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The Regional Municipality of Durham Report

To:	Committee of the Whole
From:	Commissioner of Finance and Commissioner of Works
Report:	#2022-COW-14
Date:	June 22, 2022

Subject:

2022 Asset Management Plan

Recommendation:

That the Committee of the Whole recommends to Regional Council that:

A) Regional Council endorse the 2022 Regional Municipality of Durham Asset Management Plan; and

B) The asset management plan be posted on the Region's website and the Ministry of Municipal Affairs and Housing be advised.

Executive Summary:

1. Purpose

1.1 The 2022 Asset Management Plan details the state of the Region's infrastructure, service levels, asset performance, lifecycle analysis, climate change risks and adaptation and mitigation initiatives to protect the Region's assets.

1.2 The Region's Asset Management Plan is a collaborative cross departmental effort produced from year-round asset management processes to maintain assets and identify investment needs to meet target service levels. The process is guided by the Region's Corporate Strategic Asset Management Policy.

1.3 Aligned with best business practices, the Asset Management Plan informs the Region's long-term planning and the annual business plans, budgets and nine-year capital forecast.

1.4 This report maintains the Region's compliance with provincial and federal regulatory requirements and meets grant funding programs' requirements, including new requirements under Ontario Regulation 588/17 that are due by July 1, 2022.

2. Previous Reports and Decisions

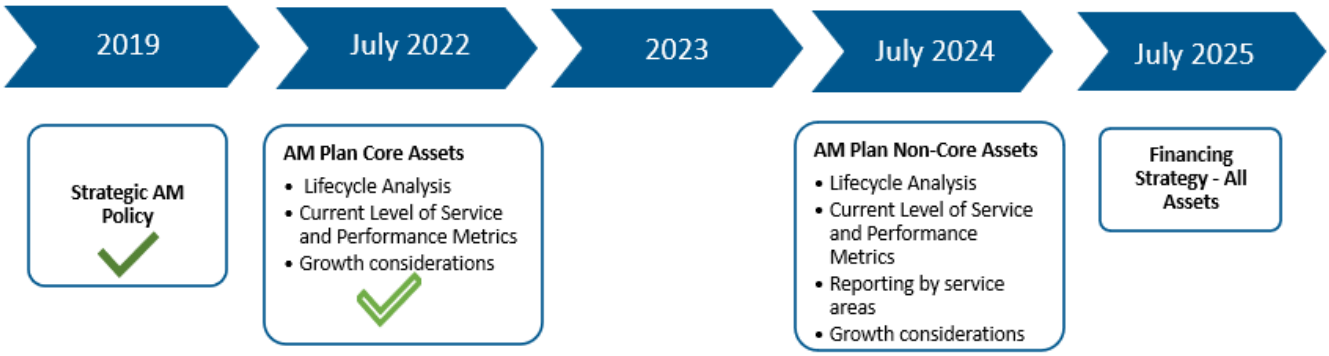
2.1 On June 26, 2019 Regional Council approved the Region's 2019 Asset Management Plan (Report 2019-COW-16). This report presented the Region's asset management goals, approach and policies, and advised Council on the state of the Region's infrastructure, service levels, performance, lifecycle considerations and risk and climate change adaptation and mitigation initiatives.

2.2 On September 30, 2020 Regional Council approved the Region's 2020 Corporate Asset Management Update Report (Report 2020-COW-24). This report provided an update to the Region's full 2019 Asset Management Plan (Report 2019-COW-16).

3. Complying with Ontario Regulation 588/17

3.1 On January 1, 2018, Ontario Regulation 588/17, Asset Management Planning for Municipal Infrastructure, under the Ontario Infrastructure for Jobs and Prosperity Act 2015, came into effect with a full implementation deadline of 2024. Due to the pandemic, the regulation was amended to provide a one-year extension to implementation timelines. The regulation requires the Region's municipal asset management plans to include the following new aspects as specified in Figure 1.

Figure 1: Ontario Regulation 588/17 Key Changes and Timeline



3.2 Compliance with Ontario Regulation 588/17 is required for senior government capital funding programs like the Canada Community-Building Fund (CCBF), formerly the Federal Gas Tax Fund.

3.3 The Region's 2022 Asset Management Plan achieves the new requirements outlined in Ontario Regulation 588/17 for core assets (Water, Sewer, Roads, Bridges, Culverts and Traffic Systems) by July 1, 2022 and includes:

- Community levels of service (qualitative descriptions on service scope and reliability);
- Technical levels of service (technical service delivery metrics);

- Inventory with asset condition, replacement value and remaining useful life; and,
- Lifecycle analysis on operating and capital investment to maintain current levels of service over a ten-year period.

3.4 Lifecycle analysis considers all operating and capital costs required for an asset to deliver its targeted service level over its useful life; from initial acquisition, repairs and maintenance, rehabilitation and eventual decommissioning costs. Ontario Regulation 588/17 requires the lifecycle analysis for a ten-year forecast period.

3.5 Regional staff will continue to refine lifecycle data processes and cost analysis aligned with the continual improvement practices enshrined in both the regulation and the Region's Corporate Strategic Asset Management Policy.

3.6 Additionally, the Region is well positioned to meet additional reporting requirements due in 2024 and 2025 including:

- Lifecycle reporting requirements for non-core assets;
- Levels of service and technical metrics for non-core assets;
- Proposed levels of service and costs associated with proposed and technical levels of service; and
- A robust financing strategy.

3.7 In addition to Ontario Regulation 588/17, the Region's Asset Management Plan ensures compliance with the following:

- The Development Charges Act;
- The Smart Growth for Our Communities Act, 2015;
- Requirements under A Place to Grow: Growth Plan for the Greater Golden Horseshoe to support the next Municipal Comprehensive Review (Regional Official Plan Amendment);
- The Region's Tangible Capital Assets (TCA) Policy;
- PSAB requirements for the recording of Tangible Capital Assets; and
- Federal CCBF Agreement requirements.

4. Asset Management Planning Process

4.1 Formal asset management has been in place at the Region since 2004. In 2019, Council approved the Region's first Corporate Strategic Asset Management Policy. The policy articulated asset management goals, objectives, guiding principles as well as an asset management framework. In accordance with Ontario Regulation 588/17, the Region's Corporate Strategic Asset Management Policy must be reviewed and updated at least once every five years.

4.2 In 2020, Council received a Corporate Asset Management Update Report that provided an update on the Region's 2019 Asset Management Plan. The report provided an update on the state of the Region's infrastructure including replacement costs, condition rating and updated infrastructure investment needs as of December 31, 2019 to help inform the development of the 2021 budget and nine-year capital forecast;

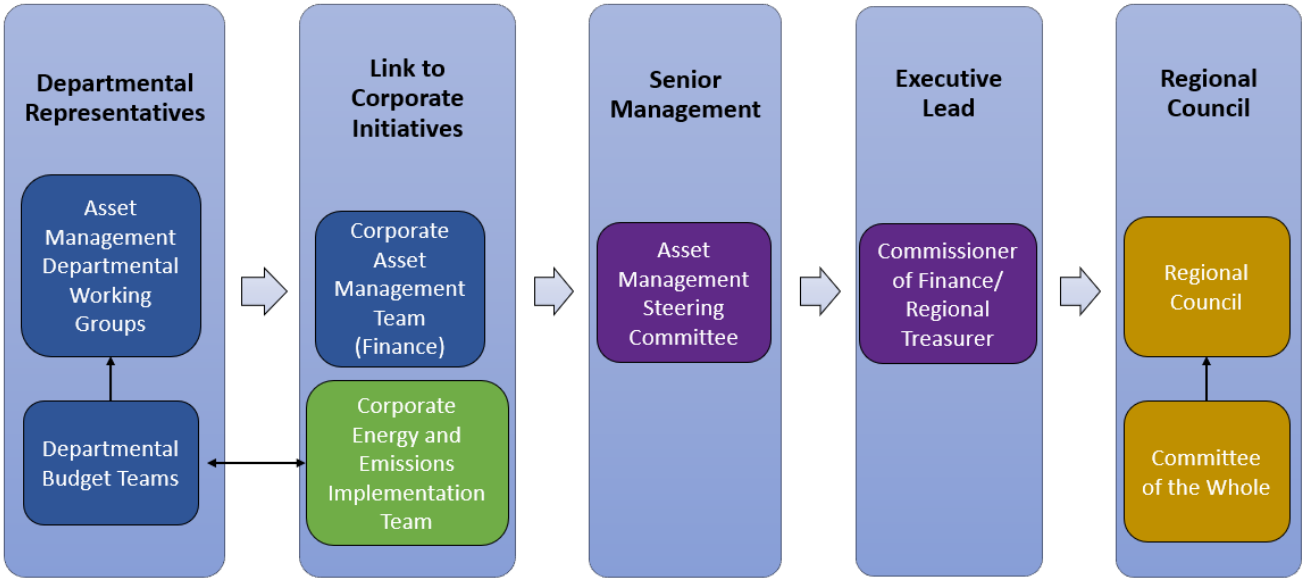
4.3 Asset management planning is a cross-departmental continuous year-round process that supports the development of Regional business and financial plans as illustrated in Figure 2. The asset management planning process is a cornerstone of the Region's annual business planning cycle.

Figure 2: Region's Asset Management Planning Process

4.4 The Asset Management Plan considers asset condition, remaining useful life and service needs and identifies operating and capital requirements including maintenance, repair, rehabilitation, and replacement over a ten-year period. Asset management investment needs and financing strategies are addressed through the annual business plans, budget and nine-year capital forecast.

4.5 Development of the Asset Management Plan is led by the Finance Department and overseen by a Director-level Steering Committee. Figure 3 illustrates the governance structure of asset management at the Region.

Figure 3: Regional Asset Management Governance Structure



4.6 Departmental working groups, coordinated by the Finance Department collaboratively gather, analyze and report on the various asset management components detailed in Figure 4:

Figure 4: Asset Management Analysis Components

5. Replacement Value of Regional Assets

5.1 The Region's infrastructure assets have a total replacement value of approximately $17.85 billion (as of December 31, 2021), of which $11.50 billion are utility-rate supported and $6.35 billion are property tax supported.

$11.50 billion in Utility-Rate supported replacement value

$6.35 billion in Property Tax supported replacement value

5.2 Replacement values are impacted by both growth (additional infrastructure) and inflationary cost increases. The December 31, 2021 replacement value of the Region's assets has increased $1.82 billion (11.39 per cent) from December 31, 2020.

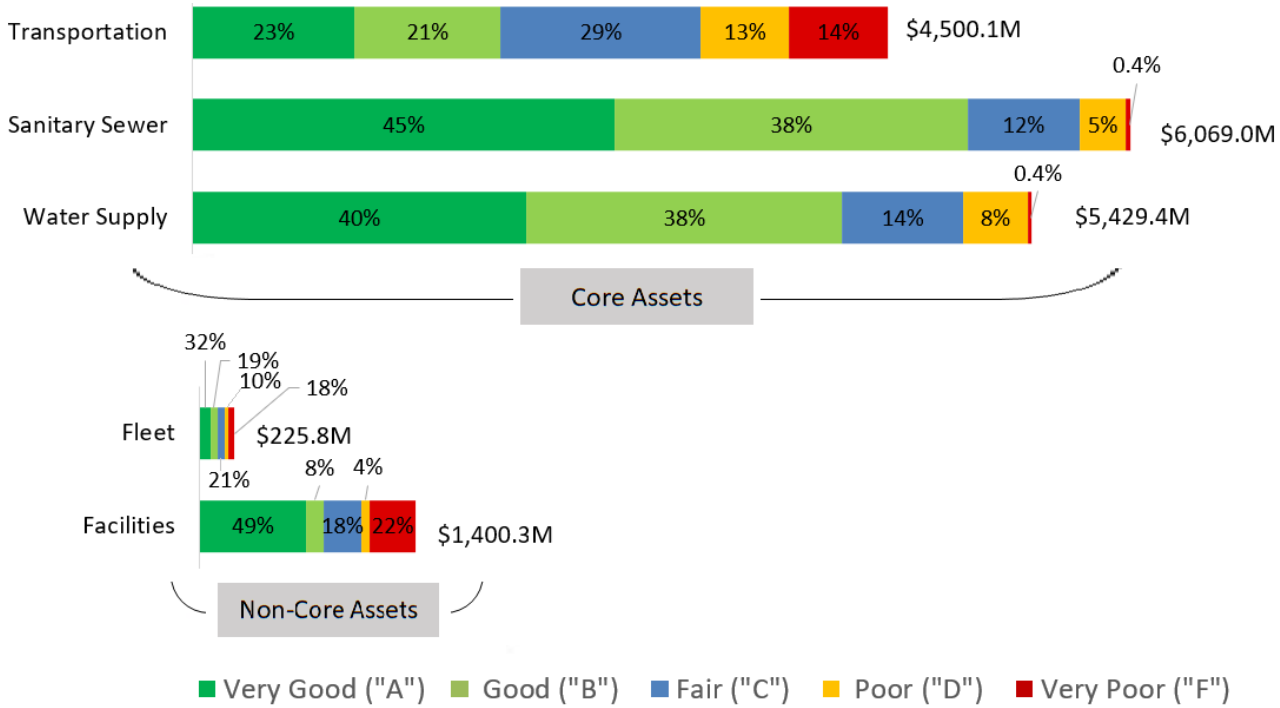
5.3 For 2021, approximately $73,435 per Durham household would be required to replace the Region's entire asset inventory. This is a representation of the community's investment in Regional infrastructure.

Investment/Household to Replace all Assets $73,435

6. The Condition of the Region's Infrastructure

6.1 Asset condition helps to inform the Region's prioritization of maintenance, repair and replacement investments. The average condition across all Regional assets is Good and is consistent with the average condition in 2020. Across all assets, most are rated in Fair to Very Good condition (86.3 per cent based on proportion of total replacement value). Figure 5 below displays the total replacement values and condition ratings of the Region's major asset classes except for equipment (replacement value $0.2 billion) as these assets are pooled and current condition ratings are not available.

Figure 5: Condition and Replacement Values for Regional Assets*



*Condition ratings for assets may not add to 100 per cent due to rounding.

6.2 An asset assessed as Poor or Very Poor condition does not represent a health and safety risk. Rather, these are assets that may not be performing as intended, may be experiencing higher than average rehabilitation and/or maintenance costs due to condition, or may be deemed to be at or near the end of its useful life. When warranted, Very Poor assets are considered for current year replacement or significant rehabilitation. Staff balance replacement and repair work with the impact of asset poor performance to ensure assets are not prematurely replaced and deliver best value to user rate and property taxpayers.

6.3 Table 1 outlines the approaches Regional asset management staff employ to assess the condition of each asset class:

Table 1: Asset Condition Assessment Methods

Asset Class	Assessment Methods
Linear Water and Sewer (e.g. buried pipes)	Pipe material, break rates, inspections, remaining service life and operational concerns
Vertical Water and Sewer (facilities)	Site-specific inspections
Roads and Traffic Infrastructure	Inspections and consideration of age-based condition rating where appropriate
Bridges and Culverts >3m	Biennial visual inspections
Facilities	Building Condition Assessment (BCA) and age (where BCA not yet complete)

6.4 The assets currently rated in Poor to Very Poor condition will continue to undergo assessment for investment through the 2023 Business Planning and Budget cycle.

- Of assets in Very Poor condition, roads represent approximately 62.0 per cent ($640.0 million) with the Pavement Condition Index (PCI) decreasing for the overall Regional network from 53.5 in 2020 to 52.0 in 2021. Roads in Very Poor Condition represent 22.2 per cent of the Region's total Roads inventory ($2,882.8 million). Road rehabilitation continues to be a Regional Council priority and the Region's annual investment in road rehabilitation has increased from $23.5 million in 2017 to $38.7 million in 2022, an increase of $15.2 million (64.7 per cent). Given the nature of road rehabilitation and replacement there is often a time lag between funding approval and project completion. It is anticipated that the increased investment in roads rehabilitation will improve PCI.
- Facilities represent 29.2 per cent ($301.7 million) of Regional assets in Very Poor condition. Durham Regional Local Housing Corporation (DRLHC) represents the majority of the Region's facility assets in Very Poor condition ($262.6 million). The 2022 Budget includes $3.3 million for repairs and renovations for DRLHC facilities and an additional $26.0 million in facility capital works including $22.24 million for deep energy efficient retrofits at four

DRLHC Senior's housing properties. The 2023 to 2031 capital forecast includes an additional investment of $55.0 million in DRLHC facilities capital works.

7. Service Levels

7.1 Assets are instrumental in the Region delivering services at its desired service levels. Desired service levels are set both by regulatory compliance and Regional priorities. Regional plans, studies, policies, by-laws influencing all assets' service levels include:

- Durham Region Strategic Plan: 2020 – 2024;
- The Regional Official Plan;
- Durham Region Corporate Climate Change Action Plan;
- Energy Conservation and Demand Management Plan (CDM); and
- The 2022 Durham Accessibility and Inclusivity Standards.

7.2 Additionally, service levels are also influenced by:

- Departmental reports and plans;
- Best engineering and industry practices;
- Regulatory guidelines and/or requirements; and
- Other performance expectations as defined through multiple reports as approved by Regional Council.

7.3 Desired service levels influence asset management planning and subsequent investment decisions. Attachments #2 through #7 outline the desired service levels for each asset class as well as performance measures to track progress.

7.4 Ontario Regulation 588/17 sets out specific technical metrics and qualitative descriptions that must be included in service level reporting for core assets (water, wastewater, roads, bridges, culverts, traffic systems) by July 1, 2022. The Region is compliant with all the service level reporting requirements.

7.5 Moving forward, Regional staff will review and update service level reporting requirements for non-core assets, as required by Ontario Regulation 588/17, in advance of the July 1, 2024 deadline. In addition, service levels for core services will continue to be refined to reflect Regional Council approved goals, plans, policies, strategies as well as best engineering practices.

8. Lifecycle Considerations

8.1 Lifecycle analysis considers the costs for all capital and operating activities undertaken during the life of an asset to ensure it meets its desired service levels and target performance measures at the best value to user rate and property taxpayers. Lifecycle costs begin before an asset is even acquired including planning activities to determine needs, through to eventual asset disposal and possible site remediation activities.

8.2 Ontario Regulation 588/17 requires lifecycle analysis for core assets be included in the Region's Asset Management Plan by July 1, 2022. To ensure compliance with the Regulation, staff considered the operating and capital costs needed to ensure assets could deliver on service levels as well as the optimal repair, maintenance and replacement activities over the asset's lifecycle.

8.3 Lifecycle costing analysis for core assets is contained in the attached detailed Asset Management Plan and in Attachments #2, #3 and #4. The analysis includes a preliminary comparison of ideal operating and capital asset investment levels over the next ten years compared to the level of investment included in the 2022 Business Plans and Budget and nine-year forecast (2023 to 2031). Asset classes have varying levels of gaps between ideal investment levels and the current approved funding levels which are further outlined in Figure 7 and Attachments #2, #3 and #4.

8.4 Regional staff will continue to refine lifecycle costing data processes and analysis techniques in upcoming asset management plans including an assessment of lifecycle costs for non-core infrastructure by July 1, 2024 to remain compliant with Ontario Regulation 588/17.

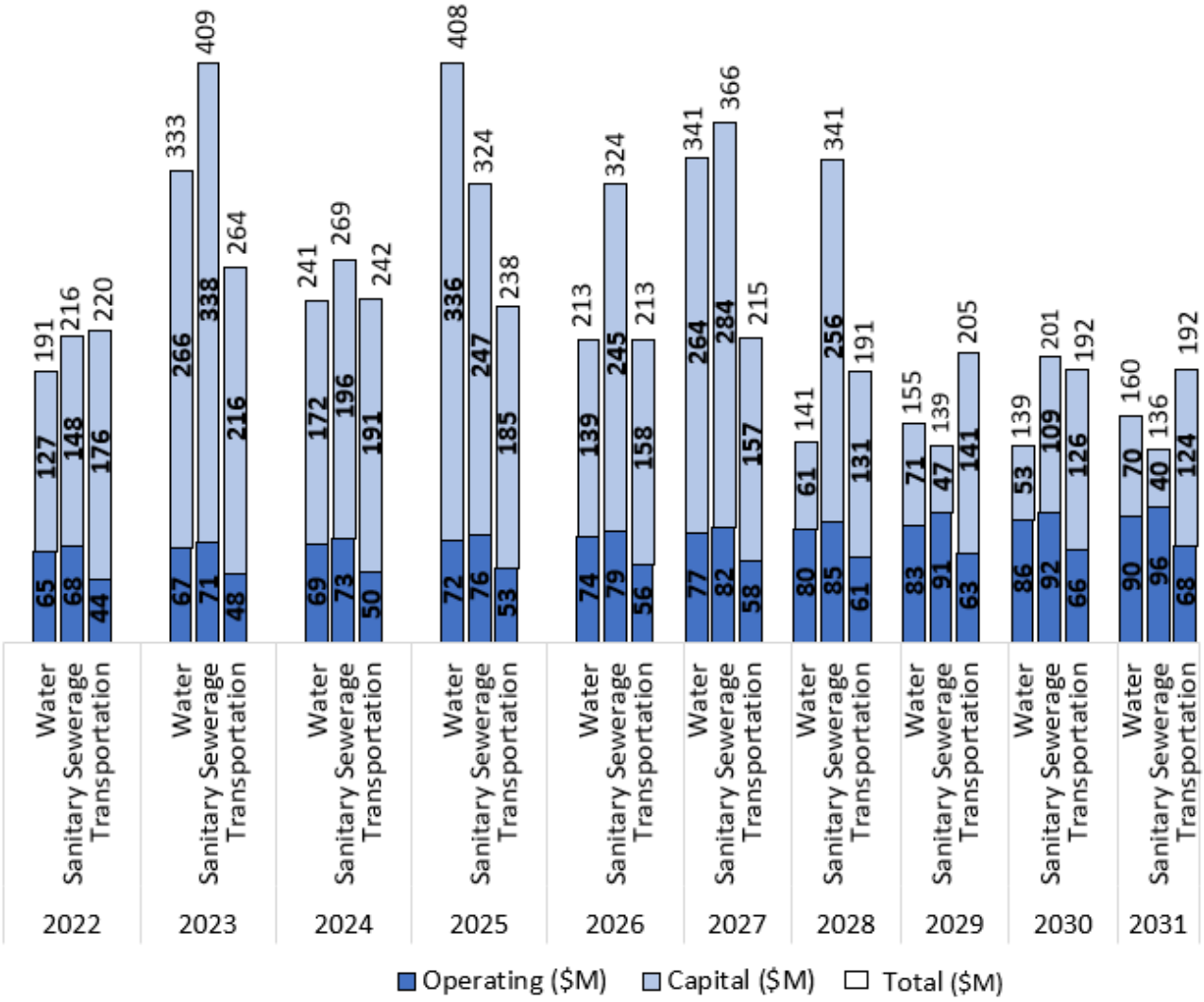
9. Core Assets Lifecycle Costs and Capital Forecast

Core Assets Lifecycle Costs

9.1 In accordance with Ontario Regulation 588/17, the 2022 Asset Management Plan includes an analysis of lifecycle costing for core assets.

9.2 The Region's 2022 Business Plans and Budget includes $627.7 million in gross lifecycle costs (operating and capital) for water supply, sanitary sewerage, roads, storm sewer, bridges, culverts and traffic system as illustrated in Figure 6. Over the nine-year forecast period, total planned lifecycle expenditures total $6,592.4 million for core assets.

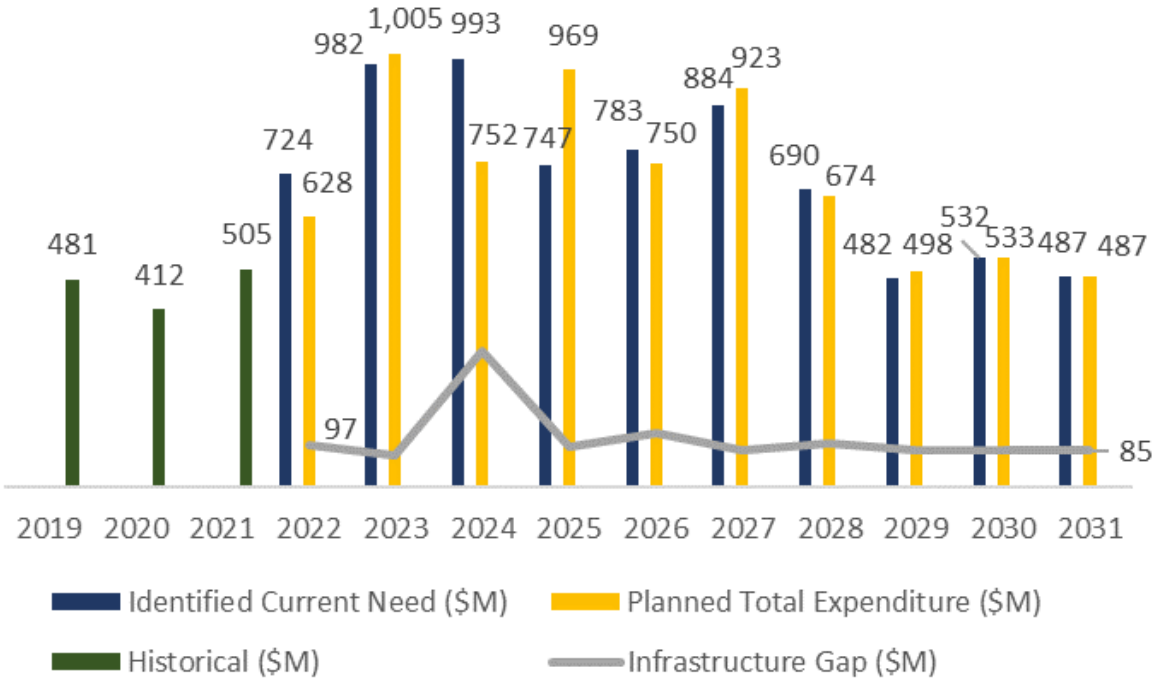
Figure 6: Ten-Year Lifecycle Costs for Core Assets ($ millions)*



*Operating and Capital may not add to Total due to rounding.

9.3 As part of the lifecycle costing analysis for core assets, staff analysed the current planned funding against expected funding needs (both operating and capital) to meet service levels. Through this analysis an infrastructure funding gap of $96.6 million in 2022 was identified, decreasing to $85.0 million by 2031 based on planned investments (Figure 7).

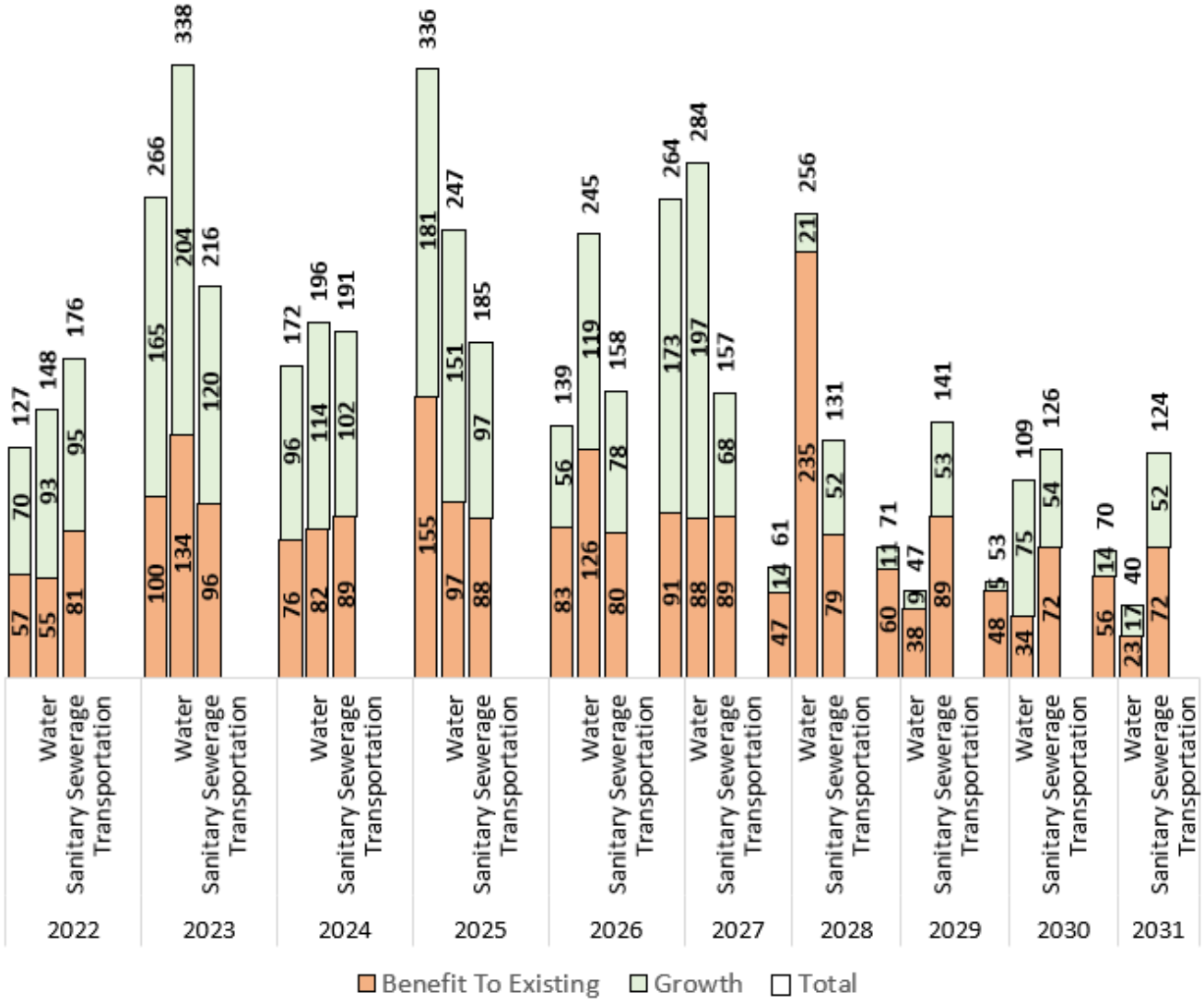
Figure 7: Infrastructure Gap Analysis for Core Assets ($ millions)



Core Assets Capital Forecast

9.4 The Region's 2022 Business Plans and Budget identified major capital investments for water, sewer and transportation services of $5,074.0 million from 2022 to 2031. As illustrated in Figure 8, approximately $2,555.4 million of this investment is growth related and proposed to be funded primarily from development charges. The balance of $2,518.6 million will to be funded primarily from property taxes, water and sewer user rates and Regional reserve funds.

Figure 8: Ten-Year Capital Forecast: Core Assets ($ millions)



*Benefit to Existing and Growth may not add to Total due to rounding.

9.5 Forecasted infrastructure needs will be updated, refined and reprioritized during the 2023 business planning and budget and long-term financial planning processes. Funding needs, gaps and strategies to address these infrastructure needs will also be refined through ongoing long-term capital planning exercises and future business plans and budgets.

10. Climate Change Mitigation and Adaptation Measures

10.1 The Durham Region Corporate Climate Action Plan has set targets to achieve net-zero corporate GHG emissions by 2045. The 2022 Business Plans and Budget includes a number of asset investments to reduce corporate GHG emissions including the purchase of low carbon vehicles, the completion of Durham Region Transit's zero emission fleet and facility feasibility study, the use of recycled materials

in construction projects, the completion of various deep energy retrofits of a number Regional facilities, and the undertaking of comprehensive building condition assessments and level 3 energy audits to document the baseline and inform the development of a greenhouse gas emissions reduction plan and pathway for the balance of the Region's facilities.

10.2 Staff employ strategies to prepare for the impacts of a changing climate as part of ongoing asset management best practices and in accordance with Ontario Regulation 588/17 requirements. Asset design, including material types, technical specifications and location, is all impacted by consideration of climate adaptation.

10.3 The asset class attachments (Attachments #2 through #7) provide further details on the specific measures being employed to adapt assets to a changing climate and highlight the ways in which investments in assets are aligned with the Region's corporate GHG inventory reduction targets.

11. Risk

11.1 Regional staff proactively analyze potential risks to assets on an ongoing basis considering risk likelihood and impact. Identified risk mitigation strategies include coordinated responses to potential risk events, measures to ensure business continuity, and systems to address service interruption.

11.2 The asset class attachments identify risks specific to each asset class as well as mitigation measures.

12. Relationship to Strategic Plan

12.1 This report aligns with and addresses the following Durham Region Strategic Plan goal and priorities.

- Goal 5 Service Excellence – to provide exceptional value to Durham user rate and property taxpayers through responsive, effective and fiscally sustainable service delivery. By responsibly managing the Region's assets, the proposed 2022 Asset Management Plan looks to optimize resources to deliver critical infrastructure and servicing for current and future generations.

13. Next Steps

13.1 Infrastructure needs identified in this report will inform the 2023 business planning and budget process, including the 2023 Budget Guideline Report, capital planning, and departmental business plans and budgets.

13.2 Asset management staff will continue to work collaboratively to meet the remaining asset management regulatory requirements due between 2024 and 2025. The specific next steps include:

- Refining data collection processes and analysis to improve asset management planning capabilities and lifecycle costing, to inform future business plans, budgets, capital forecasts, and long-term financial planning strategies;
- Shifting to fully report on assets by service areas (e.g., DRPS, Social Services) as opposed to asset class categories (e.g., Fleet, Facilities, etc.);
- Defining asset service levels and performance measurement for all non-core assets;
- Refining lifecycle data collection processes and analysis for non-core assets including consideration of operating costs and ideal maintenance, repair and replacement schedules to meet service levels;
- Continuing to work with the Office of the CAO to seek alignment between corporate climate initiatives and asset management processes; and
- Continuing to assess risk, business continuity, asset criticality, and asset reliability.

14. Conclusion

14.1 The Asset Management process is a critical element in the Region's business planning, budget and long-term financial planning processes. The Asset Management Plan details the current condition of the Region's assets and forecasts future investment needs for repair, maintenance, and replacements.

14.2 The Region's 2022 Asset Management Plan complies with Ontario Regulation 588/17 additional reporting requirements for core assets and has been improved to include a detailed lifecycle analysis which considers operating and capital needs for the entire life of an asset and potential gaps between current and ideal investment levels for the Region's core assets. This analysis will continue to be refined and inform future Business Plans and Budgets.

14.3 The overall replacement value of the Region's assets is increasing due to growth demands for additional infrastructure and inflationary pressures which were higher in 2021 than in recent years. The asset class attachments (Attachments #2 through #7) provide additional details on the change in replacement values for each asset class.

14.4 The condition of the Region's core assets remained relatively stable year-over-year as a result of preventative maintenance, rehabilitation and timely repairs and replacements with strategic investments planned that will address many assets currently in Very Poor condition. Attachments #2, #3 and #4 provide detail on how well core assets are meeting their service levels and performance targets.

14.5 As part of continual improvement, the asset management planning processes of data collection, asset assessment and asset and lifecycle analysis will continue to be refined and improved.

14.6 Regional staff will continue to work collaboratively to meet new reporting requirements for lifecycle costing and current levels of service for non-core assets and the development of financing strategies for core and non-core assets. The Region is well positioned to meet these additional Ontario Regulation 588/17 requirements due in 2024 and 2025.

Attachments:

Detailed 2022 Regional Municipality of Durham Corporate Asset Management Plan

Attachment #1: Regional Asset Inventory, Replacement Value and Condition

Attachment #2: Water Supply Asset Class Report

Attachment #3: Sanitary Sewerage Asset Class Report

Attachment #4: Transportation Asset Class Report

Attachment #5: Durham Region Transit Asset Class Report

Attachment #6: Fleet Asset Class Report

Attachment #7: Facilities Asset Class Report

Attachment #8: Equipment Asset Class Report

Respectfully submitted,

Original Signed By
Nancy Taylor, BBA, CPA, CA
Commissioner of Finance

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Recommended for Presentation to Committee

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DURHAM REGION

2022 Asset Management Plan

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Attachment #1: Regional Asset Inventory, Replacement Value and Condition

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Attachment #5: Durham Region Transit Asset Class Report

Attachment #6: Fleet Asset Class Report

Attachment #7: Facilities Asset Class Report

Attachment #8: Equipment Asset Class Report

1. Overview of Asset Management Processes

1.1 Formal asset management has been in place at the Region of Durham since 2004. In 2019, Council approved the Region's first Corporate Strategic Asset Management Policy. The policy articulated asset management goals, objectives, guiding principles as well as an asset management framework. In accordance with Ontario Regulation 588/17 this policy must be reviewed and updated once every five years.

