very good condition remains relatively low, fluctuating between 0% and 12%, while those in good condition hover between 8% and 29%. Notably, assets in fair condition make up approximately 3–34% throughout the period. The most significant concern is the persistently high percentage of assets in poor and very poor condition, which together comprise over 50% of the fleet by total replacement value in all years. Specifically, very poor assets alone account for 28–50% from 2025 to 2034, with progressive improvement over time. This trend suggests that although the $3.8 million budget may be sufficient to prevent further degradation, it is not enough to substantially improve overall fleet condition. Strategic reinvestment planning will therefore be essential to prioritize critical assets and optimize lifecycle outcomes within budget constraints.

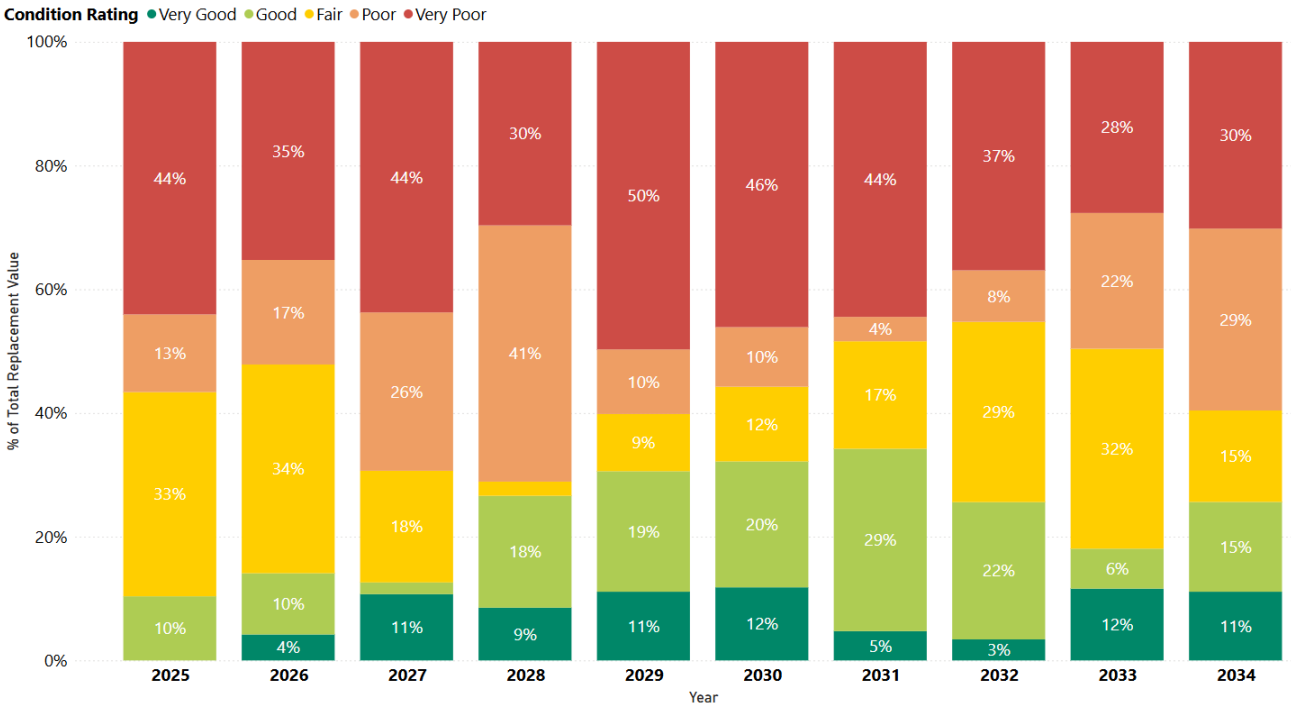

Figure 5-7: CDES Fleet Assets Condition Projection under Scenario 3 - $3.8 Million Annually (Like for Like)

5.2.4 Fleet Budget Scenarios & 10-Year Service Level Forecast: Green Fleet Expansion

The green fleet expansion scenario is to replace the existing vehicles with new ones of similar functionality with cleaner energy types, such as pure electric vehicles, hybrid, and plug-in hybrid vehicles. The green fleet alternatives are not available for all types of vehicles (refer to **Section 4.6**). Only the vehicles belonging to the automobile, carts, LD (Light-Duty) Truck, SUV and Transit Bus class categories are considered to be replaced with electric vehicles or different types of hybrid vehicles in this green fleet expansion scenario. In this case, a plus 30% price adjustment is applied to the vehicle replacement costs to account for the average price increase between traditional fossil fuel vehicles and green vehicles (refer to **Section 4.6**). **Table 5-9** summarizes the number of vehicles in the City's fleet that are possible to be replaced with green vehicle alternatives by each vehicle category and the price difference.

Table 5-9: Vehicle Classes Considered for Transition to Green Alternatives

Class Category	Green Fleet Option	Number of Vehicles Affected	Price Increase
Automobile	Hybrid/EV	17	$110,000
Carts	EV	10	$190,000
LD Truck	Hybrid/EV	90	$1,947,000
SUV	Hybrid/EV	6	$117,000
Transit Bus	EV Bus	42	$5,434,000
Total		**165**	**$7,797,000**

In total, there are 165 vehicles of various class categories that could potentially be replaced with green vehicles, which incurs a total additional cost of $7.8 million.

5.2.4.1 PWES Fleet Assets Funding Needs

In the unconstrained budget scenario (S2), the City's PWES fleet assets require an average annual capital reinvestment of $4.2 million (in inflated dollar values) from 2025 to 2034, as presented in **Figure 5-8**. This is equivalent to a total of approximately $41.6 million over the next 10-year period. A significant portion of this funding is allocated to the replacement of the PW – Operations Fleet, averaging $3.1 million annually, with peak spending projected in 2027 at $3.9 million. Another key contributor is the PW – Parks Fleet, requiring approximately $607 thousand per year, also reaching its highest expenditure in 2027 ($1.5 million).

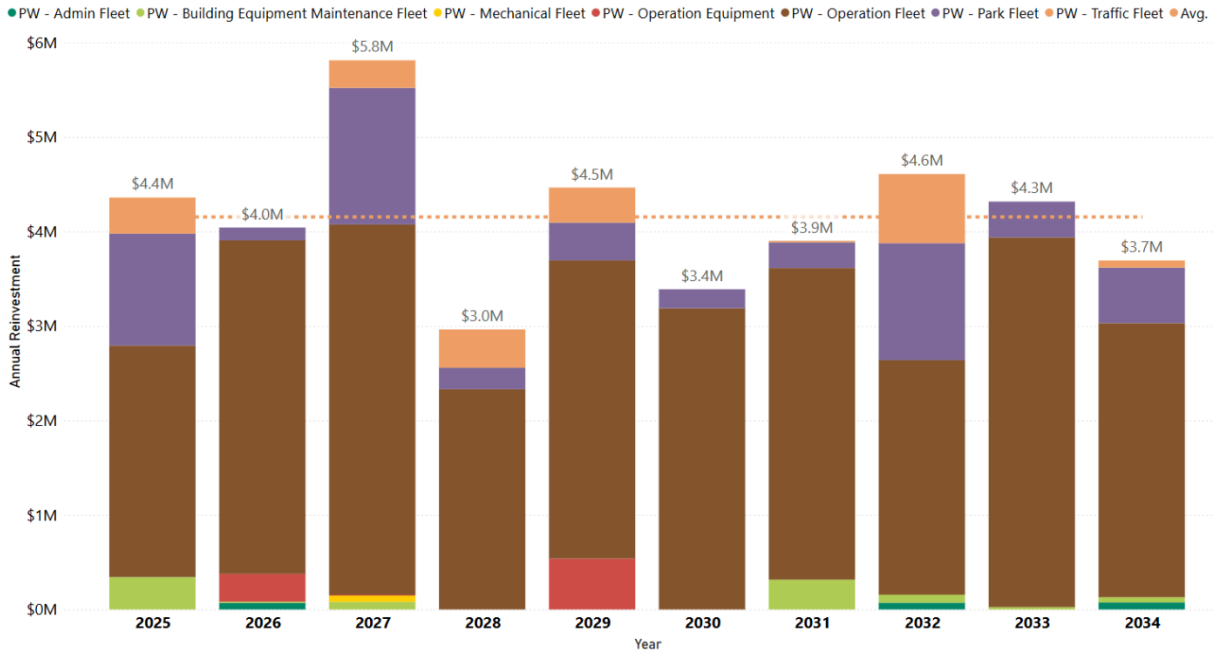

Figure 5-8: 10-Year Capital Reinvestment Funding Needs for PWES Fleet Assets (Green Fleet Expansion) – Unlimited Budget Scenario

The detailed 10-year reinvestment needs for fleet assets are presented in **Table 5-10** in inflated dollar values.

