



The Regional Municipality of Durham Report

To: Committee of the Whole
From: Commissioner of Finance and Commissioner of Works
Report: #2019-COW-16
Date: June 12, 2019

Subject:

The 2019 Regional Municipality of Durham Asset Management Plan

Recommendations:

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

- A) The Regional Strategic Asset Management Policy (Attachment #1) be approved and submitted to the Ontario Ministry of Infrastructure to comply with Ontario Regulation 588/17, Asset Management Planning for Municipal Infrastructure, which requires municipalities to have adopted a Strategic Asset Management Policy by July 1, 2019; and
 - B) The best business practice of allocating funds to address priority rehabilitation and replacement needs of Regional infrastructure systems identified in this report produced through the Region's asset management planning process, continue as part of the Region of Durham's 2020 Financial Planning and Budget deliberations.
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Executive Summary:

1. Purpose

- 1.1 The purpose of this report is to present the Region's asset management goals, approach and policies, and to advise on the state of the Region's infrastructure, service levels, performance, life cycle considerations, and risk and climate change adaptation and mitigation initiatives. This report also establishes compliance with new regulations under Ontario Regulation 588/17 and reflects in almost all cases, the Region is compliant two years ahead of specified deadlines.
- 1.2 The Region's Asset Management Plan is produced annually from the ongoing asset management planning process that Regional staff undertakes as part of best business practices as well as to ensure compliance with all Provincial and Federal regulatory and reporting requirements and grant funding programs.
- 1.3 This asset management approach places identified infrastructure investment needs into the annual and long term financial and business planning and budget process

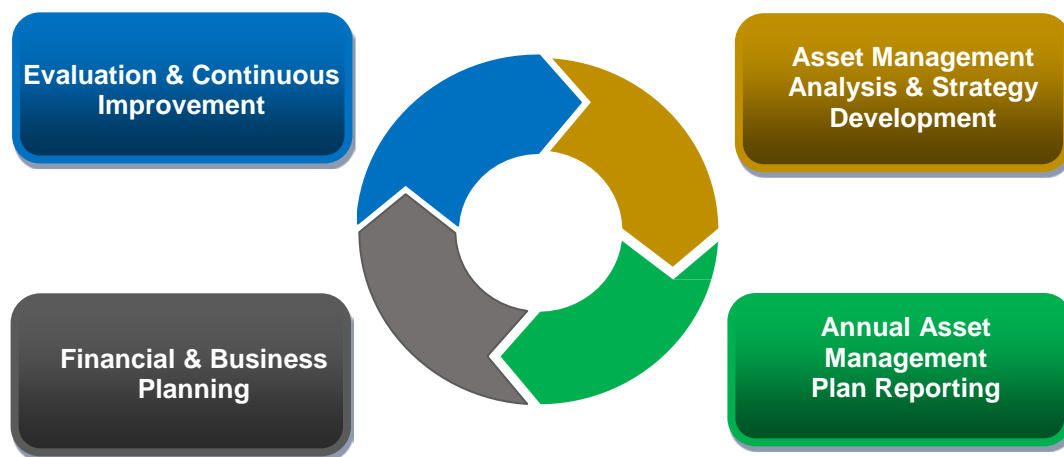
for consideration, prioritization and subsequent approval.

2. Corporate Strategic Asset Management Policy: Goals, Approach and Policy

2.1 A formal asset management program has been in place at the Region since 2004. The Corporate Strategic Asset Management Policy (Attachment #1) recommended for approval, encapsulates the Region's asset management goals, planning process and policies, which have evolved and improved since 2004.

2.2 The Region's asset management planning is a continuous year-round process:

Figure 1: Region's Asset Management Planning Process



2.3 Multi-disciplinary departmental asset management teams, coordinated by the Finance Department and led by an inter-departmental Director Steering Committee, collaboratively gather, analyze and report on the following asset information (Figure 2):

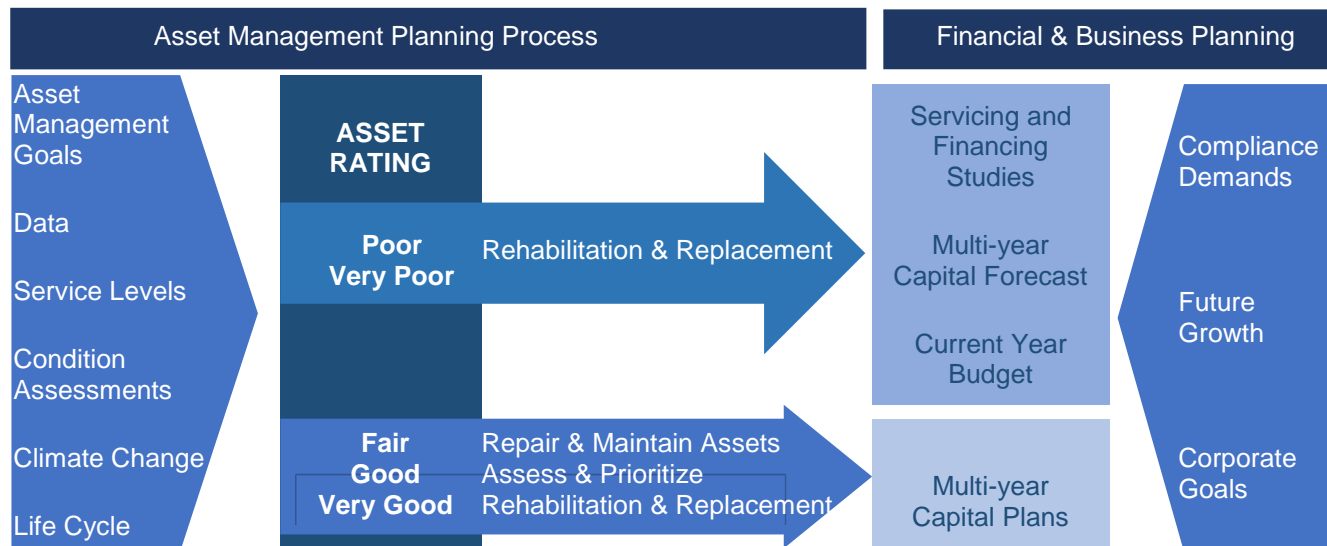
Figure 2: Regional Asset Management Analysis

Assets	Inventory, valuation, condition, age and capacity
Service Level Demands	Strategic goals, policies, plans, growth, densities, best business practices, regulatory compliance, land use requirements and performance measurement
Life Cycle Considerations	Timing and type of maintenance, repair, rehabilitation and replacement activities
Asset Risk and Climate Adaptation and Mitigation	Asset risk and criticality, business continuity, climate adaptation and mitigation, and emergency planning
Financial Planning	Expenditure and financing forecasts & strategies including maintenance, rehabilitation, replacement, disposal activities and non-infrastructure solutions

2.4 The departmental asset management working teams also participate in the Region's Corporate Climate Change Staff Working Group (CCSWG) as well as in the preparation of servicing and financing studies and annual business plans and budgets. Through this integrated multi-disciplinary approach and analysis, Regional staff strive to achieve the seven asset management goals as included in the recommended Corporate Strategic Asset Management Policy. The seven goals are based on the Region's current Strategic Plan and other various strategic planning documents, policies, reports and studies approved by Council:

- The Region will maintain its assets in a safe condition throughout their life cycles with tolerable risks mitigated through effective strategies, to deliver Regional services at approved levels in a financially prudent and sustainable manner;
- 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 life cycle cost as feasible;
- 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;
- 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;
- 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;
- The Region's asset management planning and reporting process will be transparent and accountable through the development and approval of an annual 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
- 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.

**Figure 3:
Durham's Corporate Asset Management Process & Financial & Business Planning**



- 2.5 The asset management planning process is a cornerstone in the Region's annual business planning cycle. The identified infrastructure maintenance, repair, rehabilitation and/or replacement investments are prioritized based on detailed options analysis. These asset management investment needs and financing strategies are addressed in subsequent servicing and financing studies for major program areas as well as Regional Business Plans and Budgets.
- 2.6 The annual Asset Management Plan, along with the subsequent servicing and financing studies and business plans and budgets, proceed to Regional Council for approval on an annual basis, setting the path for infrastructure renewal and new investments. Opportunities for the public to provide input is available throughout this approval process.
- 2.7 The Region's approach ensures that asset management planning includes opportunities for continuous improvements and asset management strategies and infrastructure needs are addressed with approval of funding through the annual business planning and budget process as part of best business practices.
- 3. Complying with Federal and Provincial Requirements, including Ontario Regulation 588/17, Asset Management Planning for Municipal Infrastructure**
- 3.1 In addition to best practices, the Region's annual Asset Management Plan also ensures the Region is consistent and compliant with the following Provincial, Federal and Regional requirements:
- Federal requirements for the recording of Tangible Capital Assets (TCA);
 - Federal Gas Tax Municipal Funding Agreement requirements;
 - Requirements related to the *Ontario Infrastructure for Jobs and Prosperity Act, 2015*;

- *The Development Charges Act*;
- Requirements under *The Smart Growth for Our Communities Act, 2015*;
- Requirements under the Growth Plan to support the next Municipal Comprehensive Review (ROPA); and
- The Region's Tangible Capital Assets (TCA) Policy.