1.2 Year-round asset management planning processes are undertaken as part of the Region's best business practices of long-term financial planning as well as to ensure compliance with all senior government grant programs.

1.3 Asset investment priorities are identified over a multi-year planning horizon based on lifecycle analysis, asset condition, and risks assessment with the objective of delivering approved service levels that are aligned with corporate goals and comply with regulatory requirements.

1.4 Financing to fund identified asset investment priorities is sought through the Region's annual business planning and budget process. Investment decisions balance asset condition and service needs with ensuring assets are not prematurely replaced to ensure best value for rate and property taxpayers and the community.

1.5 The 2022 Asset Management Plan includes analysis of the following:

- Current asset status (inventory, replacement value, condition, average age, and remaining useful life);
- Service levels and asset performance based on Regionally-defined objectives, best practice and regulatory requirements;
- Lifecycle analysis for core assets (water, sanitary sewerage system and transportation);
- Climate mitigation and climate adaption initiatives including linkages to the Corporate Climate Change Action Plan; and,
- Infrastructure investment needs and financial planning strategies.

1.6 Development of the Asset Management Plan is a multi-departmental collaborative process led by the Finance Department and overseen by a Director-level Steering Committee.

1.7 The Region's Asset Management Plan and supporting asset management processes are compliant with Ontario Regulation 588/17, the regulation governing municipal asset management plans. Ontario Regulation 588/17 was passed in 2018 with a phased implementation that must be fully implemented by municipalities by July 1, 2025 (as amended in 2021 due to the pandemic).

1.8 The Region's aggregated asset information (inventory, condition and replacement value) is provided in Attachment #1 and Attachments #2 through #8 provide details of each asset class namely water supply, sanitary sewerage, transportation, facilities, transit, fleet and equipment.

2. The State of the Region's Infrastructure

2.1 Under the coordination of the Corporate Asset Management Team in Finance, year-round tracking, assessment and analysis of all Regional assets by departmental asset working teams determine inventory, valuations, conditions, average ages and remaining useful life.

Table 1: Key Components of the State of Infrastructure

Component	Description
Inventory	Asset inventories are tracked by asset class including consideration of new assets acquired and decommissioned assets. Year-over-year changes are identified and analyzed.
Replacement Costs	Asset replacement costs are updated annually using the most up to date information, with significant year-over-year changes analyzed.
Condition Assessment Ratings	Asset condition ratings from an "A" (Very Good) to an "F" (Very Poor) are assigned using the most appropriate assessment methods and the best data available. Rating changes year-over-year are analyzed.
Remaining Useful Life	The average age and useful lives are updated and assigned relative to the asset lifespan.

Asset Inventory

2.2 Table 2 provides a summary of the Region's infrastructure assets as of December 31, 2021. Further details can be found in Attachment 1.

Table 2: Regional Infrastructure Summary

Asset Class	Assets Inventory (December 31, 2021)
Water Supply System	Watermains (2,631 km), control and specialty valves (28,394), hydrants (16,785), service connections (182,448), fire lines (1,948), meters (182,063), water supply plants and well systems (14), pumping stations (10), water storage facilities (14), combined pumping station/storage (8).
Sanitary Sewerage System	Gravity sewers (2,205 km), forcemains (65 km), maintenance holes (32,096), service connections (178,581), water pollution control plants (11), sanitary sewage pumping stations (51), wastewater storage facilities (2).
Transportation System	Roads (2,461 lane km), bridges and culverts >3m (240), culverts<3m (30 km), storm sewer mains (322 km), maintenance holes (5,053), catch basins (5,878), outfalls (475), traffic control signals (493), traffic control systems (16), communication infrastructure (338 km), roadside protection (111 km), signs (20,961), and CCTV (108 intersections).
Region-Owned Facilities	Durham Regional Police Service (DRPS) facilities (8), Durham Regional Local Housing Corporation (DRLHC) facilities (23), Works depots (5), Region of Durham Paramedic Services (RDPS) stations (8), Region-owned childcare facilities (4), waste management facilities (7), long-term care homes (4), and corporate/other facilities (5).
Durham Region Transit (DRT)	241 Transit vehicles (conventional buses, demand responsive service vehicles and supervisory vehicles), 3 garage/maintenance facilities and 2,579 bus pads and shelters.
Vehicles and Fleet	84 RDPS vehicles, 363 DRPS vehicles and 374 Works vehicles
Equipment	Information technology; communications infrastructure; DRPS, long-term care, and RDPS equipment; and Works equipment, furniture and fixtures,

Replacement Value of Regional Assets

2.3 As of December 31, 2021, the Region's infrastructure assets had an estimated replacement value of approximately $17.85 billion representing an increase of 11.39 per cent from December 31, 2020. (Figure 1 shows both asset condition and replacement values).

2.4 Replacement values assist with long-term financial planning through informing cost estimates for eventual asset replacement at end of useful life. Regional staff consider the following information when assigning replacement values:

- Annual increases in benchmark construction costs (Statistic Canada's Non-Residential Building Construction Price Index) and other inflationary asset replacement cost pressures;
- Updated market information including recent vendor quotes; and
- Inclusion of new assets into the Region's inventory to accommodate growth (e.g., new Seaton Paramedic Services Response Station and Training Centre).

The Condition of the Region's Assets

2.5 Asset condition assessment, coupled with service level targets, play an important role in replacement and maintenance decisions. Table 3 highlights the most common asset condition assessment approaches undertaken at the Region.

Table 3: Asset Condition Assessment Methods

Asset Class	Assessment Methods
Linear Water and Sewer (e.g. pipeline)	Pipe material, break rates, inspections, remaining service life and operational concerns.
Vertical Water and Sewer	Site specific inspections
Roads and Traffic Infrastructure	Inspections and consideration of age-based condition rating where appropriate
Bridges and Culverts >3m	Biennial visual inspections
Facilities	Building Condition Assessment (BCA) and age (where BCA not yet complete)

2.6 Using the above-mentioned approaches, Regional assets are assigned one of five condition ratings described in Table 4.

Table 4: Condition Rating Categories and Description

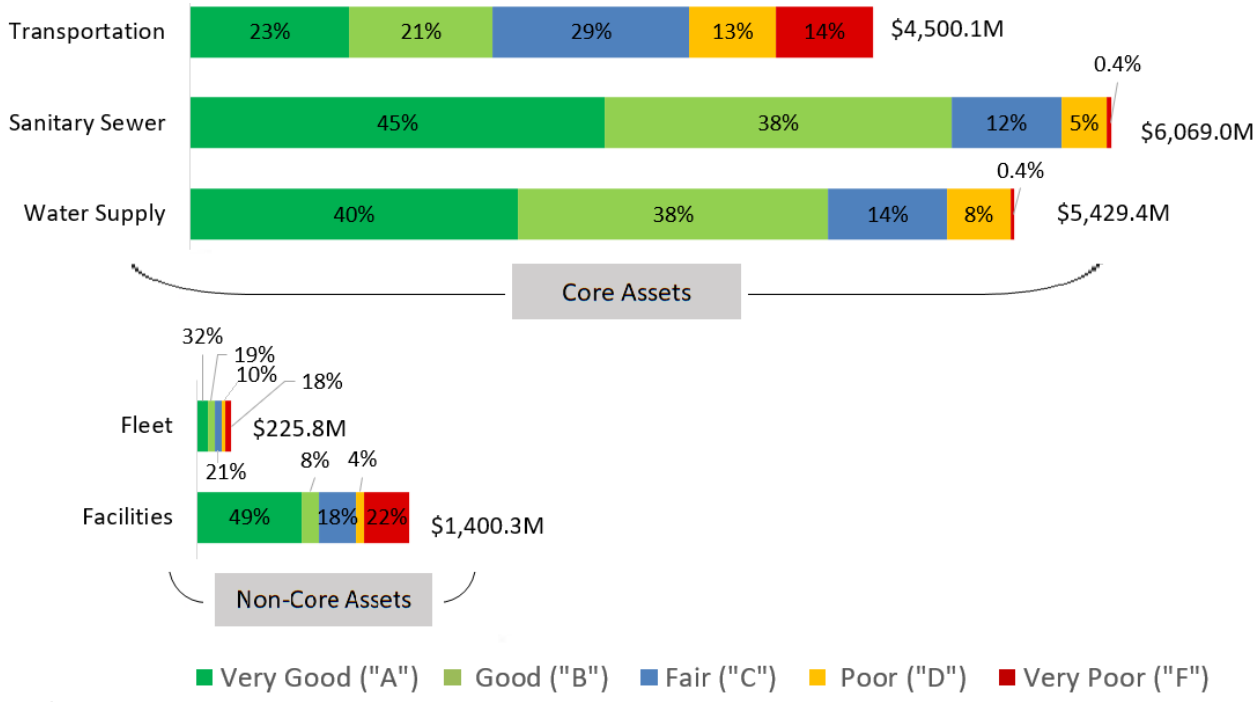
Grade	Rating	Description
A	Very Good	Asset is sound and functioning as intended. Typically, would be a newer asset.
B	Good	Asset is sound and functioning as intended. Typically, could be within mid-range of useful life.
C	Fair	Asset is starting to show signs of deterioration and functioning lower than intended. Typically, asset could be approaching later stages of useful life.
D	Poor	Asset is showing significant signs of deterioration and functioning much lower than intended. Typically, asset could be approaching the end of useful life.
F	Very Poor	Assets are not performing as intended. Typically, asset could be at the end of useful life.

2.7 An asset which has been classified as Poor or Very Poor does not represent a health and safety risk. Rather, these are assets that may not be performing as intended, may be experiencing higher than average rehabilitation and/or maintenance costs due to condition, or may be deemed to be at the end of their useful life. When warranted, Very Poor assets are considered for current year replacement or significant rehabilitation. Staff balance replacement and repair work with the impact of asset poor performance to ensure assets are not prematurely replaced and deliver best value to rate and property taxpayers.

2.8 The asset management working groups continue to refine, advance, and improve condition-based assessments including the planned completion of Facility BCAs for all Regional facilities by 2023.

2.9 Figure 1 illustrates the condition and replacement values for the Region's assets as of December 31, 2021. More detailed information on the asset inventory, replacement value and condition is included in Attachment #1.

Figure 1: Condition and Replacement Values for Regional Assets



2.10 Of the infrastructure assets currently rated in Very Poor condition:

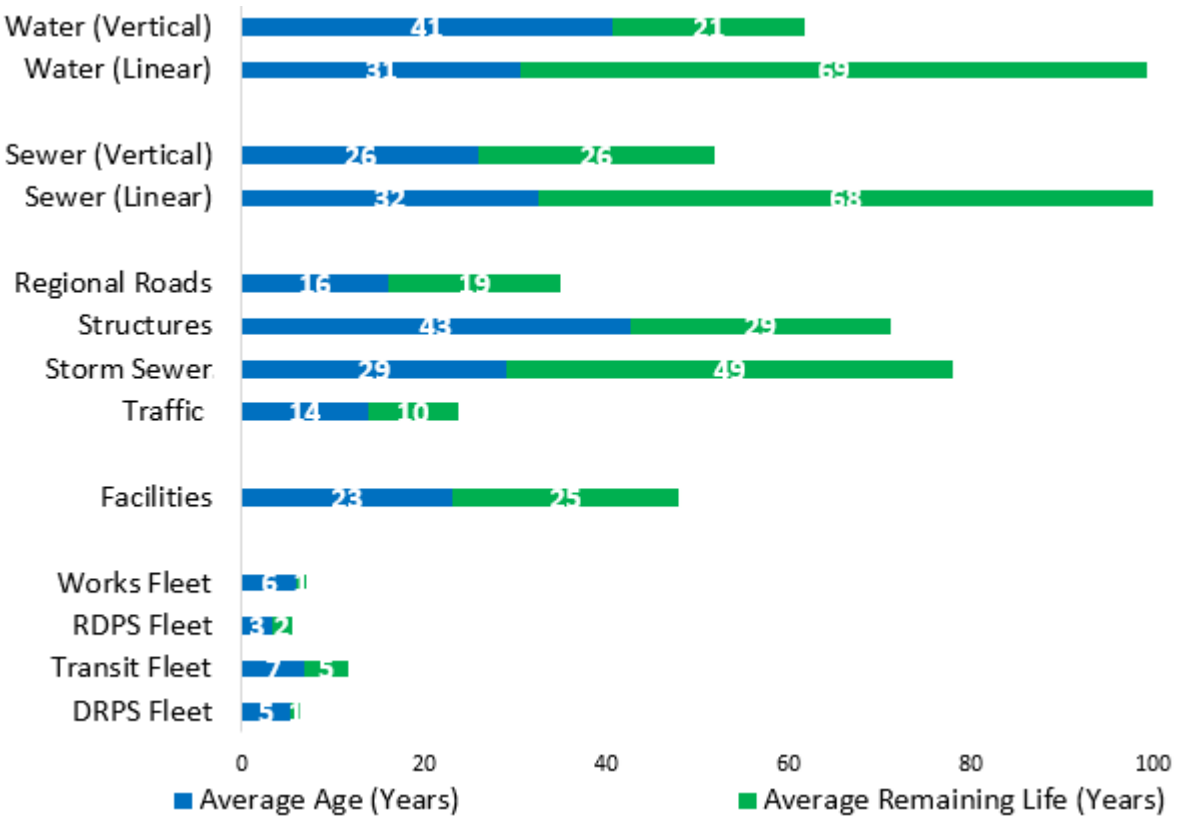
- Roads represent approximately 62.0 per cent ($640.0 million) with the Pavement Condition Index (PCI) decreasing for the overall Regional network from 53.5 in 2020 to 52.0 in 2021. Roads in Very Poor Condition represent 22.2 per cent of the total Road inventory ($2,882.8 million). Road rehabilitation continues to be a Regional Council priority and the Region's annual investment in road rehabilitation has increased from $23.5 million in 2017 to $38.7 million in 2022, an increase of $15.2 million (64.7 per cent). Given the nature of road rehabilitation and replacement there is often a time lag between funding approval and project completion. It is anticipated that the increased investment in roads rehabilitation will impact PCI.
- Facilities represent 29.2 per cent ($301.7 million) of Regional assets in Very Poor condition. (DRLHC) represents the bulk of Facility assets in Very Poor condition ($262.6 million). The 2022 Budget includes $3.3 million for repairs and renovations for DRLHC facilities and an additional $26.0 million in facility capital works including $22.2 million for deep energy efficient retrofits at four DRLHC Senior's housing properties. The 2023 to 2031 capital forecast includes an additional investment of $55.0 million in facilities capital works.
- There is one bridge with a load restriction which has been approved for replacement and, one bridge with a dimensional restriction due to reduced/minimal vertical and horizontal clearances.

2.11 The assets currently rated in Poor to Very Poor condition will continue to undergo assessment through the 2023 Business Planning and Budget cycle for continued investment. Ongoing maintenance and repair investments for assets in Fair to Very Good condition will continue through annual business planning and budgets processes.

Average Age and Remaining Life of Regional Assets

2.12 Figure 2 summarizes the average age and estimated remaining life by asset class as of December 31, 2021.

Figure 2: Average Age and Remaining Useful Life



Asset Replacement Based on Remaining Useful Life

2.13 Asset useful life considers when an asset came into service, how it has been performing, expected lifespan of the asset and any rehabilitation work undertaken to extend its life.

2.14 Asset useful life can play a role in informing long-term financial planning for asset replacement. Generally, assets that have reached the end of their useful life may experience additional repair and maintenance costs and may be prioritized for replacement or rehabilitation to extend their useful life. Figure 3 and Figure 4 illustrate what the cost would be to replace assets at end of useful life during the 2022 budget and nine-year forecast period and forty-year time period respectively.

Figure 3: 10-Year Asset Replacement Costs Based on Useful Life and Replacement Costs ($ millions)

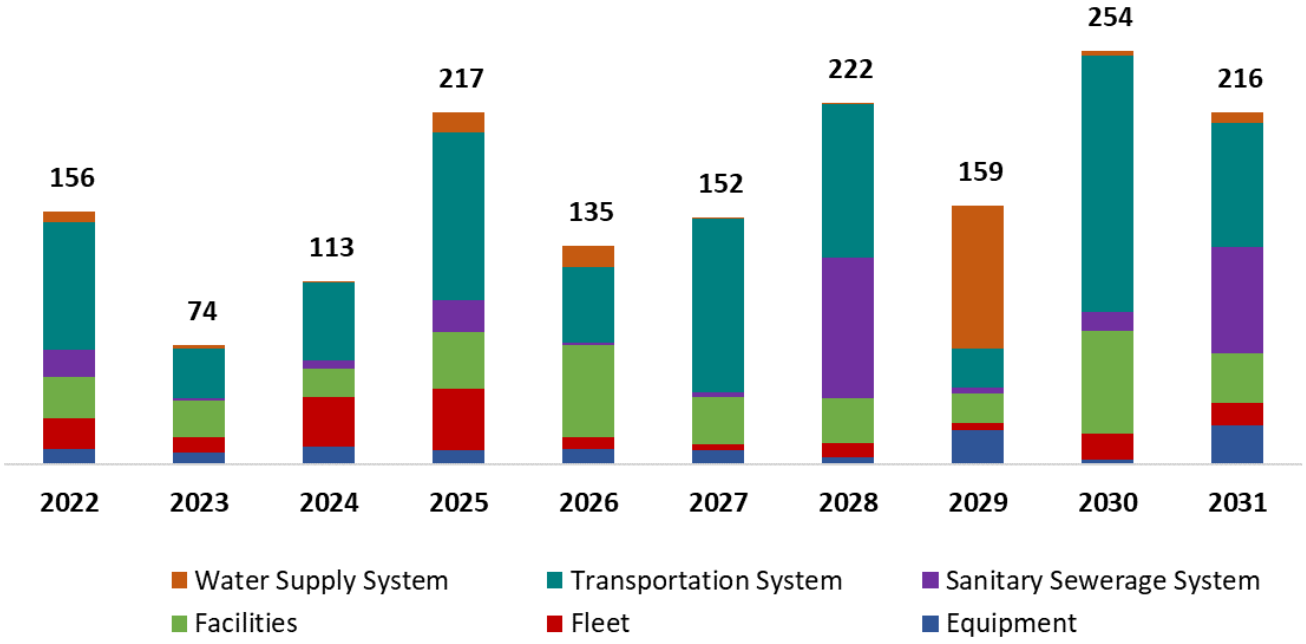
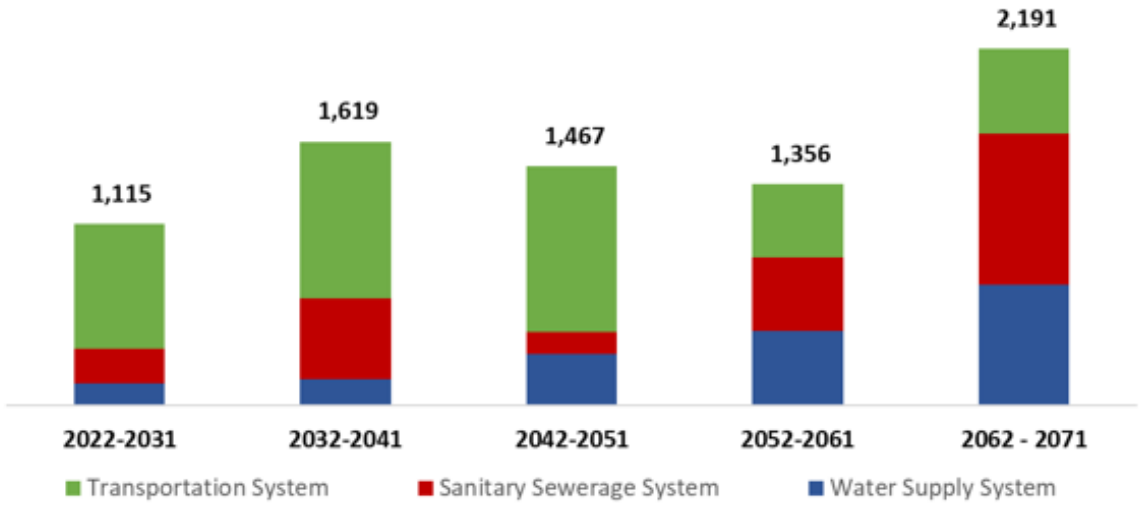


Figure 4: 50-Year Core Asset Replacement Costs Based on Useful Life and Replacement Costs ($ millions)



2.15 It is also important to assess which assets are considered as operating “Beyond Useful Life” but are still functioning as designed and may be assigned favourable condition ratings of Fair to Very Good. Regional staff monitor the performance and condition of assets operating beyond expected useful life as part of ongoing asset management processes.

3. Asset Management Service Levels and Performance Measurement

3.1 Level of service is a key consideration that influences asset management planning and investment decisions. Assets must be maintained, through ongoing maintenance activities as well as timely repairs, rehabilitation and/or eventual replacement to ensure service levels can be provided.

3.2 Asset management related service levels are defined through the following:

- Approved Regional strategic and master plans, related service standards and supporting plans, policies and by-laws;
- Regulatory compliance requirements; and,
- Other performance expectations as defined through best practice and Regional Council direction.

3.3 For core assets, Ontario Regulation 588/17 requires municipalities to include both community service levels which provide qualitative descriptions on asset reliability and asset management practices as well as technical service levels which focus on service delivery and reliability in their Asset Management Plans.

3.4 Details on the Region’s community and technical service levels for each of the Region’s core assets are provided in Attachments #2 through #4. In addition, the Region has also included some new and refined service levels for non-core assets (e.g., Transit) in Attachment #5 ahead of the July 1, 2024 deadline required under Ontario Regulation 588/17.

3.5 Regionally defined performance measures are further utilized to gauge progress toward achieving corporate goals and desired service levels. Within each asset class attachment (see Attachments #2 through #7), specific service levels, performance goals, targets and measures are highlighted.

3.6 Moving forward, staff will complete the service level reporting requirements for non-core assets due by July 1, 2024 in accordance with Ontario Regulation 588/17. In addition, existing service levels will continue to be refined to reflect Regional Council approved goals, plans, policies, strategies as well as best engineering practices.

4. Durham Region's Corporate Goals and Objectives

Durham Region Strategic Plan

4.1 The Durham Region Strategic Plan 2020-2024, translates the Region's vision of, "a healthy, prosperous community for all" into concrete goals for Durham's communities. Strategic Plan goals inform asset investment decisions and operating and maintenance activities.

4.2 Regional assets and corporate asset management processes support the Region in meeting its Strategic Plan goals. Figure 5 outlines which Strategic Plan goals can be directly linked to asset management.

Figure 5: Strategic Plan Goals Linkages to Asset Management

4.3 The Strategic Plan goals can be further directly linked to the targeted levels of service of an individual asset class as these targets reflect both legislated standards and corporate goals and objectives. Detailed tables linking each service-level target to Strategic Plan goals and other corporative priorities can be found in each asset class attachment (Attachments #2 through #7).

Corporate Strategic Asset Management Policy Goals

4.4 The Corporate Strategic Asset Management Policy approved by Council in 2019 reflects best practices for asset management and various Regional priorities and plans. The following are the Policy's seven objectives:

1) The Region will maintain its assets in a safe condition throughout their lifecycles with tolerable risks mitigated through effective strategies, to deliver Regional services at approved levels in a financially prudent and sustainable manner;
2) The Region will maximize the value of its assets by undertaking the most appropriate and cost-effective maintenance, repair, rehabilitation, and/or replacement activities at the most optimal time, to achieve the lowest possible lifecycle cost as feasible;
3) The Region will demonstrate leadership in sustainable asset management, including investments in assets to mitigate (reduce energy use and emissions) and adapt to climate change (to build resiliency), as part of asset management planning;
4) The Region will proactively monitor, identify, and implement asset related risk mitigation measures to ensure the continuity of asset related services, as part of asset management planning;
5) The Region will strive for continuous improvements and innovation in asset management planning, including data analysis, technologies, processes, practices, strategies, and coordination with its lower tier municipalities, neighboring municipalities and senior governments;
6) The Region's asset management planning and reporting process will be transparent and accountable through the development and approval of an Asset Management Plan by Regional Council (which reports performance as well as ensures compliance with all senior government legislative, regulatory, and grant funding reporting requirements); and
7) Infrastructure capital needs identified through asset management planning, as well as risk and climate adaptation and mitigation measures, will be addressed based on funding allocated through the Region's Business Planning and Budget process.

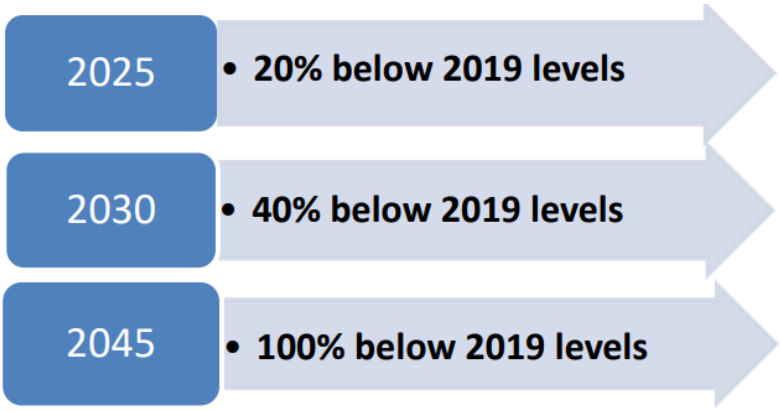
Climate Change Adaptation and Mitigation

4.5 Addressing climate change is a critical priority for the Region that is reflected in the Durham Region Strategic Plan 2020 – 2024, the 2020 Council declaration of a climate emergency and the Region's 2021 Corporate Climate Action Plan (CCAP) that positions the Region as a leader in the community-wide effort.

4.6 In 2019, the Region introduced a Corporate Strategic Asset Management Policy that specifies that leadership in sustainable asset management, including investments in assets to mitigate (reduce greenhouse gas emissions) and adapt to climate change (to build resiliency), be a key part of asset management planning.

4.7 The Region's 2021 Corporate Climate Action Plan (CCAP) establishes corporate GHG emission reduction targets and a carbon budgeting framework. As shown in Figure 6, the Region is moving towards a target of 100 per cent reduction in corporate GHG emissions from the 2019 baseline by 2045.

Figure 6: Corporate GHG Reduction Targets



4.8 The clear establishment of corporate performance targets provides guidance for corporate facility operations and will inform updates of the Region's Corporate Energy Conservation and Demand Management Plan, 2019 to 2024.

4.9 Corporate climate change considerations and related initiatives continue to be integrated into the Region's asset management planning processes and reporting requirements. Within each asset class attachment, specific climate resiliency and mitigation risks and actions are identified and linked to target service levels as appropriate. Key asset-related climate change initiatives in the 2022 Budget and forecast include:

- Continuation of the Uninterrupted Power Supply (UPS) for traffic signals to ensure adequate backup power for key intersections ($0.5 million).
- Complete a Biocover Feasibility Project at the Oshawa Landfill to determine the effectiveness of biocover as a methane reduction measure for closed landfills.
- Installation of Electrical Vehicle (EV) chargers at the Ajax, Oshawa/Whitby, Scugog and Sunderland Depots, the Durham York Energy Centre (DYEC), Clarington Municipal Hazardous Special Waste (MHSW), the Durham Recycling Centre (DRC), Seaton Paramedic Station, five Durham Regional Local Housing Corporation properties, Oshawa and Ajax Transit Garages, Transit Maintenance Facility, and Durham Regional Police Operations Training Centre and East Division for a total gross cost of $1.2 million, with $0.365 million in proposed recoveries through Zero Emission Vehicle Infrastructure Program grant funding.
- New and replacement hybrid and electric vehicles for fleet.
- Acquisition of the Region's first electric buses.
- Use of recycled materials in construction projects.

- Comprehensive building condition assessments and level 3 energy audits for development of a baseline and greenhouse gas emissions reduction plan and pathway for Regional buildings at an estimated cost of $2.5 million.
- A $22.24 million capital project for deep energy efficient retrofits at four DRLHC Senior's housing properties.
- Deep energy retrofits at 101 Consumers Drive, in the Town of Whitby to obtain a near-zero energy outcome at an estimated cost of $8.4 million.

4.10 The 2022 Asset Management Plan's assessment of climate-related risks and climate adaptation and mitigation initiatives complies with the requirement of Ontario's asset management planning regulation (Ontario Regulation 588/17) to consider vulnerabilities that may be caused by climate change as part of asset management planning.

4.11 GHG emission impacts (with a view towards reduction targets) and climate resiliency will continue to be integrated into asset planning and supporting lifecycle analysis, where possible.

Barrier Free Infrastructure

4.12 Ensuring inclusive and accessible environments is a key corporate value for Durham Region and new facility and retrofit projects, whether owned or leased by the Region, are guided by Durham's accessibility and inclusivity standards and provincial requirements.

4.13 Provincial requirements include those related to the Ontario Building Code Act, Accessibility for Ontarians with Disabilities Act, 2005 (AODA), The Ontarians with Disabilities Act, (ODA), Ontario Regulation 191/11 Integrated Accessibility Standards Regulation (IASR): the Provincial Policy Statement, and the Human Rights Code.

4.14 Meeting the requirements of the Accessibility for Ontarians with Disabilities Act (AODA), 2005, outlined under the Integrated Accessibility Standards Regulations (IASR) continues. The Region of Durham continues to look for ways to go beyond the regulations.

4.15 Development of Durham Building Standard is in progress and will inform the design of public spaces as it relates to environmental sustainability, space optimization, accessibility and inclusivity.

4.16 The Accessibility Advisory Committee (AAC) and/or the AAC Site Plan review sub-committee continue to be consulted by staff for their review and input on projects.

4.17 The following are ongoing asset-related accessibility initiatives:

- New public facilities are designed and built for full accessibility;

- Existing facility upgrades include removing trip hazards and implementing accessibility features (e.g., depressed curbs, ramps, smooth sidewalks, tactile plates, automatic doors and accessible reception areas, parking, entrances and washrooms etc.);
- Effective facility and transportation enhancements including accessible signage, bus stops/shelters, traffic signals, pedestrian poles and signals, sidewalks, curbs and reduced crossing distances at cross walks; and,
- Increased maintenance activities to enhance accessibility through enhanced snow clearing and de-icing.

Coordination of Planning and Partnerships with Other Governments

4.18 Successful coordination and partnerships with other governments related to asset management include:

- Partnership with the City of Oshawa and Town of Whitby to deliver an integrated solid waste management system. Oshawa and Whitby collect garbage and organic waste in their municipalities, while the Region collects these in the other six area municipalities as well as Blue Box material collections across all eight municipalities. The province is currently developing a provincial Blue Box collection system run by producers that will replace municipal collection programs. The program will roll out between 2023 and 2025 and Durham Region is scheduled to transition its Blue Box material collections by July 2024;
- The Durham York Energy Centre (DYEC) in the Municipality of Clarington is co-owned by the Region of Durham (78.6 per cent) and York Region (21.4 per cent) and is operated by the private sector through a design-build-operate public-private-partnership (P3) model under a 20-year Project Agreement to 2036. The facility processes 140,000 tonnes of garbage/year of which 110,000 is from Durham residents. Through an Environmental Certificate of Approval amendment, the Region is anticipating approval to increase the amount of DYEC processing throughput by 20,000 tonnes per year commencing in 2022 to fully utilize available equipment and further divert waste going to landfills;
- The Next Generation Interoperable Communications Platform (NextGen) allows DRPS, other Regional Departments and other stakeholders (fire services and public works staff from the area municipalities, Ontario Power Generation (OPG)) to jointly use the communication platform to improve service efficiency and achieve cost efficiencies;
- DRT and Metrolinx coordination and partnerships include:
    - DRT continued participation in the Metrolinx-led Joint Transit Procurement Initiative (TPI) for the procurement of vehicles, equipment, technology, supplies and services to increase buying power, assist in standardization of equipment and leverage industry expertise.
    - The Metrolinx-led Durham Scarborough Bus Rapid Transit, Transit Project Assessment Process (TPAP) was completed on March 29, 2022.

  - DRT continues to use the PRESTO fare collection system under agreement with Metrolinx.
  - DRT continues to leverage Metrolinx Radio service under agreement with Metrolinx.
  - Effective March 15, 2022, DRT riders connecting to a Metrolinx GO train or bus are no longer required to pay DRT fares as Metrolinx has agreed to reimburse DRT 100 per cent of fare revenues for such trips. Prior to March 15, 2022, riders were required to pay $0.80, with Metrolinx only reimbursing the difference between this rate and the full DRT fare rate.

- DRT, Works, Federal and Provincial Government coordination and partnerships include the ongoing implementation of Investing in Canada Infrastructure Program (ICIP) Transit Stream projects, including vehicle replacements, facility construction and bus rapid transit implementation;
- The Regions of York and Durham work in partnership to operate, maintain and expand the Duffin Creek Water Pollution Control Plant (WPCP) and related sanitary sewerage infrastructure;
- The Region works with the five conservation authorities to ensure environmental objectives are met related to watershed planning, environmental conservation and protection, as well as contracting with the Lake Simcoe Region Conservation Authority for the management of the Durham Regional Forest on behalf of the Region;
- The Region in partnership with the Region of York, Region of Peel, City of Toronto and nine Conservation Authorities have developed the Oak Ridges Moraine Groundwater Program which provides a collaborative approach to collecting, analyzing and disseminating water resource data and information as a basis for effective stewardship and management of water resources; and
- Co-ordination of planning and timing for infrastructure construction with the local area municipalities (e.g., Roads Capital Budget and Water and Sewer Capital Budget, Area Municipal Road Program, MTO and GO Transit Projects).

4.19 The Region’s best business practice for coordination complies with Ontario Regulation 588/17 to coordinate where possible connected and/or interrelated assets with other municipalities and delivers on the Region’s commitment to continuous improvement. This is also consistent with the Region’s Corporate Strategic Asset Management Policy.

5. Lifecycle Overview

5.1 Lifecycle costing is a comprehensive consideration of the capital and operating activities (Table 5) that must be taken during the life of an asset to ensure it meets the desired service levels and target performance measures. Lifecycle costs can begin before an asset is even acquired through planning activities to determine needs (e.g., master plans) and continue through to eventual asset disposal and possible site remediation activities.

5.2 The focus of capital lifecycle activities includes ongoing regular inspections and timely preventative repair and maintenance and applying the most appropriate treatment at the optimal time. The goal of capital lifecycle activities is to maximize asset lifespan at the lowest possible cost and risk.

5.3 Operating lifecycle activities considers direct (e.g., fuel costs for fleet) and indirect activities (e.g., tree trimming programs along Regional Roads) required to ensure the asset can meet its service goals.

5.4 Ontario Regulation 588/17 requires lifecycle costing analysis for a ten-year period by July 1, 2022 for core assets and July 1, 2024 for non-core assets. The analysis must include:

- Full lifecycle costing of assets; all maintenance, repair, replacement and related-operating activities required over the life of an asset (from acquisition to disposal).
- Options for which lifecycle activities could be undertaken to meet desired service levels including risks associated with any options and which represent the lowest cost to deliver on service levels.

5.5 The Region is in compliance with Ontario Regulation 588/17. Going forward staff will consider data processes and analysis techniques, and lifecycle assumptions to refine the lifecycle analysis provided in this initial lifecycle costing exercise. Staff will also proactively prepare for lifecycle analysis reporting for non-core assets due to be implemented by July 1, 2024.

