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Transit
Asset Management Plan

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Version 1.1

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Introduction

1.1 Background

Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure requires all municipalities to prepare baseline asset management plans for all their assets. The purpose of this legislation is to have municipalities demonstrate they can maintain their assets, balancing affordability, risk, and service levels to sustain them in their present state, with no change to the service level for the next ten years.

To meet the provincial requirements, the City has created this first version of its Transit Asset Management Plan. It reports the current state of the assets, levels of service provided, strategies and activities applied by the City, historical and forecasted financial details, and potential improvement actions. It is a strategic document that provides a snapshot of current conditions and establishes a basis for future asset management planning and decision making. The Asset Management Plan is based on asset data and financial information from 2023.

1.2 Asset Classes and Types

The Transit Asset Management Plan includes assets that support bus, O-Train, and Para Transpo services that provide public transit travel options to residents and visitors.

For the City's light rail assets, this report

- Includes O-Train Line 1 assets that are owned by the City.
- Excludes transit assets that are or will be impacted by Stage 2 LRT implementation, such as transitway infrastructure located along the future Stage 2 LRT alignment and O-Train Lines 2 and 4.
- Excludes transit assets that are part of the Stage 2 LRT contract, as well as existing O-Train Lines 2 and 4 assets that are being rehabilitated. These assets will be incorporated into a future version of the Asset Management Plan.

Transit Asset Classes and Types

Transit Facilities

- Bus Stops and Shelters
- Park & Ride Lots
- General Garage Equipment
- Transit Buildings and Facilities

Transit Fleet

- Buses
- Operational Support Vehicles
- Para Transpo Vehicles

Transit Assets

- Transitway and Dedicated Lanes

Transit Structures

- Transit Road Bridges
- Transit Road Bridge-Culverts
- Transit Road Culverts
- Other Transit Structures

Other Transit Assets

- Transit Streetlights

O-Train Line 1 Assets

- O-Train Line 1 Bridges
- O-Train Line 1 Culverts
- O-Train Line 1 Facilities and Maintenance
- O-Train Line 1 Stations
- O-Train Line 1 Tunnels
- O-Train Line 1 Vehicles
- Non-revenue Rail Vehicles
- Tracks and Rail Infrastructure
- Other O-Train Line 1 Structures

State of Local Infrastructure

The state of local infrastructure reported in this Asset Management Plan is current as of January 2023, so it excludes transit assets that are impacted by Stage 2 LRT implementation (such as Transitway stations, Transitway lanes and structures located along the future Stage 2 LRT alignment) and transit assets that are part of the Stage 2 LRT contract (which will be included in a future version of the Asset Management Plan).

2.1 Asset Inventory and Valuation

The total replacement cost of transit assets is approximately $4.43 billion as summarized in the table below.

Transit Asset Inventory and Replacement Cost

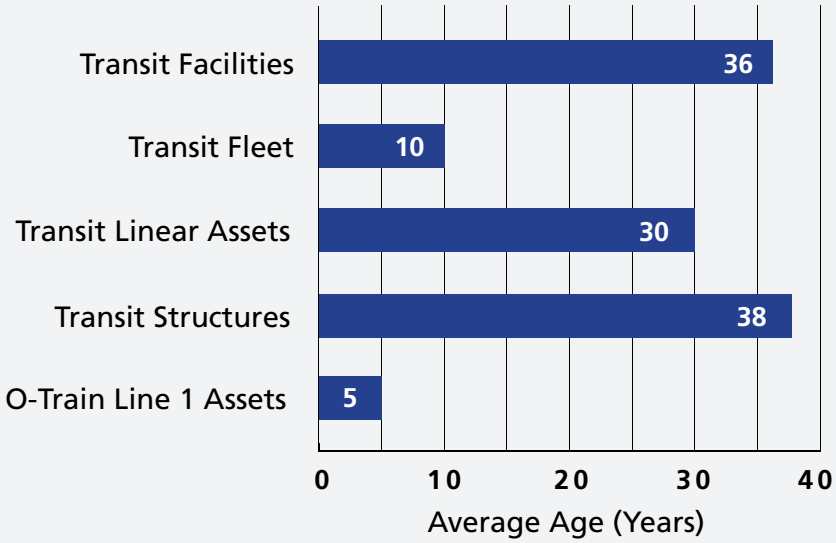
Asset Class	Inventory	Replacement Cost
Transit Facilities	1,923	$810M
Transit Fleet	1,074[1]	$962M
Transit Linear Assets	82 km	$136M
Transit Structures	209	$896M
Other Transit Assets	2,100	$14M
O-Train Line 1 Assets	88 / 28km	$1,611 M

[1] Subsequent to the data collection undertaken for this report, the inventory of transit fleet has significantly reduced. Values reported in this Asset Management Plan reflect January 2023 data.