Table 5-10: PWES Fleet 10-Year Total and Annual Average Reinvestment Need (Green Fleet Expansion)

Asset Category	Annual Average Need	10-Year Total
PW - Admin Fleet	$22,000	$220,000
PW – Building Equipment Maintenance	$92,000	$920,000
PW – Mechanical Fleet	$7,000	$70,000
PW – Operation Fleet	$3,117,000	$31,170,000
PW – Park Fleet	$607,000	$6,070,000
PW – Traffic Fleet	$228,000	$2,280,000
PW – Operation Fleet	$85,000	$850,000
Total	**$4,158,000**	**$41,580,000**

5.2.4.2 PWES Fleet Assets 10-Year LoS Trend Forecast

Figure 5-9 presents the projected condition of PWES fleet assets under the two funding scenarios over the 10-year analysis period. Currently, 47% of PWES fleet assets are in fair or better condition.

Under Scenario S1 – Do Nothing, the proportion of assets in fair or better condition declines to just 0.14% by 2034. In contrast, under Scenario S2 – Unlimited Budget, which equates to an average annual reinvestment of $4.16 million, the percentage of assets in fair or better condition improves to 57%. Under Scenario S3, with a constrained annual budget of $3.6 million over the next 10 years, the proportion of assets in fair or better condition is projected to decline to 50%. Given that the City's projected future budget of $3.6 million is sufficient to maintain the overall asset conditions at current levels. This underscores the importance of strategic reinvestment planning to optimize asset performance within the available funding constraints.

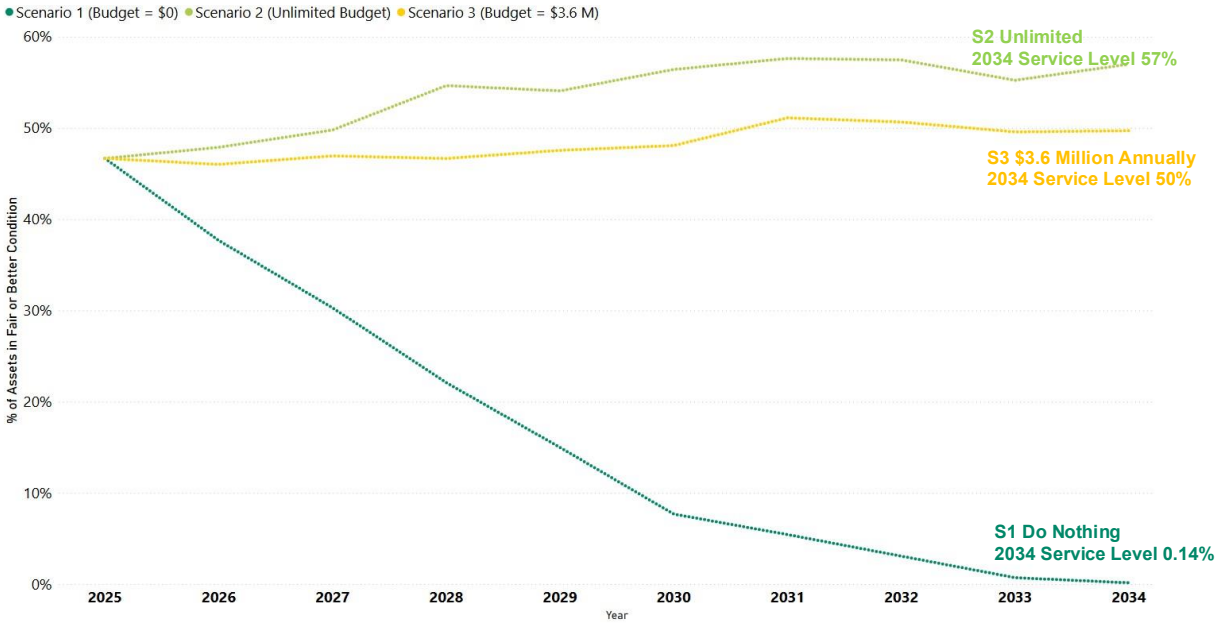

Figure 5-9: PWES Fleet Assets Levels of Service Trend for All Budget Scenarios (Green Fleet Expansion)

Figure 5-10 illustrates the projected condition distribution of PWES fleet assets from 2025 to 2034 under the constrained budget scenario (S3), with $3.6 million capital reinvestment budget annually. Over the 10-year period, the proportion of assets in very good condition remains relatively low, fluctuating between 6% and 15%, while those in Good condition hover between 13% and 18%. Notably, assets in fair condition make up approximately 17–23% throughout the period. The most significant concern is the persistently high percentage of assets in poor and very poor condition, which together comprise over 50% of the fleet by total replacement value in all years. Specifically, very poor assets alone account for 32–36% from 2025 to 2034, with minimal improvement over time. This trend suggests that although the $3.6 million budget may be sufficient to prevent further degradation, it is not enough to substantially improve overall fleet condition. Strategic reinvestment planning will therefore be essential to prioritize critical assets and optimize lifecycle outcomes within budget constraints.

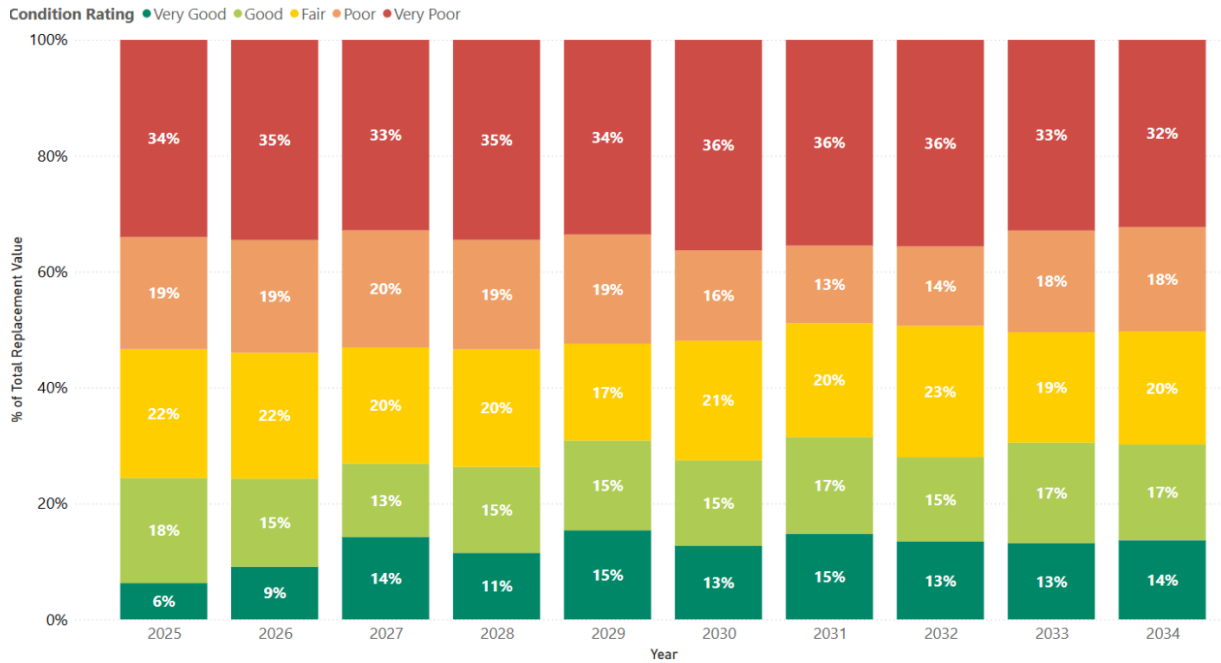

Figure 5-10: PWES Fleet Assets Condition Projection under Scenario 3 - $3.6 Million Annually (Green Fleet Expansion)