Table 5: Key Concepts: Asset Lifecycle Activities

Activity Type	Description
Operating	All operating activities required to ensure the asset can meet service level delivery (e.g. snow plowing roads)
Maintenance	Regular scheduled inspections and preventative maintenance, or repair activities associated with unexpected events.
Renewal and Rehabilitation	Major repairs designed to extend asset life, restore level of service and/or defer the need for replacement.
Replacement	Replacement occurs when the asset has reached the end of its useful life and/or renewal and rehabilitation activities are no longer considered appropriate.
Disposal	Activities associated with decommissioning an asset including sale or disposal.
Expansion	Planned activities to expand services either to enhance service levels (e.g., service frequency) or meet growth demands.

6. Lifecycle Analysis Core Assets

6.1 Regional staff undertook lifecycle costing analysis for core assets to determine historical and planned capital and operating lifecycle activities. Asset management practices such as condition assessments and expected useful life analysis inform capital and operating lifecycle activities.

6.2 To assess capital lifecycle costs, staff considered rehabilitation and replacement activities that extend the useful life of assets and/or meet service delivery targets.

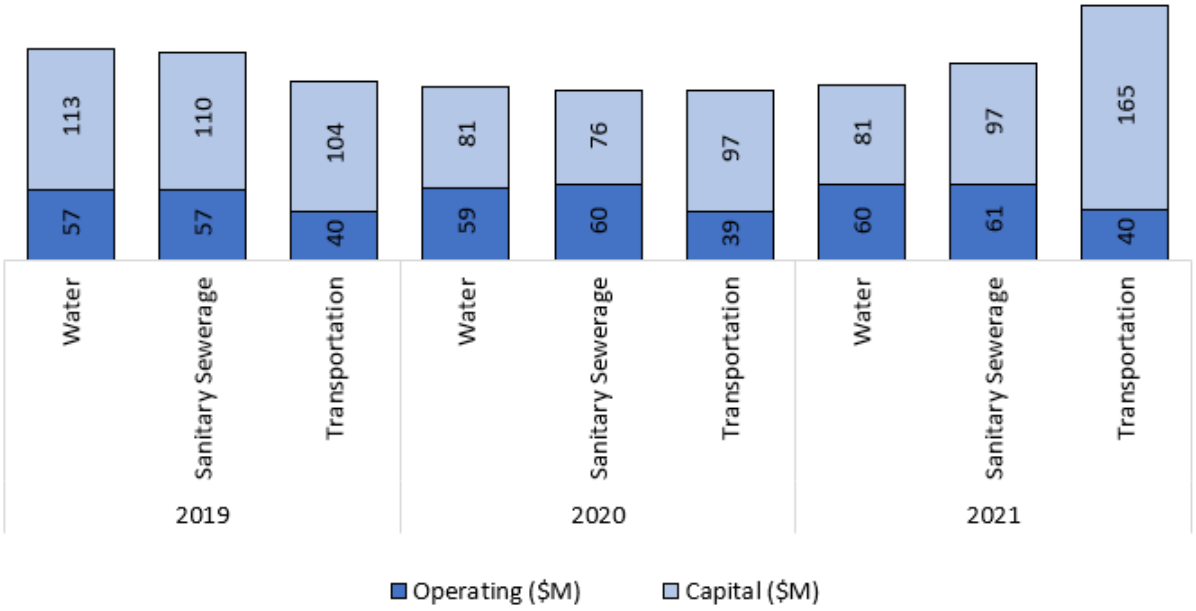
6.3 In addition to repair and maintenance activities, staff considered other ongoing operating expenditures required for assets to meet target service levels. Some examples include overhead costs (e.g., office/depot space, training, software, etc.), gas and fuel, utilities and fleet rentals.

Historical Lifecycle Expenditures for Core Assets

6.4 Regional Council has supported significant investment in Regional assets, including new and expanded infrastructure, capital replacement expenditures, and maintenance and operating expenditures. Such investments are essential to maintaining the performance of existing infrastructure assets and achieving desired levels of service.

6.5 Figure 7 summarizes the budgeted capital investments and actual operating expenditures for water supply, sanitary sewerage, roads, bridges and culverts and traffic programs over the last three years (2019 to 2021 inclusive) on a lifecycle basis.

Figure 7: Historical Lifecycle Operating Expenditure and Capital Budget – Core Assets ($ millions)

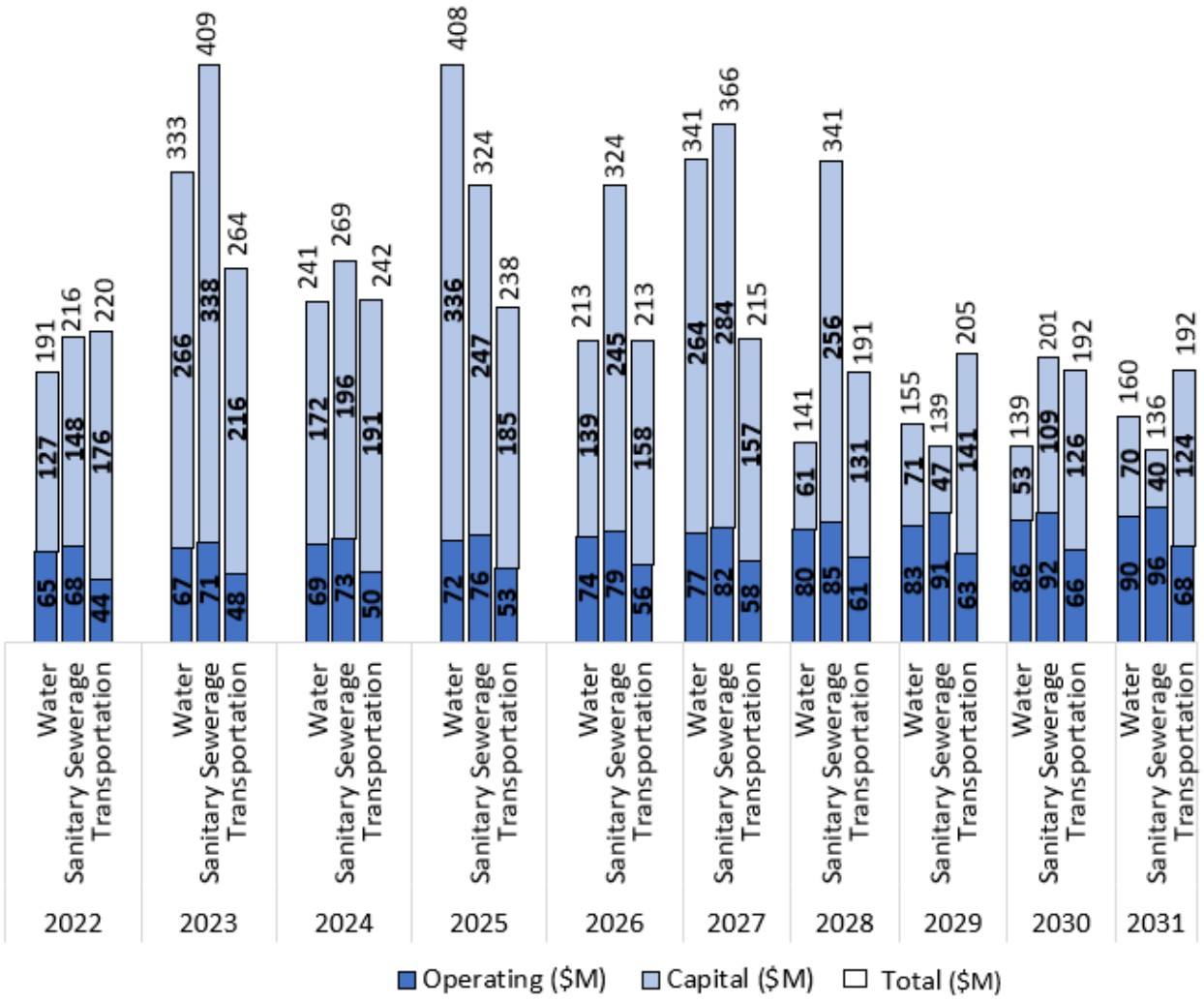


6.6 As compared to 2019, annual spending in maintenance and operations in 2021 increased by approximately $8.1 million (4.5 per cent) while budgeted annual capital investment increased by $15.8 million (4.9 per cent) to meet expansion and existing infrastructure investment needs for core assets.

Planned Lifecycle Core Asset Expenditures (2022 - 2031)

6.7 Total operating lifecycle expenditures for core assets total $177.1 million in 2022 and approximately $2.0 billion over the nine-year forecast period. Capital funding totals $450.5 million in 2022 and $4.6 billion over the nine-year forecast period. Figure 8 below provides planned capital, and operating expenditures for core assets over the Budget 2022 and nine-year forecast period.

Figure 8: Ten-Year Lifecycle Costs for Core Assets ($ millions)*

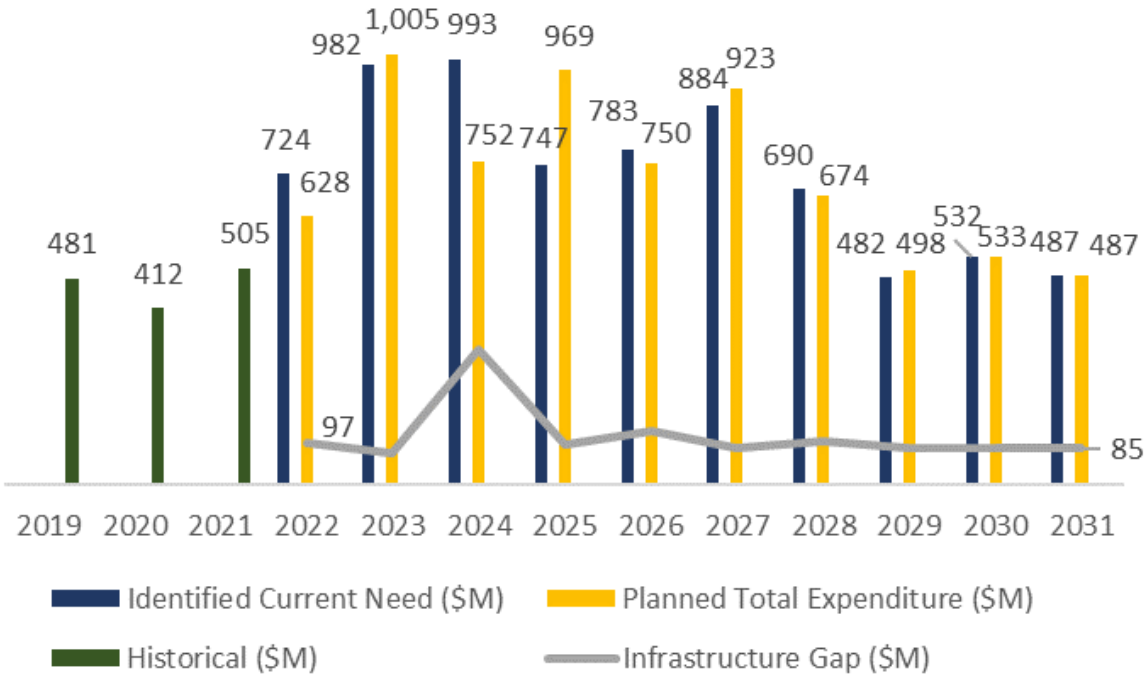


*Operating and Capital may not add to Total due to rounding.

Infrastructure Gap Analysis

6.8 As part of lifecycle analysis, staff undertook a gap analysis that compared identified funding needs to meet service level targets against planned expenditures for core assets. Figure 9 below provides identified funding needs, planned expenditures and the infrastructure gap.

Figure 9: Infrastructure Gap Analysis Core Assets ($ millions)



6.9 Year-over-year variability in planned capital spending is primarily a result of major water supply and sanitary sewerage plant renewal and expansion projects over the forecast period. The Region continues to utilize flexible financing sources such as the Asset Management Reserves, Development Charge funding, Water Rate Stabilization Reserve Fund, Sewer Rate Stabilization Reserve Fund and the strategic use of debt financing to ensure predictable, stable and gradual changes to user rates. Further details on Regional financing strategies can be found in Table 6. Reserve funds will play a critical role in the forecast years.

6.10 Lifecycle costing analysis for core assets identified a current funding gap of $96.6 million in 2022 decreasing to $85.0 million by 2031 based on planned investments. It is important to note that any rehabilitation or replacement work required to meet health and safety or legislative standards are reflected in the planned total expenditure.

6.11 The identified current need reflects accelerating project timelines for some non-urgent projects. Not accelerating these projects may result in increased repair and maintenance work or not meeting service level targets which is balanced with cost savings to property taxpayers and utility ratepayers and ensuring full value is extracted from assets by avoiding premature replacement. Further details on lifecycle costing and infrastructure gap analysis for core assets can be found in Attachments #2 through #4.

6.12 Staff will continue to monitor funding needs and refine identification and assessment processes including utilizing Maximo, the Region's new Enterprise Maintenance Management System (EMMS). The next steps for Maximo will enhance asset management capabilities and allow for improved analysis of lifecycle costing.

6.13 Moving forward, Regional staff will be further refining lifecycle costing analysis and data collection for core assets and will undertake lifecycle costing analysis for non-core assets by 2024 in accordance with Ontario Regulation 588/17.

7. Capital Forecast and Financing Options

7.1 Growth-related infrastructure requirements are forecasted as part of the Region's business and capital planning process and as part of development charge (DC) studies.

7.2 In accordance with Schedule 3 of the Growth Plan for the Greater Golden Horseshoe, Durham Region is forecast to reach significant employment and population growth by 2051:

- Population growth to 1,300,000 residents by 2051, an increase of 79.8 per cent over 2021; and
- Employment growth to 460,000 employees by 2051, an increase of 90 per cent over 2021.

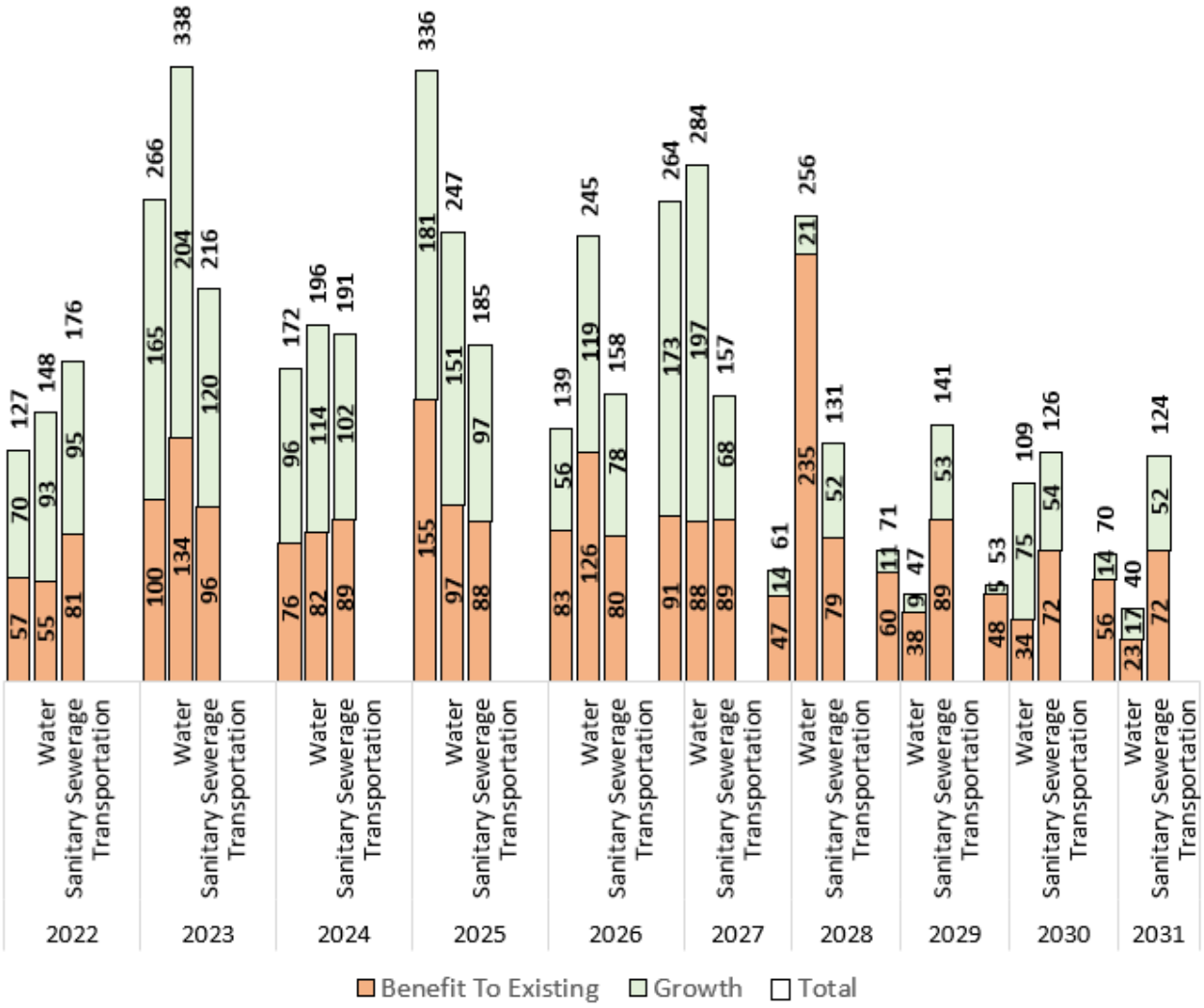
7.3 As part of Envision Durham, the Municipal Comprehensive Review of the Regional Official Plan (ROP) is currently being updated and revised forecast numbers will be reflected in future asset management reporting.

7.4 Growth infrastructure and related service demands are analyzed within the Region's DC By-law and supporting DC Background Study, which are updated at a minimum every five years. The DC Study estimates the anticipated capital requirements and related costs attributable to new development over the long-term to accommodate the growth in population and employees. The DC By-law and Background Study plan for the growth forecasts contained within the ROP.

7.5 The asset management plan and subsequent business plans, budgets and long-term capital forecasts often result in refinements to growth-related capital projects and financing projections, consistent with annual data updates and changing economic and financial environment. There are often timing differences due to the significant investment in resources to generate DC background studies, asset management plans, and long-term capital forecasts.

7.6 Capital growth requirements were considered as part of the 2022 Budget and nine-year forecast.

Figure 10: Ten-Year Capital Forecast: Core Assets ($ millions)*



*Benefit to Existing and Growth may not add to Total due to rounding.

7.7 Forecasted infrastructure needs will be updated, refined and reprioritized during the 2023 business planning and budget process and long-term capital planning. Funding needs, gaps and strategies to address these infrastructure needs will also be refined through business planning, budgets and long-term financial planning.

8. Funding Options

8.1 The Region's financing approach for assets is guided by the Long-Term Financial Planning Framework and the Corporate Asset Management Policy's goal to deliver Regional services at approved levels in a financially prudent and sustainable manner. Asset management planning in the annual budget planning exercises inform investment needs.

8.2 The annual property tax levy, water supply and sanitary sewerage user rates, reserves, reserve funds, development charges, Canada Community-Building Funds, provincial gas tax revenue and the strategic and sustainable use of debt are important financing tools to maintain and expand Regional assets.

8.3 Table 6 below provides a summary of the Region's key infrastructure financing options. Further details of planned capital investments in 2022 and during the nine-year forecast can be found in the asset class attachments.

Table 6: Key Regional Financing Sources

Funding Source	Purpose
Regional Roads Rehabilitation Reserve Fund	Provides sustainable funding to address the rehabilitation needs of the road network.
Regional Roads Reserve - Growth	Provides sustainable property tax funding for the property tax portion of growth-related projects.
Vision Zero Initiatives Reserve Fund	Supports projects to meet Regional Council Vision Zero targets.
Regional Bridge Rehabilitation Reserve Fund	Addresses bridge rehabilitation and replacement needs.
Water Rate Stabilization Reserve Fund and Sewer Rate Stabilization Reserve Fund	In addition to providing funding to stabilize water and sewer user rates, funds are used for major water and sanitary sewer capital projects and asset management needs.
Water Supply and Sanitary Sewerage Asset Management Reserve Fund	Funds high priority capital initiatives related to repair, rehabilitation and replacement of existing water supply and sanitary sewer assets.
General Levy Asset Management Reserve Fund	Funds high priority capital initiatives related to repair, rehabilitation and replacement of existing assets (i.e., general purpose needs, such as facilities).
Equipment Replacement Reserve	Funding for regional works equipment and fleet replacements.
Various Service Area Reserve Funds	Funds rehabilitation, replacement and growth needs for DRT, RDPS and Social Housing.

Funding Source	Purpose
Capital Impact Stabilization Reserve Fund and Capital Project Reserve	Enables contributions towards capital project financing to mitigate impacts on tax levy from major projects, ensures adequate capital funding for Regional priorities and ongoing business continuity.
Development Charges	Funding to pay for infrastructure growth needs. The Region charges development charges for all eligible asset classes to maximize recoveries related to growth infrastructure per the principle that 'growth pays for growth' as permitted under the Development Charges Act (DCA) legislation.
Canada Community-Building Fund (formally Federal Gas Tax) and Provincial Gas Tax	Provincial Gas Tax funds: expanding and improving public transit. Canada Community-Building Funds: source of funding for eligible Regional infrastructure projects.
User Rates	A portion of annual water and sanitary sewer user rate revenues are dedicated to the highest priority needs.
Property Taxes	A portion of annual property tax revenues are utilized to finance upgrades, rehabilitation and the replacement of infrastructure assets for Regional roads, transit and other tax-supported programs.
Debt Financing	For large-scale capital projects which may require significant up-front financing over a shorter time horizon, debt financing options provide the ability to distribute the costs over a longer time horizon to current and future users who will benefit from the use of the infrastructure asset.

9. Risk Assessment

9.1 Staff continuously monitor and assess asset risk including likelihood and impact and the effectiveness of mitigation controls.

9.2 Table 7 includes a sample of identified risks for the Region's assets in achieving its service level standards as well as the mitigation controls to address these risks.

Table 7: Asset-Related Risks and Mitigation Measures

Risk	Existing Controls	Remediation
Disruption to Water Supply	Maintenance, repair and rehabilitation (e.g., lining and cathodic pipe protection) Studies, inspections, monitoring controls and systems (e.g., leak detection, SCADA alerts) Source water and well head protection	Continue condition assessments and prioritize repair, maintenance, and rehabilitation needs and programs Continue erosion mitigation studies and strategies, monitoring, and use of systems Continue to include prioritized remediation work and system improvements for funding through financial and business planning
Loss of Utilities and Fuel	Essential services policies and business continuity/emergency plans Standby power, on call service contracts, system redundancies, and re-routing plans Fuel delivery system and water and sewer monitoring systems	Continue programs to ensure facility/ depot standby power and fuel storage systems, water and sewer monitoring, service contracts and continuity plans Assess criticality of facilities/depots and continue prioritization and planning Continue Traffic UPS equipment
Major Facility System Failures	Well maintained assets and equipment (i.e., proactive maintenance programs) Business continuity/emergency plans Standby power, on call service contracts, parts inventory, and system redundancies Capital and financing planning	Continued condition assessments and maintenance and rehabilitation program Continue programs to ensure standby power, fuel storage systems, IT services, service contracts and continuity plans Prioritize remediation work and continue rehabilitation funding

Risk	Existing Controls	Remediation
Disruption to Sanitary Sewerage Collection	Asset condition assessments for forcemains and gravity pipes Maintenance, repair and rehabilitation System alerts/controls and emergency response planning Increase contingency through pipe twinning	Continued condition assessments (including larger pipe inspections) and maintenance, repairs and rehabilitation programs and funding through budget process Reassess contingency planning and prioritize needs and available funding Continue with SCADA system upgrades to improve management control during storms
Sanitary Sewerage Inflow and Infiltration (I/I)	I/I program, flow monitoring equipment and performance assessments during storms Capital investments and system repairs Household drainage surveys and education	Continue to prioritize I/I program strategies Continue to include and prioritize funding through the financial and business planning and budget process

10. Next Steps

10.1 The infrastructure needs and challenges identified in this report will continue to be considered through future business planning, budget and long-term capital planning processes.

10.2 Asset management staff will continue to work collaboratively to improve asset management planning, data collection and analysis as part of continual improvement, as well as to work towards meeting the remaining new asset management regulatory requirements of Ontario Regulation 588/17 due in 2024 and 2025. Specific next steps include:

- Continue to refine data collection, methodology and analyses as well as data verification protocols to enhance accuracy, consistency, and improve asset management planning capabilities to better inform business plans, budgets, capital forecasts, and long-term financial planning strategies;
- Migrate reporting and analysis to service area reporting (e.g., DRPS, Social Services) as opposed to asset class category (e.g., Fleet, Equipment, etc.);
- Identify target service levels and performance measures for all non-core assets and continue to refine service levels for core assets;

- Continue to ensure integration of climate adaptation and mitigation into asset management planning in alignment with the Corporate Climate Change Action Plan;
- Refine lifecycle options, data, costing, and analysis for core assets and implement lifecycle analysis for non-core assets by the regulatory deadlines of July 1, 2024;
- Continue to assess risk, business continuity, asset criticality, and asset reliability to develop, consider and incorporate risk mitigation approaches; and
- Continue to consider growth needs and infrastructure and servicing costs based on growth projections, as part of asset management planning.

11. Conclusions

11.1 The Asset Management Plan report is a key part of the financial planning, business planning and budget processes, providing the necessary information to facilitate capital planning.

11.2 The Region's collaborative asset management process has supported several successful asset management strategies and initiatives, which are detailed within each individual asset class attachment (Attachments #2 through #7).

11.3 The overall replacement value of the Region's assets is increasing due to growth demands for additional infrastructure and as a result of inflationary pressures which were higher in 2021 than in recent years. The asset class attachments (Attachments #2 through #7) provide additional details on the change in replacement values for assets.

11.4 The condition of the Region's core assets remained relatively stable year-over-year as a result of preventative maintenance, rehabilitation and timely repairs and replacements, with strategic investments planned that will address many assets currently in Very Poor condition.

11.5 This report complies with Ontario Regulation 588/17 thus ensuring the Region is eligible for senior-level government funding grants.

11.6 As part of continual improvement, the asset management planning processes of data collection, asset assessment and asset analysis will be reviewed including refining lifecycle analysis.

11.7 Regional staff will continue to work collaboratively to meet new reporting requirements for lifecycle costing and current levels of service for non-core assets and the development of financing strategies for core and non-core assets. The Region is well positioned to meet the additional Ontario Regulation 588/17 requirements due in 2024 and 2025.

Regional Asset Inventory, Replacement Value and Condition (Attachment #1)

Category	2019			2020			2021		
	Inventory	Replacement Value ($M)	Condition	Inventory	Replacement Value ($M)	Condition	Inventory	Replacement Value ($M)	Condition
Water Supply System									
Vertical Assets - Treatment, Pumping & Storage									
Supply Plants and Well Systems	14	$ 638.7	C-	14	$ 657.1	C-	14	$ 719.5	C-
Pumping Stations	10	$ 30.6	C+	10	$ 31.4	C+	10	$ 35.6	C+
Water Storage Facilities	14	$ 70.5	B	14	$ 72.3	C+	14	$ 79.5	C+
Combined Pumping Station/Storage	8	$ 184.1	C+	8	$ 188.9	B-	8	$ 206.8	B-
Facilities Other	3	$ 1.5	B-	3	$ 1.5	B-	5	$ 4.0	B-
Total Vertical	**49**	**$ 925.4**	**C-**	**49**	**$ 951.3**	**C-**	**51**	**$ 1,045.4**	**C-**
Linear Assets - Water Distribution									
Mains (km)	2,564	$ 2,492.4	B+	2,601	$ 2,627.3	B+	2,631	$ 2,909.9	B+
Control Valves	26,922	$ 204.7	B+	27,334	$ 213.2	B+	27,698	$ 236.5	B+
Specialty Valves	665	$ 14.4	B+	685	$ 15.4	B+	696	$ 17.2	B+
Service Connections	178,652	$ 837.9	B+	180,437	$ 867.9	B+	182,448	$ 960.6	B+
Hydrants	16,301	$ 173.8	B+	16,491	$ 180.3	B+	16,785	$ 201.0	B+
Fire Lines	1,936	$ 19.6	B+	1,948	$ 20.1	B+	1,948	$ 22.2	B+
Meters	177,032	$ 33.2	B+	179,553	$ 33.8	B+	182,063	$ 36.6	B+
Total Linear	**404,072**	**$ 3,776.1**	**B+**	**409,049**	**$ 3,958**	**B+**	**414,269**	**$ 4,384.0**	**B+**
Total Water Supply	**404,121**	**$ 4,701.5**	**B**	**409,098**	**$ 4,909.4**	**B**	**414,320**	**$ 5,429.4**	**B**
Sanitary Sewerage System									
Vertical Assets - Treatment, Pumping & Storage									
Water Pollution Control Plants	11	$ 1,051.9	C+	11	$ 1,079.0	C+	11	$ 1,236.5	C+
Wastewater Pumping Stations	51	$ 291.4	C+	51	$ 298.9	C+	51	$ 327.3	C+
Wastewater Storage Facilities	2	$ 6.7	A	2	$ 6.9	A	2	$ 7.5	A
Water Facilities Other	N/A	N/A	N/A	1	$ 2.4	A	1	$ 2.6	A
Total Vertical	**64**	**$ 1,350.0**	**C+**	**65**	**$ 1,387.2**	**C+**	**65**	**$ 1,574.0**	**C+**
Linear Assets - Sewage Collection									
Gravity Sewers / Siphons (km)	2,151	$ 2,442.6	B+	2,177	$ 2,542.7	B+	2,205	$ 2,808.8	B+
Forcemains (km)	64	$ 119.4	A-	64	$ 124.5	B+	65	$ 139.9	B+
Maintenance Holes	31,269	$ 464.0	B+	31,629	$ 481.4	B+	32,096	$ 533.2	B+
Service Connections	174,827	$ 883.4	A-	176,588	$ 910.6	A-	178,581	$ 1,013.1	A-
Total Linear	**208,311**	**$ 3,909.4**	**B+**	**210,459**	**$ 4,059.2**	**A-**	**212,947**	**$ 4,495.0**	**A-**
Total Sanitary Sewerage	**208,375**	**$ 5,259.4**	**B+**	**210,524**	**$ 5,446.4**	**B+**	**213,012**	**$ 6,069.0**	**B+**

Category	2019			2020			2021		
	Inventory	Replacement Value ($M)	Condition	Inventory	Replacement Value ($M)	Condition	Inventory	Replacement Value ($M)	Condition
Transportation System									
Roads (arterial)									
Urban (lane km)	1,012	$ 1,123.2	C+	1,021	$ 1,165.9	C+	1,068	$ 1,341.5	C+
Rural (lane Km)	1,378	$ 1,378.9	C+	1,378	$ 1,432.3	C-	1,393	$ 1,541.3	C-
Bridges and Culverts (>3m)	234	$ 589.8	B	237	$ 612.6	B	240	$ 788.6	B
Total Roads, Bridges & Culverts	**2,624**	**$ 3,091.8**	**C+**	**2,636**	**$ 3,210.8**	**C+**	**2,701**	**$ 3,671.4**	**C+**
Storm Sewer System									
Storm Sewer Mains (km)	304	$ 478.3	C	320	$ 520.2	C	322	$ 573.1	C
Culverts (<3m) (km)	30	$ 34.3	C	30	$ 40.2	C	30	$ 44.0	C
Maintenance Holes	4,751	$ 29.3	C	5,017	$ 31.7	C	5,053	$ 35.0	C
Catchbasins	5,525	$ 34.0	C	5,807	$ 36.7	C	5,878	$ 40.7	C
Outfalls	288	$ 0.5	C	473	$ 1.1	C	475	$ 1.2	C
Total Storm Sewer	**10,899**	**$ 576.4**	**C**	**11,646**	**$ 630.0**	**C**	**11,758**	**$ 693.9**	**C**
Traffic Control System									
Control Signals/ Flashing Beacons	464	$ 77.1	C+	486	$ 78.9	C+	493	$ 88.3	B
Traffic Management Systems	17	$ 7.6	C-	17	$ 7.6	C-	16	$ 5.7	C
Communication Infrastructure (km)	320	$ 10.5	B-	320	$ 10.7	B-	338	$ 12.6	B-
Regulatory, Warning and Info Signs	22,275	$ 4.4	A-	21,300	$ 4.4	A	20,961	$ 4.7	A
Roadside Protection (km)	104	$ 20.5	C	104	$ 20.9	A-	111	$ 23.1	A-
CCTV	103	$ 0.3	A-	107	$ 0.3	C	108	$ 0.4	C-
Total Traffic Control	**23,283**	**$ 120.4**	**C+**	**22,334**	**$ 122.9**	**B-**	**22,027**	**$ 134.7**	**B**
Total Transportation	**36,806**	**$ 3,788.6**	**C+**	**36,617**	**$ 3,963.7**	**C+**	**36,485**	**$ 4,500.0**	**C+**
Regionally Owned Facilities									
DRLHC	23	$ 261.5	D+	23	$ 268.2	F+	23	$ 293.7	F
Durham Regional Police Service	8	$ 117.4	B+	8	$ 120.4	B	8	$ 131.8	B
Regional Works Depots	5	$ 53.9	C	5	$ 55.2	C	5	$ 60.5	C
Paramedic Services	8	$ 32.1	B+	8	$ 32.9	B	8	$ 36.1	B
Regional Child Care Facilities	4	$ 9.2	D+	4	$ 9.4	D+	4	$ 10.3	D+
Waste Management Facilities	7	$ 264.2	A	7	$ 271.1	A	7	$ 296.8	A
Long Term Care (LTC) Facilities	4	$ 263.4	B+	4	$ 270.2	B	4	$ 295.8	B-
DRT Facilities	3	$ 81.9	A-	3	$ 84.0	A-	3	$ 91.9	A-
DRT Pads and Shelters	2,437	$ 11.3	n/a	2,293	$ 11.1	n/a	2,579	$ 14.6	A
Administration Faciities	3	$ 123.3	A-	3	$ 126.5	A-	3	$ 138.5	B+
Parking Structure	1	$ 22.4	A	1	$ 22.9	A	1	$ 25.1	A
Centennial Building	1	$ 4.6	B	1	$ 4.8	B	1	$ 5.2	B
Other	1	$ 1.7	D	n/a	n/a	n/a	n/a	n/a	n/a
Total Facilities [1]	**68**	**$ 1,246.8**	**B**	**67**	**$ 1,276.8**	**B-**	**67**	**$ 1,400.3**	**B-**

Category	2019			2020			2021		
	Inventory	Replacement Value ($M)	Condition	Inventory	Replacement Value ($M)	Condition	Inventory	Replacement Value ($M)	Condition
Fleet									
Transit	257	$ 139.6	C	260	$ 147.0	C	241	$ 136.9	C
Works	359	$ 40.3	C-	367	$ 47.8	D	374	$ 52.2	B-
Durham Regional Police Service	359	$ 23.2	A-	352	$ 23.2	A-	363	$ 25.8	A-
Paramedic Services	83	$ 9.6	C+	83	$ 9.9	C	84	$ 10.9	B-
Total Fleet	**1,058**	**$ 212.7**	**C**	**1,062**	**$ 228.0**	C	**1,062**	**$ 225.8**	**C**
Equipment									
Water	n/a	$ 22.6	n/a	n/a	$ 22.2	n/a	n/a	$ 27.3	n/a
Sewer	n/a	$ 15.3	n/a	n/a	$ 17.0	n/a	n/a	$ 17.4	n/a
Transportation	n/a	$ 9.3	n/a	n/a	$ 7.3	n/a	n/a	$ 7.6	n/a
Waste Management	n/a	$ 11.8	n/a	n/a	$ 14.0	n/a	n/a	$ 14.5	n/a
RDPS (Paramedics)	n/a	$ 5.4	n/a	n/a	$ 5.3	n/a	n/a	$ 5.6	n/a
DRPS (Police)	n/a	$ 43.8	n/a	n/a	$ 44.3	n/a	n/a	$ 49.2	n/a
DRT (Transit)	n/a	$ 10.6	n/a	n/a	$ 15.5	n/a	n/a	$ 15.3	n/a
Health	n/a	$ 2.3	n/a	n/a	$ 2.0	n/a	n/a	$ 2.3	n/a
Social Services	n/a	$ 20.0	n/a	n/a	$ 21.1	n/a	n/a	$ 22.5	n/a
Administration	n/a	$ 47.0	n/a	n/a	$ 50.9	n/a	n/a	$ 61.9	n/a
Total Equipment		**$ 188.1**			**$ 199.5**			**$ 223.8**	
Total[2]	**650,427.6**	**$ 15,397.0**	**$ -**	**657,367.6**	**$ 16,023.8**	**$ -**	**664,946.1**	**$ 17,848.3**	

[1] Facilities inventory total excludes DRT bus stop pads and shelters

[2] 2019 Replacement values have been restated

1. **Water Supply Asset Class Report (Attachment #2)**

Service Level Objectives
• To provide a safe and sufficient water supply while complying with all Provincial and Federal Acts and Regulations. • To protect the environment and the quality and quantity of ground and surface water. • To support the coordination of growth and achieve and maintain an optimal condition standard for all existing and new water supply system assets.