2.2 Age and Condition

The age of an asset gives a sense of how close it is to the end of its service life and what renewal interventions may be appropriate. The average age of the City's transit services assets is shown in the figure below.

Average Age of Transit Assets



The City uses a range of techniques and solutions to collect and assess condition data, and at various frequencies, which is summarized in the table below.

Condition Data Collection Methods for Transit Services Assets

Asset Type	Condition Data Collection Technique	Frequency
Bus Stops and Shelters	Inspection and Maintenance	Stops: 3 months
		Shelters: Lifecycle-Annually Cleaning-2 Weeks
General Garage Equipment	Age-based	Annually
Park and Ride Lots	Automatic Road Analyser	Varies
Transit Buildings and Facilities	Building Condition Audits	10 years
Buses	Inspection and Maintenance	Time- and/or mileage-based (varies depending on OEM requirements
Operational Support Vehicles		
Para Transpo Vehicles	Inspection and Maintenance	6 months
Transitway and Dedicated Lanes	Automatic Road Analyser	2 years
Transit Road Bridges	In compliance with Ontario Structure Inspection Manual (OSIM)	2 years (up to 4 years for Bridge Culverts with 3 to 6 metre span)
Transit Road Bridge-Culverts		
Transit Road Culverts	Inspection	Varies
Other Transit Structures	Inspection	Varies
Transit Streetlights	N/A	N/A
O-Train Line 1 Facilities and Maintenance	Inspection and Maintenance	Maintenance performed regularly; structural inspections conducted every two years (Maintenance and Storage Facility)

Asset Type	Condition Data Collection Technique	Frequency
O-Train Line 1 Culverts	Inspection and Maintenance	All condition data collection and reporting on an annual basis (PREP9 - Other Asset Classes Condition Data). Inspections conducted every two years.
O-Train Line 1 Bridges	In compliance with Ontario Structural Inspection Manual (OSIM)	Inspections conducted every two years.
O-Train Line 1 Stations	Inspection and Maintenance	Maintenance and cleaning performed regularly. Structural inspections conducted every two years.
O-Train Line 1 Tunnels	Inspection and Maintenance	All condition data collection and reporting on an annual basis (PREP5 - Tunnel Condition Data).
O-Train Line 1 Light Rail Vehicles	Inspection and Maintenance	Regular maintenance and inspections completed at pre-determined intervals by mileage.
Non-revenue Rail Vehicles	Inspection and Maintenance	Daily (Vehicle Walkaround) Weekly (Hi-Rail Check) Regular maintenance and inspections completed at pre-determined intervals by mileage (Hi-Rail/MOW Vehicles)
Tracks and Rail Infrastructure	Inspection and Maintenance	Regular maintenance and inspections at pre-determined intervals, from daily to annual (rail, turnouts/special trackwork, OCS, signals)
Other O-Train Line 1 Structures	In compliance with Ontario Structural Inspection Manual (OSIM)	Inspections conducted every 2 years (retaining walls)

Based on condition data, supplemented by subject matter expert knowledge and professional judgment, the condition of assets is rated on a scale from "Very Good" to "Very Poor" as shown in the table below.