3.2 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. This regulation requires municipal asset management plans to include the following by the specified dates as reflected in Figure 4:

**Figure 4:
Ontario Regulation 588/17 Asset Management Planning for Municipal Infrastructure**



3.3 Additional notable requirements include:

- A municipality's Strategic Asset Management Policy must be reviewed and updated at least once every five years;
- A municipality's asset management plan must be approved by Council;
- Commencing July 1, 2024, municipalities will be required to undertake and complete an annual review of their asset management progress and report to Council by July 1 of each subsequent year; and
- Municipalities are required to review and update their asset management plan at least once every five years.

3.4 Regional Council's approval of the recommended Corporate Strategic Asset Management Policy as contained in Attachment #1, will ensure Durham complies with this requirement in the regulation by July 1, 2019.

3.5 Furthermore, combined with the additional analysis and reporting improvements in this year's report, the Region's 2019 Asset Management Plan already meets almost all Phase 1 new asset management regulatory reporting requirements two years

ahead of the specified deadlines.

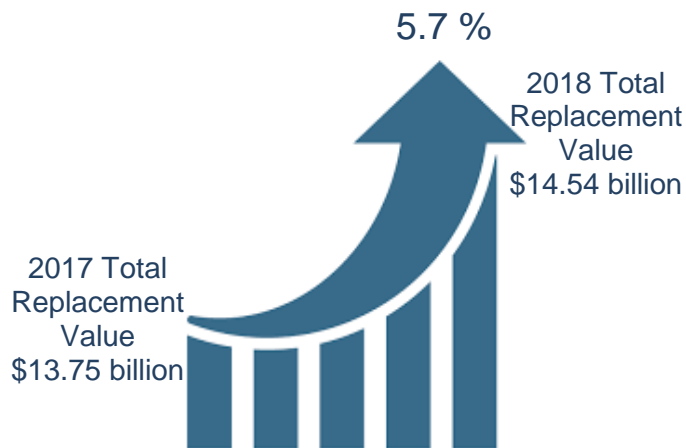
**Figure 5:
Durham's Compliance with Phase 1 of the Ontario Regulation 588/17, Asset
Management Planning for Municipal Infrastructure**

Current Levels of Service for Core Assets by July 1, 2021						
Service Area	State of Infrastructure	Community & Technical Levels of Service	Asset Management Strategies	Life Cycle Cost	Climate Change and Risk	Financing Strategies (Asset Management and Growth)
Water	Achieved	Achieved	Achieved	In Progress	Achieved	Achieved
Wastewater	Achieved	Achieved	Achieved	In Progress	Achieved	Achieved
Roads	Achieved	Achieved	Achieved	In Progress	Achieved	Achieved
Structures	Achieved	Achieved	Achieved	In Progress	Achieved	Achieved
Stormwater	Achieved	In Progress	In Progress	In Progress	Achieved	Achieved

- 3.6 Moving forward, the Region is very well positioned and staff have a plan to meet the remaining Phase 1 as well as future phases' regulatory requirements by the specified timelines over the next two years and into the future (summarized in Section 11).

4. Replacement Value of Regional Assets'

- 4.1 At year-end 2018, the Region's infrastructure assets had a total replacement value of approximately \$14.54 billion, which is an increase of \$0.79 billion or 5.7 per cent over 2017 year-end (\$13.75 billion).



- 4.2 For 2018, approximately \$62,190 per Durham household would be required to replace the Region's entire asset inventory (compared to \$59,140 for 2017)

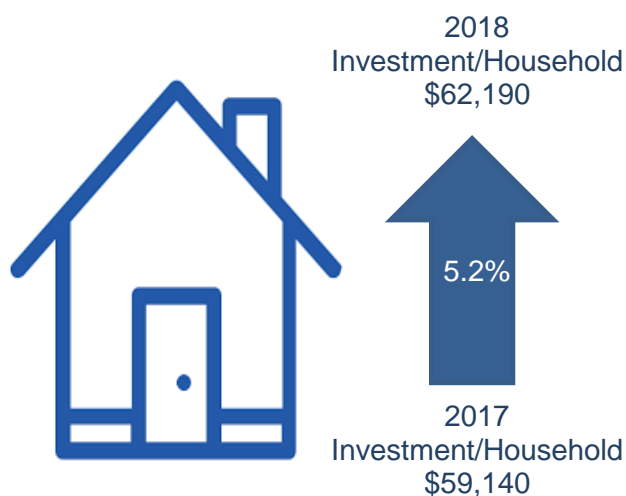
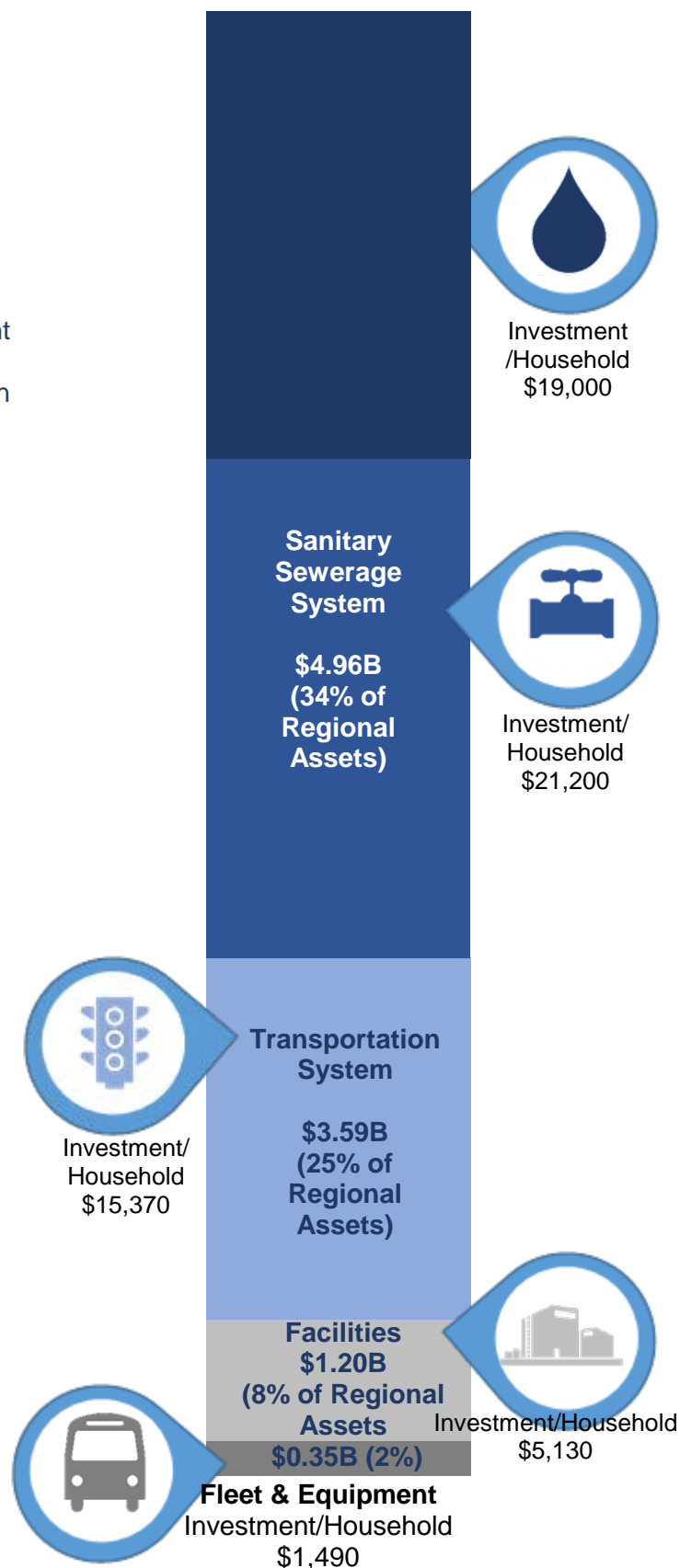