5.2.4.3 CDES Fleet Assets Funding Needs

In the unconstrained budget scenario (S2), the City's CDES Fleet assets require an average annual capital reinvestment of $4.6 million (in inflated dollar values) from 2025 to 2034, as presented in **Figure 5-11**. This is equivalent to a total of approximately $45.6 million over the next 10-year period. A significant portion of this funding is allocated to the replacement of the Transit Fleet, averaging $2.6 million annually, with peak spending projected in 2031 at $9.3 million. Another key contributor is the transit equipment, requiring approximately $1.6 million per year, reaching its highest expenditure in 2027 ($3.9 million).

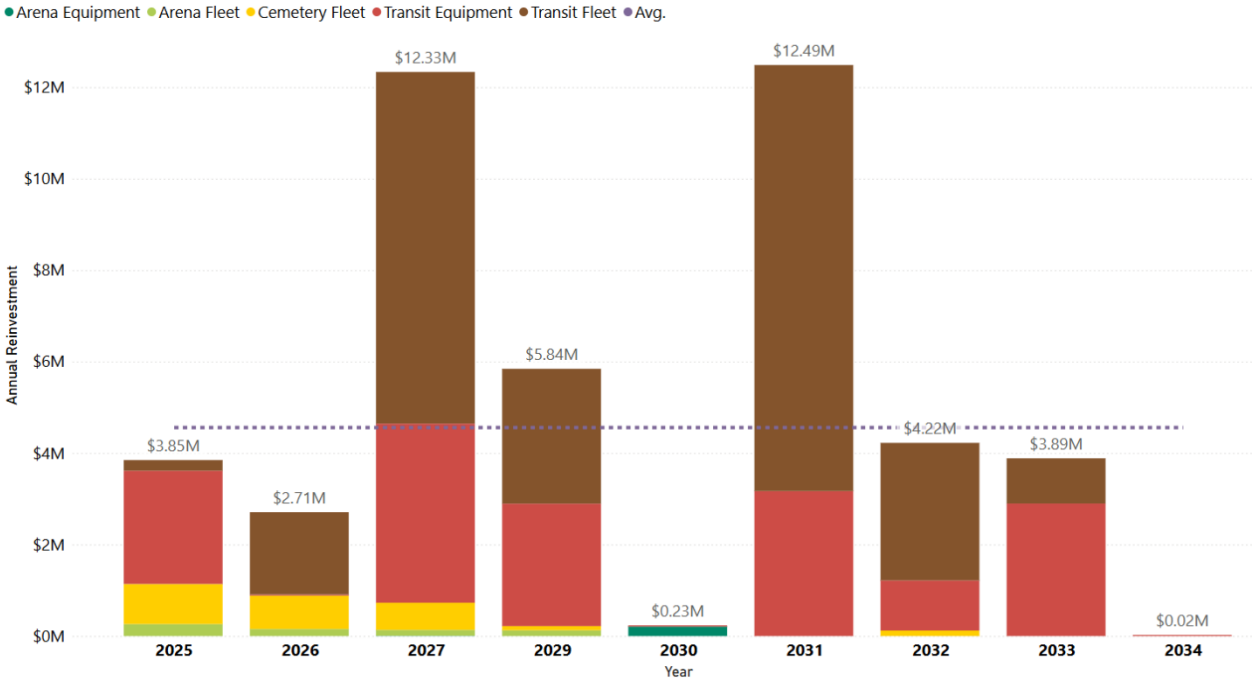

Figure 5-11: 10-Year Capital Reinvestment Funding Needs for CDES Fleet Assets (Green Fleet Expansion) – Unlimited Budget Scenario

The detailed 10-year reinvestment needs for fleet assets are presented in **Table 5-11** in inflated dollar values.

Table 5-11: CDES Fleet 10-Year Total and Annual Average Reinvestment Needs (Green Fleet Expansion)

Asset Category	Annual Average Need	10-Year Total
Arena Fleet	$68,000	$680,000
Cemetery Fleet	$242,000	$2,420,000
Transit Fleet	$2,598,000	$25,980,000
Arena Equipment	$22,000	$220,000
Transit Equipment	$1,631,000	$16,310,000
Total	**$4,561,000**	**$45,610,000**

5.2.4.4 CDES Fleet Assets 10-Year LoS Trend Forecast

Figure 5-12 presents the projected condition of CDES fleet assets under the two funding scenarios over the 10-year analysis period. Currently, 45% of CDES fleet assets are in fair or better condition.

Under Scenario S1 – Do Nothing, the proportion of assets in fair or better condition declines to just 0% by 2034. In contrast, under Scenario S2 – Unlimited Budget, which equates to an average annual reinvestment of $4.4 million, the percentage of assets in fair or better condition improves to 56%. Under Scenario S3, with a constrained annual budget of $3.8 million over the next 10 years, the proportion of assets in fair or better condition is projected to decline to 42%. Given that the City's projected future budget of $3.8 million is reasonably sufficient, overall asset conditions

are expected to remain at current levels. This underscores the importance of strategic reinvestment planning to optimize asset performance within the available funding constraints.

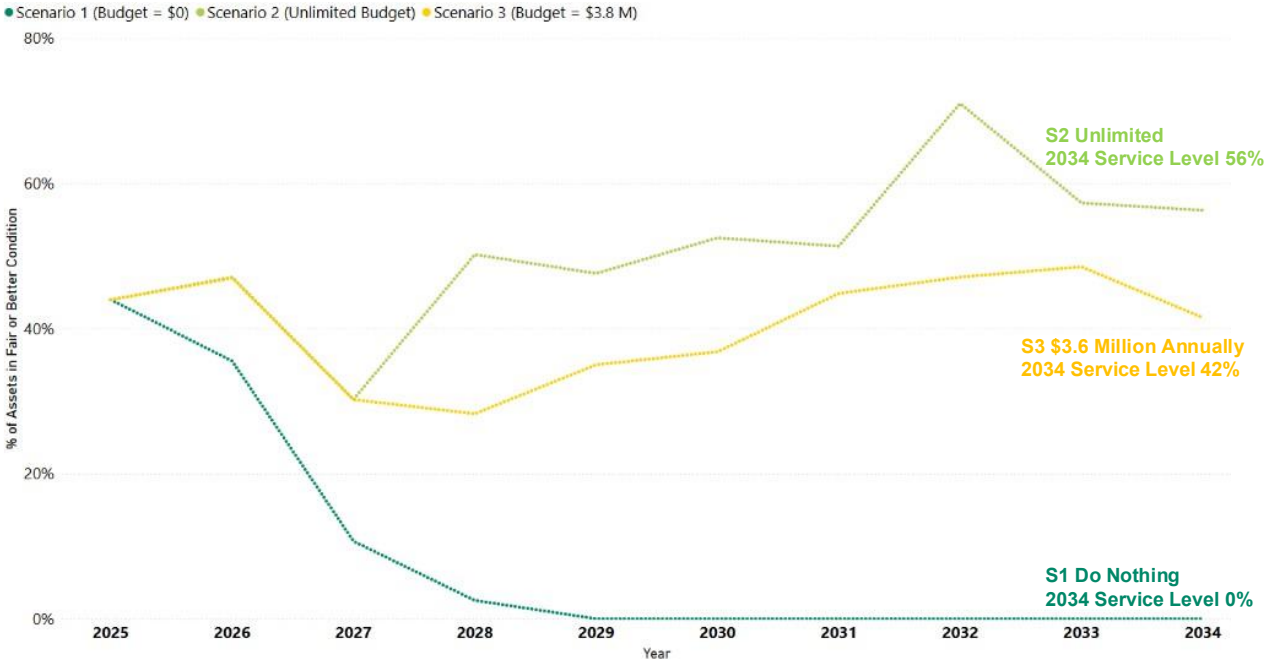

Figure 5-12: CDES Fleets Assets Levels of Service Trend for All Budget Scenarios - (Green Fleet Expansion)