Five-point Scale for Transit Asset Condition

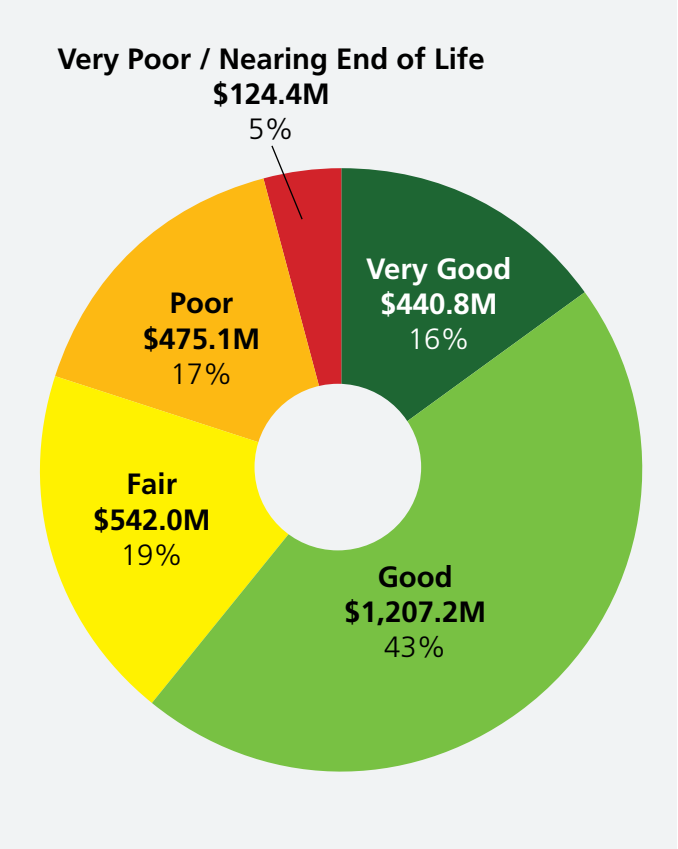
Rating	Rating Description	Subject Matter Expert Opinion (Bus Stops and Shelters)	Pavement Quality Index (Park & Ride Lots, Transitway and Dedicated Lanes)	Condition Index (Transit Structures, O-Train Line 1 Culverts, Bridges, Tunnels and Other Structures)	Facility Condition Index (FCI)[1] (Transit Buildings and Facilities)	Life Consumed (O-Train Line 1 Stations)	Life Remaining (Transit Fleet)
Very Good	**Sound Physical Condition** No short-term failure risk and no work required.	Subject Matter Expert Opinion	80 – 100	80 – 100	< 0.02	< 25%	Subject Matter Expert Opinion (varies by vehicle type)
Good	**Adequate for Now** Acceptable, generally in mid stage of expected service life		60 – 79	70 – 79	0.02 – 0.05	26% – 50%	
Fair	**Requires Attention** Signs of deterioration, requires attention, some elements exhibit deficiencies		40 – 59	60 – 69	0.05 – 0.15	51% – 75%	
Poor	**Increasing Potential of Affecting Service** Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration		20 – 39	40 – 59	0.15 – 0.30	76% – 100%	
Very Poor	**Unfit for Sustained Service (built infrastructure) / Nearing end of life (fleet)** Near or beyond expected service life, widespread signs of advanced deterioration, some built assets may be unusable.		0 – 19	0 - 39	> 0.30	> 100%	

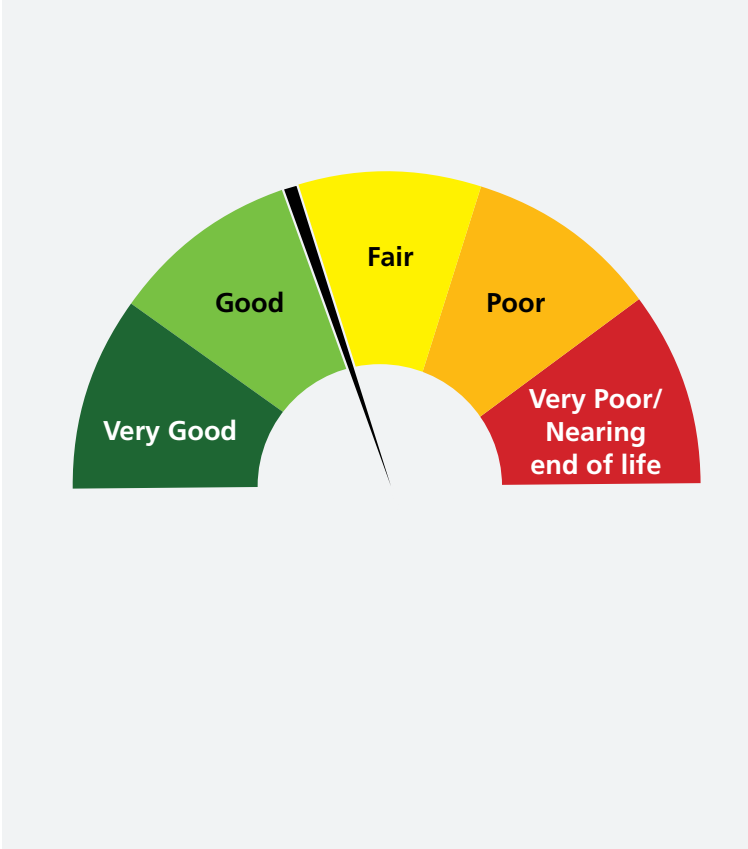
(1) For Buildings and Facilities where FCI = 0, or no deferred maintenance is reported, or required maintenance is reported but has not yet been deferred, condition is reported based on typical useful life consumed as follows:

	Very Good	Good	Fair	Poor	Very Poor
Typical Useful Life Consumed	<40%	40% - 70%	70% - 90%	90% - 100%	≥100%