Total 2021 Replacement Value

$5,429.4 million

⬆ **11%** from 2020

Average Condition
(Year-over-Year Trend)

B ➡

14 Water Supply Plants and Well Systems

10 Water Pumping Stations

8 Combined Water Pumping Stations/ Storage Facilities

14 Water Storage Facilities

5 Other Water Facilities

2,631 km watermains

27,698 control valves

182,448 service connections

696 Speciality Valves

16,785 hydrants

1,948 fire lines

182,063 meters

1.1. Water Supply Inventory Overview

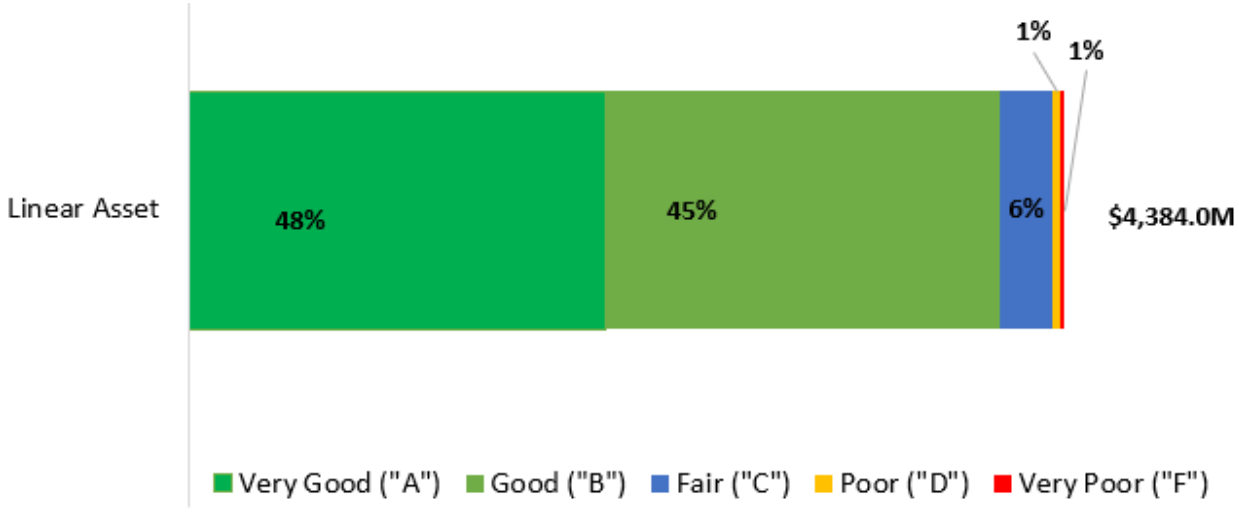
Durham's water supply system assets consist of both vertical and linear assets. Vertical assets treat, store and pump drinking water and linear assets distribute the water to residents and businesses through pipes.

1.2. Water Supply Condition Ratings, Replacement Values and Average Ages

The overall water supply condition rating in 2021 was B representing no year-over-year condition change. Condition ratings for vertical (C-) and linear assets (B+) also remained stable year-over-year. Overall replacement values totalled $5,429.4 million, a 10.6 per cent increase over 2020 primarily as a result of inflationary replacement cost increases and also minor increases to linear assets to accommodate growth.

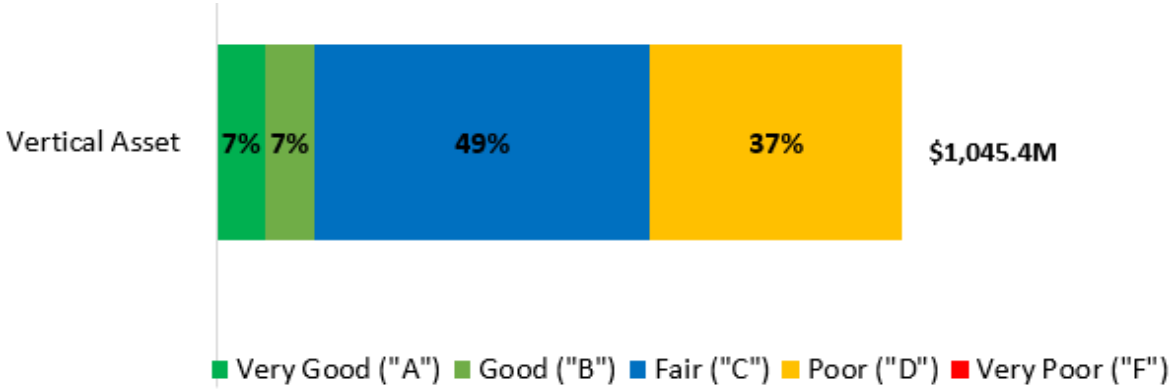
Figure 1 illustrates the condition rating and replacement value of linear and vertical water supply assets.

Figure 1: Water Supply Linear Assets Condition and Replacement Values*



*Condition ratings for assets may not add to 100 per cent due to rounding

Figure 2: Water Supply Vertical Assets Condition and Replacement Values*



1.3. Water Supply Condition Assessment Methods

Table 1 outlines the assessment methods used to determine condition ratings.

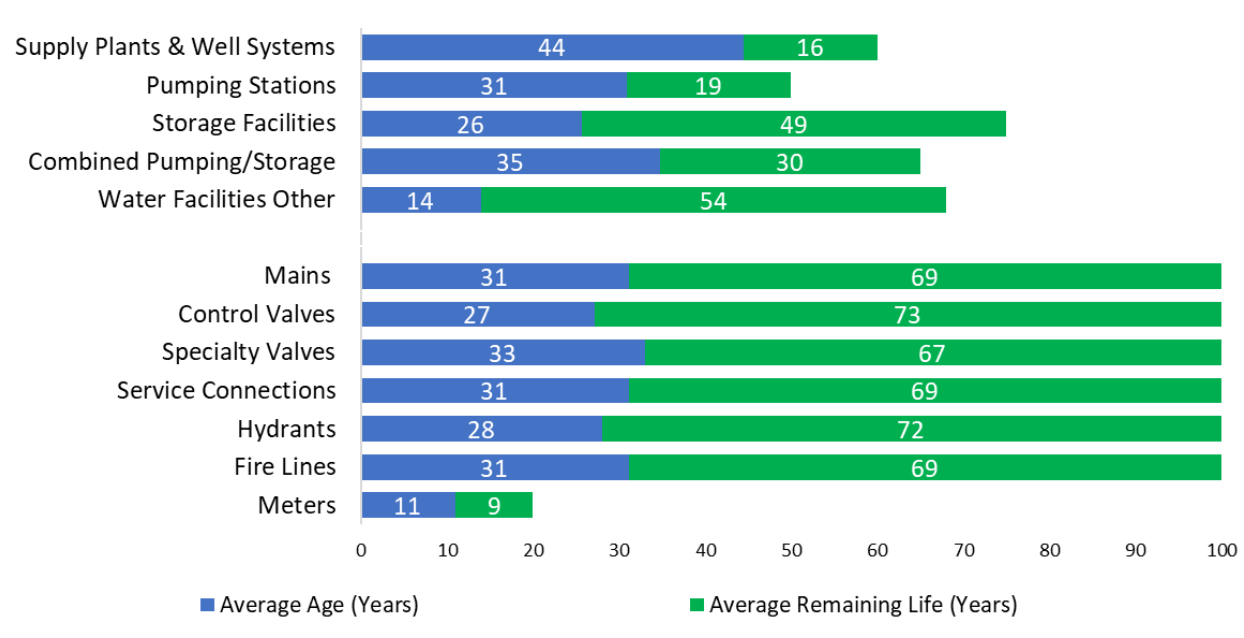
Table 1: Water Supply Condition Assessment Methods

Asset Class	Assessment Methods
Plants, pumping stations, wells and reservoirs	Site-specific detailed condition assessments for the process equipment and building structure are planned at all facilities in the coming years. They are coordinated with upcoming capital projects where possible. In the interim, a high-level scoring was done for all sites by Operations and Facilities staff for long range planning. Staff also recommend repair work for incorporation into the annual operating and capital budgets.
Water towers/standpipes	Annual site-specific inspections per legislated requirements.
Watermains	Consideration of the number of watermain breaks, break rate, pipe material, age, maintenance concerns and issues, lining type, and cathodic protection.
Fire lines, hydrants and water meters	Condition rating is based on age.
Control valves, service connections and specialty valves	Condition rating is based on the connected watermain condition scores.

1.4. Water Supply Average Age and Remaining Useful Life

Figure 3 summarizes the average age and remaining asset life of water system assets. Overall, the water system is relatively young with an average remaining life of 70 years for those assets with a useful life of 100 years.

Figure 3: Water System Average Age and Remaining Useful Life



1.5. Water Supply Levels of Service and Performance Measurement

Service level objectives and performance targets are set through Regional Council approved master plans, studies, policies and procedures, as well as through departmental studies and regulatory and/or compliance guidelines.

Table 2: Plans, Studies, Policies, Procedures, Regulations that Inform Service Levels

Regional Plans, Studies, Policies, & Procedures
• Regional Water Supply System Design Standards & Specifications • Regional Water Supply System By-law 89-2003 • Regional Backflow Prevention By-law 24-2018 • Region's Service Connection Cleaning By-law 90-2003 • Service Levels for Water Operation • The Great Lakes St Lawrence Cities Initiative and the Sustainable Municipal Water Management Framework

- Credit Valley-Toronto and Region-Central Lake Ontario Source Protection Plan
- South Georgian Bay Lake Simcoe Source Protection Plan
- Trent Conservation Coalition Source Protection Plan
- Lake Simcoe Protection Plan

Regulatory Compliance Requirements and Guidelines

- Ontario Safe Drinking Water Act 2002 and associated Regulations:
  - Ontario Regulation 169/03 Ontario Drinking Water Quality Standards
  - Ontario Regulation 170/03 Drinking Water Systems
  - Ontario Regulation 128/04 Certification of Drinking Water System Operators and Water Quality Analysts
  - Ontario Regulation 188/07 Licensing of Municipal Drinking Water Systems
  - Ontario Regulation 453/07 Financial Plans
  - Ontario Regulation 248/03 Drinking Water Testing Services
- Clean Water Act 2006
- Ontario Water Resources Act, R.S.O. 1990 and associated Regulations:
  - R.R.O. 1990, Reg. 903: Wells
  - Ontario Regulation 387/04 Water Taking and Transfer
- Great Lakes Protection Act, 2015
- Lake Simcoe Protection Act, 2008
- Environmental Protection Act, R.S.O. 1990
- Water Opportunities and Conservation Act, 2010
- Oak Ridges Moraine Conservation Act, 2001
- Greenbelt Act, 2005
- Planning Act, R.S.O. 1990
- Building Code Act, 1992 and Ontario Regulation 332/12 Building Code
- Ontario Regulation 319/08 Small Drinking Water Systems
- Canadian Drinking Water Guidelines
- Environmental Management Standard ISO 14001
- Quality Management Standard ISO 9001:2000
- Technical Support Document for Ontario Drinking Water Standards, Objectives, and Guidelines.

Detailed service level descriptions and targets are outlined in the Community Levels of Service, Technical Levels of Service and Performance Measures subsections that follow.

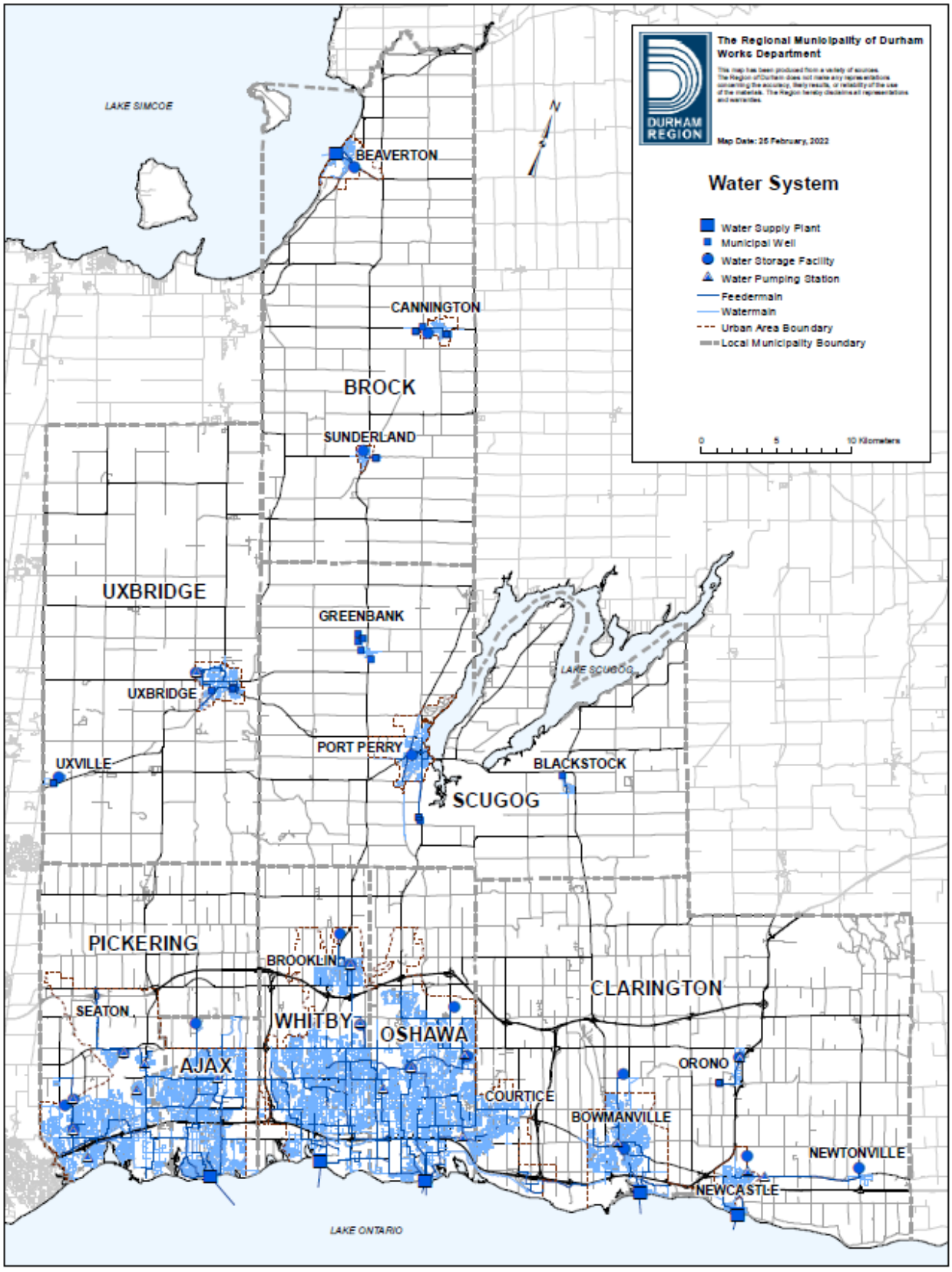
Community Levels of Service

Community levels of service provide qualitative descriptions of service reliability, service standards and service scope as required by Ontario Regulation 588/17.

Table 3: Community Levels of Service

Criteria	Description
Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system.	Approximately 95 per cent of Durham's municipal tap water comes from Lake Ontario, with the remaining from underground sources (wells) and Lake Simcoe for the Beaverton area. Map 1 identifies the areas that are connected to the Region of Durham's water supply system.
Description, which may include maps, of the user groups or areas of the municipality that have fire flow.	Proximity to a hydrant is a benefit of being connected to the water supply system for fire protection. There are 16,785 fire hydrants in Durham Region. There is 100 per cent fire flow in the Region of Durham with 92 per cent of residents having direct supply from hydrants.
Description of boil water advisories and service interruptions.	Boil water advisories can be issued due to adverse water quality testing results or suspected contaminants. They protect water users from potential health risks. Due to the Region's rigorous and thorough water treatment and testing process, there were zero boil advisory days in 2021.

Map 1: Durham Region's Water Supply and Fire Flow System



Technical Levels of Service

Ontario Regulation 588/17 includes a list of required technical metrics for water supply systems as shown in Table 4.

Table 4: Technical Service Levels per Ontario Regulation 588/17

Technical Metric	Target	Year of Measure		
		2019	2020	2021
Percentage of Properties Connected to the Region's Water Supply System	100 per cent of Properties with Proximity to a Watermain to be Connected	99%	99%	99%
Measures the percentage of properties connected to the Region's treated water supply system. Only properties within an Urban Boundary can be potentially connected to a water system. Durham has a number of properties in rural areas.				
Percentage of Properties Where Fire Flow is Available	100 per cent of Properties with Proximity to a Watermain has Fire Flow	100%	100%	100%
This measure tracks the percentage of properties that have fire flow in the Region. Any property in proximity to a watermain has fire flow through hydrants.				
Service Interruptions due to Watermain breaks	0.00 per cent	0.00%	0.00%	0.00%
The number of connection-days per year where service is disrupted due to watermain breaks compared to the total number of properties connected to the municipal water system.				
Boil Water Advisory Days	Zero days annually	0	0	0
The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system.				

Performance Measures

Beyond community service levels and technical reporting requirements of Ontario Regulation 588/17, a number of performance metrics are being tracked to measure how well assets are meeting service level objectives.

Table 5: Performance Measures

Performance Measure	Target	Year of Measure		
		2019	2020	2021
Condition Index Rating	0.2 per cent of linear assets rated as very poor	0.50%	0.40%	0.54%
Measure identifies the per cent of linear assets (watermains, hydrants, valves, service connections, fire lines and water meters) rated as "Very Poor" calculated on total replacement value of these assets.				
Non-Revenue Water	Reduce non-revenue water by 0.5 per cent annually	13.80%	14.57%	13.69%
Measures non-revenue water as a percentage of total water treated. Non-revenue water is a total of unbilled authorized consumption, apparent losses and real losses. Examples of each type are as follows: • Unbilled Authorized = flushing hydrants at dead ends, in new developments or following replacement or repair of hydrant. • Apparent Losses = unauthorized consumption like water theft at hydrants and customer metering inaccuracies. • Real Losses = leakage on mains and service connections, overflows at water storage facilities and at point of customer metering.				
Valves Inspected	100 per cent of line valves ≥300mm every 2 years	90%	84%	84%
	100 per cent of line valves <300mm every 6 years	90%	87%	89%
Percent of valves inspected per current Durham Service Levels. The purpose is to ensure all valves are operational when required for use and to minimize water losses.				
Hydrants Inspected	100 per cent of hydrants inspected annually	99%	99%	99%
Measures the percentage of hydrants inspected annually per Durham Service Level. The goal is to ensure sufficient, reliable service for fire protection.				

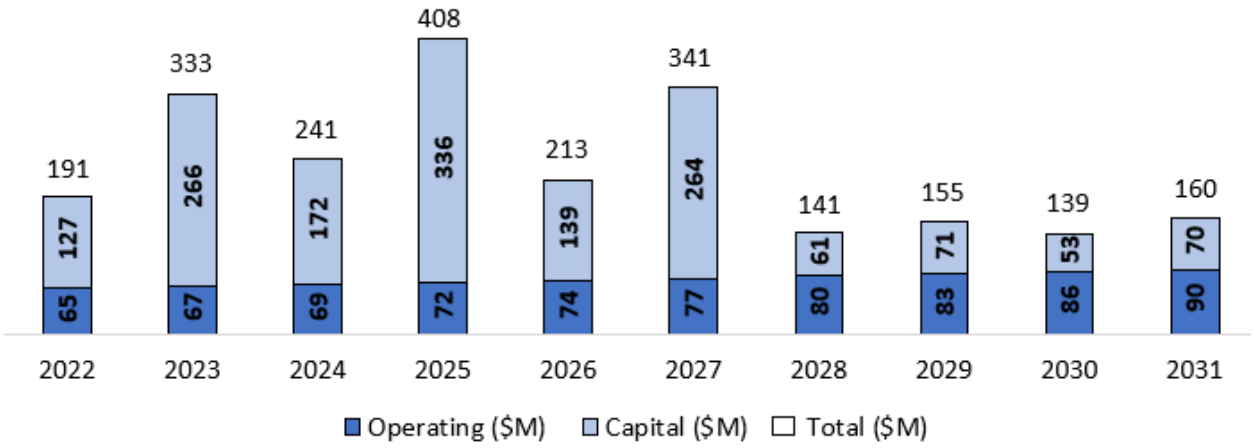
Performance Measure	Target	Year of Measure		
		2019	2020	2021
Condition Index Rating	0 per cent of vertical assets rated as very poor	4.85%	4.84%	0.00%
Measure identifies the percentage of plants (including wells, pumping stations and water storage facilities) rated very poor. The condition percentage is based on replacement value rather than number of sites.				
Compliance to Drinking Water Standards and MECP Regulatory Requirements	100 per cent compliance of drinking water test results annually	100.00%	99.90%	99.88%
Measures compliance to MECP drinking water standards using number of drinking water test results within standards (Ontario Regulation 169/03 microbiological tests only) / total number of drinking water tests performed at the plants and on the distribution system. Purpose is to ensure safe water source to all residents of Durham. Microbiological tests on commissioned and operating systems including any tests carried out in addition to Regulatory requirements.				
Back-up power capabilities	100 per cent of plants, wells, and pumping stations with back up generators	83%	83%	83%
	100 per cent of generators newer than 30 years in age	88%	79%	83%
Ensure that all plants, wells and pumping stations' back-up power generators are no older than 30 years. Portable generators used at maintenance hole-type pumping stations and those too small to house a generator are not included in the calculation. The age measure is calculated using only the number of existing generators currently in place.				
Mainline Valves in Operable Condition	100 per cent of valves in operable condition	99%	99%	99%
This measures the percent of valves that are found to be operable during annual inspections. The Region's strives to keep all valves operable and schedules required valve repairs as soon as possible.				

1.6. Lifecycle

Water Supply System maintenance and rehabilitation lifecycle activities aim to extend the useful life of linear and vertical assets and improve service delivery. For some linear assets such as cast iron and ductile iron watermains, there are activities that can be done to slow deterioration and extend the useful life.

Figure 4 illustrates capital and maintenance lifecycle costs for the water supply asset class.

Figure 4: Lifecycle Costs Water Supply Operating and Capital ($ millions)*



*Operating and Capital may not add to Total due to rounding.

Lifecycle Activities

In the past, cement lining was used to improve water flow and quality as well as reduce internal pipe corrosion. The structural lining technology that is used by the Region now provides the same benefits but also renews the pipe to an almost new condition. Cathodic protection is used extensively throughout the Region to slow external corrosion on iron watermains. These rehabilitation methods have the benefit of improving the condition of the watermains while limiting the amount of disruption to residents and the cost to rate payers.

Full pipe replacement is preferred when the watermain condition is in very poor condition or when there is an opportunity to coordinate with other infrastructure work such as road reconstruction or sanitary sewer replacement.

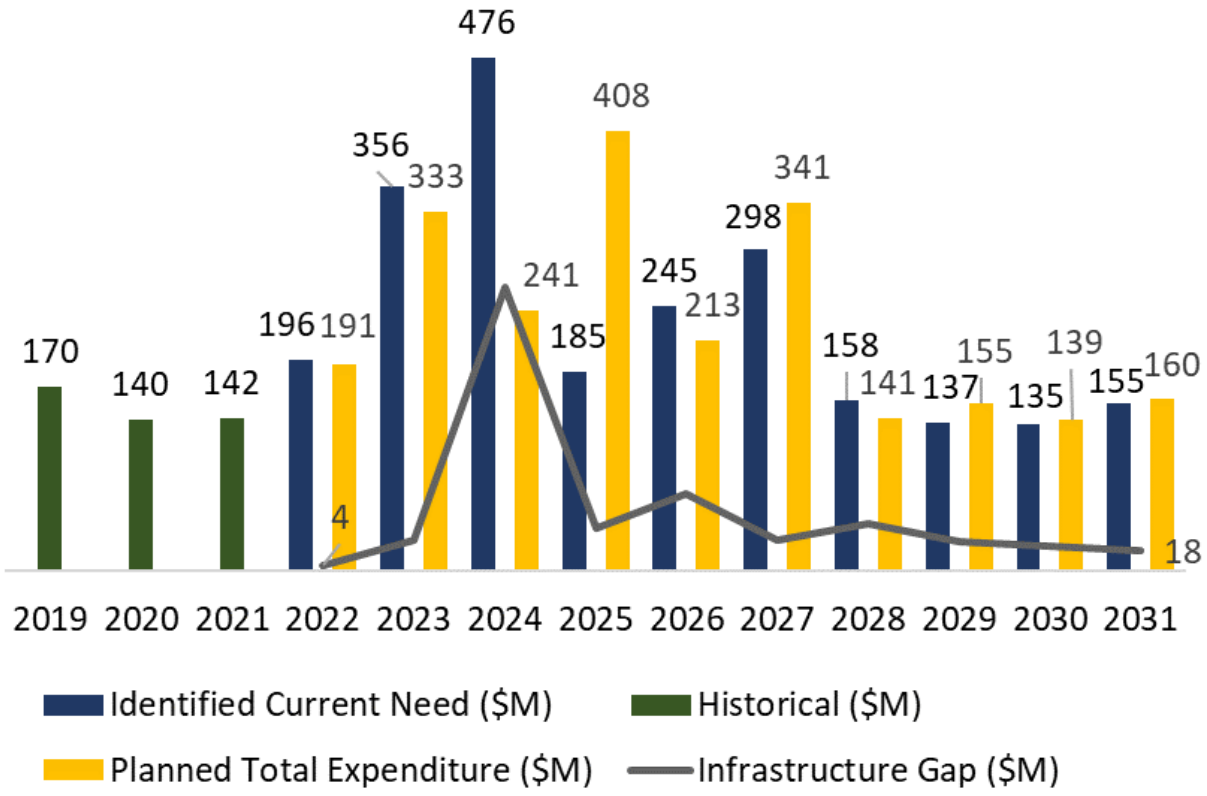
For vertical water system assets, lifecycle activities are informed by detailed site-specific condition assessments as well as by Operations and Facilities staff knowledge of issues as they attend the various sites regularly. The detailed inspections inform rehabilitation and renewal activities and forecast investment needs over the long-term.

In addition to repair and maintenance activities, other ongoing operating expenditures are required to ensure water assets can meet service levels. Some examples include overhead costs (e.g., office staff, training, software, etc.), gas and fuel, utilities, chemicals and fleet rentals.

Total operating lifecycle expenditures for water total $764.7 million over the 2022 Budget and nine-year forecast period (2023 to 2031) while capital funding totals $1,558.2 million over this period. Figure 5 below provides planned capital and operating expenditures for the water system for 2022 and the nine-year forecast period. Additionally, staff have undertaken an analysis to forecast the funding required to optimally sustain current service levels.

Any rehabilitation or replacement work required to meet health and safety or legislative standards are reflected in the planned total expenditures while the identified current need builds on the approved budget to accelerate some lower priority works as illustrated in Figure 5.

Figure 5: Water System: Lifecycle Gap Analysis ($ millions)



In 2022, the infrastructure gap is estimated at $4.4 million. Based on currently planned expenditures this infrastructure gap grows to $18.2 million in 2031.

The identified current need reflects accelerating replacements for some non-urgent linear projects. Not accelerating these projects may result in increased repair and maintenance work which is balanced with cost savings to rate payers and ensuring full value is extracted from assets by avoiding premature replacement. It is important to note that the planned total expenditure poses no health and safety risk or material impacts to service as compared to the identified current need scenario.

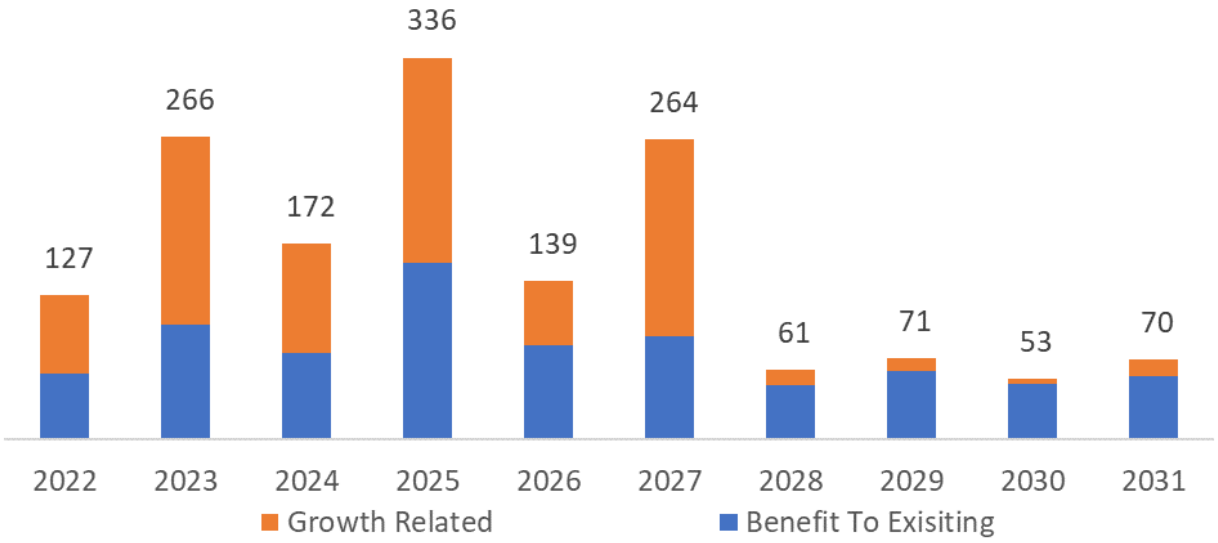
Staff will continue to monitor funding needs and refine identification and assessment processes. The recently implemented enterprise maintenance management and workorder software system, Maximo, will enhance asset management capabilities and allow for improved analysis for lifecycle costing.

Moving forward, staff will be further refining lifecycle costing analysis and data collection for both linear and vertical water supply assets that will be reported in future asset management plans.

1.7. Water System Capital Forecast

Major capital investments for the water supply system identified through the 2022 business plans and budget process (rehabilitation and growth) total $126.9 million for 2022 and $1,431.2 million over the 2023 to 2031 forecast period.

Figure 6: Water System Capital Forecast ($ millions)



Capital investments

The 2022 Water Supply Capital Budget includes $5.6 million in linear improvements in collaboration with the Transportations Department, Local Municipalities and Ministry of Transportation Ontario (MTO) projects.

There is an additional $12.9 million for the Region to replace watermains which includes valves, hydrants and water service connections independently.

In addition, there is also $5.5 million included for other linear replacements such as water meters and hydrants. For water supply buildings and plant equipment (vertical assets), there is approximately $9.8 million included in the 2022 Water Supply Capital Budget to address asset management needs.

A key project in the budget and forecast period is a three-year project starting in 2022 to retrofit existing water meters with radio frequency remote reading devices to minimize manual meter readings. The total estimated cost of this initiative over the three-year period is $10.0 million.

Capital investments in water supply assets to meet growth needs totals approximately $70 million in 2022 including advancements in the servicing of employment lands.

1.8. Climate Change

Climate Mitigation: Water Supply System Strategies to Reduce GHG Emissions

The Durham Region Corporate Climate Action Plan has set targets to achieve net-zero GHG emissions by 2045. The corporate GHG inventory includes emissions produced to treat, store and pump water as well as non-energy GHG emissions associated with water management operations.

Key climate change mitigation accomplishments in water supply systems for 2021 include:

- Energy management programs and equipment replacements which are more energy efficient to reduce the growth of emissions.

Key 2022 to 2031 initiatives that support GHG reductions include:

- Completion and implementation of the Water & Wastewater GHG Emission Management Strategy.
- Significant water supply process and facility upgrades scheduled for 2022 and 2023 including the implementation of initiatives from Durham's Energy Conservation and Demand Management Plan.

Climate Adaptation: Increasing the Resiliency of Water Supply System

A changing climate can put additional pressures on systems through extreme weather events that necessitate proactive measures and modifications to system design.

Priority climate change mitigation measures for the water supply system include:

- The Cannington Water Supply System New Well and Pumphouse with Standby Power– detailed design complete, the tender has been awarded and construction has commenced.

- Enhancing erosion protection at creek crossings to protect pipes and associated structures.
- Replacement of standby generators at Whitby WSP, Grandview PS, Waverly PS, Beaverton WSP and Port Perry Well 6.

Climate adaptation will continue to be addressed through the business planning, budget and long-term financial planning processes to ensure a proactive approach.

1.9. Risk Assessment

Regional staff investigate potential risks to water supply assets on an ongoing basis, considering probability, potential consequences and suitability of risk mitigation controls. Table 6 highlights some key identified risks as well as ongoing and new mitigation measures.

Table 6: Water Systems Risk Mitigation Strategies

Risk	Mitigation
Loss of external utilities	Standby generation assessments, options analysis and implementation. Uninterrupted Power Supply (UPS) systems and upgrades. Update depot-specific contingency plans and training programs. Essential services policies, contingency plans, and continuity plans. Capital redundancy and work around programs. (e.g., twinning, looping, etc.).

Risk	Mitigation
Disruption to water supply and water quantity losses	Maintenance and infrastructure rehabilitation and replacement programs. Inspections, risk assessments and source water protection practices. Capital redundancy and continuity programs (e.g., twinning, looping, etc.). Engineering, hydrology, design and erosion mitigation studies and strategies. Water meter replacement and funding strategy. Wellhead protection and management program. Cement lining and cathodic pipe protection strategy. Bulk water dispensing strategy. Leak detection program. SCADA alerts and controls.
Potential for water contamination	Regional source water protection plans and wellhead protection programs. Water quality testing and SCADA alerts and controls. Lead pipe strategy. Sewer Use By-law and Backflow Prevention Program and By-law. Maintain effective emergency, contingency, and continuity plans. Spill control procedures. Maintenance and infrastructure rehabilitation and replacement programs.

1. Sanitary Sewerage System Asset Class Report (Attachment #3)

Service Level Objectives
• To provide safe and reliable wastewater collection and treatment for all Durham residents, businesses and industries. • To protect the environment, improve the quality of effluent discharged, and comply with all Provincial and Federal Acts and Regulations. • To support the coordination of growth and maintain an optimal condition standard for all existing and new sanitary sewerage system assets.