Figure 5-13 illustrates the projected condition distribution of CDES fleet assets from 2025 to 2034 under the constrained budget scenario (S3), with $3.8 million capital reinvestment budget annually. Over the 10-year period, the proportion of assets in very good condition remains relatively low, fluctuating between 0% and 11%, while those in good condition hover between 2% and 27%. Notably, assets in fair condition make up approximately 3%–33% throughout the period. The most significant concern is the persistently high percentage of assets in poor and very poor condition, which together comprise over 50% of the fleet by total replacement value in all years. Specifically, very poor assets alone account for 31%–54% from 2025 to 2034, with progressive improvement over time. This trend suggests that although the $3.8 million budget may be sufficient to prevent further degradation, it is not enough to substantially improve overall fleet condition. Strategic reinvestment planning will therefore be essential to prioritize critical assets and optimize lifecycle outcomes within budget constraints.

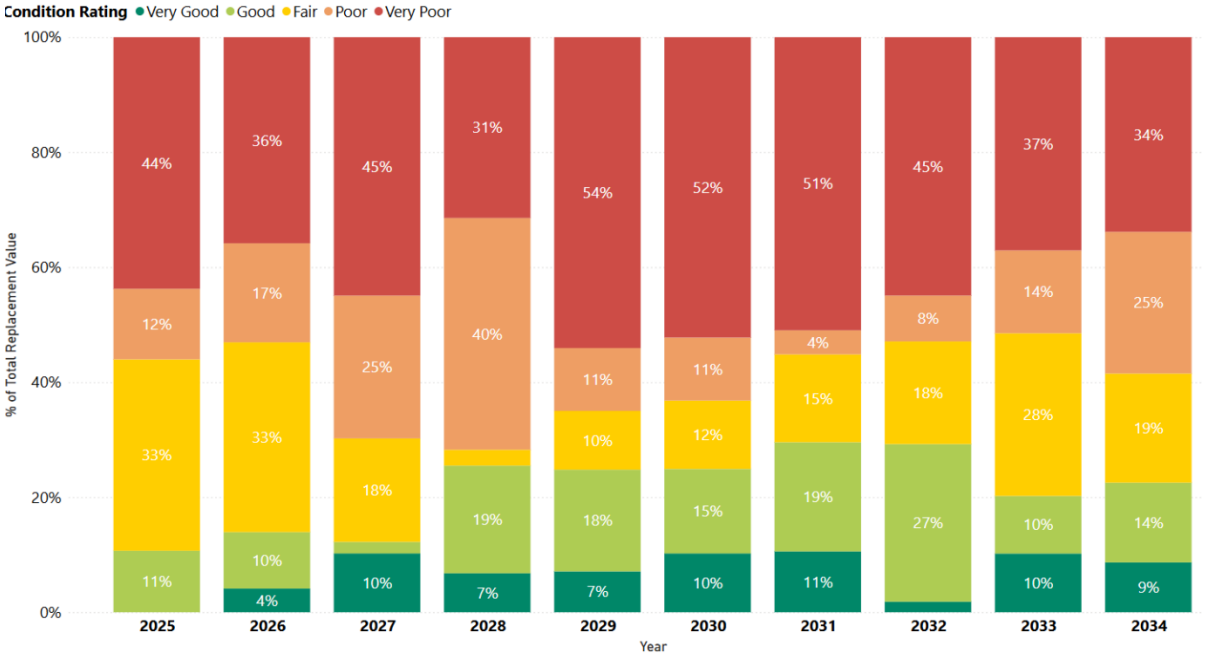

Figure 5-13: CDES Fleet Assets Condition Projection under Scenario 3 - $3.8 Million Annually - (Green Fleet Expansion)

5.3 Capital Expansion Funding Needs

5.3.1 Green Fleet Infrastructure Investment Needs

To address the growing demand for vehicle charging, both for public and private vehicles, the City is considering implementing several key actions, such as:

- Investment in public charging stations in high-traffic areas such as recreational facilities, City hall, public parking lots, and transportation hubs.
- Upgrade the existing fleet maintenance garage and bus servicing facilities to support the operation and maintenance needs of the EV fleet.

By analyzing the 2021 to 2024 capital budgets published by the City, the historical expenditures in green fleet infrastructure investment were captured, and the historical costs were summarized in **Table 5-12.** The average expenditure for the green fleet infrastructure over the past 3 years was $0.8 million.

Table 5-12: Historical Green Fleet Infrastructure Investment

Capital Year	Asset Class	Cost Item	Cost
2024	Transit Fleet	Electrical Upgrade and Charging Units	$825,000
2023	Transit Fleet	Infrastructure Modifications for Elec Bus	$450,000
2022	Transit Fleet	Charging Station	1,166,000
	Transit Fleet	EV Infrastructure Design	
Total			**$2,441,000**
3-Year Average			**$814,000**

5.3.2 Capital Expansion Funding Needs

By analyzing the 2019 to 2023 capital budgets published by the City, the historical capital expansion (definition refers to **Section 4.2**) expenditures were captured, and the historical costs were summarized in **Table 5-13**. The average expenditure for the green fleet infrastructure over the past 5 years was $3.6 million.

Table 5-13: Historical Capital Expenditure

Capital Year	Fleet	Equipment	Total
2023	$5,555,000	$499,000	$6,054,000
2022	$3,609,000	$583,000	$4,192,000
2021	$2,205,000	$0	$2,205,000
2020	$1,559,000	$0	$1,559,000
2019	$2,267,000	$0	$2,267,000
2019-2023 Average	**$3,039,000**	**$541,000**	**$3,580,000**

5.4 Full Funding Need Profile

The total annual full funding needs for fleet assets under like-for like replacement and green fleet expansion scenarios were combined with the following:

- Capital reinvestment needs (**Section 5.2**)
- Projected fleet O&M cost (**Section 5.1.2**).
- One percent of the annual replacement cost was added to account for the asset disposal cost. Note that PS 3280 Asset Retirement Obligations is a new accounting standard covering asset retirement obligations that applies to all Canadian public sector entities that prepare their financial statements under PSAB.

5.4.1 PWES Fleet Assets Full Funding Needs

Figure 5-14 shows a full picture of the City's PWES fleet funding forecast for the next 10 years, under the like-for-like scenario. This graph provides the City with clear understanding of the full funding requirements, essential for effective financial planning activities. Specifically, the reinvestment needs for PWES Fleets are categorized as "Replace" (refer to **Table 5-7** for like-for-like scenario and **Table 5-10** for green fleet expansion). These reinvestment needs are presented alongside the City's projected PWES Fleet O&M costs (refer to **Table 5-4** for details). Additionally, one percent of the annual replacement cost was added to account for the asset disposal cost. With these additions, the City's PWES Fleet full funding requirement increases to approximately $91.6 million over the next 10 years, averaging $9.2 million per year in inflated dollar value for like-for-like scenario, and approximately $93.6 million over the next 10 years, averaging $9.4 million per year in inflated dollar value for green fleet expansion scenario.