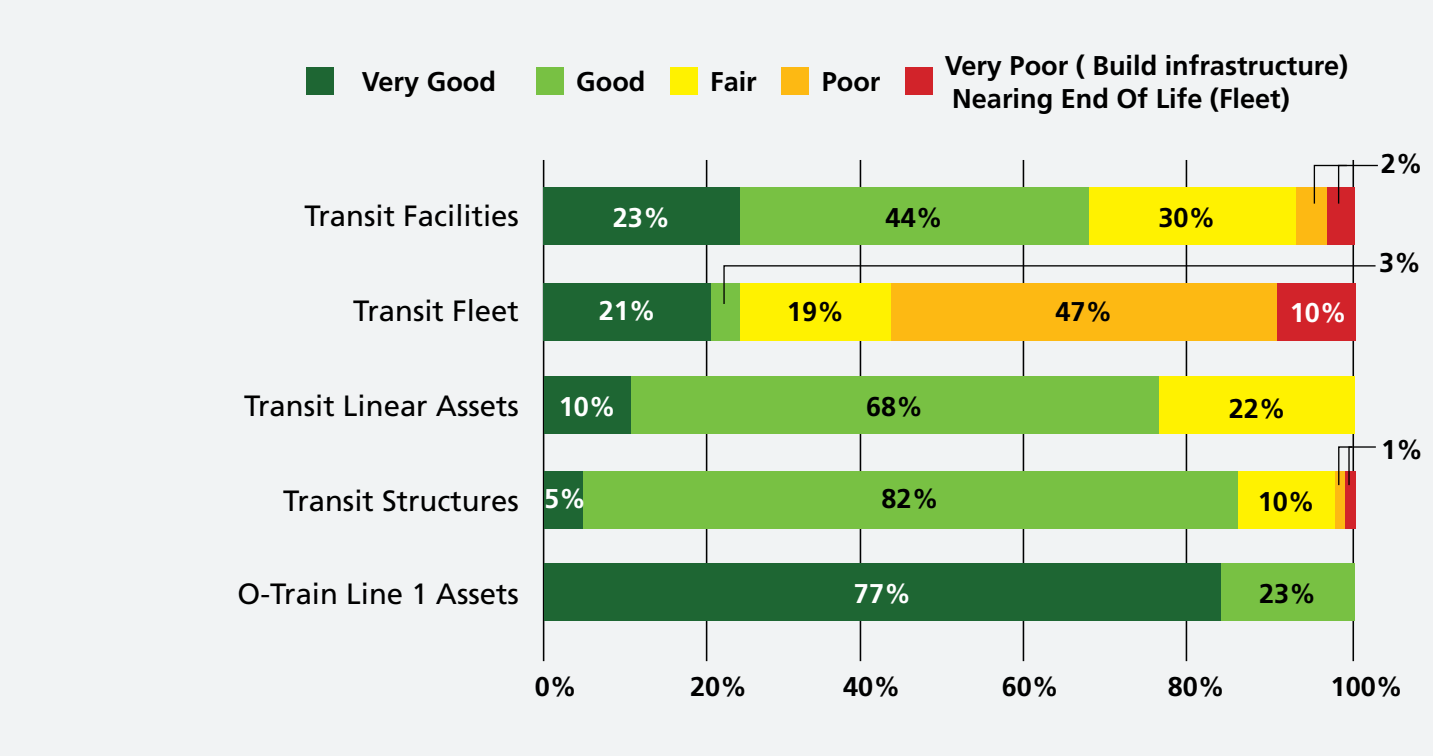
The overall condition of transit assets is "Good to Fair" and a breakdown for the various asset classes is shown in the figures below. It should be noted that the oldest buses in the transit fleet will always be in the poorest condition as they approach their planned end of life; they remain safe and fit for use until they are retired.

Overall Condition Profile of Transit Assets





Condition Profile of Transit Assets



Note: condition data was unavailable or incomplete for Other Transit Assets.

Levels of Service

The City's assets exist to deliver service to customers. Levels of service measure the actual service delivered so that decisions can be made about the assets based on the service that they provide rather than simply on their condition.

The Transit Asset Management Plan establishes level of service measures and reports the current levels of service being provided. The measures align with City goals and recognize that transit assets should be managed in a way that:

- Increases transit ridership
- Provides a safe and secure public transit system
- Reduces emissions associated with the City's operations and facilities
- Increases resiliency to extreme weather and changing climate conditions
- Provides service when scheduled
- Maintains assets in a state of good repair
- Provides sustainable and affordable services over the long-term

The level of service measures for transit are shown in the table below.