Figure 6: 2018 Asset Replacement Value by Asset Type and Durham Household



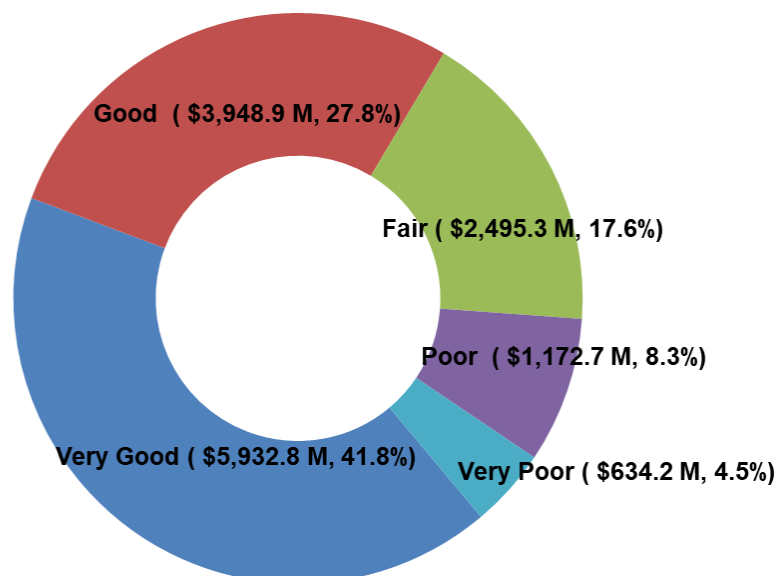
5. The Condition of the Region's Infrastructure

5.1 Asset condition is an important consideration in the prioritization of maintenance, repair and replacement investments. Regional asset management staff employ the following approaches to assess the condition of each asset class:

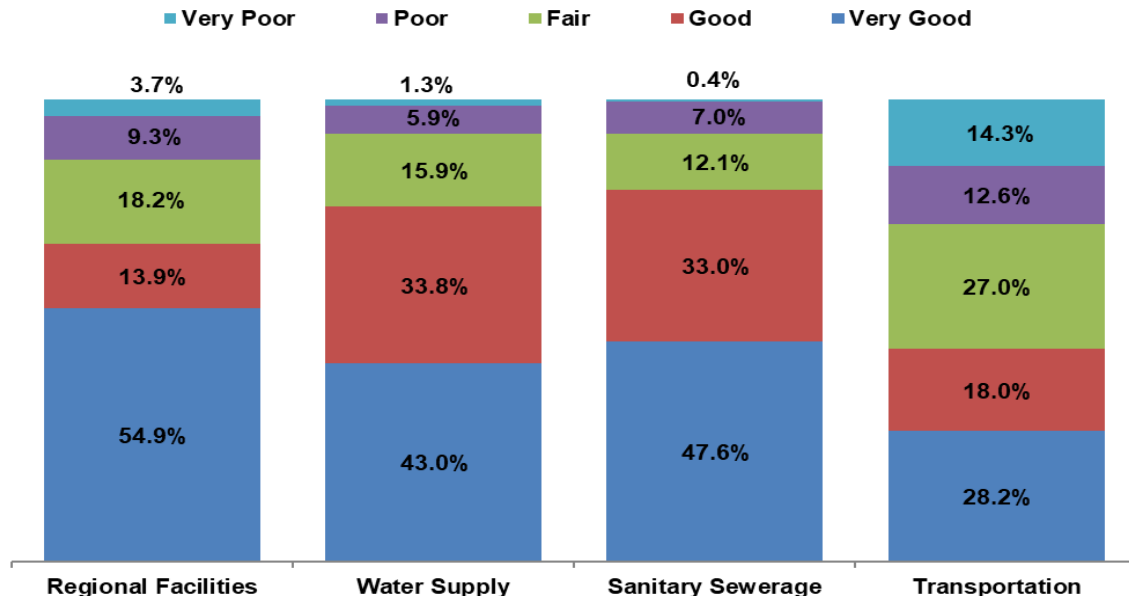
- For watermain and sanitary sewers and service connections (linear assets), some of the factors used to assess condition are pipe material, break rates and remaining service life. For vertical water and sanitary sewerage assets, either high level assessment or detailed assessment are employed for the building structure and process equipment;
- For the transportation network, inspections of the condition of roads, bridges and traffic infrastructure are undertaken, along with consideration of age where appropriate, to determine condition ratings;
- For Facilities, building condition assessments (BCA) are completed to determine condition and rehabilitation and replacement requirements; and
- For some other assets, a standardized ranking of asset condition is used based upon five grades assigned across four factors: soundness; functionality; maintenance cost; and asset age.

5.2 Across all assets, most are rated in Fair to Very Good condition (87.2 per cent based on proportion of total replacement value).

**Figure 7: Regional Asset Condition Rating Overall
(By 2018 Replacement Value) (\$ millions)¹**



¹ Condition ratings exclude fleet and equipment.

Figure 8: 2018 Regional Asset Condition Rating by Asset Class

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

- Approximately \$513.1 million (14.3 per cent) are within the transportation asset class, of which \$505.9 million are roads in Very Poor condition. This asset class continues to experience material year over year construction cost increases for roads and an overall network wide decrease in Pavement Condition Index (PCI). It is important to note that road rehabilitation/reconstruction continues to be a Regional Council priority and the 2019 Roads Capital Budget approved \$35.9 million for road rehabilitation (including \$7.5 million in federal gas tax funding). This represents an increase of \$2.7 million over 2018 (\$33.2 million) and a total increase of \$12.4 million over 2017 (\$23.5 million) to address road segments mostly in Poor and Very Poor condition. There is only one bridge in the Region's inventory that is in Very Poor condition which is currently being replaced and is anticipated to be in service mid-2019 (utilizing previously approved funding from the 2016-2018 Budgets);
- There is approximately \$59.6 million in water supply assets that are in Very Poor condition representing 1.3 per cent of the total water supply system assets. Of this, \$15.8 million is related to watermain, valves and connections. These assets, along with other priority watermain repairs, betterments and replacements, are being addressed with the \$21.0 million approved in 2019 Water Supply Budget for watermain betterments and replacements, which represents an increase of \$6.6 million over 2018 (\$14.4 million). This increase was possible from the allocation of funding from the recently completed polybutylene water service connection replacement program, as well as a \$0.4 million increase from the Asset Management Reserve Fund (for a 2019 total contribution from the Asset Management Reserve Fund of \$4.6 million);

- For the Region's Sanitary Sewerage assets, approximately 0.4 per cent (with a replacement value of \$17.8 million) are in Very Poor condition, primarily in linear assets (\$14.0 million). The 2019 Sanitary Sewerage Budget includes \$14.1 million to address these Very Poor assets as well as other priority sanitary sewer linear replacements and/or betterment needs. This represents an increase in funding of approximately \$6.9 million over 2018 (\$7.2 million), which is partially attributable to a \$2.6 million increased contribution from the Asset Management Reserve Fund (total 2019 contribution from the Asset Management Reserve Fund of \$5.1 million from \$2.5 million in 2018); and
- While approximately \$43.6 million of Regional facilities are in Very Poor condition (3.7 per cent), primarily associated with the DRLHC housing stock, previously and currently approved funding for the DRLHC housing stock is assisting in addressing needs, with an update on future needs to be refined and brought forward within the 2020 Social Housing Servicing and Financing Study and 2020 Business Plan and Budget.

5.4 The assets currently rated in Poor to Very Poor condition will continue to undergo assessment through the 2020 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.

6. Service Levels

6.1 Service levels are a key consideration influencing asset management planning and subsequent investment decisions. Assets must be maintained, repaired, rehabilitated and/or replaced in a timely manner to ensure services can be provided at approved levels.

6.2 The Region's asset related service levels are defined through:

- Council approved corporate plans, studies, strategic planning documents, policies, by laws, reports and goals and objectives;
- Best engineering and industry practices;
- Regulatory guidelines and/or requirements; and
- Other performance expectations as defined through multiple reports as approved by Regional Council.