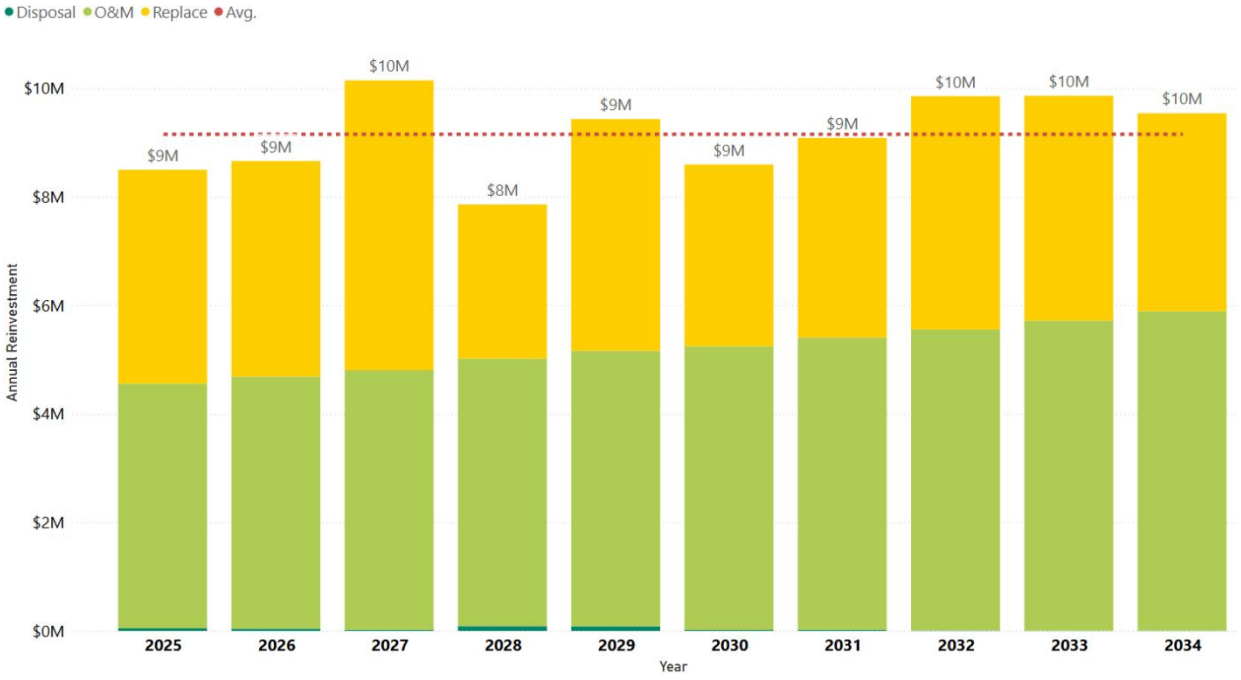

Figure 5-14: PWES Fleet Full Funding Need Profile (Like-for-Like)

5.4.2 CDES Fleet Assets Full Funding Needs

Figure 5-15 shows a full picture of the City's CDES fleet funding forecast for the next 10 years, under the like-for-like scenario. This graph provides the City with clear understanding of the full funding requirements, essential for effective financial planning activities. Specifically, the reinvestment needs for CDES Fleets are categorized as "Replace" (refer to **Table 5-8** for like-for-like scenario and **Table 5-11** for green fleet expansion). These reinvestment needs are presented alongside the City's projected CDES Fleet O&M costs (refer to **Table 5-4** for details). Additionally, one percent of the annual replacement cost was added to account for the asset disposal cost. With these additions, the City's CDES Fleet full funding requirement increases to approximately $68.1 million over the next 10 years, averaging

$6.8 million per year in inflated dollar value for like-for-like scenario, and approximately $72.0 million over the next 10 years, averaging $7.2 million per year in inflated dollar value for green fleet expansion scenario.

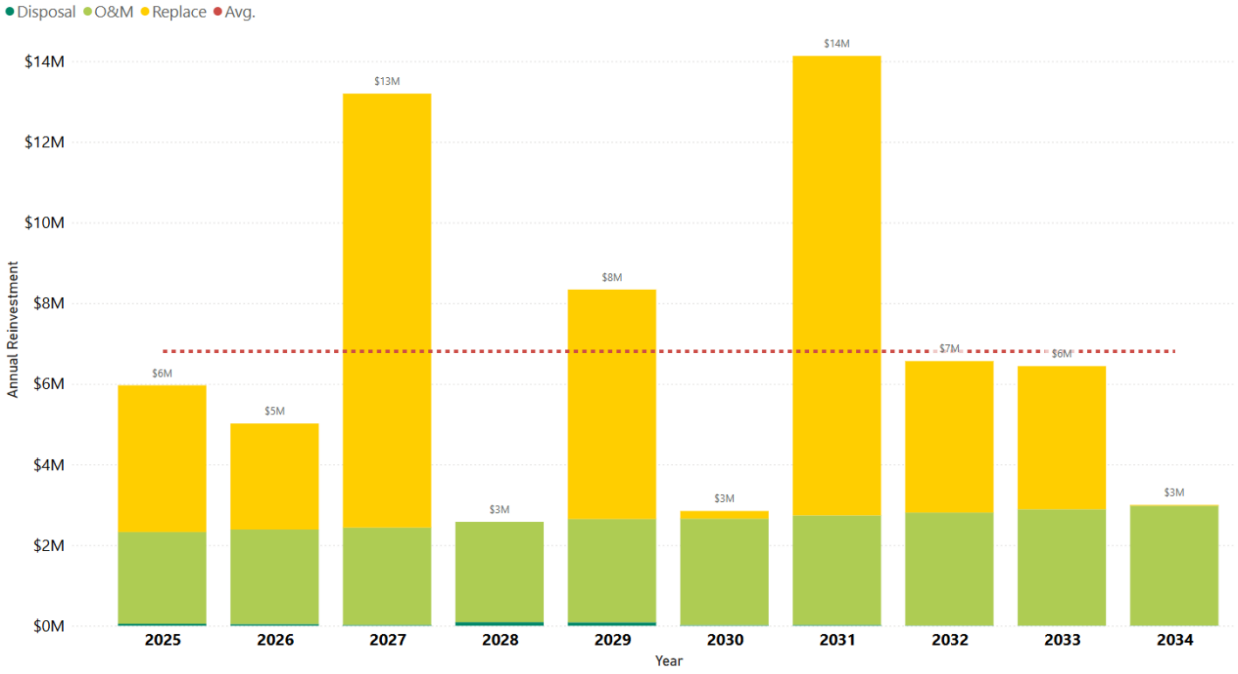

Figure 5-15: CDES Fleet Full Funding Need Profile (Like-for-Like)

5.5 Capital Reinvestment Funding Gaps & Risk

The City intends to continue to invest in the growth and renewal of the fleet assets over the next 10 years. **Table 5-14** compares the City's planned capital reinvestment budget against the capital reinvestment funding needs. The shortfall between the City's planned capital reinvestment budget against the capital reinvestment funding needs is referred to as the "funding gap".

Table 5-14: Funding Gap – Capital Reinvestment Funding Needs vs. Budget Forecast

Asset Class	10-Year Need Total (Like-for-Like / Green Fleet Expansion)	10-Year City Budget Total	10-Year Gap Total (Like-for-Like / Green Fleet Expansion)
PWES Fleet	$39.5 million / $41.6 million	$36 million	$3.5 million / $5.6 million
CDES Fleet	$41.7 million / $45.6 million	$38 million	$3.7 million / $7.6 million

The capital expansion funding need is outlined in **Section 5.3**, which further exacerbates the funding for the City's fleet assets by highlighting additional investments required to accommodate future growth.