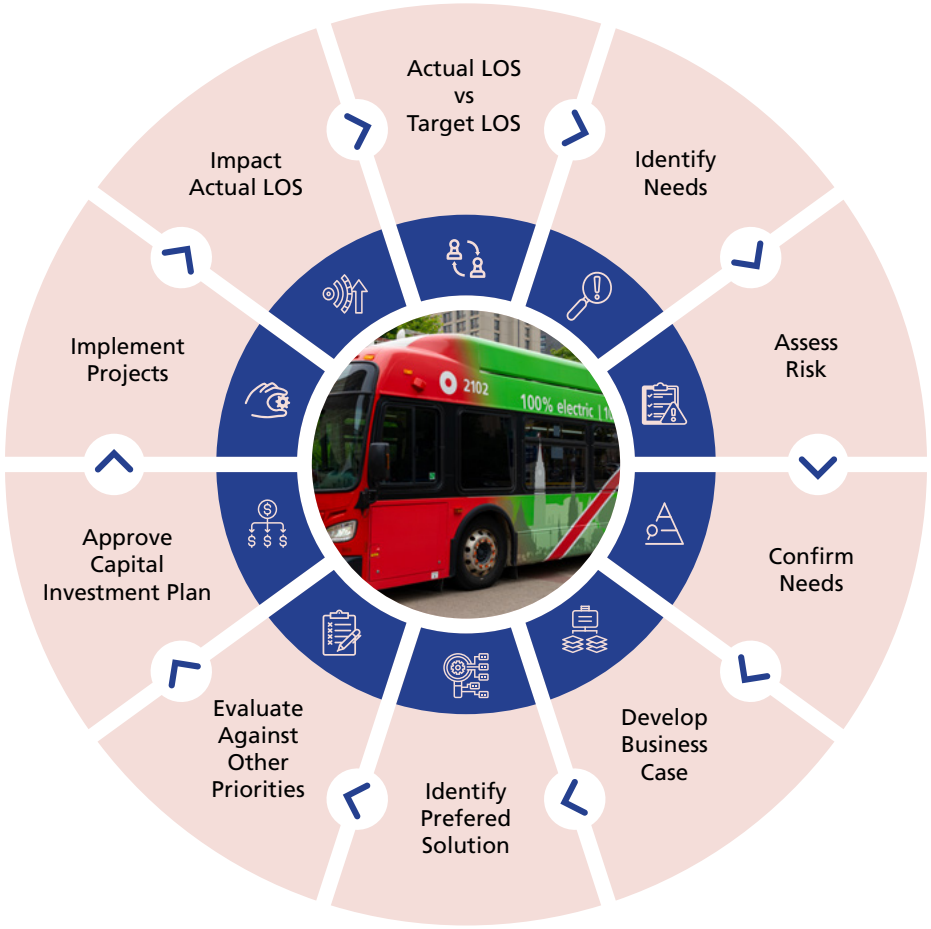
Level of Service Measures for Transit

Service Attribute	Community Level of Service	Technical Level of Service	Current Performance (2022)
Capacity and use	Increase transit ridership	Total annual linked trips on bus and O-Train across the OC Transpo network	50.2 million
		Annual Para Transpo ridership	572,000
Function	Provide a safe and secure public transit system	Collision rate (collisions per 100,000 vehicle kilometres driven)	1.87
		Customer injury rate (injuries per million trips)	1.27
	Reduce emissions associated with the City's operations and facilities	GHG emissions per thousand square feet	8.6 tonnes CO2e
		GHG emissions per total fleet	93,208 tonnes CO2e
	Increase resiliency to extreme weather and changing climate conditions	Percent of transit stops with a shelter (provides shade and protection from inclement weather)	24%
Reliability	Provide service when scheduled	Percent of scheduled hours of service that were delivered (bus)	96.6%
		Percent of scheduled hours of service that were delivered (O-Train Line 1)	98.1%
	Maintain assets in a state of good repair	Percent of assets in fair or better condition	80%
Affordability	Provide sustainable and affordable services over the long-term	Asset Renewal Funding Ratio	Not available
		Average Annual Renewal Investment	Not available

Asset Management Strategy

4.1 Practices, Procedures and Tools

One of the key objectives of asset management is to recognize the objectives of the City and align them with the City's long term financial plans. This will allow Council to make informed decisions and provide clear direction on how the City will balance service levels, risks, and costs. The City has well-established practices to assess the risk of not meeting community and technical level of service standards and to determine the lowest lifecycle cost activities to reduce the risks to acceptable levels and the associated costs of undertaking them. The Asset Management Plan provides the needs forecast associated with maintaining current levels of service and compares it to the planned budget to determine funding gaps or surpluses.