6.3 This year's Asset Management Plan includes refined and new service levels for the Region's asset classes (as detailed in Attachments #3 to #9). Ontario Regulation 588/17 (Asset Management Planning for Municipal Infrastructure) prescribes specific service levels for core assets (water, wastewater, roads, structures, and storm management) that municipalities must track, measure, and report by July 1, 2021. With the refined and additional service levels in this year's Asset Management Plan, the Region is compliant with all these service level reporting requirements for water, wastewater, roads, and structures two years ahead of the specified deadlines (see Figure # 5 above). This year's Asset Management Plan also includes some new and refined service levels for non-core assets (e.g. Transit) that are not due until July 1, 2023.

- 6.4 Moving forward, Regional staff will complete the service level reporting requirements for storm management and report them in a future Asset Management Plan. In addition, service levels will continue to be refined to reflect evolving Regional Council approved goals, plans, policies, strategies as well as best engineering practices as part of best business practices.

7. Life Cycle Considerations

- 7.1 Life cycle refers to how assets are managed over their useful lives, from construction to disposal. Life cycle management involves determining the optimal timing and type of maintenance, repair, renewal, rehabilitation and replacement to maximize the value of that asset at its lowest possible cost over its life span.
- 7.2 Life cycle management is important as it improves the ability to predict, plan and include the necessary investments into business plans and budgets to undertake those optimal treatments at the appropriate time to maintain service levels while maximizing the life of the asset at its lowest cost.
- 7.3 Attachments #3 to #9 provide further life cycle considerations for each asset class including timing and type of repair, rehabilitation and operational treatments, the associated costs and investments in the 2019 Budgets to address them.
- 7.4 This year's Asset Management Plan is progressing work towards achieving compliance with the life cycle reporting requirements in the new provincial asset management planning regulation for municipal infrastructure (O. Reg. 588/17). Regional staff will continue to refine life cycle analysis as part of best business practices as well as to complete achievement of the life cycle reporting requirements specified in the new provincial asset management regulation (O. Reg. 588/17) by July 1, 2021 for core assets.

8. Risks Including Climate Change and Adaptation Measures

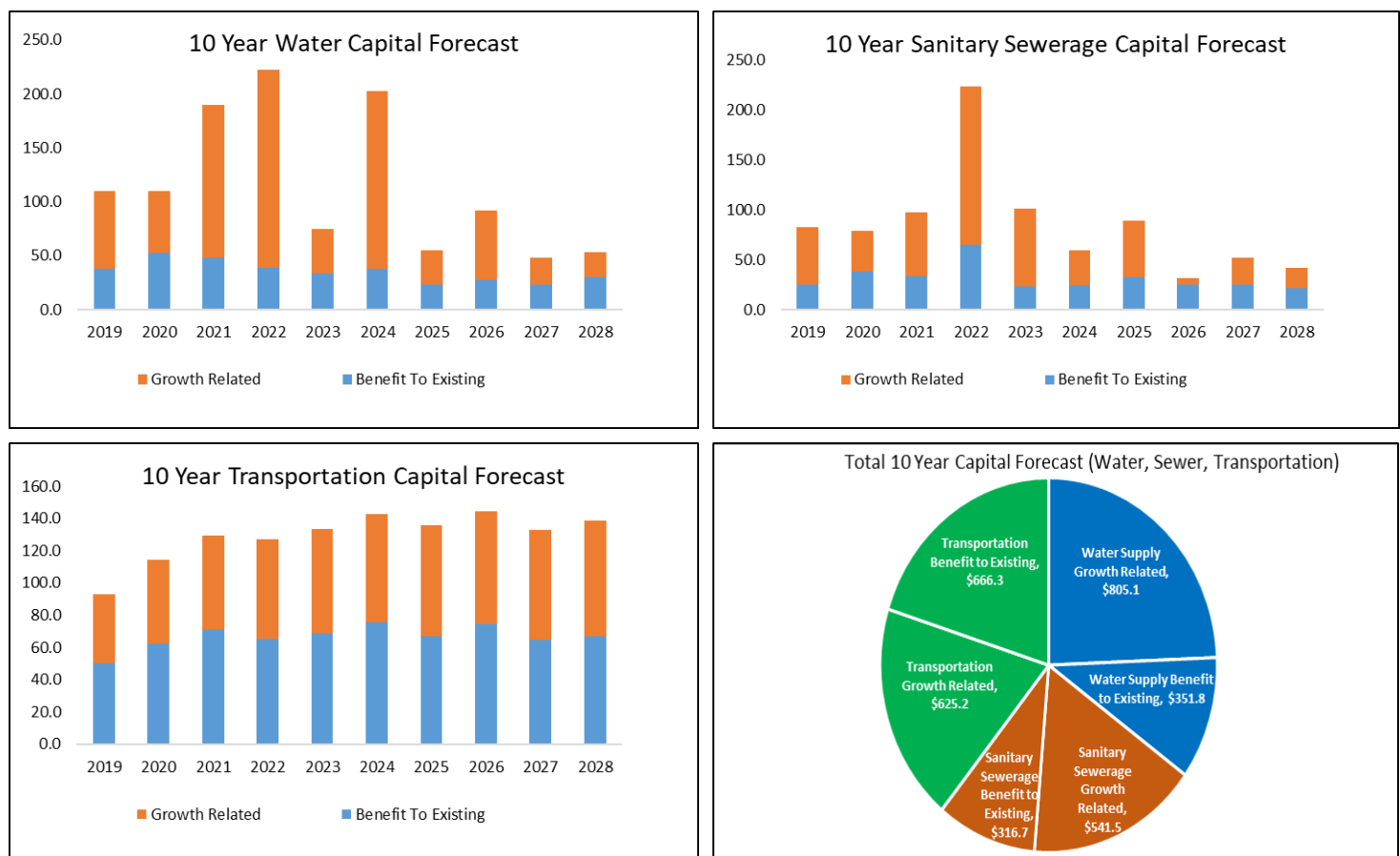
- 8.1 The Region proactively identifies and manages potential risks through its enterprise risk management program, including climate risk. The Region's Corporate Climate Change Staff Working Group also collaborates with asset and risk management teams in identifying key climate related risks to infrastructure, opportunities, and potential mitigation strategies.
- 8.2 The Region's asset management planning process includes consideration of those potential risks related to asset condition, health, and performance, as well as potential impacts to infrastructure due to climate related conditions. Mitigation strategies include efforts to ensure effective and coordinated response to potential risk events, ensure business continuity objectives, and address service interruption and quality issues.
- 8.3 The asset class attachments identify asset management related risks and climate considerations and provides mitigation and adaptation measures and investments to address them through the Regional Business Plans and Budgets.
- 8.4 Risks and climate adaptation and mitigation related to Regional assets will continue

to be monitored and addressed through the Region's Corporate Climate Change Working group, asset management working group teams and business planning process as part of best business practices. This will also allow the Region to continue to remain in compliance with the new provincial asset management regulatory reporting requirements (O. Reg. 588/17).

9. Capital Forecast (For Core Infrastructure) and Potential Funding Options

9.1 Major capital investments for water, sewer, and transportation (core assets defined and required to be reported per O. Reg 588/17) approved for 2019 and identified over the forecast period (as part of the 2019 Business Planning and Budget process) totals \$3.3 billion (Region owned assets). Of this, approximately \$1.3 billion (40 per cent) is for improving existing infrastructure and \$2.0 billion (60 percent) is for new growth-related infrastructure expansion.

Figure 9: 2019 Budget and 2020-2028 Capital Forecast (Core Infrastructure) (\$ millions)



- 9.2 For all Regional owned assets, the 2019 and 2020-2028 capital forecast totals approximately \$4.1 billion for major capital infrastructure investments, of which \$2.4 billion (58 percent) are for growth expansion needs and \$1.7 billion (42 percent) are for improvements to existing infrastructure.
- 9.3 In addition to these forecasted major capital infrastructure needs identified over the next 10 years, investments are also made annually in the following capital assets, based upon associated life cycles and replacement schedules:
- Computer hardware and associated infrastructure;
 - Building repairs and renovations (improvements);
 - Vehicles (fleet replacement);
 - Machinery and equipment; and
 - Furniture and fixtures.
- 9.4 These capital investments are funded through annual departmental budgets, which in 2019 totaled \$33.7 million for both new (\$4.2 million) and replacements (\$29.5 million).
- 9.5 Through this year's updated asset management plan, refined asset needs have been identified. Based on the above, the Region is facing significant asset needs for both new expansion capital and to improve existing infrastructure across all asset classes.
- 9.6 Prioritization of these asset management needs, refinement of the capital forecast and financing strategies will be updated through the 2020 financial and business planning process. The Region will continue to employ and refine as well as explore new and/or additional combinations of financing options to fund these capital needs through business planning and long-term financial planning (detailed report):
- Regional Roads Rehabilitation Reserve Fund;
 - Regional Bridge Rehabilitation Reserve Fund;
 - Asset Management Reserve Funds;
 - Equipment Reserve (Works);
 - Water Supply Treatment Plant/Rate Stabilization Reserve Fund;
 - Sanitary Sewerage Treatment Plant/Rate Stabilization Reserve Fund;
 - Provincial and Federal Gas Tax Revenues;
 - User Rate Revenues;
 - Property Tax Revenues;
 - Development Charges; and
 - Debt (with repayment over subsequent years).