As described in **Section 3.5**, risks are identified for each service level performance measure. **Table 5-15** provides a high-level overview of the key risks associated with funding gaps, as well as the potential consequences and impacts of not meeting the proposed service levels.

Table 5-15: Risk of Delayed Intervention for Fleet Assets

Key Risk	Potential Consequences/Impacts
Operational Reliability and Service Delivery Risks	• **Increased Equipment Downtime** Aging, unreplaced vehicles are more prone to mechanical failures, reducing fleet availability and disrupting critical municipal services (e.g., transit, road maintenance, emergency response). • **Reduced Quality of Service** Declining vehicle reliability impairs the City's ability to meet expected quality of service, especially during peak demand or emergencies.
Escalating Maintenance and Lifecycle Costs	• **Higher Repair Costs per Vehicle** Older vehicles require more frequent and costly maintenance, diverting operational funds that could be used for proactive fleet renewal or efficiency upgrades. • **Inefficient Use of Resources** Maintaining poor-condition assets yields diminishing returns and increases the total cost of ownership.
Safety and Compliance Risks	• **Increased Safety Incidents** Operating beyond service life raises the risk of mechanical failures that could endanger staff and the public. • **Regulatory Non-Compliance** Vehicles may fail to meet provincial safety, emissions, or inspection requirements, leading to legal liabilities or forced decommissioning.
Environmental and Sustainability Risks	• **Inability to Meet GHG Reduction Goals** Without fleet renewal, the City may fall short of climate targets due to continued reliance on older, high-emission vehicles. • **Delayed Electrification** Limited capital investment may stall the transition to hybrid or electric vehicles, increasing long-term emissions and fuel costs.
Financial and Strategic Planning Risks	• **Capital Replacement Backlog** Deferring replacements creates a "bow wave" of aging assets that will eventually require large, simultaneous capital investments, overwhelming future budgets. • **Loss of Funding Opportunities** The City may become ineligible for federal or provincial grants that require timely asset renewal or minimum condition thresholds.
Reputational and Public Trust Risks	• **Public Perception of Mismanagement** Frequent breakdowns, unreliable services, and visibly aging fleet assets can erode public confidence in the City's asset management practices.

5.6 Funding Strategies

The City's public works fleet is primarily supported by the property tax levy, while transit heavily depends on funding from both Federal and Provincial governments, constituting approximately 75% of its financial support. However, there is a growing concern about the sustainability of government funding for transit. The lack of continuous financial support from the government may result in a significant decrease in capital investment, affecting the City's ability to deliver services to desired levels. In light of these concerns, AECOM encourages the City to actively explore alternative funding sources to mitigate potential challenges. This section introduces the following potential funding options that could be considered, acknowledging that the City's eligibility for these funds is subject to certain criteria:

- Canada Community-Building Fund (CCBF)
- Investing in Canada Infrastructure Program
- Zero Emission Transit Fund
- Canada Infrastructure Bank (CIB)
- Federal incentives for zero-emission vehicles (ZEVs)

- The Incentives for Zero-Emission Vehicles Program
- The Incentives for Medium- and Heavy-Duty Zero-Emission Vehicles (iMHZEV) Program

- Green Municipal Fund (GMF)
- Green Freight Program (GFP)

5.6.1 Canada Community-Building Fund (CCBF)

The CCBF, previously known as the Federal Gas Tax Fund, is a permanent source of upfront funding distributed twice a year to territories and provinces. The delivery of the CCBF to municipalities varies by province or territory, with allocation following a per-capita basis for provinces, territories, and First Nations[13].

The CCBF is administered in Ontario through a bilateral agreement with the Government of Ontario, the Association of Municipalities of Ontario (AMO), and municipalities. This program allocates approximately $816 million annually to 641 communities in Ontario, with an additional top-up of $816.5 million provided in 2020 to expedite communities' recovery from the COVID-19 pandemic. Notably, as of 2022, the City has received over $9 million through the CCBF, granting the City flexibility to strategically invest across 19 distinct project categories[14].

5.6.2 Investing in Canada Infrastructure Program

Administered by the Government of Canada, the Investing in Canada Infrastructure Program delivers long-term and stable funding to communities with the aim of addressing environmental challenges, fostering clean growth, and enhancing resilience to climate change. Through bilateral agreements, over $33 billion in funding is allocated to provinces and territories, supporting a diverse range of infrastructure projects nationwide[15].

The program encompasses investments across four targeted funding streams: the public transit stream, the green infrastructure stream, the community, culture, and recreation infrastructure stream, and the rural and northern communities' infrastructure stream. The public transit stream allocates funds for the construction, expansion, and enhancement of public transit infrastructure. The focus of these investments is on projects that aim to increase the capacity of public transit systems, enhance the quality and safety of existing or future transit infrastructure, and improve overall access to public transit systems. In pursuit of funding through this stream, the City has actively submitted proposals for the following projects[16]:

- Electrification of Transit System.
- Transit Facility and Equipment Upgrades.
- Purchase of Rolling Stock Assets.
- Relocation of the Downtown Transit Terminal Construction and Renovation.
- Transit Facility and Equipment Upgrades.
- Purchase of Transit Ticket Vending Machines.
- Purchase and Installation of Transit Bus Shelter.

[13] The Canada Community-Building Fund. (2022). Infrastructure Canada. Infrastructure Canada - The Canada Community-Building Fund. Retrieved on February 12th, 2024.

[14] Ontario's 2021–22 federal Canada Community-Building Fund allocations and top-up amounts. (2021). Infrastructure Canada. Backgrounder: Ontario's 2021–22 federal Canada Community-Building Fund allocations and top-up amounts - Canada.ca. Retrieved on February 12th, 2024.

[15] Investing in Canada Infrastructure Program. (2023). Infrastructure Canada. Infrastructure Canada - Investing in Canada Infrastructure Program. Retrieved on February 12th, 2024.

[16] Investing in Canada Infrastructure Program: Projects Under Review. (2022). Infrastructure Canada. Infrastructure Canada - Investing in Canada Infrastructure Program: Projects Under Review. Retrieved on February 12th, 2024.

5.6.3 Zero Emission Transit Fund

The Zero Emission Transit Fund is a separate fund that builds on the existing Investing in Canada Infrastructure Program[17]. Through this fund, the Government of Canada is investing $2.75 billion over five years, starting in 2021, to support public transit and school bus operators in planning for electrification. The funding also supports the purchase of 5,000 zero-emission buses and the construction of necessary infrastructure, including charging facilities and facility upgrades.

There are two components under the Zero Emission Transit Fund for which projects are eligible for funding:

- Planning Projects: Eligible projects include studies, modeling, and feasibility analyses that will support the development of future larger-scale capital projects.
- Capital Projects: Eligible capital projects include buses, charging and refueling infrastructure, and other ancillary infrastructure needs.

5.6.4 Canada Infrastructure Bank (CIB)

The CIB is a Crown corporation mandated to invest in transformative infrastructure projects. With almost 50 partnerships spanning the entire country, including small communities and large urban areas, the CIB focuses on five key investment areas: public transit, green infrastructure, clean power, trade and transportation, and broadband infrastructure[18].

In the public transit sector, their involvement extends to advising, investing in, and building knowledge with public transit owners and service providers, with a particular emphasis on initiatives such as zero-emission buses, light rail transit, and bus rapid transit. Since the announcement of the $10 billion Growth Plan in October 2020, the CIB has formed partnerships and approved investments for the purchase of 1,300 zero-emission public transit and school buses. Moving forward, the CIB has set a long-term target to invest $5 billion in public transit, with a specific allocation of at least $1.5 billion for zero-emission buses and associated infrastructure[19].