11 Water Pollution Control Plants

51 Pumping Stations

3 Other Wastewater Facilities

2,205 km Gravity Sewers

65 km Forcemains

32,096 Maintenance Holes

178,581 Service Connections

Total 2021 Replacement Value

$6,069 million

⬆ **11**% from 2020

Average Condition
(Year-over-Year Trend)

B+ ➡

1.1 Asset Inventory Overview

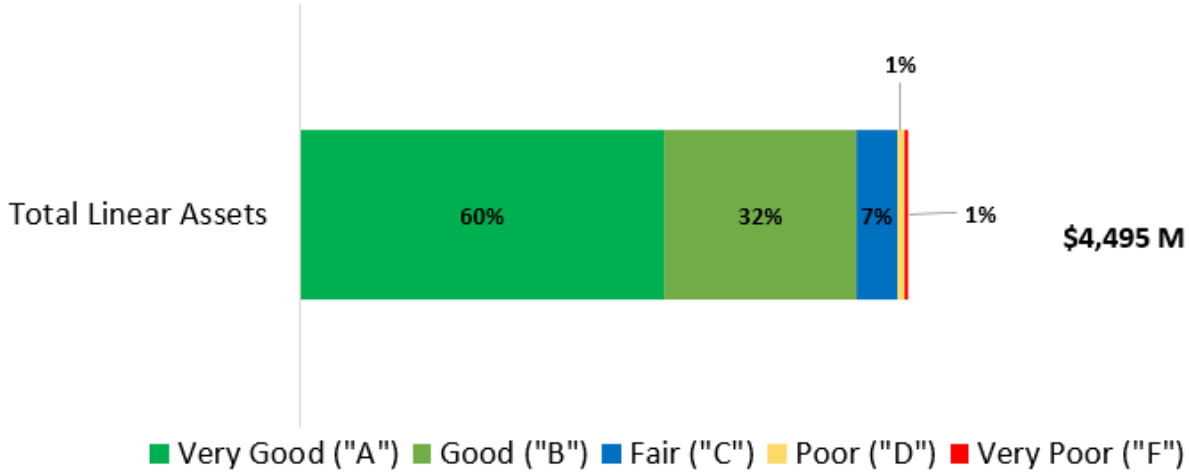
Durham Region's sanitary sewerage system consists of vertical and linear assets. Vertical assets refer to facilities that treat and pump sanitary sewage and store excess sewage while linear assets collect sanitary sewage and provide a piped route from customers to the treatment plants.

1.2 Sanitary Sewerage Condition Ratings, Replacement Values and Average Ages

The overall condition rating for sanitary sewerage remained B+ in 2021 as compared to 2020 with condition ratings for vertical (C+) and linear assets (A-) remaining stable. Overall replacement values increased 11.4 per cent over 2020 as a result of inflationary replacement cost increases and minor increases to linear assets to accommodate growth.

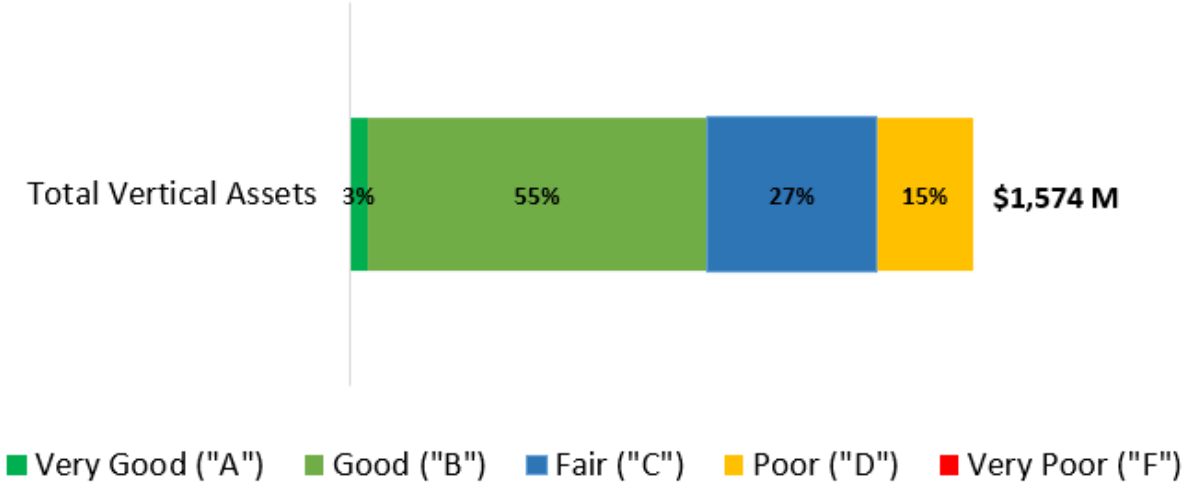
Figure 1 below illustrates the condition rating and replacement value of linear and vertical sewer assets.

Figure 1: Linear Sanitary Sewerage Assets Condition and Replacement Values



*Condition ratings for assets my not add to 100 per cent due to rounding.

Figure 2: Vertical Sanitary Sewerage Assets Condition and Replacement Values



*Condition ratings for assets may not add to 100 per cent due to rounding

1.3 Sanitary Sewerage Condition Assessment Methods

Table 1 outlines the assessment methods used to determine condition ratings.

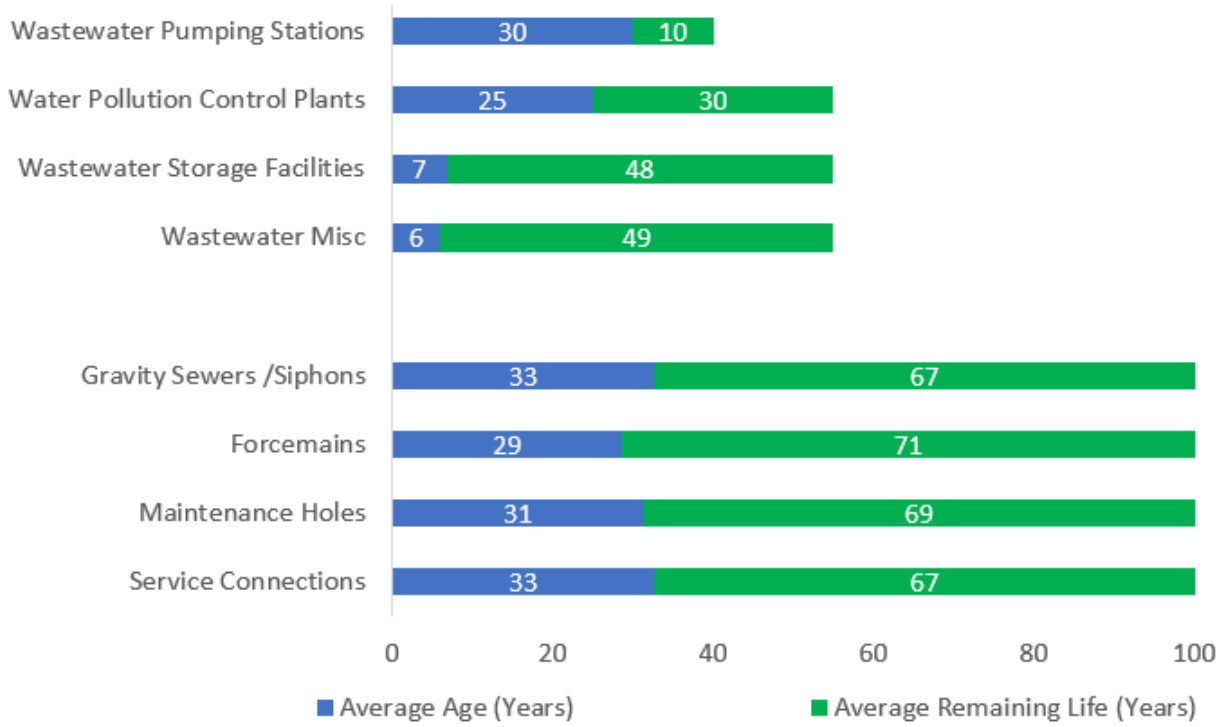
Table 1: Sanitary Sewerage Condition Assessment Methods

Asset Class	Assessment Methods
Plants, Pumping Stations and Storage	Site-specific detailed condition assessments for the process equipment and building structure are planned at all facilities in the coming years. They are coordinated with upcoming capital projects where possible. In the interim, a high-level scoring was done for all sites by Operations and Facilities staff for long range planning. Staff recommend repair work for incorporation into the annual operating and capital budgets.
Gravity Sanitary Sewers and Forcemains	Structural grade score from CCTV inspections, material type, age of the pipe and any concerns or issues from Maintenance Operations are used to compile a score for each pipe segment. Forcemains also use break history in scoring.
Maintenance Holes and Chambers	Infrastructure age.
Service Connections	Assigned same score as the gravity sewer they are connected to.

1.4 Sanitary Sewerage Average Age and Remaining Useful Life

Figure 3 summarizes the average age and remaining asset life of sanitary sewer assets as of December 31, 2021. Overall the sanitary sewerage system is relatively young as evidenced by generally significant remaining useful life.

Figure 3: Sanitary Sewerage System Average Age and Remaining Useful Life



1.5 Levels of Service and Performance Measurement

Service levels objectives and performance targets are set through Regional Council approved master plans, studies, policies and procedures, as well as through departmental studies and regulatory and/or compliance guidelines.

Table 2: Plans, Studies, Policies, Procedures, Regulations that Inform Service Levels

Regional By-Laws, Departmental Studies, Policies, & Procedures
• The Region's Sanitary Sewer System By-Law • Service Levels for Sanitary Sewerage Operation • The Region's Service Connection Cleaning By-law 90-2003 • Water Pollution Control Plan and Storm Water System By-law • Regional Sanitary Sewerage System Design Standards and Specifications

Regulatory Compliance Requirements and Guidelines

- Wastewater System Effluent Regulations (WSER)
- Environmental Protection Act of Ontario
- Pollution Prevention Plan (P2)
- Lake Simcoe Protection Plan
- Water Opportunities and Water Conservation Act
- Ontario Water Resources Act
- Fisheries Act
- Ontario Regulation 129/04 Licencing of Sewage Works Operators
- Ontario Regulation 248/03 Drinking Water Testing Services
- Clean Water Act
- Human Pathogens and Toxins Act and Regulation (SOR/2015-44)
- Canadian Biosafety Standard and Guidelines
- ISO/IEC 17025:2017 General requirements for competence of testing and calibrating laboratories

Detailed service level descriptions and targets are outlined in the Community Level of Service, Technical Levels of Service and Performance Measures subsections that follow.

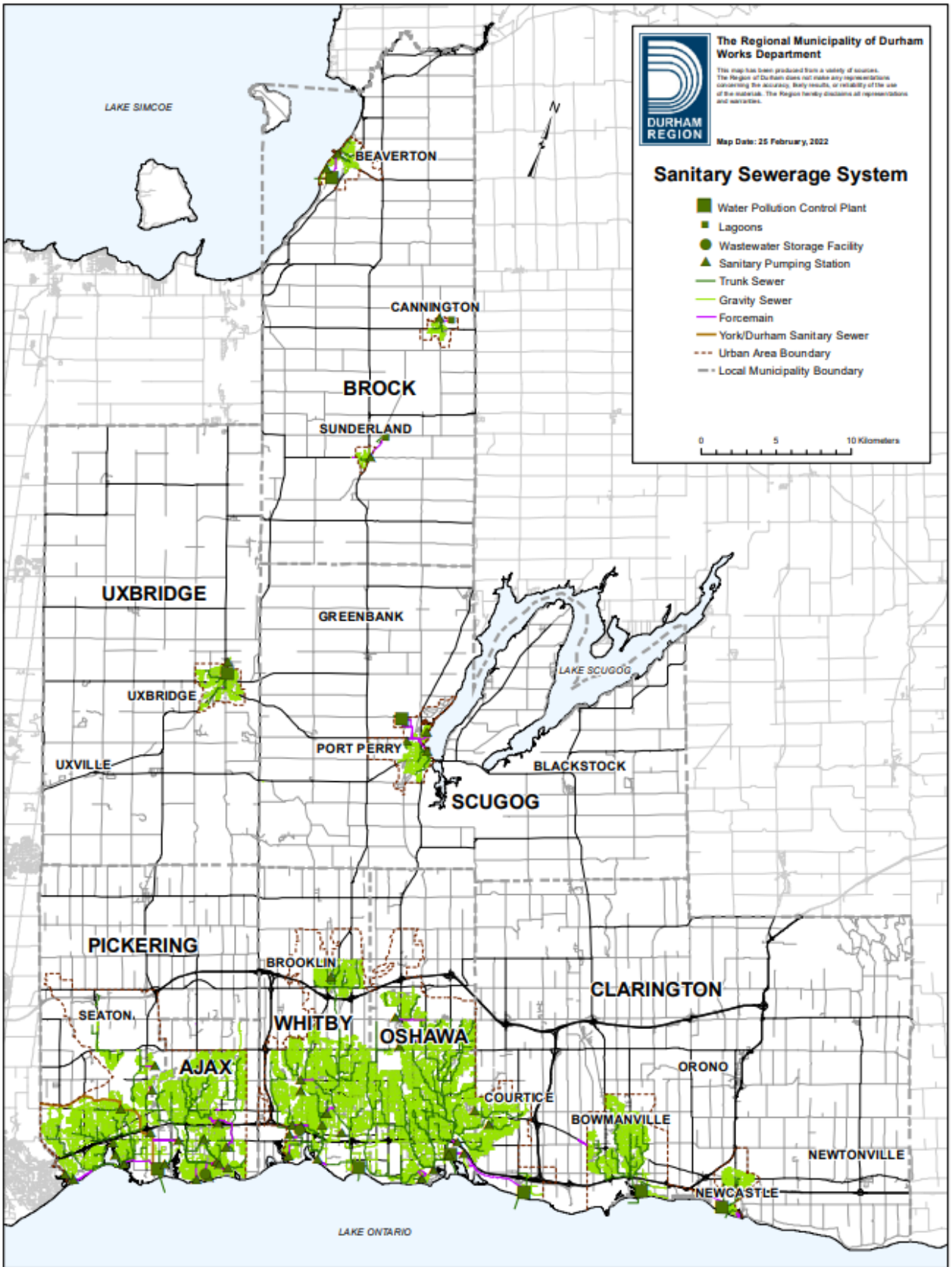
Community Levels of Service

Community levels of service provide qualitative descriptions of service reliability, service standards and service scope as required in Ontario Regulation 588/17.

Table 3: Community Levels of Service

Criteria	Description
Description which may include maps of areas of the municipality that are connected to the wastewater system.	Refer to Map 1.
Description of how stormwater can get into sanitary sewers in the wastewater system, causing sewage to overflow into streets or backup into homes.	Infiltration can occur at poor joints in the pipe or at lids of maintenance holes along the sewer system. In older neighbourhoods, the foundation drains are connected to the sewer system.
Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described above.	Annual inflow & infiltration reduction program to continue identifying potential stormwater entry points in the sanitary sewerage system. Additional flow monitoring work on key sewers on selected sanitary sewers to identify cross connections from the storm drainage system and rainwater downspouts. Prohibiting the connection of foundation drains to the sanitary sewerage system for new builds and educating the public on disconnecting existing foundation drains. Backflow prevention program on all water services that could pose a hazard to the municipal drinking water system.
Description of the effluent (treated sewage liquid) that is discharged from sewage treatment plants.	The Region's sanitary sewage is treated in accordance with Ministry of the Environment, Conservation and Parks effluent quality regulations. Effluent undergoes full unit processes as per each plant's Environmental Compliance Approval before being discharged into the plant's approved receiving water body.

Map 1: Map of Durham Region Sanitary Sewerage System



Technical Levels of Service

Ontario Regulation 588/17 includes a list of required technical metrics for sanitary sewerage systems as shown in Table 4.

Table 4: Technical Service Levels per Ontario Regulation 588/17

Technical Metric	Target	Year of Measure		
		2019	2020	2021
Percentage of Properties connected to Region's Wastewater System	100 per cent of Properties with Proximity to a Sanitary Sewer to be Connected	99%	99%	99%
Measures the percentage of properties in proximity to a sanitary sewer that are connected to Durham's wastewater system. Only properties within an Urban Boundary can be potentially connected to a sewage system. Durham has a number of properties in rural areas.				
Number of Effluent Violations Per Year to Total Number of Properties Connected to Region's Wastewater System	0 per cent of Effluent Violations to Properties Connected to Region's Wastewater System	0%	0%	0%
This measures the percentage of effluent violations compared to the total number of properties connected to the Region's wastewater system.				
Number of Wastewater Backups to Total Number of Properties Connected to Region's Wastewater System	0 per cent of Wastewater Backups to Properties Connected to Region's Wastewater System	0%	0%	0%
This measures the percentage of wastewater backups compared to the total number of properties connected to the Region's wastewater system.				

Performance Measures

Beyond community service levels and technical reporting requirements of Ontario Regulation 588/17, a number of performance metrics are being tracked to measure how well assets are meeting service level objectives.

Table 5: Performance Measures

Performance Measure	Target	Year of Measure		
		2019	2020	2021
Condition Index Rating	0.1 per cent of linear assets rated as very poor	0.50%	0.64%	0.60%
Measure identifies the percentage of sewer system (gravity, forcemains, maintenance holes, chambers and service connections) which are in very poor rating calculated on the total replacement value of these assets. Condition scoring factors include material type of pipe, remaining service life, CCTV inspection score and Operational staff input.				
Mainline Sewer Inspections	10 per cent of sanitary sewers inspected by CCTV per year	8.09%	8.26%	6.70%
Measures percentage of sanitary sewers inspected by CCTV every year as per Durham Service Levels. The target is 10 per cent of gravity sewers only (not including siphons) per year so a number of 10 per cent or greater in the above chart is meeting the target. The procedure provides a report on the condition of gravity sewers (preventative inspection). Based on the results, a full replacement or a repair/ rehabilitation is scheduled as required.				
Sanitary Maintenance Hole Inspections	50 per cent of maintenance holes inspected annually	44%	46%	47%
Measures the percentage of maintenance holes inspected on a two-year cycle as per Durham Service Levels. The target is 50 per cent inspected each year. It is a preventative maintenance procedure which validates condition.				
Mainline Sewer Cleanings	50 per cent of ≤375mm diameter sewers cleaned annually	50%	43%	49%
Measures percentage of sewers cleaned based on size as per Durham Service Levels. A value in the chart above of 50 per cent indicates that the target has been met for the gravity pipes 375 mm diameter and less. This is a maintenance program that can reduce the number of sewer blockages and emergency type calls.				

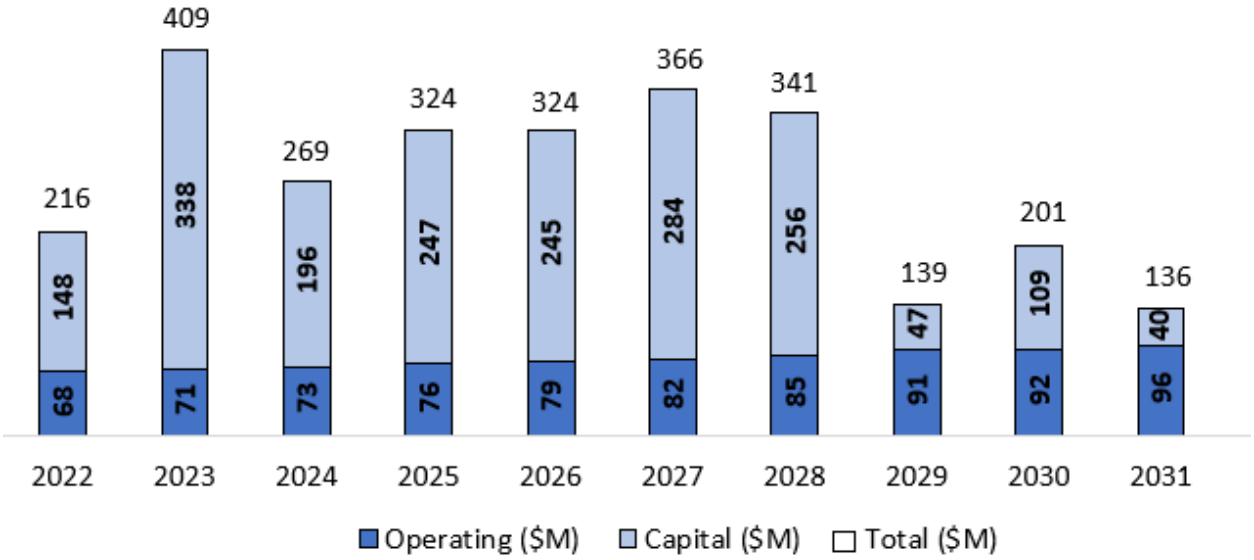
Performance Measure	Target	Year of Measure		
		2019	2020	2021
Condition Index Rating	0 per cent of vertical assets rated as very poor	0.30%	0.30%	0.00%
Measure identifies the percentage of plants, pumping stations and sewage storage facilities which have very poor rating. A high level assessment completed by plant operations staff for the process equipment and facilities staff for the building condition is used for scoring until a detailed condition inspection can be done at that location. It is anticipated that detailed condition assessments of all facilities will be done over the next 5 to 7 years. The condition percentage is calculated on replacement value not number of sites.				
Odour Complaints	0 valid odour complaints per year	0	1	0
Odour complaints can be indicative of the operating process at the sewerage treatment plants. The annual target for this measure is zero valid odour complaints from the public.				
Compliance with MECP Regulatory Requirements	0 per cent wastewater by-passed treatment annually	0%	0%	0%
Measures the percentage of untreated wastewater in accordance with wastewater by-passes as reported to the MECP (numerator) as a share of total megalitres of treated wastewater plus estimated megalitres of untreated wastewater (denominator).				
Back up Power Capabilities	100 per cent of plants and pumping stations with back-up generators	96%	96%	96%
	100 per cent of generators newer than 30 years in age	67%	65%	61%
Ensure that all plants (lagoons not included) and pumping stations have a back up power generator that is no older than 30 years. Only pumping stations that can house a generator are included in the calculation. Portable generators can be used at the other locations. The age measure is calculated using only the number of existing generators currently in place.				

1.6 Lifecycle

Sanitary sewerage system maintenance and rehabilitation lifecycle activities aim to extend the useful life of linear and vertical assets and improve service delivery. For linear assets these renewal activities include pipe liners, ream and seal technology, and pipe segment replacements.

Figure 4 illustrates capital and maintenance lifecycle costs for the Sanitary Sewerage asset class.

Figure 4: Lifecycle Costs Sanitary Sewerage Operating and Capital ($ millions)*



*Operating and Capital may not add to Total due to rounding.

Total operating lifecycle expenditures for sewer total $813.6 million over the 2022 Budget and nine-year forecast period while capital funding totals $1,910.9 million over this period.

Lifecycle Activities

Full replacements are preferred when the linear asset condition is in Very Poor condition, or when there is an opportunity to coordinate with other infrastructure work such as road reconstruction or watermain replacement for cost savings.

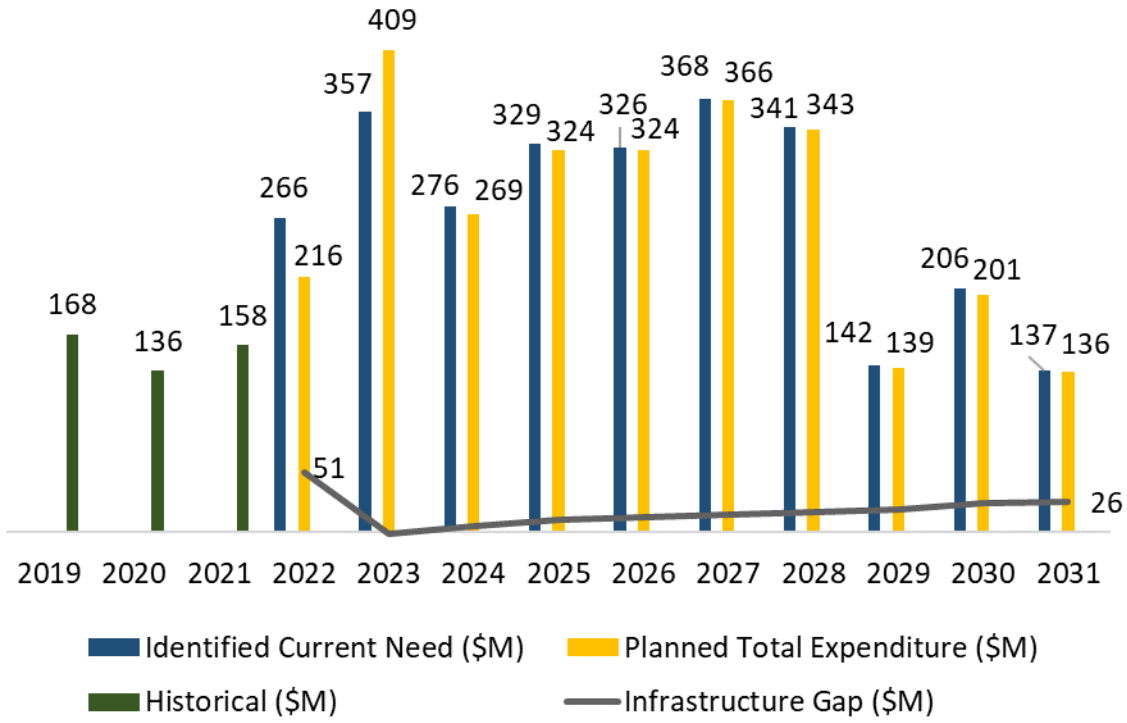
For vertical sewage system assets, lifecycle activities are informed by detailed site-specific condition assessments as well as by Operations and Facilities staff knowledge of issues by attending the various sites regularly. The detailed inspections inform rehabilitation and renewal activities and forecast investment needs over the long-term.

In addition to repair and maintenance activities, other ongoing operating expenditures are required to ensure sanitary sewerage assets can meet service levels. Some examples include overhead costs (e.g., office staff, training, software, etc.), gas and fuel, utilities, chemicals and fleet rentals.

Lifecycle Gap Analysis

Staff have undertaken an analysis to forecast the funding required to optimally sustain current service levels. Any rehabilitation or replacement work required to meet health and safety or legislative standards are reflected in the planned total expenditures while the identified current need builds on the approved budget to accelerate some non-urgent works as illustrated in Figure 5.

Figure 5: Sanitary Sewerage: Lifecycle Gap Analysis ($ millions)



In 2022, the infrastructure gap is estimated at $50.6 million. Based on currently planned expenditures this infrastructure gap declines to $25.8 million in 2031.

The identified current need primarily reflects earlier replacements for some non-urgent linear projects. Not accelerating these projects, may result in increased repair and maintenance work. It is important to note that the planned expenditure investment level poses no health and safety risk or material impacts to service as compared to the identified current need scenario.

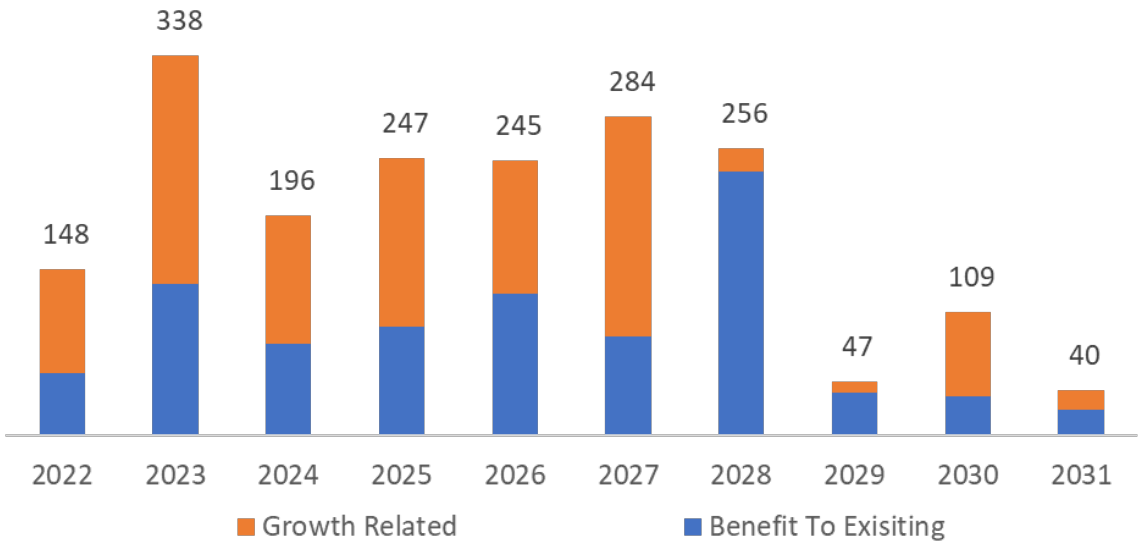
Staff will continue to monitor funding needs and refine identification and assessment processes. The recently implemented enterprise maintenance management and workorder software system, Maximo, will enhance asset management capabilities and allow for improved analysis for lifecycle costing.

Moving forward, staff will be further refining lifecycle costing analysis and data collection for both linear and vertical sanitary sewerage assets that will be reported in future asset management plans.

1.7 Sanitary Sewerage Capital Forecast

Major capital investments for sanitary sewerage services identified through the 2022 business planning and budget process (rehabilitation and growth) total $147.6 million for 2022 and $1,763.3 million over the 2023 to 2031 forecast period.

Figure 6: Sanitary Sewerage Capital Forecast ($ millions)



The 2022 Sanitary Sewerage Systems Business Plans and Budget includes $8.2 million to address the priority sewer linear assets in poor or very poor condition and $89.3 million for plant equipment (vertical assets), to address asset management needs.

1.8 Climate Change

Climate Mitigation: Sanitary Sewerage Strategies to Reduce GHG Emissions

The Durham Region Corporate Climate Action Plan has set targets to achieve net-zero GHG emissions by 2045. The corporate GHG inventory includes emissions produced to pump and treat wastewater as well as non-energy GHG emissions associated with wastewater management operations.

Combined, water and wastewater treatment operations are the largest sources of corporate energy consumption and, in 2020, produced approximately 27,200 tCO2e or 16 per cent of total corporate emissions. These emissions are largely related to wastewater treatment, which includes non-energy GHG emissions.

Key climate change mitigation accomplishments for sanitary sewerage systems in 2021 include:

- Completion of an Integrated Resource Recovery study for the Duffin Creek Water Pollution Control Plant on behalf of Durham and York Regions. This study outlines several projects with significant GHG reduction potential that will be evaluated by Regional Staff in collaboration with York Region for inclusion in future business plans, budgets and long-term capital forecasts.

Key Budget 2022 to 2031 initiatives that support GHG reductions include:

- Completion and implementation of the Water & Wastewater GHG Emission Management Strategy.

- Significant sanitary sewerage process and facility upgrades scheduled for 2022 and 2023 including blower upgrades at Harmony Creek and Courtice Water Control Pollution Plants and the implementation of initiatives from Durham's Energy Conservation and Demand Management Plan.

Climate Adaptation: Increasing the Resiliency of Sanitary Sewerage System

A changing climate can put additional pressures on systems through extreme weather events that necessitate proactive measures and modifications to system design. Priority climate change mitigation measures for sanitary sewerage system include:

- Ensure adequate standby power, redundancies, business continuity and supervisory control and data (SCADA) systems throughout program areas;

- Reduce potential infiltration and inflow of groundwater or stormwater into the sanitary sewer collection system to mitigate flooding and inflow risk;

- Enhance erosion protection at creek crossings to protect sanitary sewer systems; and,

- Assess climate adaptation requirements within the asset management planning process to inform:
    - Operations and preventative maintenance programs;
    - Capital rehabilitation and replacement priorities;
    - Inventory management planning; and,
    - Redundancy and contingency planning.

Climate adaptation will continue to be addressed through the business planning, budget and long-term financial planning processes to ensure a proactive approach.

1.9 Risk Assessment

Regional staff investigate potential risks to sanitary sewerage system assets on an ongoing basis. Table 6 highlights some high impact potential risks as well as ongoing and new risk mitigation measures.

Table 6: Sanitary Sewerage Systems Risk Mitigation Strategies

Risk	Mitigation
Broken forcemain/trunk sanitary sewer	Pipe twinning capital program to increase forcemain redundancy. SCADA system alerts, controls and improvements. Maintain emergency, contingency re-routing and continuity plans. Forcemain condition assessment pilot project. Inspection and asset repairs, maintenance, and replacements.
Sanitary sewerage inflow and infiltration (I&I)	Gather data to understand performance during extreme storms. System repairs, proactive maintenance, and capital investments. Monitor flows, conduct household drainage surveys and I&I education. Minimize on-site water retention.
Disruptions to wastewater treatment services (e.g. extended loss of power)	Maintain emergency, contingency and continuity plans. Ensure adequate stand-by power and UPS as needed. On-call service contracts. SCADA alerts, response, communication and control. Repairs, preventative maintenance and rehabilitation investments.
Potential contamination of adjacent drinking water sources	Source Water Protection Plan implementation. Phosphorous Reduction Strategy. Effluent Requirements. Sewer Use By-law. SCADA alerts, response, communication and control. Monitor and ensure adequate capacity at all facilities. Vertical and linear condition assessments. Plant upgrades/ replacements. Capital improvements and effluent improvements. Maintain emergency, contingency and continuity plans.

1. Transportation System Asset Class Report (Attachment #4)

Service Level Objectives
• Achieve and maintain an acceptable condition standard for all Regional transportation assets. • Regional roads will be continuous and connected. • Regional roads will be reliable, functional, and serve all modes and users as appropriate and feasible within the context of each project. • Regional roads will be expanded and grow with the Region to provide capacity for users. • Continue to plan asset management infrastructure investments that recognize service impacts.

Total 2021 Replacement Value

$4,500.0 million

⬆ **14%** from 2020

Average Condition
(Year-over-Year Trend)

C+ ➡

2,461 lane km Road Network

120 Bridges

120 Culverts >3m

11,406 Storm Appurtenances (catchbasins, etc.)

352 km Storm Mains and Culverts <3m

16 Traffic Management Systems

21,454 Traffic Control (Flashing Beacons, Signs, etc.)

338 km Traffic Communication Infrastructure

111 km Roadside Protection

108 CCTV

1.1 Description of Transportation System Assets

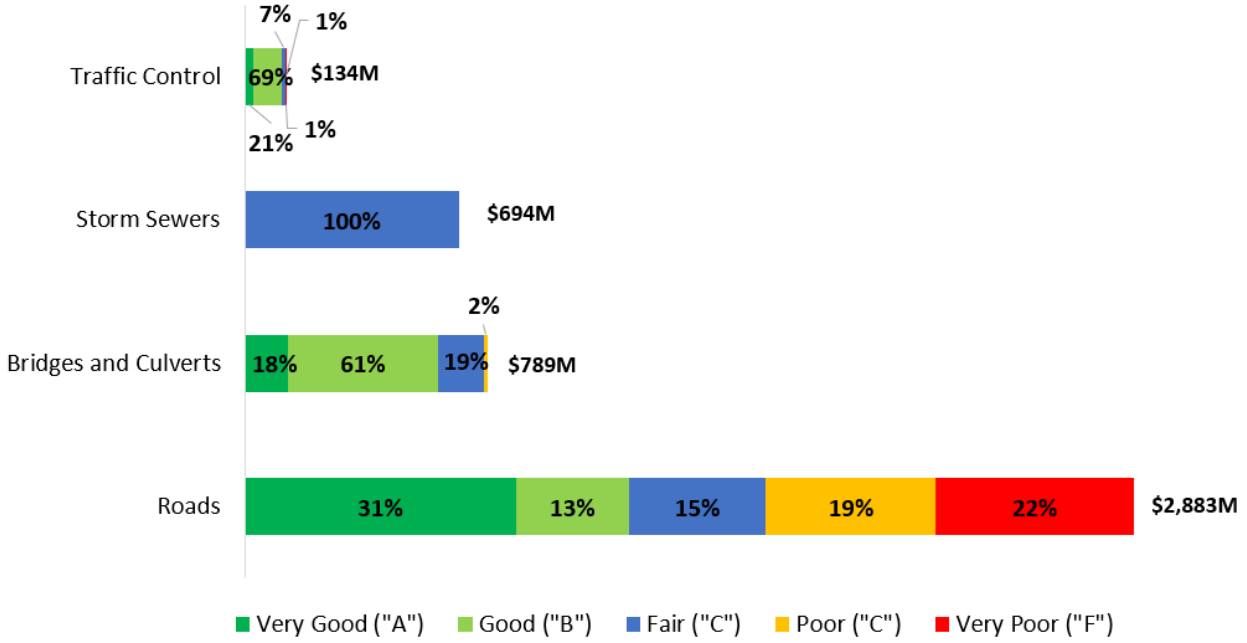
Durham's transportation system assets include a network of urban and rural arterial road segments (including bus only and cycling lanes), bridges, culverts, infrastructure to capture storm water flows from Regional roads, traffic control and safety systems.