10. Successful Asset Management Strategies and Accomplishments

- 10.1 Regional staff will continue to recommend short and long-term asset management strategies based on the following considerations below, which are reviewed, implemented and reported through multiple reports over the financial planning cycle. The annual asset management plan provides a consolidated approach (details

provided in each asset class attachment):

- Continuation and expansion of service levels;
- Maintaining and improving the condition of assets;
- Optimizing life-cycle of assets;
- Minimizing asset related risks through mitigation controls;
- Furthering climate mitigation and adaptation measures; and
- Balancing growth-related demands.

10.2 The goal is to ensure assets are maintained to deliver services in accordance with corporate goals while complying with regulatory guidelines in a financially sustainable manner with tolerable risks mitigated through strategies and prudent and informed life cycle considerations.

10.3 Examples of successful asset management strategies include:

- Completion of the polybutylene water service connection replacement program three years ahead of schedule (seven years instead of ten years), with a financing strategy approved in 2011 (total of \$92.6 million);
- Application of \$13.2 million from the water and sewer asset management reserve funds into the 2019 water and sewer budgets to address priority needs, which is an increase of \$1.8 million from 2018 (\$11.4 million). Annual contributions to these funds were established in 2004 to provide sustainable funding for water and sewer asset renewal needs;
- Water meter, lead water service connection, and watermain replacement programs to address asset renewal needs, with funding allocated annually in the Water Supply Budget;
- The sanitary sewerage linear replacement program funded annually through the Sanitary Sewerage budget (\$14.1 million in 2019, an increase of \$6.9 million from \$7.2 million approved in 2018);
- The Regional road rehabilitation and replacement program to address priority asset management road needs, funded annually through the Roads Rehabilitation Levy. This annual levy was established in 2001 (\$1.2 million) and has increased over time (to \$26.1 million in 2019). This has been further boosted with funding from the normal roads program (property tax) and the application of Federal Gas Tax funding in 2018 (\$4.8 million) and 2019 (\$7.5 million) to address the most critical rehabilitation and replacement needs;
- The Regional bridge rehabilitation and replacement program to address priority asset management structure needs, funded annually through the Bridge Rehabilitation Levy. This annual levy was established in 2008 (\$0.7 million) and has gradually increased over time (\$5.5 million in 2019). This has been supplemented with funding from the normal roads program (property tax funding);
- Various traffic asset replacement programs, including for traffic control signals and roadway safety program among others, which is funded annually through the Works General Tax Capital Budget;
- DRT's conventional bus replacement program has resulted in achieving an average conventional bus fleet age of approximately seven years of age (from

over 13 years of age in 2006). The approximate average fleet age of seven years old has been maintained since around 2012 with the use of Regional funding and strategic use of Provincial/Federal funding through DRT's Capital Budgets;

- Regular Works fleet replacements as they reach their expected useful life, utilizing the Equipment Reserve funded through the Works General Tax Capital Budget; and
- Evolving and improving condition assessment strategies for assets, (e.g. Building Condition Assessments for Region owned facilities) to identify asset needs, funded through the annual business plans and budgets.

10.4 Asset management strategies will continue to be reviewed, refined and created through the continuous year-round asset management planning process and will be reported in future Asset Management Plans with funding to be considered through the annual financial planning and budget process.

11. Next Steps

11.1 The infrastructure needs identified in this report will continue to be considered through the 2020 financial and business planning process, including the 2020 Budget Guideline Report, Servicing and Financing studies for major program areas, and detailed individual business plans and budgets.

11.2 Asset management staff will continue to work collaboratively to improve on the following tasks below as part of best business practices, as well as to meet the remaining asset management regulatory requirements due between 2021 and 2024. The specific next step tasks include:

- Refine data collection, methodology and analyses to improve asset management planning capabilities, reporting, strategies and recommendations that inform business plans and budgets, capital forecasts, and long-term financial planning strategies;
- Migrate reporting and analysis to specific municipal service-based categories (i.e. as opposed to asset class category);
- Continue to develop and refine service levels and performance measurement;
- Refine life cycle data, costing, and analysis to maintain as well as achieve future service level requirements. This will also better inform timing and type of maintenance, repair, rehabilitation, replacement, disposal, and/or new renewal expansion decisions to optimize the life cycle of assets at the lowest possible cost; and
- Continue to assess risk (including climate risk), business continuity, asset criticality, and asset reliability to refine existing and incorporate any new mitigation approaches as warranted.

12. Conclusions

12.1 The Asset Management Plan is the first step in the annual financial planning process. It identifies asset investment needs (based on the state of infrastructure, service levels, risks, life cycle, and climate mitigation and adaptation) and informs

business plans and budgets and long-term capital forecasting and financial planning.

12.2 The collaborative and coordinated multi-disciplinary asset management team approach has supported several successful Regional initiatives, which are described within individual asset class attachments.

12.3 Asset Management is a key element of the Region's long-term financial planning practice, which is recognized as a best business practice.

12.4 The results contained in this report also highlight that the Region is compliant with senior government requirements as well as with almost all the phase 1 new Ontario asset management planning regulatory requirements (O. Reg. 588/17), two years ahead of schedule (due by July 1, 2021).

12.5 Regional staff will continue to refine the annual asset management planning and reporting as part of best business practices. As a result, the Region is well positioned to meet the remaining requirements of the new asset management planning regulation due between 2021 and 2024 as well as compliance with various other requirements.

Respectfully submitted,

Original Signed by Nancy Taylor

Nancy Taylor, BBA, CPA, CA
Commissioner of Finance

Original Signed by John Presta for

Susan Siopis, P.Eng.
Commissioner of Works

Recommended for Presentation to Committee

Original Signed by Elaine C. Baxter-Trahair

Elaine C. Baxter-Trahair
Chief Administrative Officer

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Attachments:

Attachment 1 – Corporate Strategic Asset Management Policy

Attachment 2 – Summary of Regional Asset Inventory & Replacement Values

Attachment 3 – Water Supply Asset Class Report

Attachment 4 – Sanitary Sewerage System Asset Class Report

Attachment 5 – Transportation System Asset Class Report

Attachment 6 – Region Owned Facilities Asset Class Report

Attachment 7 – Durham Region Transit Asset Class Report

Attachment 8 – Fleet Asset Class Report

Attachment 9 – Equipment Asset Class Report



The Regional Municipality of Durham Report

1. Purpose of the Region's Asset Management Planning Process and Corporate Asset Management Plan

- 1.1 The Region has been undertaking formal asset management planning since 2004, with continual evolution and improvement since then. This continuous and year-round asset management planning process, which results in the development of the Region's annual Corporate Asset Management Plan, is undertaken as part of the Region's best business practices of long-term financial planning as well as to ensure compliance with all Provincial and Federal senior grant funding programs and regulatory and reporting requirements.
- 1.2 Asset investment priorities are identified over a multi-year planning horizon based on life cycle analysis, to maintain the Region's assets in optimal condition, address risks and accessibility, and mitigate and build resiliency to climate change impacts, with the objective of delivering approved service levels that are consistent with corporate goals while complying with regulatory guidelines. Asset management strategies and the approval of subsequent financing to fund these asset investment priorities is then sought through the Region's annual business planning and budget process. This achieves best value of the Region's assets for taxpayers and community benefit.
- 1.3 This process also ensures analysis, recording and reporting of the Region's assets from across the organization on a consistent corporate basis for Federal and Provincial external regulatory and reporting requirements as well as grant funding opportunities.
- 1.4 This Asset Management Plan includes analysis of the following:
 - Goals, approach and policies (including Attachment #1- Region's Corporate Strategic Asset Management Policy for Regional Council approval);
 - Current infrastructure status (inventory, replacement value, condition, average age, and remaining useful life);
 - Service levels and performance based on corporate objectives and goals, policies and regulatory guidelines and requirements;
 - Life cycle considerations;
 - Risk and climate mitigation and climate adaption plan's initiatives;
 - Infrastructure investment needs and financial planning strategies for infrastructure sustainability; and
 - Successful asset management strategies to meet service and life cycle requirements, mitigate asset risk and climate change