5.6.5 Federal incentives for zero-emission vehicles (ZEVs)

There are Federal incentives available for buying or leasing zero-emission vehicles (ZEVs) through two programs, each tailored to different vehicle types[20]:

- **The Incentives for Zero-Emission Vehicles (iZEV) Program**

  The Incentives for Zero-Emission Vehicles (iZEV) Program, launched in May 2019, aims to promote the adoption of Zero-Emission Vehicles (ZEVs) among Canadians and Canadian organizations. Individuals and organizations in Canada are eligible for up to $5,000 at the point of sale when purchasing or leasing light-duty ZEVs such as cars, SUVs, and light pick-up trucks.

- **The Incentives for Medium- and Heavy-Duty Zero-Emission Vehicles (iMHZEV) Program**

  Initiated on July 11th, 2022, the Incentives for Medium- and Heavy-Duty Zero-Emission Vehicles (iMHZEV) Program offers up to $200,000 at the point of sale for the purchase or lease of medium- and heavy-duty Zero-Emission Vehicles (ZEVs) with a gross weight rating exceeding 8,500 lbs. To qualify, the vehicle must be intended for use on public streets, roads, highways, or other paved surfaces. Eligible organizations can benefit from up to 10 incentives in a calendar year, reaching a maximum cap of $1,000,000.

[17] Zero Emission Transit Fund. (2023). Infrastructure Canada. Infrastructure Canada - Zero Emission Transit Fund. Retrieved on February 12th, 2024.

[18] Public Transit. (n.d.). Canada Infrastructure Bank. Public Transit | Canada Infrastructure Bank (CIB) (cib-bic.ca). Retrieved on February 12th, 2024.

[19] Government of Canada targets zero emission bus transportation with launch of new fund. (2021). Infrastructure Canada. Government of Canada targets zero emission bus transportation with launch of new fund - Canada.ca. Retrieved on February 12th, 2024.

[20] Zero-emission vehicles. (2024). Transport and Infrastructure, Government of Canada. Zero-emission vehicles - Incentives - Canada.ca Retrieved on February 12th, 2024.

5.6.6 Green Municipal Fund (GMF)

The GMF is a financial initiative in Canada dedicated to supporting sustainability and environmental projects at the municipal level. Managed by the Federation of Canadian Municipalities (FCM), the GMF provides funding and resources to assist municipalities across the country in undertaking projects that contribute to environmental sustainability, energy efficiency, and the reduction of greenhouse gas (GHG) emissions[21].

In the context of fleet management, the GMF allocates funds for pilot projects, feasibility studies, and capital projects aimed at reducing or avoiding fossil fuel use in municipal service delivery vehicles. Eligible projects should aim to reduce greenhouse gas (GHG) emissions by 20% compared to an existing or modeled baseline measurement. Priority during the evaluation of applications will be given to projects that demonstrate transformative potential, significant impacts, and a strong implementation framework.

5.6.7 Green Freight Program (GFP)

The GFP aims to assist fleets in reducing fuel consumption and greenhouse gas emissions. It offers support through various means, such as fleet energy assessments, retrofits, engine repowers, adopting logistical best practices, and acquiring low-carbon vehicles[22]. The program operates through two funding streams. Stream 1 (Assess and Retrofit) offers grant funding of up to $250,000 for Third-Party Fleet Energy Assessments and Truck/Trailer Equipment Retrofits. Meanwhile, Stream 2 (Repower and Replace) offers non-repayable contributions for fuel switching, engine repowers, and the procurement of low-carbon alternative fuel vehicles. Under Stream 2, the program covers up to 50% of the incremental cost for purchasing low-carbon alternative fuel vehicles or 50% of total project costs, with a maximum cap of $5 million per project. It is important to note that Stream 2 is currently closed, and submitted proposals are under review.

5.6.8 Alternative Strategies

Recognizing the constrains of internal funding and limitations and uncertainties associated with external funding, it becomes increasingly important to explore complementary approaches that do not depend solely on financial sources. In this context, alternative strategies play a critical role in enhancing the City's ability to manage service levels and asset performance within existing fiscal constraints. **Table 5-16** highlights some non-financial strategies that could help the City address the potential funding gaps for fleet assets.

Table 5-16: Non-Financial Strategies to Address Potential Funding Gaps for Fleet Assets

Strategy	Description / Actions
Condition-Based Maintenance	Shift from time-based to condition-based and criticality-based maintenance where possible. Using condition assessments (e.g., visual inspections or performance metrics) helps extend asset life by targeting maintenance where it's most needed.
Preventive Maintenance Programs	Develop and implement preventive maintenance schedules to address minor defects before they lead to larger failures. Preventive measures often cost less than emergency repairs and can delay the need for full replacement.
Training and Knowledge Sharing	Provide training to O&M staff on best practices for maintaining different asset types. Encourage internal knowledge sharing to improve consistency and efficiency in asset care.
Community and Interdepartmental Engagement	Continuously collaborate with other City departments and the public to identify issues early and gather feedback on service levels. This can help align asset strategies with user needs and expectations.

[21] Funding opportunities. (n.d.). Green Municipal Fund. Funding opportunities | Green Municipal Fund. Retrieved on February 12th, 2024.

[22] Green Freight Program. (2023). Natural Resources Canada. Green Freight Program (canada.ca). Retrieved on February 12th, 2024.

6 Implementation Plan and Continuous Improvement

Continuous improvement is an important component of any AM program and is achieved through the implementation of recommended improvement initiatives which support sustainable service delivery. AECOM has identified a set of activities that represents the next stage of AM planning and implementation within the City, as shown in **Table 6-1**.

Table 6-1: Recommended AM Improvement Initiatives

Index	Improvement Initiative	Description
1.	Refine the asset hierarchy and inventory.	Continue to refine the asset inventory and close existing data gaps, to have a more accurate representation of the current state of the fleet assets; and, ultimately, to make more informed and defensible decisions. • AECOM recommends the City to continue maintaining the fleet inventory, keep updating the inventory as assets are acquired or disposed. • Continue collecting the installation date information of fleet assets to better estimate their remaining service life. Once the gap is closed, the City will be able to conduct more accurate lifecycle analyses, forecast reinvestment needs with greater confidence, and enhance long-term asset management planning. • Develop and implement unique identifiers for all fleet assets. It will enable more efficient asset tracking, condition monitoring, and lifecycle management.
2.	Establish and implement a data information management strategy	• Asset data will be centralized, digitized and accessible to all staff. • Annual updates for the state of infrastructure data attributes such as the asset inventory, including the age and condition of the assets. • Staff will have the ability to collect and update asset data in the field and in real time. • Workflows will be documented and digitized
3.	Track the vehicle operational data within the Computerized Maintenance Management System (CMMS)	• The operation data for vehicles should be recorded within the CMMS. • Vehicle operational data including: - Monthly odometer reading - Vehicle operation hours tracking - Vehicle idle time monitoring - Fuel consumption - Vehicle service date and next service date forecast - Any vehicle inspection and diagnosis reports - Parts replacement and vehicle repair history - Factory warranty expiration dates - Vehicle insurance policy and expiration date - Insurance claims history • Keeping track of the vehicle's operational data is beneficial for monitoring the vehicle status, preventing critical malfunction and service interruption, planning adequate vehicle service, retaining moderate insurance premiums, and making decisions on lifecycle activities, such as vehicle renewal, replacement, and retirement.
4.	Develop a formalized fleet condition assessment process and use condition grading schemes for fleet assets.	• The fleet condition assessment grading system should include a description directly tied to each condition grade, along with details about the asset's performance and the necessary level of corrective and preventive maintenance required for assets falling within a certain condition rating category. This process will enable the City to keep track of and better forecast asset renewal needs. • Perform condition assessments on the most critical assets first. This ensures that assets are assessed using the same methodology and prioritized based on their criticality. It facilitates a more defensible business case when addressing issues of asset degradation with senior management and the Council.
5.	Refine the LoS Framework.	This AMP represents the City's LoS in alignment with the requirements of O. Reg. 588/17 July 1, 2025, deadline. The City should continue its efforts to: • Regularly record LoS performance measures to monitor changes over time and identify emerging trends.