4.2 Future Demand and Service Enhancement

In developing the Transit Asset Management Plan, a preliminary estimate of the financial needs for transit services over the next 10 years was prepared based on the financial analysis conducted for the Transit Long Range Financial Plan (LRFP) Update (September 2023). The estimate includes new assets to support growth, enhancements to existing assets and renewals based on lifecycle needs.

Ottawa's population is expected to increase to 1.4 million people by 2046, a significant increase of 40% since 2018, as summarized in the table below. This growth will put pressure on existing assets and services, and may require new or expanded assets to meet growing needs.

City of Ottawa Population Projections for 2046

	2046 Projection	Growth since 2018
Population	1,409,650	402,150
Private Households	590,600	194,800
Jobs	827,000	189,500

Source: New Official Plan report to Council (ACS2021-PIE-EDP-0036), October 2021

Ottawa approved a new Official Plan (OP) in 2021 and is currently updating the Transportation Master Plan (TMP). As part of the TMP update, a Transit Plan will be developed with major themes of expanding rapid transit and transit priority networks and developing rapid transit stations into multimodal hubs integrated with the surrounding community. The proposed vision states: "In 2046, Ottawa's transportation network will be flexible, dependable, and efficient in meeting the evolving needs of residents and business across the City, while enabling the City to meet its climate change goals. The network will provide travel options for people regardless of their income, identity or ability".

The 2023 Transit Long Range Financial Plan Update provides a list of initiatives and cost forecasts from 2023 to 2048. Each initiative was apportioned between growth and other needs (enhancement, renewal, unfunded from prior years and debt servicing), and summed for the 10-year forecast of this Asset Management Plan.[2]

[2] O-Train Line 1 assets are subject to a 30 year maintenance agreement and detailed requirements for handing over to the City at the end of the contract.

Future Demand and Service Enhancement Needs Forecast for Transit

Asset Class	10-Year Growth Needs ($ Millions)	10-Year Other Needs (Enhancement, Renewal, etc.) ($ Millions)	10-Year Total Needs ($ Millions)
Transit Assets	$10,682.4	$2,387.3	$13,069.7
Total	**$10,682.4**	**$2,387.3**	**$13,069.7**

Asset management planning also needs to consider the City's Climate Change Master Plan goals for both mitigation strategies to slow climate change impacts, such as reducing greenhouse gas emissions, and adaptation strategies to reduce negative impacts associated with existing and future climate change.

Energy Evolution is the action plan for how Ottawa will meet its targets to reduce greenhouse gas emissions. For transit, this primarily includes projects to accelerate fleet electrification and the expansion of transit infrastructure. The Asset Management Plan financial analysis is based on the Transit Long Range Financial Plan Update (September 2023), which:

- Does not include electrification of the transit fleet (and so does not satisfy the Energy Evolution recommendation for electrifying transit).
- Includes future capital projects to expand the transit network, including Stage 3 LRT and various Bus Rapid Transit/Transitway extension projects (which will satisfy most but not all of the Energy Evolution recommendations for expanding transit).

Climate change will impose other additional costs beyond those noted above, for both mitigation and adaptation, which are shown in the table below. These are preliminary estimates based on the latest information available, which will be refined over time. Since these costs were not included in the Transit Long Range Financial Plan Update (September 2023), they are not considered in the Asset Management Plan Financing Strategy, and are presented here for reference purposes.

Estimated Additional Future Costs Due to Climate Change for Transit (does not include fleet electrification and the expansion of transit infrastructure)

Additional Costs due to Climate Change	Estimated 10-Year Total Additional Cost ($ Millions)
Increased operations and maintenance and capital renewal costs for buildings due to gradual, long-term impacts of climate change	$7.8 (operating & maintenance) +10% increase in capital renewal costs
Increased operations and maintenance costs due to extreme weather events	$2.9
Increased capital costs to implement climate change mitigation actions (building retrofits)	$58.7

Some climate change costs have been or are expected in future to be at least partially recovered from upper levels of government; these recoveries are not factored into the estimates. Also, the estimates do not capture damage to capital infrastructure due to catastrophic/extreme weather events (e.g., tornadoes); increased capital renewal needs due to accelerated asset deterioration; increased capital renewal costs for assets other than buildings (such as transitway and dedicated lanes, structures, fleet and equipment); and gradual, long-term impacts due to climate hazards other than extreme heat, extreme rainfall, and freeze-thaw cycles (such as drought, ice storms and wildfires).

4.3 Lifecycle Management and Risk

Lifecyle management activities refer to the set of planned activities and actions undertaken to maintain the current levels of service and achieve good economic life of the assets. The activities undertaken range from operations and maintenance activities, including planned and reactive maintenance, renewal activities (such as condition assessments and rehabilitations), disposal activities and non-infrastructure solutions (such as policies and processes that reduce costs, mitigate risks or maintain/enhance service delivery).