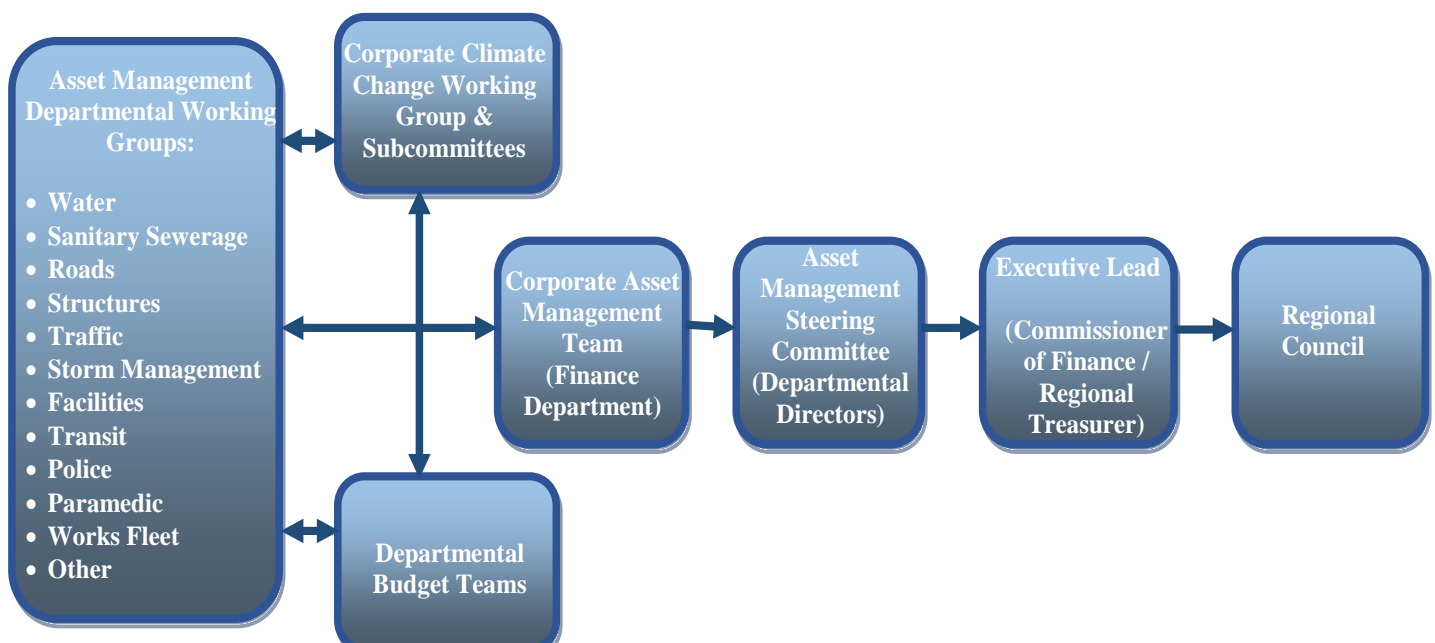
adaptation, incorporate climate change mitigation measures and address growth infrastructure needs.

- 1.5 The Region's recommended Corporate Strategic Asset Management Policy is in Attachment #1. Aggregated corporate results of asset information is provided in Attachment #2. Attachments #3 to #9 provide details of each asset class: water supply, sanitary sewerage, transportation, facilities, transit, fleet and equipment.

2. The Region's Asset Management Planning Approach and Policies

- 2.1 The proposed Corporate Strategic Asset Management Policy (Attachment #1) as recommended for approval, encapsulates the Region's asset management planning process and policies.
- 2.2 The Region uses an integrated and coordinated multi-disciplinary departmental approach to asset management planning. Asset Management Departmental Staff Working Groups (experts in each specific service area), are coordinated by the Corporate Asset Management Team (Finance Department) and directed by the Asset Management Steering Committee (Departmental Directors). The Region's Corporate Climate Change Staff Working Group and its subcommittees (Energy Advisory and Adaptation subcommittees), as well as Risk Management staff and the various Departmental Budget staff, support the asset management planning process for a fully integrated and coordinated approach. This also ensures identified infrastructure needs are considered through the Region's financial planning and budget process to secure financing to fund prioritized infrastructure needs.

Figure 1: Durham's Asset Management Planning Governance Structure



2.3 The Region's asset management planning process, which results in the development of an annual Asset Management Plan, includes:

- Gathering asset inventory, replacement values, condition, age, useful life, capacity, materials and size;
- Assessing service level requirements and demands, performance targets, population growth density and land use requirements;
- Consideration of reporting and regulatory compliance guidelines;
- Identifying challenges and risks to meeting infrastructure needs and examining risk and mitigation controls;
- Consideration of climate change adaptation and mitigation impacts and measures to address them;
- Determining life cycle considerations for assets;
- Development of asset management strategies to address identified infrastructure needs;
- Identifying opportunities for continuous improvement; and
- Prioritizing infrastructure needs and development of financing options during business planning and budget process and long-term financial capital planning.

2.4 The Region's Executive Lead (Commissioner of Finance/Regional Treasurer) is responsible for the asset management planning process and endorsing corporate asset management plans and Regional Business Plans and Budgets to Regional Council for final approval of all plans and budgets.

3. The State of the Region's Infrastructure

3.1 Detailed analysis of all Regional assets (by the multi-disciplinary asset management departmental working teams coordinated by the corporate asset management team from the Finance Department) determines inventory, valuations, conditions, average ages and remaining useful life.

Table 1: Key Components of Asset Management

Infrastructure Measure	Description
Inventory	Asset inventories are collected and year-over-year changes are identified and analyzed.
Replacement Costs	Asset replacement costs are updated, refined and analyzed using the most up to date information, with significant year over year changes analyzed.
Condition Assessment Ratings	Asset condition ratings are updated and assigned using the most appropriate methods and best data and where ratings change, year over year changes are analyzed.
Remaining Useful Life	The average age and useful lives are updated and assigned relative to their lifespan.

Inventory of Assets Owned by the Region

3.2 The Region's infrastructure consists of the following (further detail in the asset class attachments and consolidated data in Attachment #2):

Table 2: Infrastructure Inventory Managed by the Region

Asset Class	Description and 2018 Year End Inventory of Assets
Water Supply System	Watermains (2,556 km), valves (27,471), hydrants (16,241), service connections (176,768), fire lines (1,906), meters (175,342), water supply plants and well systems (14), pumping stations (18), water storage facilities (22) and water sampling buildings (3).
Sanitary Sewerage System	Gravity sewers (2,140 km), forcemains (64 km), maintenance holes (31,137), service connections (172,665), water pollution control plants (11), sanitary sewage pumping stations (51) and wastewater storage facilities (2).
Transportation System	Roads (2,370 lane km), structures (222), culverts<3m (35 km), storm sewers (293 km), maintenance holes (4,597), catch basins (5,401), outfalls (399), traffic control signals (464), traffic control systems (3), roadside protection (103 km), intelligent transportation systems (23), communication infrastructure (318 km), signs (22,275), and CCTV (95 intersections).
Region-Owned Facilities	Durham Regional Police Service facilities (8), Durham Regional Local Housing Corporation housing sites (23), Works depots (5), Region of Durham Paramedic Services stations (8), Region-owned child care facilities (5), solid waste management facilities (7), long-term care homes (4), and corporate/other facilities (6).
Durham Region Transit	242 Transit vehicles (conventional and specialized service buses and supervisory vehicles), 3 maintenance facilities and 2,391 bus stop pads and shelters.
Fleet	84 RDPS vehicles, 354 DRPS vehicles and 352 Works vehicles
Equipment	Information technology, DRPS equipment, long-term care and RDPS equipment, Works equipment, furniture and fixtures, communications infrastructure, and other miscellaneous