Index	Improvement Initiative	Description
		• Review and update performance measures as needed to ensure they remain relevant and effective. • Periodically assess proposed LoS to confirm alignment with shifting community expectations, regulatory changes, City priorities, available resources, and observed performance trends—supporting adaptive and responsive service delivery. • Continuously enhance demand management by routinely evaluating future demand drivers that influence service delivery and asset use, integrating these insights into long-term capital planning to ensure LoS remains responsive to changing needs.
6.	Incorporate risk assessment for future iterations of the AM plan, and use the risk assessment results to drive future condition assessments and financial needs forecasting	• Conduct a comprehensive criticality and risk assessment of assets to inform work prioritization. • Review risk attribute values periodically to ensure alignment with business objectives and risk appetite. • Overlay the risk model with the current state of the assets (i.e., condition) and the financial forecast. Using this approach, the City could focus its monitoring, maintenance, renewal and replacement budget and activities on high-risk assets. Medium-risk infrastructure could be addressed through the mitigation of failure via regular monitoring, while low-risk assets could be accepted with caution.
7.	Establish a sustainable fleet asset funding model that fits the needs of the community	• Establish and maintain detailed funding and budget information for fleet assets to support effective asset management planning. Once this information is in place, it is recommended that the City re-run the financial model to assess funding gaps, update condition projections, and refine reinvestment strategies based on realistic budget scenarios. • In light of the annual funding need outlined in **Figure 5-14** and **Figure 5-15**, it is recommended that the City allocate an average of **$4.0 million** per year over the next 10 years for capital reinvestment in PWES fleets, and **$4.0 million** per year over the next 10 years for capital reinvestment in CDES fleets. Additionally, a total of **$7.8 million** should be budgeted annually for O&M expenditures during the same period. • Review financial modeling assumptions on reinvestment rate and replacement values and update the financial model with new information as it becomes available. The financial model is based on several key assumptions that could have a significant impact on the outcomes of the model. • Explore funding resources and non-financial strategies that the City may take into consideration while performing strategic lifecycle and financial strategies.
8.	Continue to improve AM initiatives across the City by maintaining a high level of AM awareness through training, communication, and knowledge sharing.	• Conduct an AM Software Assessment to identify future system requirements that may include enhancing existing software, adding-on, or replacing. • Develop a Knowledge Retention Strategy & Internal Communications Plan to document staff AM knowledge and experience for reporting and succession planning purposes. Communicate AM improvement initiatives and enhance natural AM awareness internally through internal communication.
9	Grant application program	• The City should initiate an internal program for developing grant applications tailored to organizational objectives and align to the criteria of various funding programs. (refer to **Section 5.6** for available grant options). • Guidance includes: - Aligning with grant-specific criteria: prepare the grant application align with the requirements, and place emphasis on the key aspects relevant to the grant objectives. - Developing a grant application proposal: the application will be a project proposal that resonates with the grant agencies' goals, which should articulate clear objectives and expected outcome. - Budget planning: the financial plans must resonate with the grant's objectives, presenting transparency in fund utilization and emphasizing the project's viability and long-term financial sustainability. - Demonstrating feasibility and organization capacity: presenting a realistic project timeline, clear milestones, and a well-thought-out implementation plan. - Compliance, Reporting, and Effective Project Management: a robust project management strategy should be devised, illustrating the City's capacity to effectively manage, oversee, and report on the project's progress, in accordance with the grant's stipulations.

Index	Improvement Initiative	Description
		- Preparing and Organizing Supporting Documents: these documents will be organized and presented in a manner that lucidly supports and enhances the application. - Final Review and Submission Process: prior to submission, each application should undergo a thorough review to ensure it meets the specific criteria and guidelines of the respective grant program.
10	Organize public and Council engagement activities	• Establish a structured approach to public and Council engagement to ensure the AMP aligns with community expectations, supports informed decision-making, and enhances transparency, the City is committed to establishing a structured approach to public and Council engagement. While several engagement activities have already been undertaken, these efforts lay the foundation for a more consistent and strategic approach moving forward. • For Council engagement, the City has shared updates through presentations and media events. To further support elected officials, it is recommended that the City develop Councillor Tool Kits. These kits would provide clear, consistent messaging—covering topics such as infrastructure planning, investment priorities, asset management, service levels, and climate impacts—to help Councillors effectively respond to public inquiries. • On the public side, communication can be enhanced by creating a dedicated project webpage to centralize information such as FAQs, timelines, and contact details, while enabling two-way engagement. A targeted social media strategy, including sponsored posts on platforms like Facebook and Instagram, is also recommended to increase visibility and encourage community involvement.

According to the observed trends across all LoS measures, and the associated risks of not meeting targeted performance levels, (refer to **Section 3.4, 3.5, 3.6**), the following **Table 6-2** outlines recommended improvement initiatives aligned with each LoS measure. These actions aim to mitigate risk, optimize lifecycle performance, and support strategic decision-making for future fleet planning and investment.

Table 6-2: Improvement Initiatives Regarding the LoS Measures

LoS Measure	Future Trend	Improvement Initiatives
Number of Vehicles that are Electric or Hybrid	Expected to increase to meet GHG goals	Develop a phased electrification roadmap; secure grants; prioritize EVs in procurement
Total Annual Fuel Volume Used for Vehicles	Targeted to decrease	Implement eco-driving programs; optimize routing; use telematics to monitor idle/fuel use
% of Vehicles and Equipment Past Their Optimum Service Life	Projected to increase	Adopt risk-based renewal plans; extend life via PM; pursue predictable capital funding
Total Idle Time for Front Line Vehicles	Must decrease for efficiency	Enforce anti-idling policy; use automatic shut-off tech; monitor idle through telematics
Mileage or Hours per Vehicle	Increasing due to constrained fleet size	Rotate fleet usage; right-size assignments; analyze workload distribution
Total Repairs per Vehicle	Trending upward with aging fleet	Enhance PM; retire high-cost units; adopt TCO tracking; upskill maintenance teams
Total Transit Ridership per Year	Flat or declining due to population loss	Optimize routes; introduce on-demand service; promote ridership through incentives
Average Age of Fleet in Years	Remains stable if replacement stays consistent	Maintain rolling replacement plan; extend asset life with high-quality PM
Total Annual Fuel Consumption	Expected to decrease	Transition to hybrid/electric buses; optimize schedules; apply for green funding
Percentage of assets in Good and Very Good Condition	Expected to decrease without renewal	Standardize condition assessments; prioritize capital renewal; integrate AM software

APPENDIX A

Fleet Asset Inventory

A

Appendix A - Fleet Asset Inventory

The City's Fleet asset inventory is presented as a separate MS Excel file.

About AECOM

AECOM is the world's trusted infrastructure consulting firm, delivering professional services throughout the project lifecycle — from planning, design and engineering to program and construction management. On projects spanning transportation, buildings, water, new energy and the environment, our public- and private-sector clients trust us to solve their most complex challenges. Our teams are driven by a common purpose to deliver a better world through our unrivaled technical expertise and innovation, a culture of equity, diversity and inclusion, and a commitment to environmental, social and governance priorities. AECOM is a *Fortune 500* firm and its Professional Services business had revenue of $13.2 billion in fiscal year 2020. See how we are delivering sustainable legacies for generations to come at aecom.com and @AECOM.