The City applies a risk-based approach to prioritizing asset renewals. The risk assessment frameworks and methods vary across the different types of assets, but are generally based on the importance of each asset in terms of service delivery/continuity and the number of users who could be impacted.

Financing Strategy

The City continues to invest responsibly in maintaining infrastructure and has been increasing its capital investments to align with long-range financial plans. Funding targets recommended in the 2017 Comprehensive Asset Management Program were focused on maintaining critical infrastructure in a state of good repair. There will be a need to update the long range financial plans once new service levels are defined to ensure financial sustainability.

5.1 Expenditure History

For information on historical operating and capital expenditures, refer to the City's historical annual budget documents.

5.2 Expenditure Forecast

Over the next 10 years, the City will continue investing in infrastructure to support operational expenses, respond to renewal needs, serve growth, and provide enhancements. The revenue forecast for transit is based on the Transit Long Range Financial Plan Update (September 2023).

Revenue Forecast for Transit

Component	Revenue Forecast ($ Millions)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Operating Revenue Forecast	$558.6	$509.3	$556.7	$578.9	$601.7	$625.1	$649.6	$674.8	$704.9	$732.9
Capital Revenue Forecast	$404.6	$310.6	$379.3	$451.2	$535.3	$1,964.0	$1,870.5	$1,925.2	$2,030.0	$2,089.3

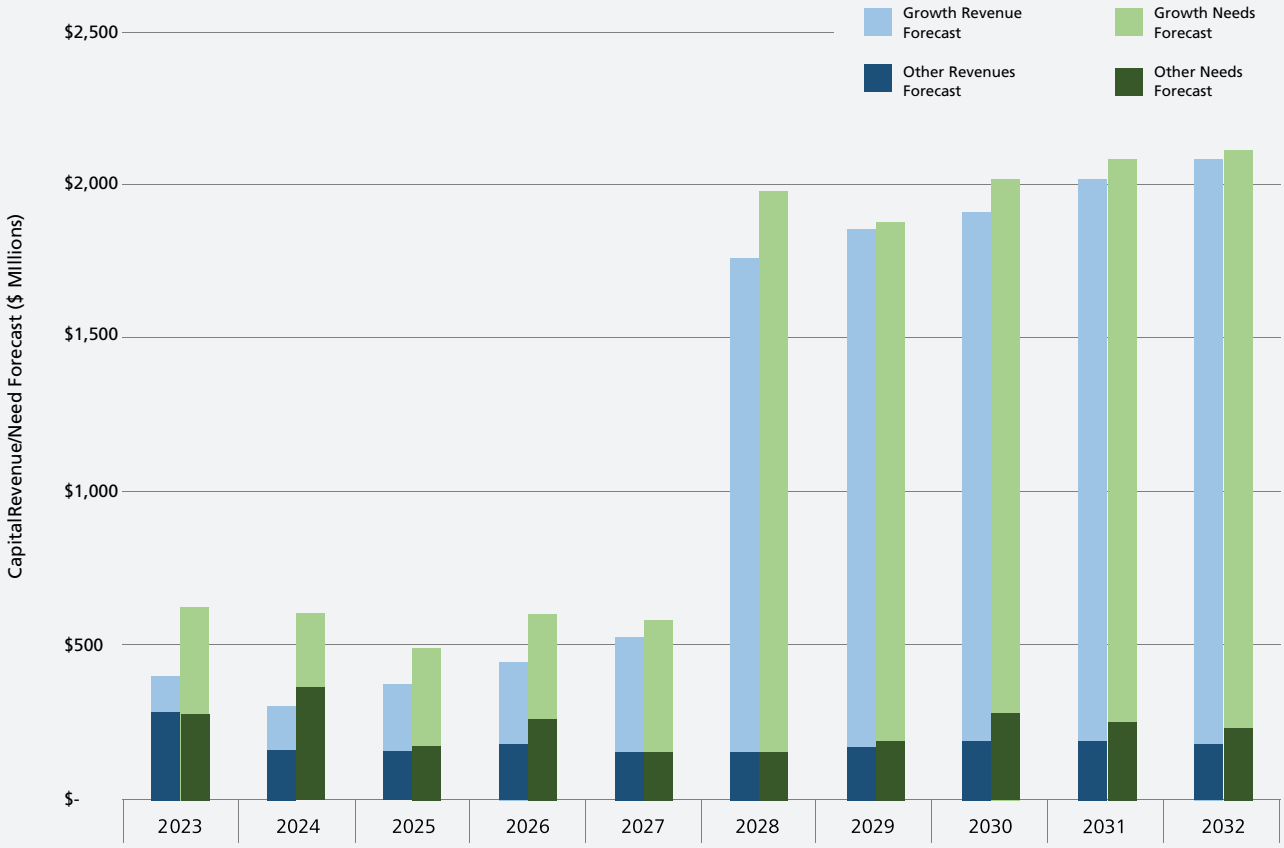
5.3 Funding Gap

The funding gap is the difference between the forecasted asset needs and the planned capital budget. Over the next 10 years, the total needs for transit assets is almost $13.1 billion, while the planned budget is just under $12 billion, leading to a funding gap of $1.1 billion. The forecasted investment need, anticipated funding and funding gap for transit assets are summarized in the table and figure below.