1.2 Transportation Condition Ratings, Replacement Values and Average Ages

The Transportation asset class has an overall condition rating of C+ comprised of road network (C+), storm sewers (C), bridges and culverts greater than 3m in length (B), and traffic control (B). Condition ratings have remained stable year-over-year for Transportation asset classes.

The average Pavement Condition Index (PCI) for Regional Roads was 52.0 in 2021, a slight decrease from 53.5 in 2020. The average Bridge Condition Index (BCI) for bridges remained stable year over year and the average BCI for culverts greater than 3m slightly improved to 74.2 in 2021 from 73.8 in 2020. Further details can be found in Table 4. There is one bridge with a load restriction, that is proposed for replacement with approved capital funding. There is also one bridge with a dimensional restriction due to reduced/minimal vertical and horizontal clearances.

Figure 1: Transportation Condition and Replacement Values



*Condition ratings for assets may not add to 100 per cent due to rounding

Overall replacement value of $4.5 billion represents an increase of 13.5 per cent ($536.6 million) from 2020 to 2021 driven primarily by inflationary increases to construction and material costs, shifts among the four types of roads and other minor increases to overall asset inventory.

1.3 Transportation Condition Assessment Methods

Table 1 provides details on the assessment methods used to determine the condition of Transportation assets.

Table 1: Transportation Assets Condition Assessment Methods.

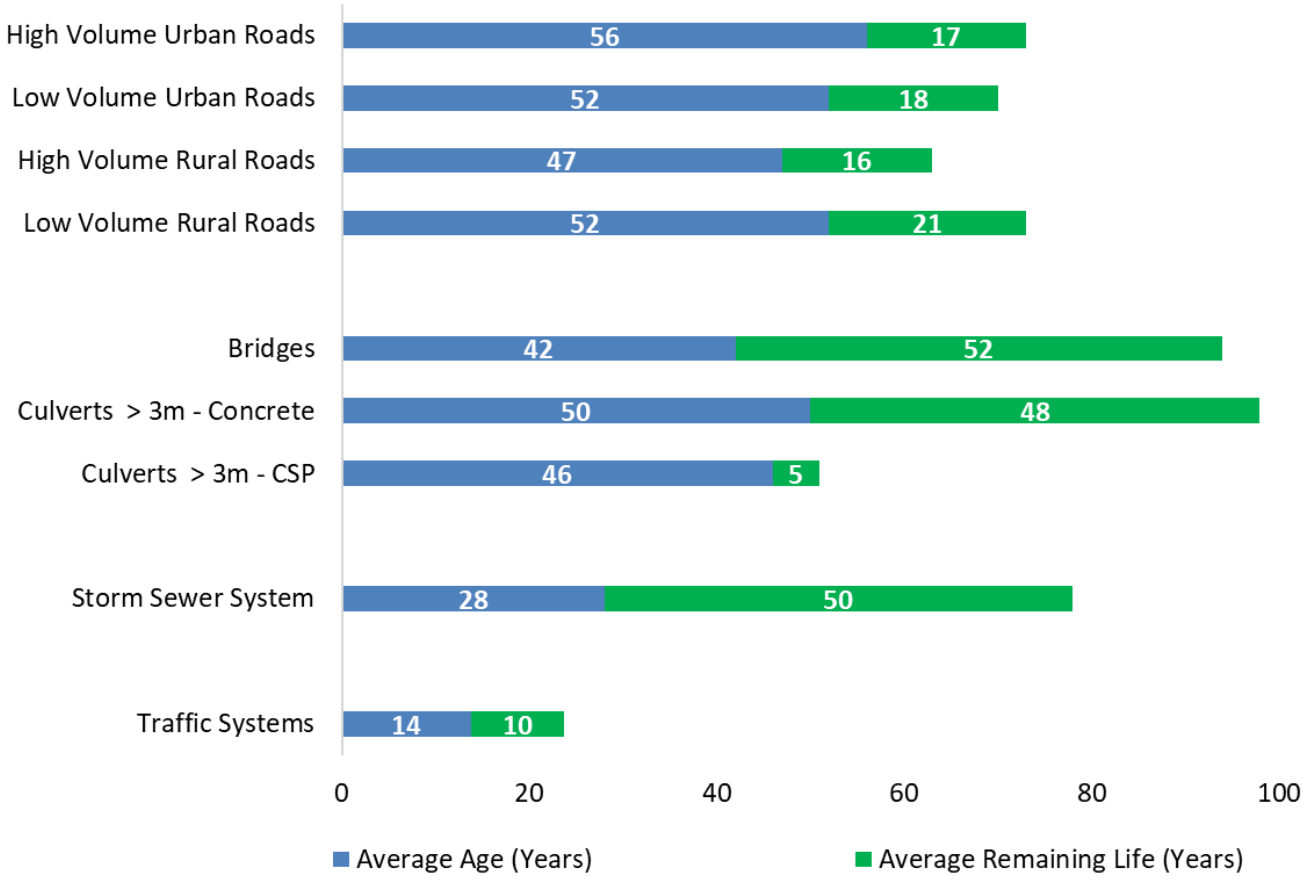
Asset Class	Assessment Methods
Roads	Works Department assessment of pavement for 50 per cent of the road network annually to generate a Pavement Condition Index (PCI) based on: • Road surface condition (i.e., ride). • Structural adequacy (i.e., distress). PCI is converted into a condition rating.
Bridges and culverts greater than 3m*	Works Department assessment of 50 per cent of inventory annually to generate Bridge Condition Index (BCI). For BCI, each structure element is inspected in accordance with the Ministry of Transportation Ontario Structure Inspection Manual 2018. BCI is then calculated using the MTO Bridge Condition Index Manual 2009 and is a weighted average of all structure elements and their conditions. BCI is converted into a condition rating.
Traffic Control Signals	Each signalized intersection is rated based on condition.
Traffic Signs	Visual condition assessments including testing for reflectivity.
Other Traffic Assets	A combination of condition assessments and age-based assessments.

*BCI is not used to rate or indicate the safety of a bridge or culvert. Any safety issues are immediately reported to the Region by the inspector for immediate action and repair.

1.4 Transportation System Average Age and Remaining Useful Life

Figure 2 summarizes the average age and remaining life of the transportation system as of December 31, 2021.

Figure 2: Transportation System Remaining Useful Life



1.5 Levels of Service and Performance Measurement

Service levels objectives and performance targets are set through Regional Council approved master plans, studies, policies and procedures, as well as through departmental studies and regulatory and/or compliance guidelines.

Table 2: Plans, Studies, Policies, Procedures, Regulations that Inform Service Levels

Departmental Plans, Studies, Policies, & Procedures
• Transportation Master Plan • Road Maintenance Operations Service Levels • Transportation System Design and Maintenance Standards and Specifications • Salt Management Plan • Traffic and Parking By-law • Intelligent Transportation System Strategic Plan • Sign Inventory and Reflectivity Review • Roadside Protection Inventory Review • Regional Cycling Plan • Vision Zero
Regulatory Compliance Guidelines and Requirements
• Minimum Maintenance Standards for Municipal Highways (Ontario Regulation 239/02) • Standards for Bridges (Ontario Regulation 472/10) • Public Transportation and Highway Improvement Act, • Transportation Association of Canada Geometric Design Guide for Canadian Roads • Environmental Assessment Act • Canada Transportation Act • Highway Traffic Act

Detailed service level descriptions and targets are outlined in the Community Level of Service, Technical Levels of Service and Performance Measures subsections that follow.

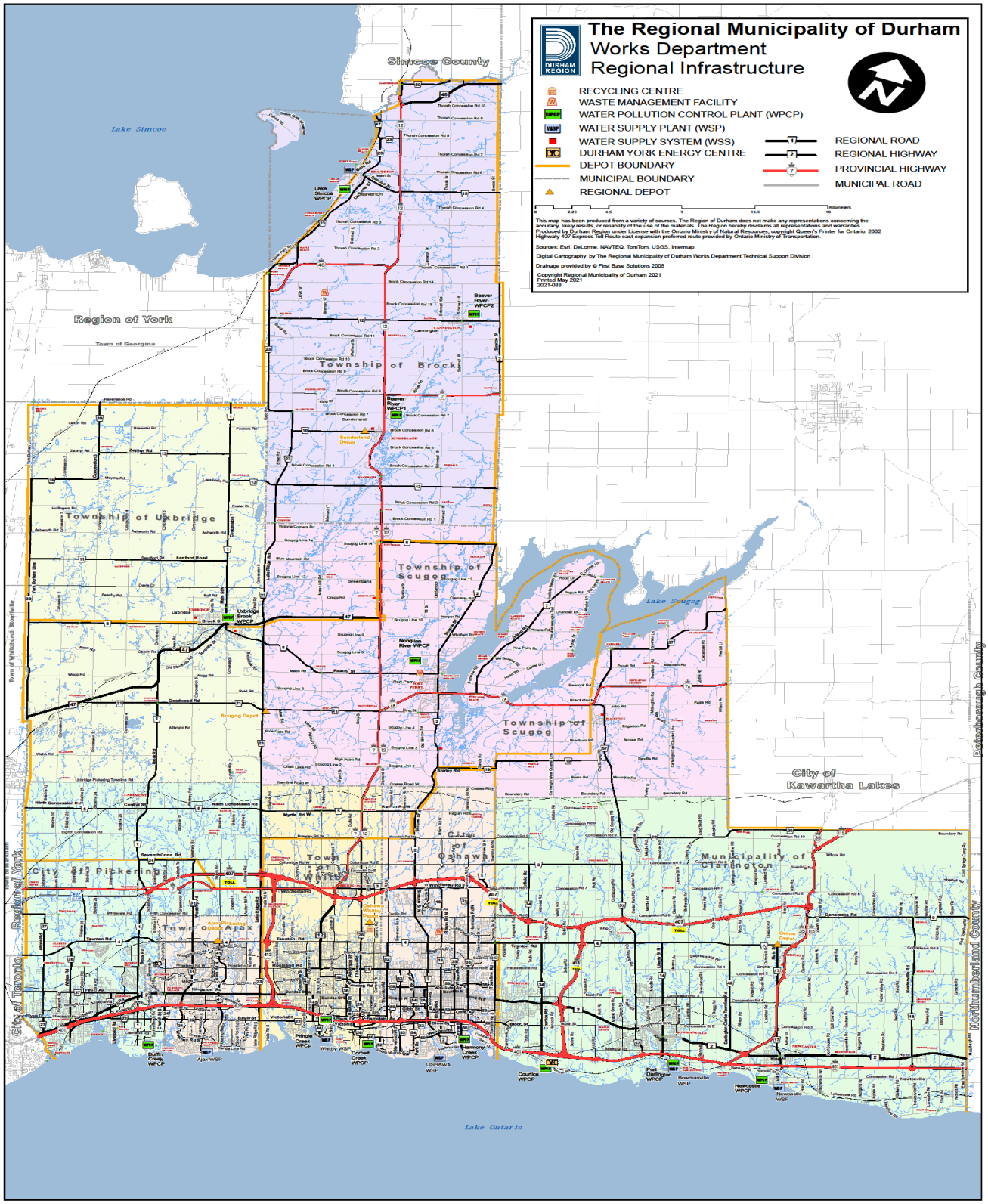
Community Levels of Service

Community levels of service provide qualitative descriptions of service reliability, service standards and service scope and reporting criteria are mandated in Ontario Regulation 588/17.

Table 3: Community Levels of Service

Criteria	Description
Description, which may include maps, of the road network in the municipality and its level of connectivity.	Refer to Map 1.
Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system.	Refer to Map 2.
Description or images that illustrate the different levels of road class pavement condition.	Refer to Figure 3.
Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	The Region's bridges and culverts are designed, built and support all vehicular traffic, including motor vehicles, heavy transport vehicles and emergency vehicles. Cyclists and pedestrians are also accommodated where bike lanes, sidewalks and/or multi-use paths are provided on the bridge structures.
Description or images of the condition of bridges and how this would affect use of the bridges.	Refer to Figure 4.
Description or images of the condition of culverts and how this would affect use of the culverts.	Refer to Figure 4.

Map 1: Durham Region Road Network



Map 2: Regional Floodplain Potential

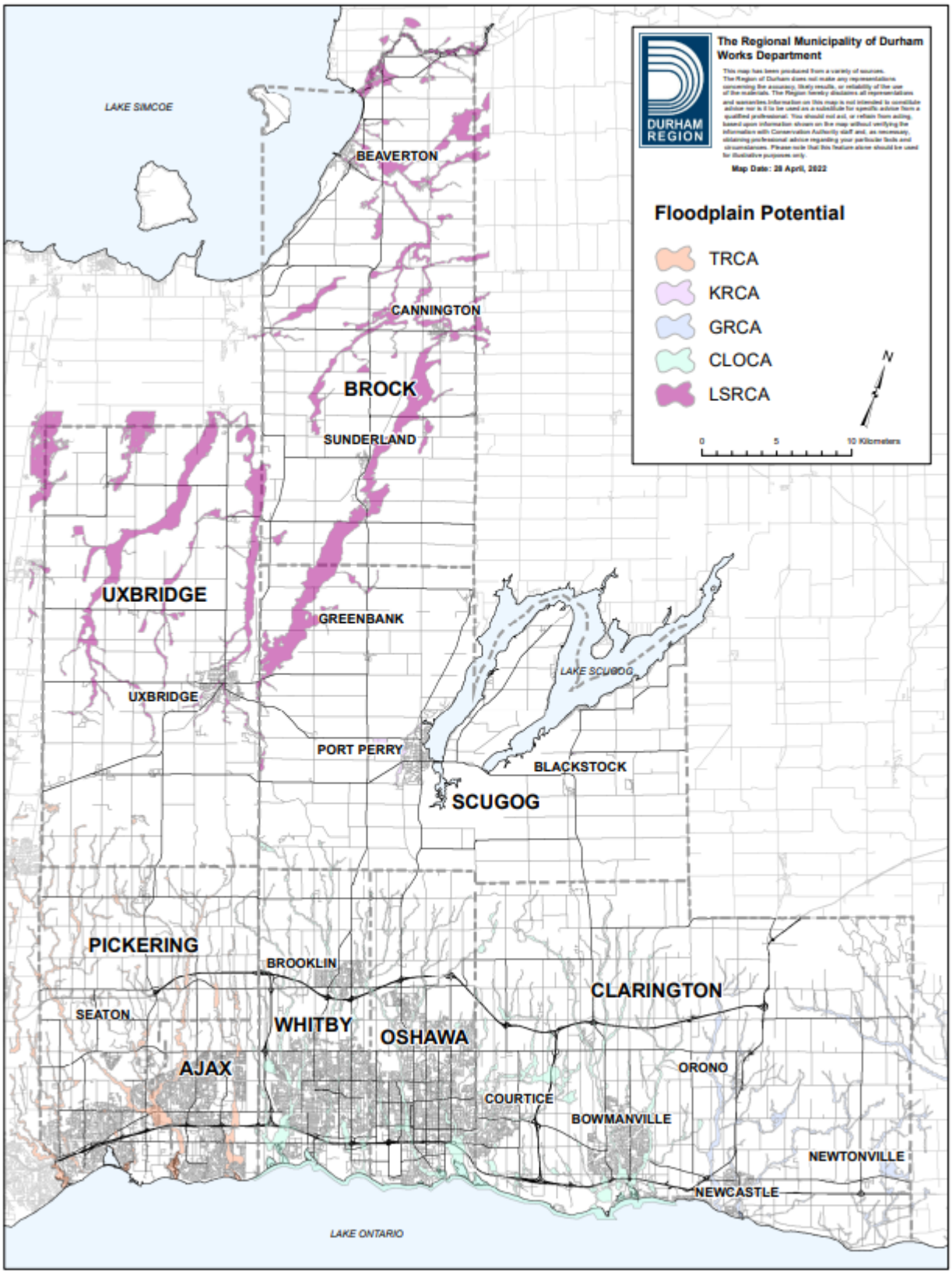


Figure 3: Regional Road Condition Index Rating

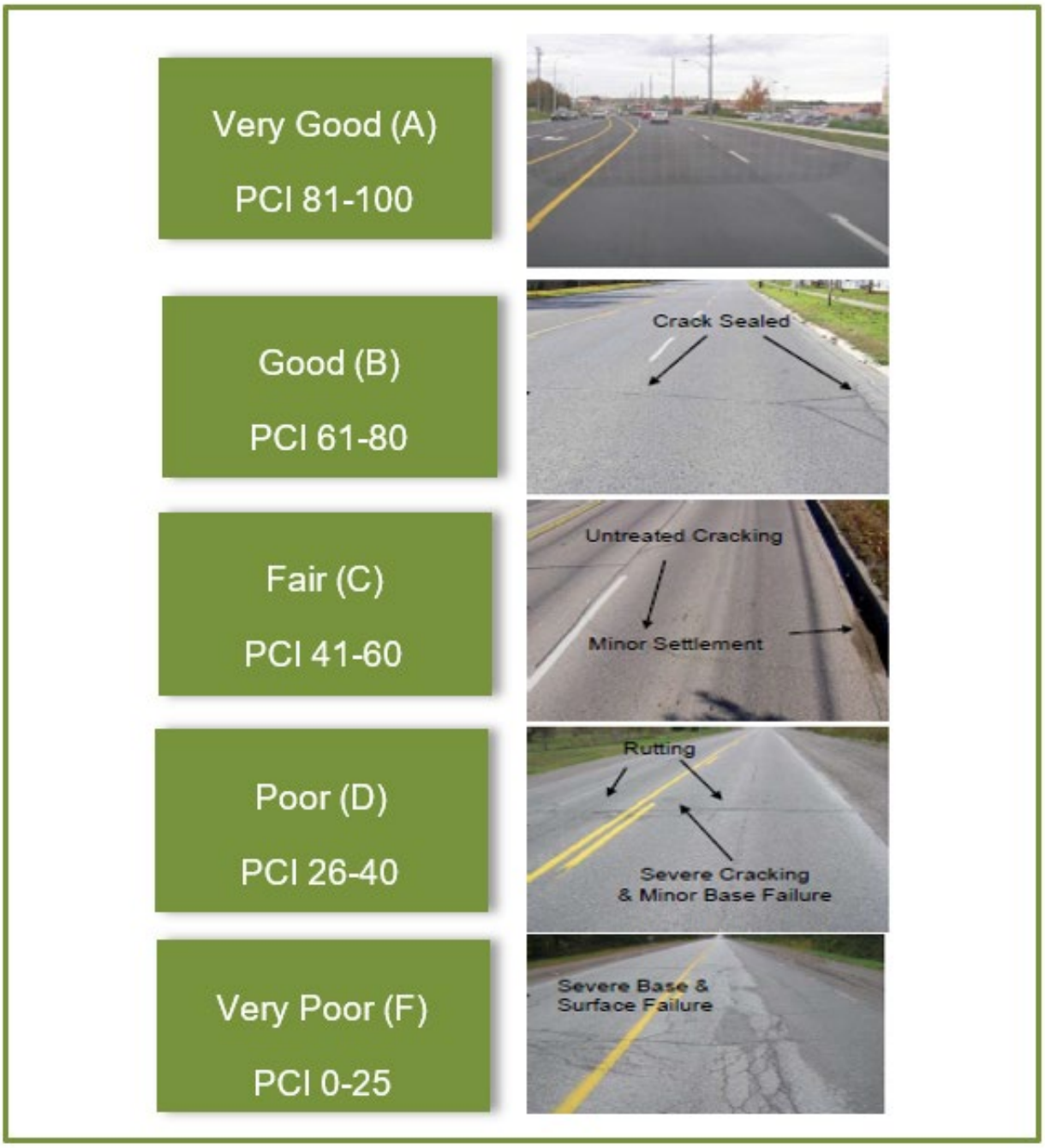


Figure 4: Structure BCI Condition Ratings

Rating	Bridge Condition	Culvert Condition	Description/How Condition Impacts Use
Very Good (BCI 80-100)			New bridge or culvert, no signs of deterioration, use not affected
Good (BCI 70-79)			Minor signs of deterioration, minor levels of maintenance required, use not affected
Fair (BCI 60-69)			Signs of deterioration, exceeding levels of maintenance, may require load posting
Poor (BCI<60)			Significant deterioration, approaching end of service life, may require load posting

Technical Levels of Service

Ontario Regulation 588/17 mandates reporting on prescribed technical metrics for roads, bridges, culverts greater than 3m and stormwater management assets.

Table 4: Technical Levels of Service per Ontario Regulation 588/17

Technical Metric	Target	Year of Measure		
		2019	2020	2021
Network average pavement condition index (PCI)	Network average PCI rating of 65	53.0	53.5	52.0
PCI summary of every regional road segment in a network-weighted average. PCI is rated between 0 to 100, with 100 being the best condition and 0 being the worst condition.				
Number of lane km's of regional roads Per Durham's land area (km^2).	To achieve a target of 1.1	0.94	0.95	0.97
This measure reports the number of Regional road lane kilometres as a proportion of the size of the Region's land area (2,537 km^2) and can identify growth in the Regional road network over time relative to its land size.				
Weighted average bridge condition index value for structures	Network weighted average BCI rating of 70 for Bridges	76.4	76.6	76.6
	Network weighted average BCI rating of 70 for culverts (> 3m)	74.1	73.8	74.2
Summary of the weighted average bridge condition index (BCI) value for bridges and culverts greater than 3m.				
Number of bridges with loading and dimensional restrictions	To have no bridges with loading or dimensional restrictions	1	2	2
This measure summarizes the number of bridges that have loading and/or dimensional restrictions. The target is 0 to ensure the transportation network is fully accessible, functional and available for all users.				
Percentage of properties in municipality resilient to a 100-year storm	90% of properties resilient to 100-year storm	N/A	N/A	94%
2021 is the first year technical levels of service for stormwater were analyzed/reported. These measures will continue to be reviewed and refined for future Asset Management Reports.				

Technical Metric	Target	Year of Measure		
		2019	2020	2021
Percentage of the municipal stormwater management system resilient to a 5-year storm	100 per cent of the SWM system resilient to a 5-year storm	N/A	N/A	98%
2021 is the first year technical service levels for stormwater were analyzed/reported. These measures will continue to be reviewed and refined for future Asset Management Reports.				

Note the Region does not have unpaved, collector or local roads and does not report on these technical metrics

Performance Measures

Beyond community service levels and technical reporting requirements of Ontario Regulation 588/17, Transportation tracks a number of performance metrics to measure how well assets are meeting service level objectives.

Table 5: Transportation Performance Measures

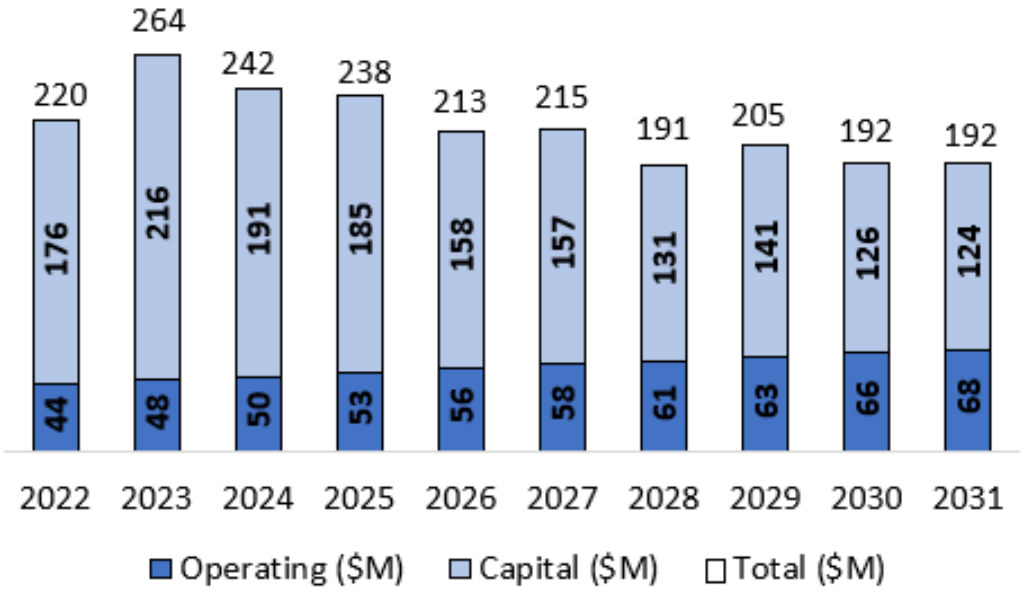
Performance Measures	Target	Year of Measure		
		2019	2020	2021
Road Condition Distribution	No more than 25 per cent of Inventory is in Poor to Very Poor Condition	41%	41%	42%
Measure identifies percentage of road assets falling into the Poor to Very Poor condition category. Target recognizes that implementation of additional funding generally is phased over time. Condition distribution provides a clearer overall picture rather than just focusing on one asset condition. Current/Baseline measure data is the percentage of total lane kms.				
Structure Condition for Bridges and Culverts	85 per cent of Structures Rated Good to Very Good	79.9%	76.4%	71.3%
This measure summarizes the percentage of bridges and culverts that are rated in Good to Very Good condition based on the bridge condition index (BCI) value.				

1.6 Lifecycle

Transportation lifecycle activities include capital investments and operating activities required to meet service needs at the lowest cost and risk for Regional roads, bridges, culverts, stormwater management systems assets and traffic systems over their entire useful lives.

Figure 5 illustrates operating and capital lifecycle costs for the Transportation asset class.

Figure 5: Lifecycle Costs Transportation Operating and Capital ($ millions)*



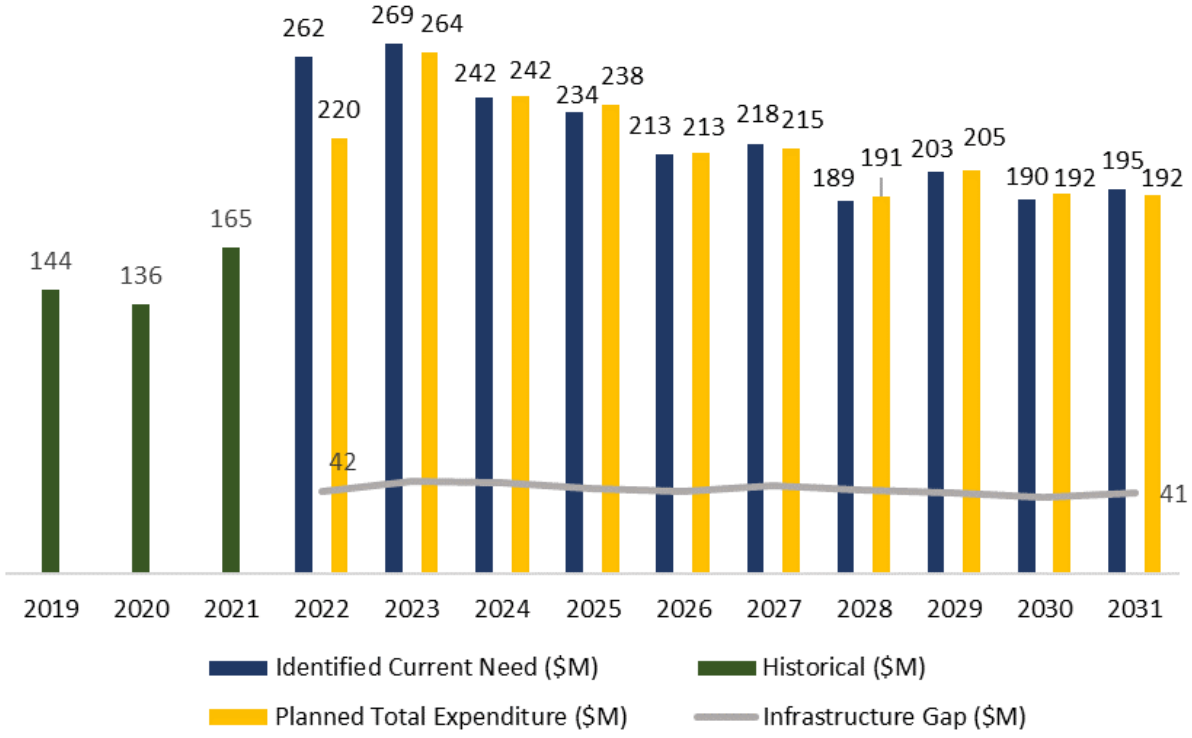
*Operating and Capital may not add to Total due to rounding.

Staff in various service areas of Transportation (Roads, Structures and Traffic) have undertaken an analysis to forecast the current funding required to optimally sustain current service levels. Figure 6 illustrates historical lifecycle costs as well as identifies an infrastructure gap for the Transportation Asset class as a whole. Any rehabilitation or replacement work required to meet health and safety or legislative standards are reflected in the planned total expenditures.

In 2022, the infrastructure gap is estimated at $41.6 million. Based on currently planned expenditures this infrastructure gap declines slightly to $41.0 million.

Further details on lifecycle costing and the identified infrastructure gap are provided in the subsections that follow.

Figure 6: Transportation: Lifecycle Gap Analysis ($ millions)



Roads

Timely road maintenance and rehabilitation lifecycle activities can extend the useful life of a road avoiding costly, premature replacement and improve PCI ratings for the Regional roads network. Figures 7 and 8 illustrates how following rehabilitation and maintenance guidelines can prolong the useful life of a road.

Figure 7: Preventative Maintenance Impact on Road Replacement (High Volume Urban)

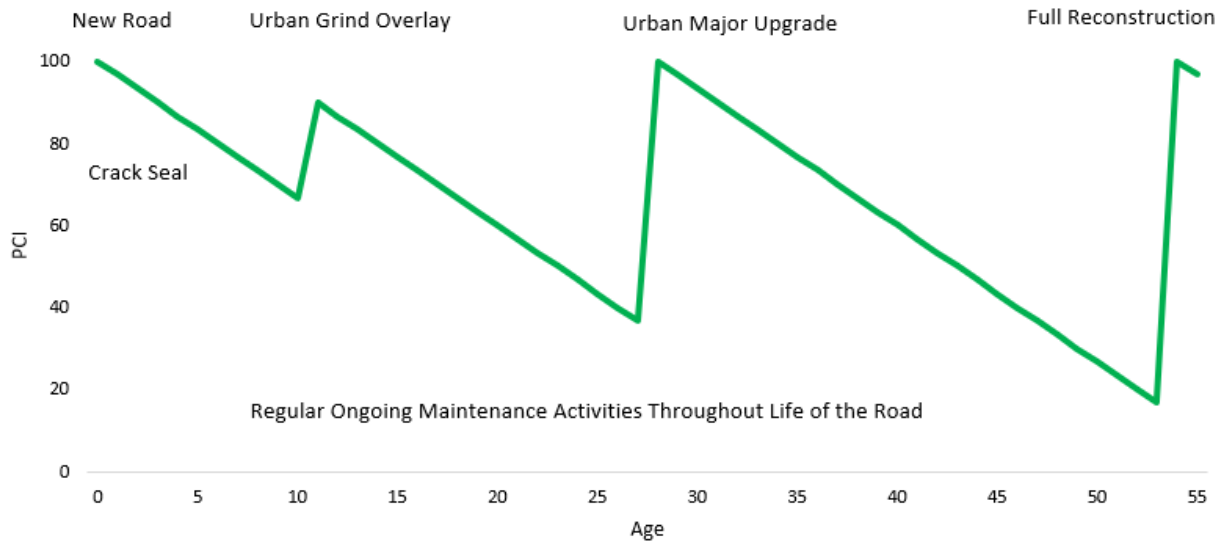
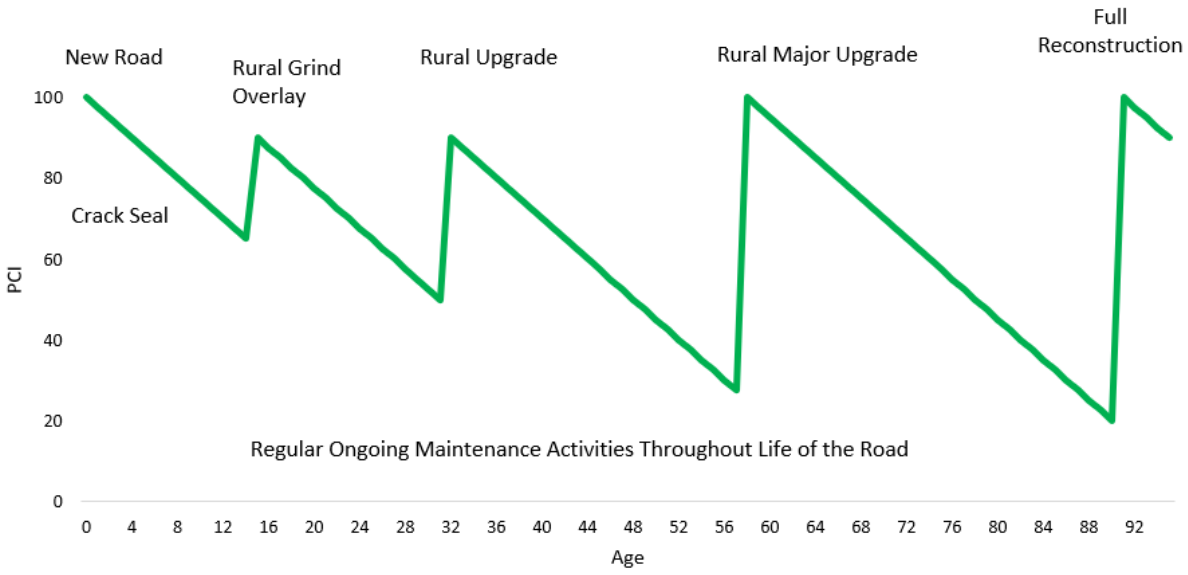


Figure 8: Preventative Maintenance Impact on Road Replacement (Low Volume Rural Roads)



The Region uses a road rehabilitation optimization software program, along with road treatment guidelines (Table 6), and the consideration of other factors (e.g., volumes), to determine the timing and type of treatment to be applied within the confines of available funding.

Table 6: Road Maintenance Guideline

Activity	PCI Criteria	PCI Reset
Rural/Urban Crack Treatment	PCI >80<= 90	Maintain
Rural Grind Overlay	PCI >65<= 75	90
Rural Upgrade	PCI >35<= 65	90
Rural Major Upgrade	PCI =>20<= 35	100
Rural Reconstruction	PCI <20	100
Urban Grind Overlay	PCI >45<= 70	90
Urban Major Upgrade	PCI >30<= 45	100
Urban Reconstruction	PCI<= 30	100

The exact timing and type of road lifecycle treatment can vary due to car and truck volumes and strategic prioritization decisions. For example, there may be instances where it would be beneficial to allow the pavement condition of a particular road to reach the next suggested treatment type to align timing of rehabilitation works.

In addition to maintenance activities, staff must undertake other ongoing operating activities to ensure that Regional roads deliver their expected levels of service. Some key non-maintenance operating lifecycle activities include winter plowing, roadside dust control, and overhead (payroll, communication expenses, vehicle fuel) at facilities and depots.

The identified current need for roads is not met in planned expenditures resulting in a cumulative infrastructure funding gap of $31.2 million by 2031. Identified current needs represents a backlog of reconstruction or rehabilitation of roads falling below a PCI of 65. Planned expenditures reflect prioritizing road investments and an overall slower pace of improving network road conditions.