Replacement Value of Region's Assets

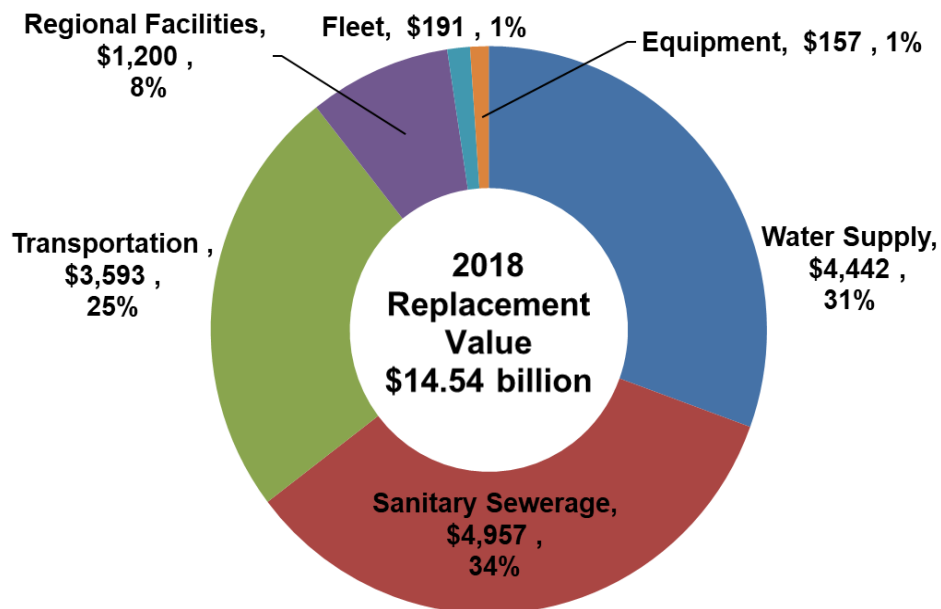
3.3 At year-end 2018, the Region's infrastructure assets had an estimated replacement value of approximately \$14.54 billion, representing an increase of \$0.79 billion or 5.7 per cent compared to 2017 (Table 3 below).

3.4 Identifying replacement values assists in estimating potential current and future investments to prepare for the eventual replacement after end of useful life, as part of long-term financial planning. The year over year change in replacement cost is largely attributed to:

- Annual increases in actual benchmark construction costs and other inflationary asset replacement value pressures;
- Inclusion of new assets into the Region's inventory to accommodate growth (e.g. Brock Road water pumping station and reservoir and Sunderland Paramedic Station); and
- Better refined replacement values based on updated market information and replacement value methodologies.

Table 3: Comparison of 2018 and 2017 Replacement Values by Asset Class

Asset Category	Replacement Value (\$ millions) 2017	Replacement Value (\$ millions) 2018	% of 2018 Total	Change in Replacement Value 2017 to 2018
Water Supply System -				
Vertical Assets - Treatment, Pumping & Storage	810.4	879.6	6.0%	8.5%
Linear Assets - Water Distribution	3,316.1	3,562.8	24.5%	7.4%
Total Water Supply	4,126.5	4,442.4	30.6%	7.7%
Sanitary Sewerage System -				
Vertical Assets - Treatment, Pumping & Storage	1,254.3	1,307.0	9.0%	4.2%
Linear Assets - Sewage Collection	3,423.5	3,650.3	25.1%	6.6%
Total Sanitary Sewerage	4,677.8	4,957.3	34.1%	6.0%
Transportation System -				
Roads (arterial)	2,280.0	2,383.8	16.4%	4.6%
Bridges and Culverts (>3m)	566.4	555.5	3.8%	-1.9%
Storm Sewer	506.9	538.8	3.7%	6.3%
Traffic Control	109.5	115.1	0.8%	5.1%
Total Transportation	3,462.8	3,593.3	24.7%	3.8%
Regionally Owned Facilities	1,140.1	1,199.7	8.3%	5.2%
Total Facilities	1,140.1	1,199.7	8.3%	5.2%
Fleet	179.7	191.5	1.3%	6.5%
Total Fleet	179.7	191.5	1.3%	6.5%
Equipment	165.3	157.0	1.1%	-5.0%
Total Equipment	165.3	157.0	1.1%	-5.0%
Total Capital Assets	13,752.2	14,541.1	100.0%	5.7%

Figure 2: 2018 Replacement Value by Share of Asset Class (\$ Millions)

- 3.5 Based on the year-end 2018 replacement values, approximately \$62,190 per Durham household would be required to replace the Region's entire asset inventory (based on 233,785 Regional households). This compares to an estimated \$59,140 per household in 2017, representing an increase of approximately 5.2 per cent.

The Condition of the Region's Assets

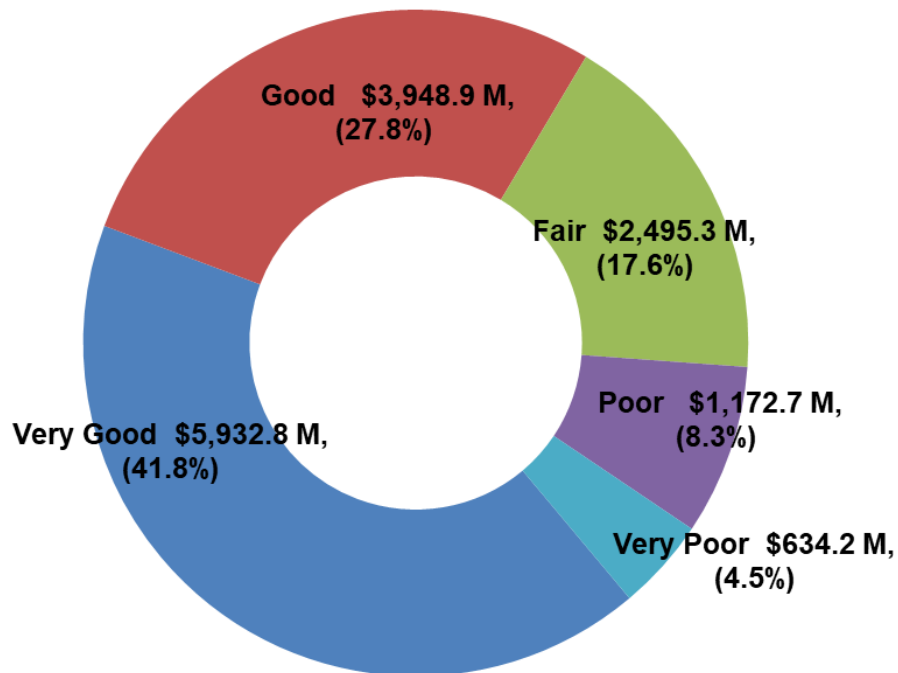
- 3.6 The assessment and analysis of asset condition is an important aspect of the annual prioritization process. It informs short and long-term asset maintenance, repair and replacement needs based on the condition of the assets so that they can continue to provide services. The following approaches are employed to assess asset condition based on the unique characteristics of each asset class:
- For water and sewer pipeline segments and service connections, (linear assets), some of the factors used to assess condition are pipe material, break rates and remaining service life. For vertical water and sewer assets, some have had detailed inspections performed and the remaining have had a high-level condition assessment completed by expert Durham staff.
 - For the transportation network, inspections of the condition of roads, bridges and traffic infrastructure are undertaken, along with consideration of age-based condition rating where appropriate;
 - For facilities, building condition assessments (BCA) are completed to determine condition and requirements around timing and type of rehabilitation and replacement treatments; and
 - For some assets, a standardized ranking of asset condition is used based upon five grades assigned across four factors: soundness; functionality; maintenance cost; and asset age.
- 3.7 Using the above-mentioned approaches, the condition of the Region's assets is assigned one of five condition ratings described in Table 4.