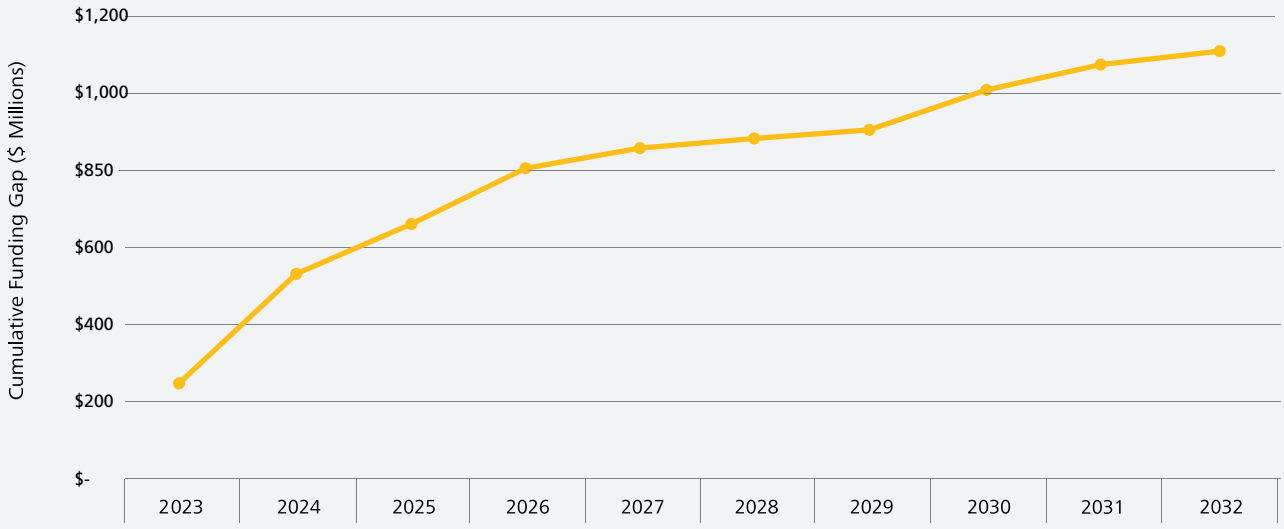
Funding Gap for Transit Assets

Component	10-Year Need ($ Millions)	10-Year Revenue ($ Millions)	10-Year Gap ($ Millions)
Transit Assets - Growth	$10,682.4	$10,103.9	($578.5)
Transit Assets - Other	$2,387.3	$1,856.0	($531.3)
Total	**$13,069.7**	**$11,959.9**	**($1,109.8)**

Revenue and Needs Forecast for Transit



Cumulative Funding Gap for Transit



The capital revenue forecast from the Transit Long Range Financial Plan assumes contributions of two-thirds funding from other levels of government for Bus Rapid Transit projects and 100 per cent funding for future light rail projects . The revenue forecast from the Long Range Financial Plan update in September 2023 included an estimate of what the City could receive in funding from the Federal Permanent Public Transit Fund, but it is not known how much will be allocated to Ottawa or what the eligibility terms will be that could potentially impact other funding assumptions made. If the funding assumptions made in the Long Range Financial Plan do not materialize, the funding gap forecasted could increase.

Improvement and Monitoring Plan

Based on the snapshot of current conditions and existing plans presented in the Transit Asset Management Plan, areas of potential improvement include:

- Data gaps, data management, and record keeping
- Cost estimating
- Level of service measures and targets
- Inspection, condition assessment, corrective maintenance, and risk assessment
- Asset maintenance practices for facilities
- Climate change resiliency
- Applying Council's equity and inclusion lens to the assessment of the functional level of service of built infrastructure

The Transit Asset Management Plan will be reviewed and updated on a regular basis and over time these improvements will be reflected in future versions of the Asset Management Plan.

More Information

For more information about comprehensive asset management, or to learn more about the City's Comprehensive Asset Management Program, please visit Ottawa.ca.