Bridges and Culverts (greater than 3m)

The bridges and culverts greater than 3m are inspected biennially, where a Bridge Condition Index (BCI) is calculated that assists in informing which treatment shall be applied to structures to maintain or improve their condition. The BCI is not used to rate or indicate the safety of a bridge or culvert. Any safety issues are immediately reported to the Region by the inspector for immediate action and repair.

The Region’s bridge investigations and repair programs including deck repair program, expansion joint replacement program, and culvert repair program, are essential to maintaining the Region’s bridge network in a safe and optimal condition and extending their useful life at the lowest cost to taxpayers.

In addition to maintenance activities, staff must undertake other ongoing operating activities to ensure that Regional structures deliver their expected levels of service. Some key non-maintenance operating lifecycle activities include tree and lawn cutting, bridge cleaning/washing, and overhead (staff support and administrative expenses).

The current approved budget and planned nine-year forecast are meeting service needs for bridges and culverts, as such there is no identified infrastructure funding gap.

Traffic

The capital traffic program targets and prioritizes annual modernization needs of aging traffic signal equipment (typically traffic signal controllers) to improve reliability, functionality, and operating efficiency as well as to address the replacement for LED traffic signals.

In addition to capital replacement and improvement activities, staff must undertake operating activities to ensure that the traffic network delivers its expected levels of service. Some operating costs include overhead (payroll, communication expenses, uniforms, software), signal maintenance and systems and a portion of facility costs for 101 Consumers Drive in Whitby.

The identified current need for Traffic is not met in planned expenditures resulting in a cumulative infrastructure funding gap of $9.8 million by 2031 primarily to accelerate certain non-urgent projects (e.g., uninterrupted power supply) and accelerate replacement of certain assets to improve service delivery.

The planned expenditures deliver traffic signal capital improvements according to forecast and approved schedules which result in improved service over the nine-year forecast period without the risk of premature replacement of assets. It is important to note that the approved budget and forecast poses no health and safety risk as compared to the identified current need scenario.

Going forward, lifecycle costing for Transportation will be refined including refining assumptions to identify needs and further defining traffic service levels. These improvements will be reflected in future asset management reports and lifecycle gap analysis.

1.7 Transportation Capital Forecast

The 2022 Transportation capital budget totals $176 million including:

- $38.7 million for road rehabilitation projects, $12.8 million for bridge rehabilitation and replacement projects.

- $32.3 million in Transportation infrastructure to support bus rapid transit which is partially funded through the Investing in Canada Infrastructure Program Transit Stream (ICIP). This initiative will contribute to reducing community GHG emissions.

- $1.5 million in capital expenses related to increasing safety on the Regional road network.

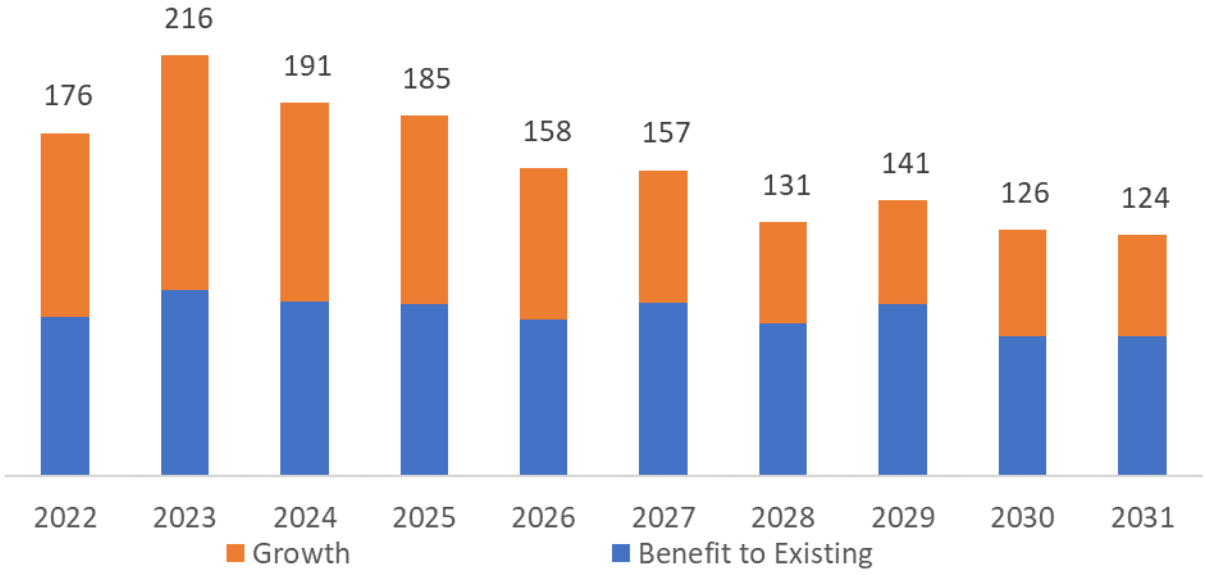
The total transportation capital expenditure over the 2023-2031 forecast period is estimated at $1.4 billion. Key highlights of the forecast include:

- Annual average investment of $45 million throughout the forecast period to bring the average pavement condition of the Region's road network from its current Pavement Condition Index (PCI) level of 53 to 65.

- The forecast also includes significant costs related to bridge rehabilitation and replacements, including pressures in 2023 related to the advancement of rehabilitation work on three bridges in coordination with Metrolinx as it implements the Bowmanville GO Rail Expansion project.

- $13.6 million in cycling infill projects over the forecast to support the Regional Cycling Plan.

Figure 9: Transportation Capital Forecast ($ millions)



1.8 Climate Change

Climate Mitigation: Transportation Strategies to Reduce GHG Emissions

The Durham Region Corporate Climate Action Plan has set targets to achieve net-zero GHG emissions by 2045. The corporate GHG inventory related to Transportation assets includes emissions associated with Works Depots used to support the operating and maintenance of the Regional Road network and from operating traffic signals. Emission details related to Works department (fleet and depots) activities to maintain the Regional Roads network can be found in the Facilities and Fleet attachments. GHG emissions from Transportation assets represent a very small portion of overall corporate emissions.

Ongoing and planned activities to reduce Transportation GHG emissions include:

- In 2022, the Regional Road 18 Pilot Reconstruction Project will divert 6 tonnes of mixed plastic and 400 tonnes of recycled glass from Durham Region's Material Recovery Facility (MRF) and incorporate it into new asphalt. This will reduce the amount of virgin material mined and trucked for road construction.

- Studying innovative technologies for future incorporation of an estimated 300 tonnes of mixed plastic, 240 tonnes of PET plastic and all recycled glass processed at Durham Region's Material Recovery Facility into new asphalt through the Region's annual road program.

Climate Adaptation: Increasing the Resiliency of Transportation Assets

Staff continue to assess transportation strategies to mitigate against the impacts of a changing climate and have already integrated several considerations into Regional business and financial plans.

Risk and climate related mitigation programs for 2022 include:

- Continuation of the Uninterrupted Power Supply (UPS) for traffic signals to ensure adequate backup power for key intersections ($0.5 million);

- Structure investigations ($0.1 million);

- Paved shoulders for rural road construction projects where feasible (as recommended in the Transportation Master Plan); and

- Other ongoing traffic initiatives including $0.6 million for Intelligent Transportation Systems (ITS) projects, $0.9 million for Accessible Pedestrian Signal (APS) installations, and $1.5 million for roadway safety program and Durham Vision Zero Program.

Moving forward, staff will continue to investigate, monitor, and explore ongoing proactive strategies and programs, which help prevent adverse climate impacts to roads and structures including:

- Resilient Asphalt: Monitoring the impacts of climate changes on the performance of asphalt and concrete products used in regional roads construction, with product specifications adjusted as needed to mitigate and enhance materials' performance;

- Adaptive Structures (culverts, bridges and storm sewers): Monitoring of the impacts from increased storm intensity on the capacity and integrity of regional structures;

- The Region, in consultation with conservation authorities, including the Toronto and Region Conservation Authority (TRCA) and the Central Lake Ontario Conservation Authority (CLOCA) undertook a flood risk assessment of the regional roads and capacity assessment of watercourse crossing (bridges and culverts) under the current and future climate scenarios (2050's and 2080's) to help identify candidate projects for enhanced resilience measures. Regional staff are analyzing the results of the study for implications on business and asset management planning;

- Embankment and Erosion Control: Adjusting specifications and design criteria to mitigate erosion. Road shoulders are primed with liquid asphalt and liquid calcium chloride to control dust and erosion with frequent inspections of erosion prone areas; and

- Road Safety and Response: State-of-the-art road weather information systems to monitor weather/pavement conditions (e.g. infrared road temperature sensors).

Staff will continue to ensure asset management plans advance long-term and effective responses to climate change.

1.9 Risk Assessment

Table 7 includes a sample of identified risks for the Region's Transportation assets in achieving its service level standards as well as the mitigation controls to address these risks.

Table 7: Risk Mitigation Strategies

Risk	Mitigation
Extended Power outage	Ensure standby power at traffic intersections and Traffic Operations Centre. Ensure effective emergency, contingency and business continuity plans.
Asset structural failures or impacts to asset effectiveness	Optimization of asset life cycles, proactive maintenance and cleaning. Asset Management database, inspections and patrols. Pest control programs (e.g., beaver damage to culverts, bridges). Design considerations for future storm events. Effective emergency, contingency and business continuity plans. Adequate redundancies and proactive detours and closures where required.
Extreme wind events and	Adequate redundancies and proactive detours and closures

Risk	Mitigation
storms beyond existing capacity/response capability affecting roads, structures and sites.	where required. Effective emergency, contingency and business continuity plans (REMS). Post-storm clean-up protocol, assessments and improvements.
An increase in winter freeze-thaw cycles and temperatures at or near 0ºC	Extensive winter control programs (e.g., salt management plan). State-of-the-art weather systems and Roadway Condition Advisory System. Optimization of asset life cycles including proactive maintenance. Design considerations and erosion control (roads, shoulders, structures).
Potential for road washouts/ditch flooding and overland flooding that could cause contaminant migration (e.g., road salt, oil, grease)	Optimization of asset life cycles, proactive maintenance and cleaning. Inspections and patrols. Effective emergency, contingency and business continuity plans (REMS). Adequate redundancies and proactive detours and closures where required. Design considerations and erosion control (roads, shoulders, structures).
Motor vehicle road incidents	Design, inspection and maintenance standards. Road signage, roadside protection and inventory assessments. Effective emergency, contingency and business continuity plans. Extensive Winter Control Program (RCAS) and Roadway Event Management System (e.g., speed and condition warnings). Implementation of the Region’s Vision Zero Program. Proactive detours and closures where required for safety.

1. Durham Region Transit Asset Class Report (Attachment #5)

Service Level Objectives
• Increase ridership and enhance customer experience. • Develop and operate a transit system that is available, consistent, direct, frequent and seamless thereby providing enhanced mobility for Durham Region residents and visitors with an attractive alternative to the personal car. • Increase operational effectiveness through asset management planning for future growth and existing assets. • Maintain an acceptable condition standard for all Regional Transit assets.

188 Conventional Buses

35 Specialized Buses

18 Supervisory Fleet

3 Maintenance, Administrative and Bus Storage Facilities

2,579 Bus Pads and Shelters

Total 2021 Replacement Value

$243.4 million

⬆ **0.5%** from 2020

Average Condition
(Year-over-Year Trend)

B- ➡

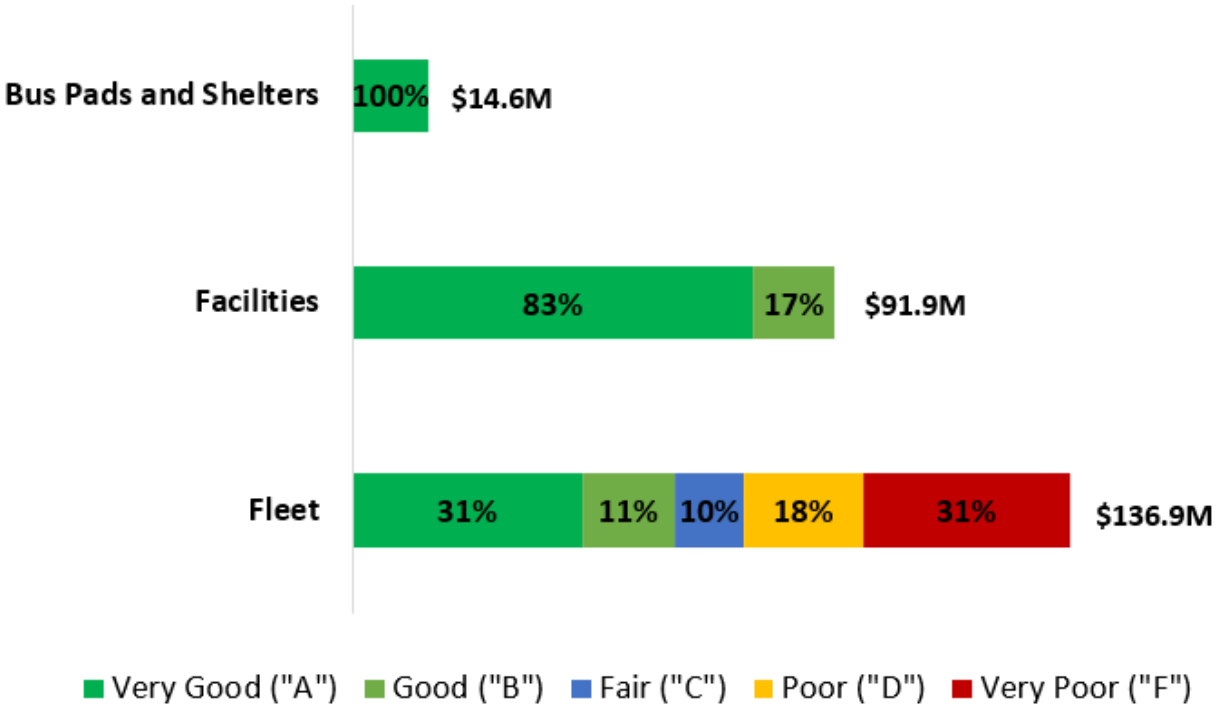
1.1 Asset Inventory Overview

Durham Region Transit's (DRT) assets consist of a fleet of revenue vehicles, non-revenue vehicles, facilities and hard surface bus stops and shelters. In 2020 sixty-foot articulated (accordion) buses were added for the first time to DRT's fleet to provide additional capacity along frequent service networks.

1.2 DRT Condition Ratings, Replacement Values and Average Ages

The overall DRT condition rating in 2021 was B- consistent with 2020. Overall replacement values totalled $243.4 million, a 0.5 per cent increase over 2020 primarily as a result of inflationary pressures partially offset by strategically deferred replacements due to reduced service demand during the pandemic and network and operational efficiencies. By 2026, fleet inventory is planned to return to pre-pandemic levels. Figure 1 below illustrates the condition rating and replacement value of DRT assets.

Figure 1: DRT Assets Condition and Replacement Values*



*Condition ratings for assets may not add to 100 per cent due to rounding

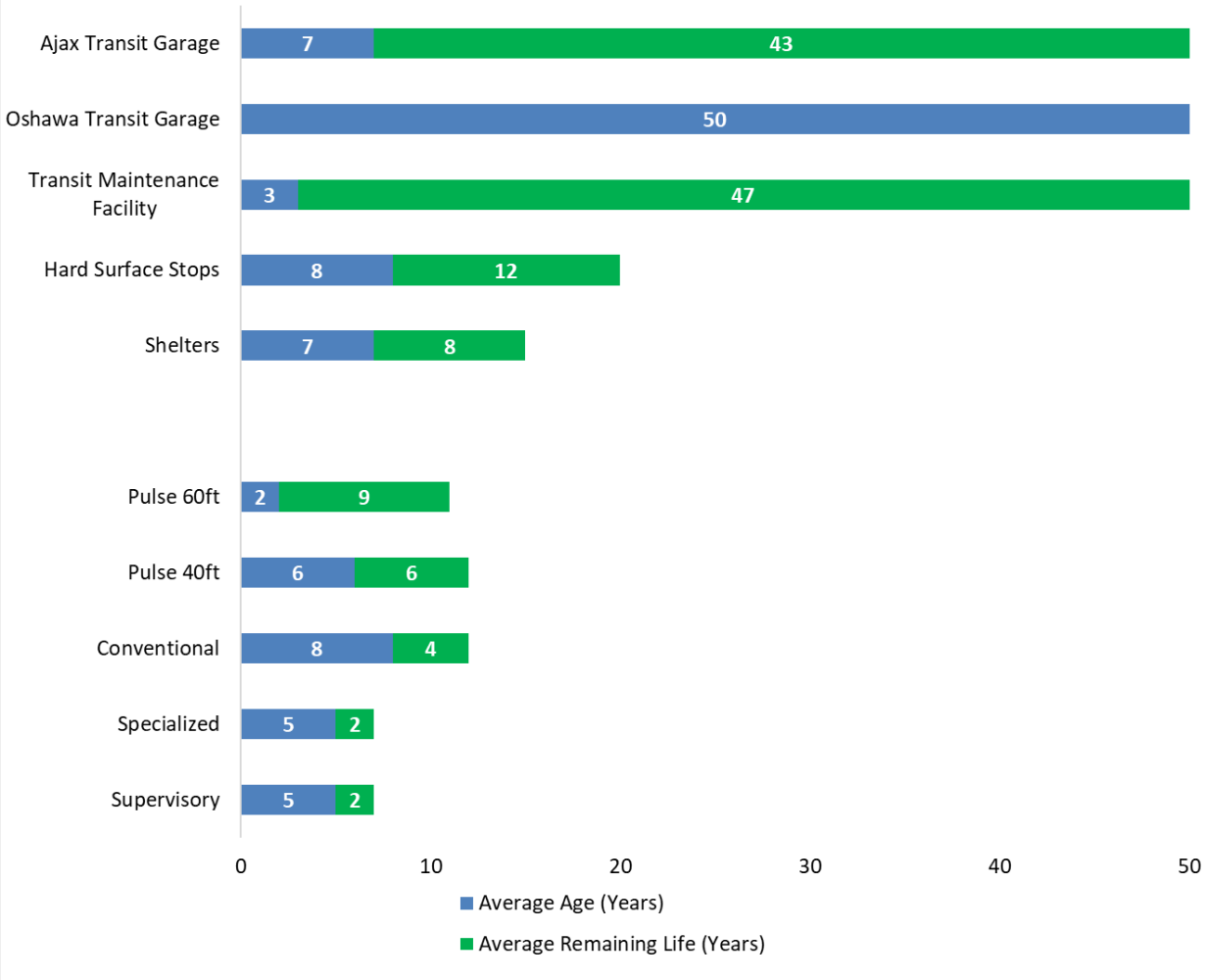
Table 1 outlines the assessment methods used to determine condition ratings.

Table 1: DRT Condition Assessment Methods

Asset Class	Assessment Methods
Facilities	Building Condition Assessments (BCA). Facilities staff undertake high-level surveys where assessments have not yet been undertaken. Condition rating criteria are used as the basis for rating facility sub structures, shells, interiors, and site work, which are considered major building elements evaluated through the BCA assessment.
Bus Stop Pads and Shelters	All bus shelters have all been installed since 2016 except for 2 older ones which are in good condition. There is no formal method for assessing the condition of bus shelters however, when there is an issue with bus shelters, they are repaired immediately.
Fleet	Condition rating criteria is based on mileage.

Figure 2 summarizes the average age and remaining asset life of the DRT storage and maintenance garages and fleet as of December 31, 2021. The Transit Maintenance Facility and Ajax Transit Garage are relatively young while ongoing maintenance and rehabilitation at the Oshawa Transit Garage has resulted in a Good rating and the facility is projected to operate beyond its expected service life.

Figure 2: DRT Average Age and Remaining Useful Life



As of December 31, 2021, the average age of DRT's conventional fleet is 6.4 years. DRT has been strategically delaying bus replacement as a result of reduced service demand due to the pandemic with 8.5 per cent of conventional buses over 12 years old. Over the forecast period vehicle replacements are planned to allow for the return to pre-pandemic service standards.

1.3 DRT Community Levels of Service

Table 2 outlines the various Regional Council approved plans, studies, and policies, as well as regulatory and or compliance guidelines that inform DRT's service level priorities.

Table 2: Plans, Studies, Polices, Procedures, Regulations that Inform Service Levels

Departmental Plans, Studies, Policies, & Procedures
• The Route Ahead 2022-2025 Service Strategy • Durham Region Transit Demand Responsive Transit Study • Transportation Master Plan • 2022 DRT Business Plans and Budget • Regional Transit 2022 Development Charge Background Study and By-law • DRT Long-term Service and Financing Strategy (under development) • Facility Needs Study • Regional Facilities Design Standards and Specifications • Regional Official Plan
Regulatory/Compliance Guidelines
• Ministry of Transportation Periodic Mandatory Commercial Vehicle Inspections (PMCVI) • Motor Vehicle Inspection Station Licencing & Standards • Public Transportation and Highway Improvement Act • Commercial Vehicle Operators Registration Program (CVOR) • Motor Vehicle Repair Standards • Truck and Bus National Safety Code • Ontario Building Code Standards • Accessibility for Ontarians with Disabilities Act (AODA) • Environmental Assessment Act • Ontario Fire Code

DRT's The Route Ahead 2022-2025 Service Strategy, identified the following key service pillars:

- Availability: Service is available in all areas of Durham Region, using a mix of scheduled service and demand response service delivery models with reduced average wait times;

- Innovation: Leverage technological solutions and service delivery models to meet customers' changing needs;

- Reliability: Remain flexible by adapting to evolving travel patterns;
- Safety: Improving the customer environment throughout a customer's journey; and
- Growth: Serving new growth areas as early as possible.

Technical Service Levels and Performance Measures

Asset management staff have identified key asset-related technical service levels and performance measures as noted in Table 3. Reporting on Community Levels of Service and Technical Levels of Service puts DRT in compliance with Ontario Regulation 588/17 two years ahead of the legislated timeline.

Table 3: DRT Performance Measures

Performance Measure	Target	Year of Measure		
		2019	2020	2021
Average Conventional Fleet Age	Maintain Average Age of Conventional Fleet at 7 years of age	7.0	6.9	6.4
This performance measure captures the average age of the conventional bus fleet.				
Percentage of Conventional Fleet Exceeding 12 Year Useful Life	To allow no more than 10 per cent of conventional bus fleet to exceed 12 years of age or older	19.8%	14.8%	8.5%
This performance measure identifies the percentage of conventional bus fleet which is 12 years of age or older. Typically, it is acceptable to have a small portion of the fleet exceed its useful life to a threshold of 10 per cent.				
Kilometres per litre of Diesel Fuel	To achieve 2.1 kilometres per litre of diesel fuel	2.1	2.2	2.3
This performance measure captures the fuel economy of DRT's conventional fleet by calculating the number of kilometres that is achieved for each litre of diesel fuel. Target is based on industry standards.				

1.4 Maintenance and Repairs

Fleet Maintenance and Repairs

Vehicle deterioration occurs by component, rather than holistically. DRT maintains the condition of its fleet assets using a three phased approach:

- Annual review of major powertrain components on a bus-by-bus basis;
- A preventative maintenance schedule based on manufacturers' recommendations and a semi-annual vehicle safety inspection process as regulated by the Ontario Ministry of Transportation.
- Required unscheduled repairs and running repairs.

Fleet preventative maintenance is scheduled when kilometres reach prescribed targets. Kilometers are tracked through nightly recording of kilometers driven for each bus into the fuel reporting software, which is then transferred to Maximo, the Region's maintenance management workorder software system.

Table 4: Preventative Maintenance Schedules for DRT Conventional Fleet

Inspection Type	KMs
A Inspection	Every 10,000 km
B Inspection	Every 20,000 km
C Inspection	Every 40,000 km
D Inspection	Every 80,000 km

Table 5 below, provides a sample of DRT's estimated fleet maintenance and fuel measures for conventional buses.

Table 5: Sample of DRT Estimated Maintenance and Fuel for Conventional Fleet

Year	# of Buses	Annual KM	Maintenance/Repair		Fuel Cost		Total Cost	$/KM
			Annual Cost	$/KM	Annual Cost	$/KM		
2021	176	10,927,609	$10,970,657	$1.00	$5,484,058	$0.50	$16,455,715	$ 1.51
2020	183	11,565,880	$11,303,164	$0.98	$4,347,728	$0.38	$15,650,892	$ 1.35
2019	207	14,639,317	$11,558,763	$0.79	$7,130,551	$0.49	$18,689,314	$ 1.28

DRT targets an expected useful life of twelve years for conventional buses after which point a bus can require significant structural refurbishment and becomes more costly to repair. Both maintenance costs and bus reliability can be impacted as a bus nears the end of its useful life and eventually, the bus will become a spare and used only when necessary.

Facilities Maintenance and Repairs

Facilities deteriorate by component rather than as a whole. Staff in the Facilities area of the Works Department undertake maintenance, repair and rehabilitation activities for these components at optimal times to allow the assets to provide service levels at the lowest risk in the most cost-effective manner.

Maintenance and replacement decisions are being further refined through the recent implementation of Maximo, the Region's maintenance management workorder software system and Ameresco, the Region's capital asset management workorder planning software system (CAMPs). DCAM staff can better identify and refine forecasted future repair, maintenance, and rehabilitation needs and subsequent cost estimates based on the recording and tracking of past treatments, current condition ratings and needs, useful life, changing compliance, building and energy codes, modernization and return on investment.

Table 6 provides a summary of some useful life guidelines for facility components, which provides some broad time frames for when replacements could potentially occur. Changing compliance, building and energy codes, modernization, return on investment and other specific needs of DRT are also considerations in facility infrastructure decisions.

Table 6: Building Elements' Useful Life

Less than 10 Years	12 to 20 Years	25 to 50 Years	Over 50 Years
Interior Finishes	Building Envelope	Mechanical Electrical Plumbing Elevators	Structure

Staff continue the analysis of DRT lifecycle costing. This analysis will be included in future Asset Management Plans in alignment with the July 1, 2024 Ontario Regulation 588/17 requirement.

1.5 DRT Capital Forecast

The 2022 Budget includes $16.1 million in DRT capital investments including the following significant projects:

- Acquisition of two replacement BRT buses ($1.4 million);
- Replacement of four mini buses and three vans for demand responsive service ($1.5 million);
- Design work for the Oshawa Transit Garage administration building demolition and rebuild ($0.6 million);
- Bus stop infrastructure improvements ($3.6 million);
- Advancing planning, design and engineering for DRT's new facility in north Oshawa ($2.5 million);
- Electric vehicle charging infrastructure acquisitions and installations for the battery electric bus pilot, which are supported through previously approved federal government funding ($3.0 million); and
- Replacement of the fuel tank at DRT's Ajax Transit Garage ($0.8 million).

Currently, DRT's nine-year capital forecast (2023-2031) includes $390.1 million in capital expenses. Costs related to transit vehicle replacements are anticipated to represent a significant pressure in future years. Currently, it is estimated that DRT must replace 147 40-foot buses ($98.7 million), seven articulated buses ($7.6 million), and 30 specialized services vehicles ($5.9 million) over the nine-year forecast period to maintain its fleet in good working condition and maintain the target average vehicle age. Furthermore, the capital forecast also includes significant expansion facility costs, including an estimated $155.0 million in 2024 for the new north Oshawa storage and maintenance facility. Approximately $4 million in DRT capital expenses approved as part of the 2022 Business Plans and Budgets have been financed using Federal and Provincial funding provided under the Investing in Canada Infrastructure Program - Transit Stream (ICIP). Over the forecast period, an additional $10.5 million in DRT capital expenses are forecasted to be financed using ICIP. Significant ICIP funding is also supporting the development of bus rapid transit infrastructure within the transportation infrastructure capital plans.

1.8 Climate Change

Climate Mitigation: DRT Strategies to Reduce GHG Emissions

The Durham Region Corporate Climate Action Plan has set targets to achieve net-zero GHG emissions by 2045. In 2020, Transit produced approximately 16,500tCO2e or 10 per cent of the Region's total corporate emissions.

DRT GHG reduction strategies focus on maximizing the efficiency of energy and fuel usage. Key climate change mitigation accomplishments for DRT in 2021 included:

- Purchasing 4 plug-in hybrid SUVs
- Finalizing the specifications for its first 10 hybrid electric buses. These hybrid electric buses are expected to be delivered in Q3 2022.
- Entering into negotiations with Oshawa Power and Utilities Corporation (OPUC) and eCamion for the charging equipment and infrastructure at DRT's Oshawa Depots (both Farewell & Raleigh), required to support the battery electric bus pilot scheduled to begin in 2023.

Key 2022 and forecasted initiatives that support DRT's GHG reductions include:

- Acquisition of DRT's first eight battery electric buses as part of the battery electric bus pilot.
- Design and construction of a new flagship net zero transit operations and maintenance facility at 2400 Thornton Road in Oshawa. Construction is expected to begin in 2024 with completion in 2026.
- Continued implementation of solar lighting in DRT bus shelters.
- Completion of DRT's zero emission fleet and facility feasibility study in 2022, with a report approved by the Transit Executive Committee on its fleet transition plan to zero greenhouse gas emission vehicles in June 2022.

While transit's share of the overall corporate carbon footprint may increase as the DRT fleet expands, DRT continues to explore and implement strategies to make transit an attractive alternative to personal vehicles to support community GHG reductions.

Climate Adaptation: Increasing the Resiliency of DRT Assets

The current focus of DRT climate adaptation work includes ensuring effective and up-to-date emergency, contingency and business continuity plans, in addition to adequate standby power and redundancies (e.g., spare parts and vehicles). DRT is also expanding bus shelters, which will increase protection against the potential impacts of a changing climate (e.g., a higher frequency of extreme storms) in addition to the usual impacts of cold and ice related to winter weather.

Climate adaptation will continue to be addressed through the Region's business planning cycle, including risk management, asset management and long-term financial planning processes to ensure a proactive approach.

1.8 Risk Assessment

Regional staff analyze potential risks to DRT's assets on an ongoing basis. Table 7 highlights some high impact potential risks and ongoing and planned risk mitigation measures.

Table 7: DRT Risk Mitigation Strategies

Risk	Mitigation
Chargeable Equipment Failure (e.g., engine and/or transmission failure, emission control systems)	Preventative maintenance, repairs, replacements and proper storage of vehicles and equipment. Inspections and maintenance of operational and compliance standards. Inventories of critical parts and spare vehicles and re-scheduling/re-routing. Maintenance protocols and warranties. Driver training and protocols.
Loss of External Utilities or Fuel	Maintain effective up-to-date emergency, contingency and continuity plans. Ensure adequate standby power at DRT facilities and partnership with Region Facilities. Development of fuel shortage plans. Essential services policies and procedures.
Vehicle Collision	Supervisory investigation. Driver screening, training and recertification programs. Compliance and licensing standards. MTO specified procedures inspection audit of Driver Certification Program by Internal Audit Division Maintain effective emergency and contingency plans.
Security Breach (e.g., theft, vandalism, terrorism)	On-site/on-bus safety systems and protocols including on-board surveillance system. Geographical Positioning System technology on buses and other vehicles. Durham Region Transit Security Strategy. Maintain effective up-to-date emergency, contingency and continuity plans.

Risk	Mitigation
Weather Related (e.g., Winter ice/cold and more frequent freeze-thaw cycles)	Winter control program (e.g., vehicle, shelter and facility warming and/or de-icing and snow removal etc.). In-bus water/ice slip hazard identification and mitigation. Asset management – preventative maintenance (e.g., in-bus HVAC). Post-storm clean-up. Condition audits and inspections. Maintain effective up-to-date emergency, contingency and continuity plans.

1. Fleet Asset Class Report (Attachment #6)

Service Level Objectives

- Maintain fleet in a state of good repair, meeting or exceeding industry standards and manufacturers' requirements, and minimizing vehicle downtime while capturing warranty claims on new equipment.
- Provide sufficient vehicles and equipment in a safe, reliable, and adequate condition to provide service levels and adapt to changes in business needs.
- Manage and optimize parts inventory to minimize costs through procedures and guidelines that ensure competitive bidding, cost effective purchasing practices, and inventory control processes in accordance with Regional policies and the Purchasing By-law.
- Maintain an orderly fleet turnover process, ensuring cost effective fleet operations, considering low carbon options where available and suitable, and participate in joint procurement opportunities where appropriate and beneficial.

44 Ambulances

6 Paramedic Emergency Response Vehicles

34 Paramedic Support Vehicles

188 Police Patrol Vehicles

175 Police Non-Patrol Vehicles

374 Works Fleet

Total 2021 Replacement Value: $88.9 million

RDPS: $**10.9**M ⬆ **10**% from 2020

DRPS: $**25.8**M ⬆ **11**% from 2020

Works: $**52.2**M ⬆ **9**% from 2020

Average Condition B
(Year-over-Year Trend)

RDPS: **B-** ⬆

DRPS: **A-** ➡

Works: **B-** ⬆

Asset Inventory Overview

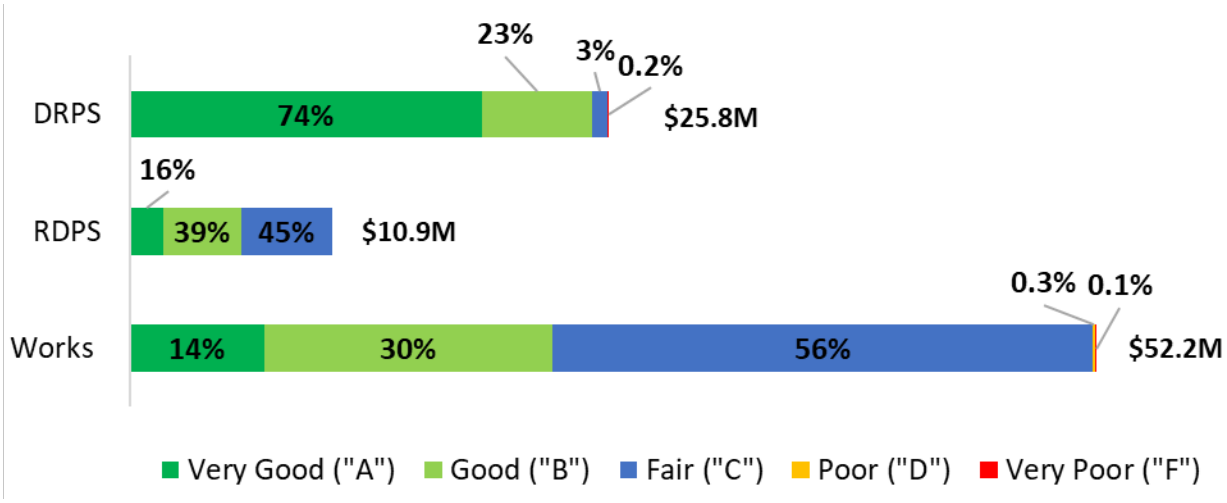
Regional fleet assets include vehicles, plows and trailers in the Region of Durham Paramedic Services (RDPS), Works Department (includes Works vehicles used for core assets (Water/Sewer/Transportation) and Durham Regional Police Service (DRPS). Detailed data and information relating to Durham Regional Transit (DRT) fleet is contained within Attachment #5.

In future asset management reports, fleet will be reported along functional lines with separate attachments dedicated to RDPS, Works, and DRPS.

1.1 Fleet Condition Ratings, Replacement Values and Average Ages

Durham Region's fleet (excluding DRT fleet) has an average overall condition rating of B. The average condition ratings are DRPS A-, RDPS B- and Works Fleet B-. The figure below illustrates condition ratings and replacement value of fleet for DRPS, RDPS and Works.

Figure 1: Fleet Condition and Replacement Values*



*Condition ratings for assets may not add to 100 per cent due to rounding

Total replacement values for fleet increased by 9.1 per cent for Works fleet, 10.4 per cent for RDPS and 11.2 per cent for DRPS over 2020 largely due to inflationary price increases and minor increases in asset inventories.

Table1 outlines the assessment methods used to determine fleet condition.

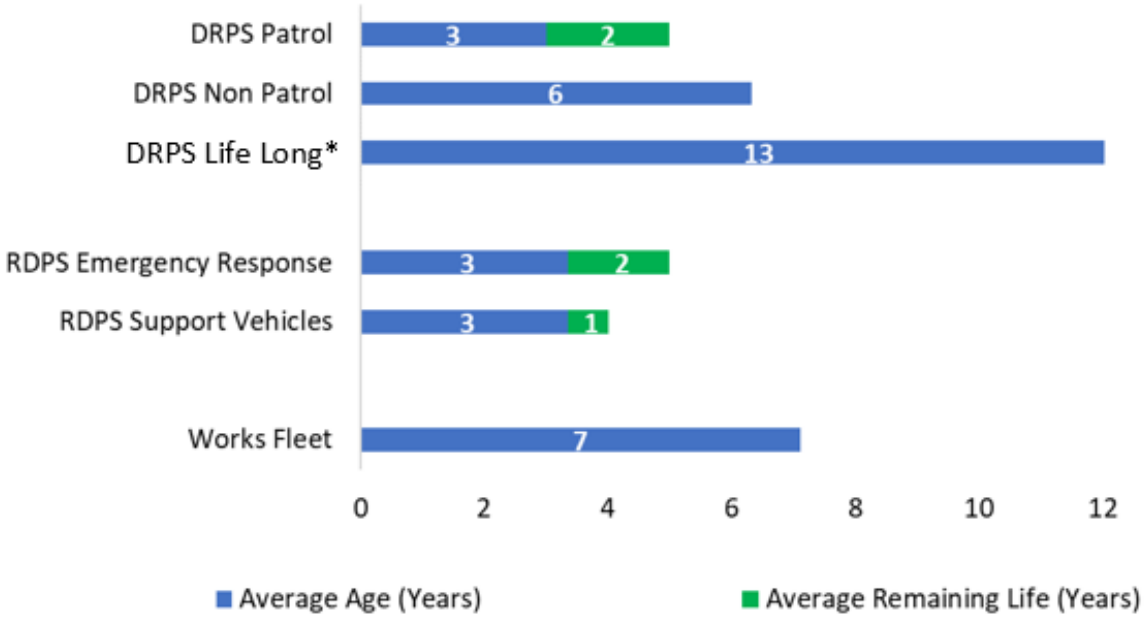
Table 1: Fleet Asset Condition Assessment Methods

Asset Class	Assessment Methods
DRPS*	Age, odometer, ongoing/pending maintenance requirements, and visual assessment for condition factors as per the scale below: • A+ or A++ would be Excellent or "as new" condition, A has minor wear and tear but still in peak operating condition. • B is a mid-life vehicle which, while it may have significant use, is still highly reliable but shows its age with more obvious signs of interior/exterior wear and tear from severe or long service. • C is approaching end of life due or overdue for replacement based on time, odometer reading, condition or greater emergence of costly maintenance/repair issues and non-safety related component failures.
Works Fleet	Mileage, run hours, age, and regular full inspections of vehicle condition.
RDPS	Mileage, vehicle inspection

*All DRPS vehicles fully meet OEM, legislative safety, and public appearance standards, and as such none can be classed as D (Poor) or E (Very Poor).

Figure 2 shows the average age and remaining useful life of the various fleet assets as of December 31, 2021.

Figure 2: Remaining Useful Life



*DRPS Life Long includes historical vehicles kept primarily for ceremonial and display purposes as well as the patrol helicopter.

1.2 Works Fleet Lifecycle Management

The Region's Works fleet often operates in harsh conditions typically over extended shifts which can increase deterioration rates. The fleet follows a proactive maintenance and repair program, leveraging Maximo, the Region's maintenance management software system, to streamline regulatory compliance requirements and preventive maintenance. The Region's maintenance program aligns with best industry standards, regulatory requirements and manufacturers' specifications.

Vehicle replacement is informed by staff assessment of historical maintenance and costs, current mechanical and structural condition, mileage, operating hours, performance/obsolescence, replacement costs, and other factors to balance investment in new vehicles with repair costs and ensure optimization of the vehicles' lifecycle. Financing for vehicle replacements is provided through the Equipment Replacement Reserve which is funded through annual reserve contributions based on the utilization of the Region's fleet. This financing model provides flexibility for replacements based on lifecycle consideration which may result in variability in the number of replacements per year over the capital forecast. This strategy has provided a safe, operational fleet of vehicles that are in good condition overall.

Moving forward, staff will further refine the lifecycle costing analysis for the fleet category of assets in accordance with the next stage of phased-in reporting changes under Ontario Regulation 588/17.

1.3 RDPS Fleet Lifecycle Management

RDPS has two main vehicle types: emergency response vehicles (ambulances, rapid response vehicles, and emergency support units) and management support vehicles. These vehicle types are managed differently given their use in operations.

The Region has a rigorous preventative maintenance program to keep vehicles in peak working condition while optimizing cost efficiency by ensuring preventative maintenance is completed and avoiding more costly repairs. Preventative maintenance programs for ambulances are delivered in accordance with provincial standards.

RDPS fleet is funded approximately 50 per cent through Ministry of Health subsidies with the balance funded by the Region. Ministry funding influences the fleet replacement program as vehicles must be kept for a minimum of 54 months to be eligible for Ministry of Health replacement funding.

RDPS uses a staged vehicle deployment approach for ambulance and other emergency response vehicles that balance service demands and maximizes the life of the fleet, where:

- For the first 3 years of a vehicle's life it serves as frontline.
- After 3 years, a vehicle becomes a spare/contingency.
- After 4 years, the vehicle becomes a secondary spare and is mainly utilized in support of contracted event services (e.g., Canadian Tire Motorsport Park, Tribute Communities Centre events).
- After 4.5 years, vehicles are classified as pending decommission and are replaced shortly thereafter subject to RDPS Business Plans and Budget approvals.

Vehicles demonstrating higher prevalence of mechanical issues and maintenance requirements and/or unusually high kilometres of travel or engine hours are replaced first. Retired rapid response vehicles, command vehicles and management support vehicles are often used administratively as paramedic transport vehicles until such time as they are permanently decommissioned and removed from service. Paramedic transport vehicles are used during shift changes to transport incoming paramedics to change tours of duty where on-duty paramedic crews are operationally unable to return to their originating paramedic response station. This is required, for example, for hospital offload delay challenges.

Table 2 provides the fleet maintenance and fuel measures for 2019, 2020 and 2021.

Table 2: Estimated RDPS Maintenance and Fuel for Emergency Response Vehicles

Year	Annual Vehicle Availability	Annual KM Driven	Maintenance Cost		Fuel Cost	
			Total	$/KM	Total	$/KM
2019	98%	1,802,450	$572,200	$0.32	$600,165	$0.33
2020	98%	2,577,007	$558,258	$0.22	$600,557	$0.23
2021	98%	2,948,974	$545,905	$0.19	$947,633	$0.32

Table 3: Estimated RDPS Maintenance and Fuel for Management Response Vehicles

Year	Annual Vehicle Availability	Annual KM Driven	Maintenance Cost		Fuel Cost	
			Total	$/KM	Total	$/KM
2019	98%	96,889	$28,695	$0.29	$26,080	$0.27
2020	98%	182,185	$25,699	$0.14	$44,036	$0.24
2021	98%	218,364	$25,608	$0.12	$56,422	$0.26

In keeping with the RDPS fleet replacement plan, the 2022 Business Plans and Budget includes the replacement of 10 ambulances in 2022 ($2.02 million) with five of these ambulances being hybrid, two emergency response vehicle replacements ($0.15 million), one hybrid administration vehicle ($0.04 million) and between eight to ten ambulance replacements per year ($18.16 million) over the forecast period (2023-2031) aligned with the forecasted replacement schedule. The 2022 Business Plans and Budget also includes one new additional ambulance ($0.18 million) to service the new Seaton paramedic response station, a new support vehicle ($0.04 million) to expand the Primary Care Outreach Program, and 8 vehicles to support the new Community Paramedicine Program ($0.50 million fully funded by the Ministry of Long-Term Care).

Moving forward, RDPS will continue to monitor, track, and refine lifecycle costing for fleet management to comply with the future requirements of Ontario Regulation 588/17. Updates will be reported in future Asset Management Plans.

1.4 DRPS Fleet Lifecycle Management

DRPS has a preventative maintenance program to keep vehicles in peak working condition to minimize the risk of failure and optimize cost efficiency by maintaining versus repairing the fleet. DRPS vehicles are maintained in accordance with guidelines based on manufacturers' service program.

DRPS employs the following fleet replacement criteria:

- Marked patrol automobiles are replaced at the earlier of 6 years of service or 160,000 to 200,000 km;

- Unmarked vehicles are replaced at the earlier of 7 years of service or 170,000 to 200,000 km; and,
- Trucks are replaced at the earlier of 10 years of service or 300,000 km.

The replacement schedule ensures that vehicles are available for officers to serve the public, while minimizing the total cost of ownership over their useful life. The kilometres driven and vehicle age do not fully capture the engine wear resulting from the significant time cruiser engines are required to idle while officers are carrying out their duties which also impacts the useful life of the vehicles.

Consistent with the fleet replacement plan for DRPS, the 2022 DRPS Business Plans and Budget includes the replacement of 36 marked patrol vehicles ($1.6 million), and 19 unmarked vehicles ($0.8 million) as well as the addition of four new marked patrol vehicles ($0.2 million), and one new unmarked vehicle ($0.04 million) to respond to growth in service requirements. The cost of the primary response vehicles includes upfitting costs (e.g., sirens, light bars, push bars, communication systems, etc.) to meet operational requirements and ensure public safety. The nine-year capital forecast (2023 to 2031) includes the projected replacement of 367 marked vehicles ($22.9 million) and 98 unmarked vehicles ($4.4 million).

The following are fleet maintenance and fuel measures for 2019, 2020 and 2021.

Table 4: DRPS Maintenance and Fuel Measures for Primary Response Vehicles

Year	Annual Vehicle Availability	Annual KM Driven	Maintenance Cost		Fuel Cost	
			Total	$/KM	Total	$/KM
2019	97%	5,569,636	$785,472	$0.14	$1,099,230	$0.20
2020	98%	5,975,129	$1,226,767	$0.21	$1,051,654	$0.18
2021	97%	5,730,420	$1,564,903	$0.27	$1,423,721	$0.25

Table 5: DRPS Maintenance and Fuel Measures for Secondary Response Vehicles

Year	Annual Vehicle Availability	Annual KM Driven	Maintenance Cost		Fuel Cost	
			Total	$/KM	Total	$/KM
2019	99%	3,270,662	$457,893	$0.14	$376,839	$0.12
2020	98%	2,938,929	$448,497	$0.15	$319,018	$0.11
2021	98%	3,527,644	$457,707	$0.13	$475,374	$0.13

Moving forward, DRPS will continue to monitor, track, and refine lifecycle costing for internal fleet management, investment decisions through business planning and budgets, external and internal reporting, and to comply with the future requirements of Ontario Regulation 588/17. Updates will be reported in future Asset Management Plans.

1.5 Fleets: Performance Measurement

Service level objectives and performance targets are set through Regional Council and Police Service Board approved master plans, studies, policies and procedures, as well as through departmental studies and regulatory and/or compliance guidelines.

Table 6: Plans, Studies, Polices, Procedures, Regulations that Inform Service Levels

Departmental Plans, Studies, Policies, & Procedures
• Various Regional Departmental program area studies, plans, policies and procedures
Regulatory/Compliance Guidelines and Requirements
• Highway Traffic Act • Motor Vehicle Inspection Station Licencing and Standards • Motor Vehicle Repair Standards • Truck and Bus National Safety Code • Commercial Vehicle Operators Registration Program (CVOR) • Ministry of Transportation PMCVI (Periodic Mandatory Commercial Vehicle Inspection) • Ministry of Health/Emergency Medical Services Accreditation (RDPS) • Provincial approved fleet replacement schedule (RDPS)

For RDPS, ambulances follow preventative maintenance programs in accordance with provincial standards. As a result, 98 per cent of ambulances and vehicles were available to provide services.

DRPS fleet preventative maintenance programs ensured that in 2021, 97 per cent of primary response vehicles and 98 per cent of secondary response vehicles were available for service.

For the Works Department fleet, the Region has a rigorous preventative maintenance program to keep vehicles in peak working condition, minimizing the risk of failure and maximize cost efficiency. This ensures that vehicles can continue to assist in providing water, sewer, transportation and traffic services.

Moving forward, staff will further refine service levels and performance measures to comply with the future phased-in reporting requirements of Ontario Regulation 588/17. Service levels will align with individual departments goals and service level objectives, as well as comply with any specific program area regulatory requirements. Updates will be provided in future Asset Management Plans.

1.6 Climate Change

Climate Change Mitigation: Reducing GHG Emissions from Fleet

The Durham Region Corporate Climate Action Plan has set targets to achieve net-zero GHG emissions by 2045. Fleet greening is a Regional priority across all Regional fleet (including DRT) and is forecast to achieve 1,319 tonnes of GHG reduction from 2021 to 2025.

Key climate change mitigation accomplishments in 2021 include:

- As of September 2021, the DRPS fleet had 46 hybrid electric vehicles in its total fleet of approximately 400 vehicles, representing slightly more than 10 per cent.
- For Works, the purchase of nine plug-in hybrid SUVs, replacing seven internal combustion engines, and adding two additional plug-in hybrid SUVs to the Utility Finance and Ajax Water Supply Plant fleets.
- Works Fleet Operations implemented Maximo, the Region's maintenance management and workorder software system that assists in data management for fleet operations, maintenance, and fuel consumption.
- RDPS purchased two hybrid ambulances.
- DRPS fuel consumption reduced by 111,096 litres from 2020 (despite an increase in travel of 344,006 kilometres to meet the needs of community safety) due to increasing use of vehicles with hybrid, stop-start and other technologies. DRPS is continuing its transition to greener vehicles where appropriate.

Key 2022 initiatives that support fleet greening include:

- DRPS fleet vehicle replacements continue the transition the fleet to lower emission outputs through the reduction of vehicles powered solely by an internal combustion engine (ICE) and procuring vehicles with hybrid or full electric technology where feasible. The build of DRPS's high-use marked patrol vehicles are replaced with gas-electric hybrids and 64 per cent of the planned replacement vehicles for 2022 are scheduled to be lower or zero emission vehicles (ZEV) where appropriate and available with DRPS acquiring 35 low carbon or zero emission vehicles.
- Works vehicle replacement and acquisition plan includes a new plug-in electric hybrid SUV for the Facilities Maintenance and Operations division, two new plug-in electric hybrid ½ ton pickup trucks for the Orono and Sunderland Depots, replacement of two electric hybrid ½ ton pickup trucks at Duffin Creek WPCP and the Oshawa/Whitby Depot.
- RDPS vehicle replacements include five hybrid-electric ambulances, one replacement hybrid vehicle and four new supervisory hybrid vehicles.

Additionally, Works is planning to pilot a battery EV and a dual fuel-propane pickup truck in 2023. Installation of EV chargers at various facilities to support the transition to electric vehicles is underway.

A continuing focus across the Regional fleet is the reduction of engine idling, which increases fuel and engine efficiencies and decreases GHG emissions. Driver training includes reduced idling policies and procedures. While emergency fleets must maintain ready vehicles to ensure public safety standards, the RDPS fleet utilizes ECO idle reduction systems to reduce GHG emissions.

Climate Adaptation: Increasing the Resiliency of Regional Fleets

The Region protects its fleets from risks associated with the changing climate through:

- ongoing inspections and preventative maintenance programs;
- winter alerts and control programs;
- prudent fleet lifecycle replacements;
- sheltered garages and maintenance facilities;
- fleet service and asset redundancies;
- staff training; and
- effective and up-to-date emergency, contingency and business continuity plans.

1.7 Risk Assessment

Table 7 includes a sample of identified risks for the Region's fleet in achieving its service level standards as well as the mitigation controls identified to address these risks.

Table 7: Risk Mitigation Strategies

Risk	Mitigation
Loss of Fuel	Maintain effective and up-to-date emergency, contingency and continuity plans. Ensure adequate standby power. Essential services policies and procedures. Audit of fuel purchasing cards. Fuel deliveries and re-routed programs/services and redundancies. Mobile services and on-call service contracts.

Risk	Mitigation
Security Breaches and Theft	Onsite safety systems and protocols (e.g., surveillance, patrols, fencing, emergency training, policies and plans). Geographical Positioning System technology on vehicles. Maintain effective and up-to-date emergency, contingency and continuity plans.
Vehicle Accidents	Supervisory oversight. Driver screening, training and recertification programs. Compliance and licensing standards. Maintain effective emergency and contingency plans.
Equipment Failures	Preventative maintenance and capital replacement programs and plans. External service contracts. Safety codes, warranties and guidelines. Inspections, checklists and accreditations. Proper equipment and vehicle storage. Fleet maintenance re-scheduling and redundancies (e.g. spare vehicles and parts inventory).
Winter ice/cold and more frequent freeze-thaw cycles	Winter control program (e.g., vehicle, shelter and facility warming and/or de-icing and snow removal etc.). Slip hazard identification and mitigation. Inspections. Maintain effective and up-to-date emergency, contingency and continuity plans.

1. Region Owned Facilities Asset Class Report (Attachment #7)

Service Level Objectives

- Achieve and maintain an acceptable condition standard for all regionally owned facilities that meets the needs/established service levels of the core users.
- Support the coordination of growth as well as provide diverse facility requirements based upon clientele utilization.
- Ensure a life cycle asset management approach to prioritize capital investments with consideration of measures to reduce GHG emissions for new facilities, expansions and renovations, and to maintain existing facilities in a good state of repair.
- Maintain the security of all facilities and Regional sites, including access control, parking management, emergency response, and security systems.
- Plan, supervise and implement building/office design (including continuous improvement in energy conservation) as well as staff relocations in a timely and professional manner with minimal disruption to staff and the delivery of their programs.

23 Durham Regional Local Housing Corporation Properties

8 DRPS Facilities

8 RDPS Facilities

5 Works Depots

4 Child Care Centres

4 LTC Homes

7 Waste Management Facilities

5 Other (Admin Buildings, etc.)

Total 2021 Replacement Value

$1,293.8 million

⬆ **9.5%** from 2020

Average Condition
(Year-over-Year Trend)

B- ➡

1.1 Facility Inventory Overview

The facilities asset class includes Regional buildings and structures across diverse service areas. Water supply and sanitary sewerage vertical facility assets can be found within the water supply and sanitary sewerage asset class attachments (Attachments #2 and #3). DRT facilities, bus stops and shelters are discussed in greater detail in Attachment #5.

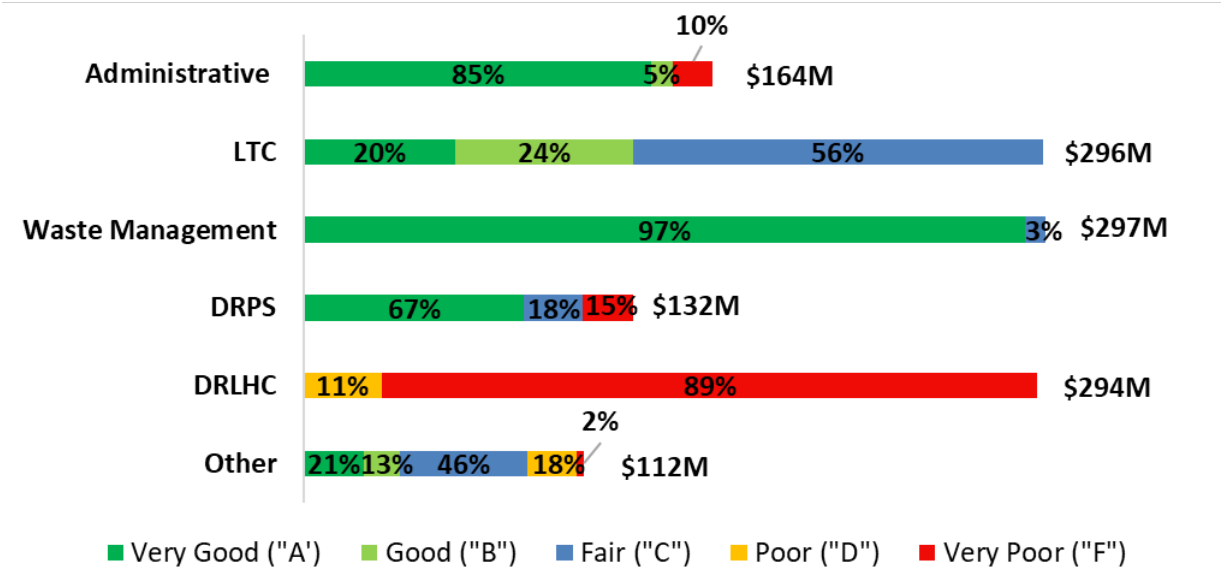
In future asset management reports, facilities will be reported along functional lines with separate attachments dedicated to RDPS, Works, DRPS, Waste Management Services, and Social Services.

1.2 Facilities Condition and Replacement Values

The overall condition rating for Facilities remained B- or Good in 2021 as compared to 2020 with only Administrative facilities experiencing a downgrade from Very Good to Good. Overall replacement values increased by 9.5 per cent over 2020 as a result of inflationary replacement cost increases.

Figure 1 illustrates the condition rating and replacement value of the Region's Facility assets.

Figure 1: Facilities Condition and Replacement Values*



*Condition ratings for assets may not add to 100 per cent due to rounding.

1.3 Facilities Condition Assessment Methods

Regional staff employ a Building Condition Assessment (BCA) method for assessing the condition of Regionally-owned facilities. For each facility, a BCA is performed on a 10-year cycle by external consultants. BCAs assess the condition of major building elements, sub-structures, shells, interiors, services and site work.

Since 2016, the Region has used a capital asset management and planning software system to assist with the collection, management, and reporting of BCA data.

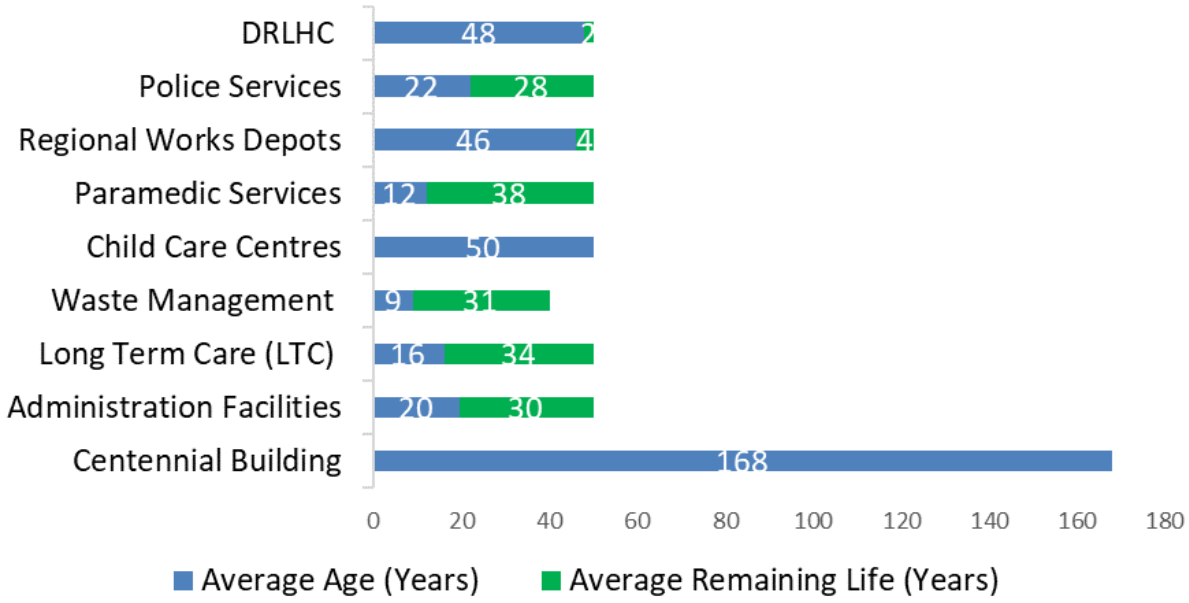
To date, 57 BCAs have been completed or are in progress, with six to be performed by 2023. Previously approved Regional Business Plans and Budgets as well as the 2022 Regional Business Plan and Budget includes $0.2 million per year to continue these BCAs.

The condition rating for each facility is based on the BCA results of the identified capital needs and associated costs and timing for them (derived from the life cycle of the building components) as a proportion of its total replacement value.

1.4 Facilities Average Age and Remaining Useful Life

The average age and remaining useful live for facility assets as of December 31, 2021 are outlined in Figure 2.

Figure 2: Region Owned Facilities Remaining Useful Life



1.5 Facilities Levels of Service and Performance Measurement

Service level objectives and performance targets are set through Regional Council approved master plans, studies, policies and procedures, as well as through departmental studies and regulatory and/or compliance guidelines.

Table 1: Plans, Studies, Policies, Procedures, Regulations that Inform Service Levels

Departmental Plans, Studies, Policies, & Procedures
• Various Regional Departmental program area plans, policies and procedures • Works Depot Rationalization Study • Paramedic Services Master Plan • At Home in Durham • Durham Building Standard (under development)
Regulatory Compliance/Guidelines and Best Practices
• Ontario Building Code Standards • Ontario Fire Code Requirements • Accessibility for Ontarians with Disabilities Act (AODA) • Environmental Assessment Act • The Green Energy Act (Ontario Regulation 397/11) • Ministry of Labour Worker Safety/Training requirements • Canadian Environmental Assessment Act • Canadian Environmental Protection Act • Local Building Code Standards • Design Standards and Specifications (American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standards)

Community Levels of Service

Levels of service for facilities are based on achieving and maintaining an acceptable condition standard for all Region owned facilities to allow the various program areas to achieve their service standards. This is measured through the tracking of the Facility Condition Index, which ranks the facilities from Very Good, Good, Fair, Poor, and Very Poor based on a calculation of a ratio of current maintenance cost to the current replacement value. As of December 31, 2021, 45.5 per cent of Regional building facilities had a Facilities Condition Index (FCI) rating of Very Poor or Poor, as reported in Table 2. FCI compares the ratio of a building's maintenance costs to the building's replacement costs.

Achieving and maintaining an acceptable condition standard for facilities requires regular and ongoing capital and preventative maintenance programs. This covers all elements of the building systems including the site and site services. To track and assess capital/maintenance needs, the Works Department's Facilities Design, Construction and Asset Management (DCAM) staff performs BCAs. DCAM is targeting to complete BCAs on all Region owned buildings by 2023.

At year-end 2021, a total of 57 detailed BCAs were in progress or completed. Approximately 87 per cent of all Regionally owned facilities have a completed BCA, as reported in Table 2 with the remaining six building BCAs to be performed over the next two years.

The Facilities Maintenance and Operations Depot, located at 289 Water Street in the Town of Whitby, will be demolished to accommodate the expansion of the Whitby Water Supply Plant. Demolition is expected to take place in 2023, therefore no further BCAs are planned at this site as a result.

The priority for the condition assessments is directed towards facilities where age-based or other ratings identified the facility as being Poor and/or Very Poor and where completing BCAs within an asset group will complete the group as a whole.

Technical Service Levels and Performance Measures

Asset management staff have identified key asset-related performance measures to assist in ensuring progress towards achieving asset-related goals and objectives related to facilities, as noted in Table 2.

Table 2: Performance Measures

Performance Measure	Target	Year of Measure		
		2019	2020	2021
Facility Condition Index (FCI)	0% of facilities rated as either Poor or Very Poor by 2023	27.2%	45.5%	45.5%
Measure used as an indicator of relative facility condition and its elements where FCI , defined as the ratio of current maintenance cost to the current replacement value of the facility, is taken from a recent building condition assessment (within past 5 years). It is recognized that the baseline measure may shift as BCAs completed and FCI ratings are updated to reflect more up-to-date information.				
% of Facilities with completed Building Condition Assessments	100% of Facilities to have a completed BCA by 2023	78%	83%	87%
This measures the percentage of facilities that have had Building Condition Assessment. Performance target is to complete BCA for all Regional owned facilities by 2023.				

1.6 Facilities: Maintenance, Repair and Rehabilitation

Facilities deteriorate by component rather than as a whole. Staff in the Facilities Maintenance and Operations Division of the Works Department complete reactive and preventative maintenance, repair and rehabilitation activities for these components at optimal times to allow the assets to provide service levels at the lowest risk in the most cost-effective manner. The type and timing of maintenance, repair, rehabilitation and replacement activities are determined through a number of considerations.

Table 3 below provides a summary of the expected useful life for major building components, which in turn, provides some broad time frames for when repair, rehabilitation, renewal and replacements could potentially occur. Changing compliance, building and energy codes, modernization and return on investment are also considerations in facility infrastructure decisions, given implications to both operating and maintenance complexity and lifecycle costs.

Maintenance and replacements decisions are being further refined through the recent implementation of Maximo, the Region's maintenance management and workorder software system and Ameresco, the Region's capital asset management planning software system (CAMPs). DCAM staff can better identify and refine forecasted future repair, maintenance, and rehabilitation needs and subsequent cost estimates based on the recording and tracking of past treatments, current condition ratings and needs, useful life, changing compliance, building and energy codes, modernization and return on investment. The CAMPs system is capable of producing up to a 25-year work plan to support long-term asset management planning. Maintenance and replacement needs are considered as part of the business planning, budget and long-term capital planning processes. This ensures facilities are maintained in a good state of repair to enable service areas to meet their targeted levels of service.

Table 3: Expected Useful Life of Building Components

10 Years	12 to 20 years	25 to 50 years	Over 50 years
Interior finishes	Building Envelope	Mechanical Electrical Plumbing Elevators	Structure

Key repair, rehabilitation and replacement activities for facilities approved in the Region's 2022 Business Plans and Budget include:

- An increase in one Facilities Maintenance Mechanic in Housing Services to provide support for the delivery of maintenance repairs and monitoring of operational building systems for the DRLHC;

- For DRLHC $3.3 million has been budgeted for repairs and renovations to maintain building envelope, structural components and unit interiors of housing stock. An additional $26.0 million is budgeted for facility capital works including $22.2 million for deep energy efficient retrofits at four DRLHC Senior's housing properties;

- For DRPS, approximately $9.8 million has been budgeted for facility operations, maintenance and major repairs and renovations. In 2021, debentures were issued in the amount of $63.9 million for Clarington Phase 2; and

- For RDPS $1.5 million was budgeted for facility operations, maintenance and major repairs and renovations.

In future Asset Management Plans, Regional staff will undertake lifecycle costing analysis for Regionally-owned facilities by service area in accordance with Ontario Regulation 588/17.

1.7 Climate Change

Climate Change Mitigation: Facilities Strategies to Reduce GHG Emissions

The Durham Region Corporate Climate Action Plan has set targets to achieve net-zero corporate GHG emissions by 2045. The corporate GHG inventory includes energy used in all Region-owned buildings.

Works DCAM staff are leading the development of a Durham Building Standard to provide direction for low carbon new development and retrofits of Regional facilities. This standard will provide a framework for decision-making in terms of sustainability and resilience, space optimization, accessibility/inclusivity for facility-based capital projects with quantifiable and measurable outcomes. The Durham Building Standard is anticipated to be finalized in 2022.

Key 2022 initiatives that support GHG reductions include:

- A $22.24 million capital project for deep energy efficient retrofits at four DRLHC Senior's housing properties.

- Initiation of a feasibility study for an Oshawa Landfill Biocover Pilot to assess the potential for an alternative landfill cover system that will biologically convert up to 50 per cent of the methane to carbon dioxide.

- Incorporation of low carbon measures at the planned Clarington Police Complex (CPC) and new RDPS Station and Training Facility in Seaton

- Comprehensive building condition assessments and level 3 energy audits for development of a baseline and greenhouse gas emissions reduction plan and pathway for Regional buildings at an estimated cost of $2.5 million.

- Deep energy retrofits at 101 Consumers Drive, in the Town of Whitby to obtain a near-zero energy outcome at an estimated cost of $8.4 million.

Going forward staff are exploring a variety of innovate initiatives to lower GHG emissions produced by facilities including a potential rooftop solar PV installation at Fairview Lodge LTC facility, Regional Headquarters and for the new Beaverton Supportive Housing facility. The proposed new Seaton LTC facility is also incorporating zero emissions standards into its preliminary designs. The workplace modernization project at Regional Headquarters is intended to alleviate the need for additional new office construction and reduce current energy requirements.

Climate Adaptation: Increasing the Resiliency of Regional Facilities

The current focus of corporate climate adaptation work is to ensure levels of service to the public are maintained. This is achieved through:

- Assessing climate adaptation requirements within the asset management planning process;
- Operating, securing, maintaining, repairing and upgrading Regional facilities; and
- Facility design and construction that considers climate adaptation (e.g., erosion control, standby power management, storm water management).

1.8 Risk Assessment

Regional staff analyze potential risks to facility assets on an ongoing basis. Table 4 highlights some high impact potential risks and ongoing and planned risk mitigation measures.

Table 4: Risk Mitigation Strategies

Risk	Mitigation
Loss of External Utilities/Fuel	Ensure adequate standby power at Regional facilities. On call services and service contracts. Essential services policies and procedures and staff training. Social services and DEMO secondary response policy. Maintain effective emergency, contingency and continuity plans. Remote/hybrid work environment.

Risk	Mitigation
Major Facility System Failures	Proactive maintenance, repairs and capital replacements. Inventory of equipment and parts. Inspections, condition assessments and capital planning for gaps. Maintain emergency, contingency and business continuity plans. Mobile and on call service contracts. Essential services policies and procedures.
Environmental Health Issues	Sealed units and quarantine protocols. Inspections and preventative maintenance. Service contracts. Pest Control programs. Cleaning protocols and preventative spraying. Asset management – inspection and remediation programs, smooth surfaces and materials management. Maintain effective emergency, contingency and continuity plans.
Facility Site Hazards	Security programs and protocols. Health and Safety Programs. Warning protocols and signage. Proactive maintenance, rehabilitation and capital replacements. Inspections and condition assessments. Winter control programs for adequate de-icing and snow removal. Maintain effective emergency, contingency and continuity plans.

1. Equipment Asset Class Report (Attachment #8)

1.1 Description of Equipment Assets

The equipment asset class includes information technology (IT) equipment (laptops, desktops, servers, printers etc.), Durham Regional Police Service (DRPS) equipment, long-term care equipment (beds, ceiling lifts, kitchen equipment etc.), Region of Durham Paramedic Services (RDPS) equipment (stretchers, defibrillators etc.) and Works Department equipment (forklifts, backhoes, excavators, pumps, compressors, CCTV inspection equipment, skid loaders, bull dozers etc.).

Furniture, fixtures and communications infrastructure are also included within this asset class.

1.2 Equipment Replacement Cost

The total estimated replacement cost for the Region's equipment as of December 31, 2021 is estimated at $223.8 million, an increase of 12.2 per cent from 2020.

Table 1: Equipment Replacement Value ($ millions)*

Asset Group	Replacement Costs ($M)			2020 to 2021 Change ($M)	2020 to 2021 % Change
	2019	2020	2021		
Water	22.6	22.2	27.3	5.2	23%
Sewer	15.3	17.0	17.4	0.5	3%
Transportation	9.3	7.3	7.6	0.3	4%
Waste Management	11.8	14.0	14.5	0.4	3%
RDPS (Paramedics)	5.4	5.3	5.6	0.3	5%
DRPS (Police)	43.8	44.3	49.2	5.0	11%
DRT (Transit)	10.6	15.5	15.3	-0.2	-1%
Health	2.3	2.0	2.3	0.4	19%
Social Services	20.0	21.1	22.5	1.5	7%
Administration	47.0	50.9	61.9	11.1	22%
Total	**188.1**	**199.5**	**223.8**	**24.3**	**12.2%**

*Rows and columns may not add due to rounding

Ontario Regulation 588/17 requires all assets to be reported on a service-area basis (e.g., Social Services, DRT, etc.) versus by asset class by July 2024.