Table 4: Condition Rating Categories and Description

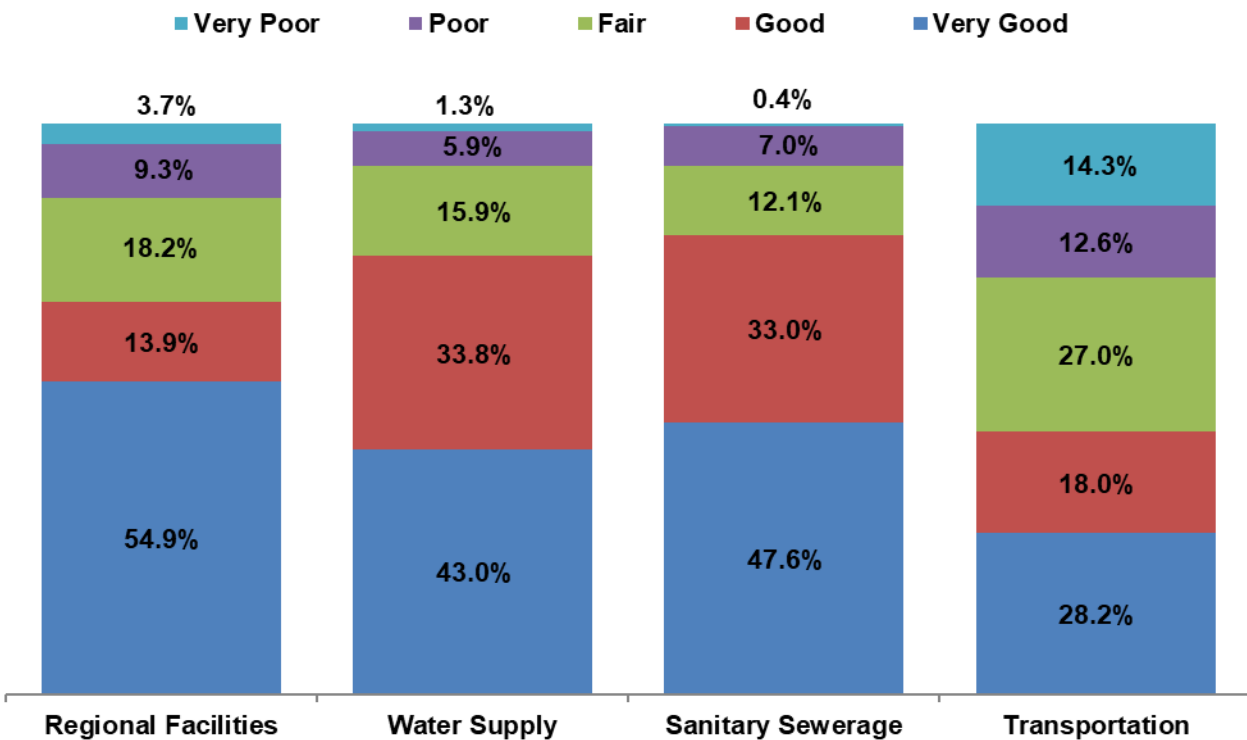
Grade	Rating	Description
A	Very Good	Asset is sound and functioning as intended. Typically, would be a newer asset.
B	Good	Asset is sound and functioning as intended. Typically, could be within mid-range of useful life.
C	Fair	Asset is starting to show signs of deterioration and functioning lower than intended. Typically, asset could be approaching latter 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, they could be at the end of their useful life.

- 3.8 An asset which has been classified as Very Poor does not represent a hazard. Rather, these are assets that may not be performing as intended (e.g. a bridge posted with a weight restriction), may be experiencing unacceptable rehabilitation and/or maintenance costs due to condition, or may be deemed to be at the end of their useful lives. When warranted, Very Poor assets are considered for current year replacement or significant rehabilitation.
- 3.9 Moving forward, the Regional asset management working groups will continue to refine, advance, and improve condition-based assessments where warranted and appropriate.
- 3.10 Across all Regional infrastructure assets, at year end 2018, the condition of Regional assets are as follows:

Figure 3: Regional Asset Condition Rating (2018 – all assets) ¹
(\$ Millions)



¹ Condition ratings are applied to broad asset classes including: water supply, sanitary sewer, transportation, Durham Region Transit (excluding pads, shelters and fleet), and Region-owned facilities (excludes fleet and equipment). Replacement values are expressed in millions of dollars.

Figure 4: Regional Asset Condition Rating by Asset Class

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

- Approximately \$513.1 million (14.3 per cent) are within the transportation asset class, of which \$505.9 million are roads in Very Poor condition. This asset class continues to experience material year over year construction cost increases for roads and an overall network wide decrease in Pavement Condition Index (PCI). It is important to note that road rehabilitation/reconstruction continues to be a Regional Council priority and the 2019 Roads Capital Budget approved \$35.9 million for road rehabilitation (including \$7.5 million in federal gas tax funding). This represents an increase of \$2.7 million over 2018 (\$33.2 million) and a total increase of \$12.4 million over 2017 (\$23.5 million) to address road segments mostly in Poor and Very Poor condition. There is only one bridge in the Region's inventory that is in Very Poor condition, which is currently being replaced and is anticipated to be in service mid-2019 (utilizing previously approved funding from the 2016-2018 Budgets);
- There is approximately \$59.6 million in water supply assets that are in Very Poor condition representing 1.3 per cent of the total water supply system assets. Of this, \$15.8 million is related to watermain, valves and connections. These assets, along with other priority repairs, betterments and/or replacements, are being addressed with the \$21.0 million approved in 2019 Water Supply Budget for this purpose, which represents an increase of \$6.6 million over 2018

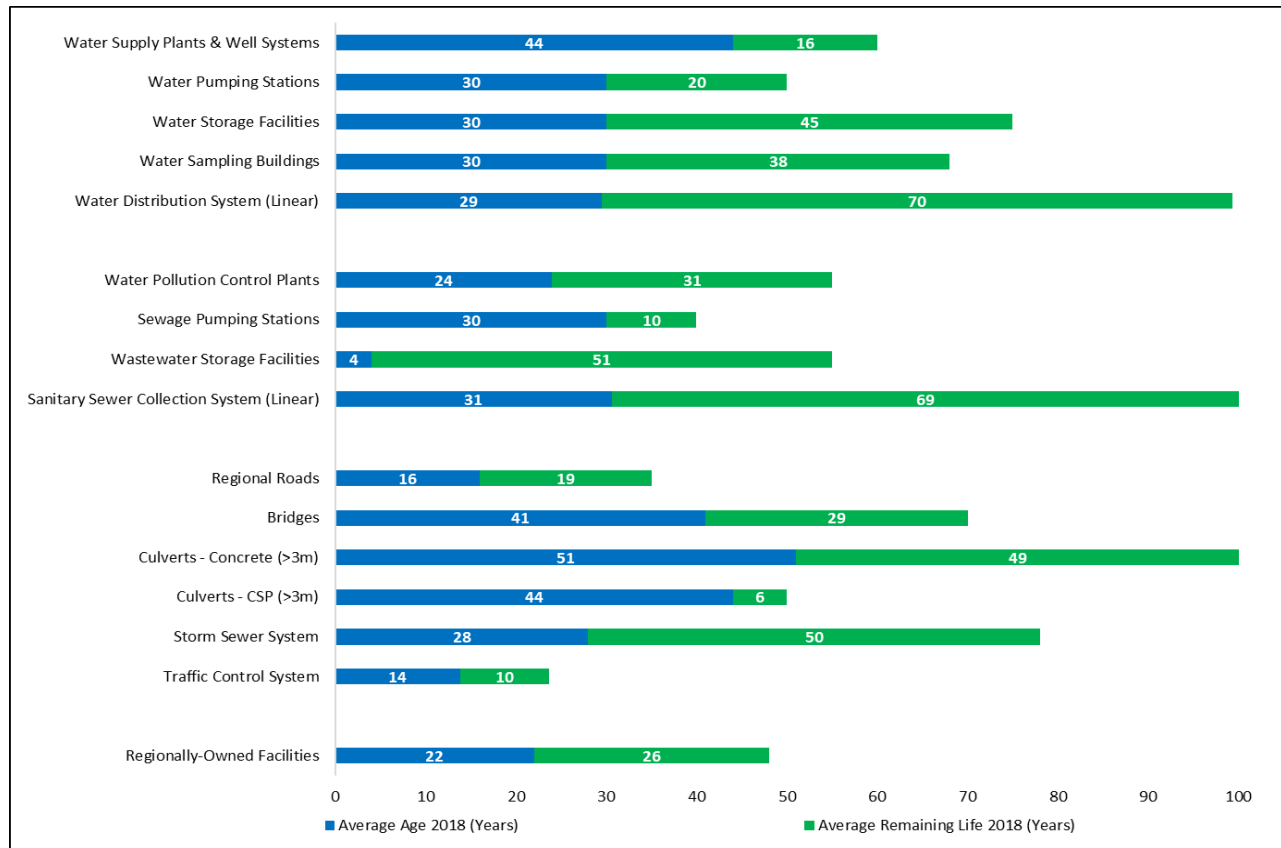
(\$14.4 million). This increase was possible from the allocation of funding from the recently completed polybutylene water service connection replacement program as well as a \$0.4 million increase from the Asset Management Reserve Fund (for a 2019 total contribution from the Asset Management Reserve Fund of \$4.6 million);

- For the Region's Sanitary Sewerage assets, approximately 0.4 per cent (with a replacement value of \$17.8 million) are in Very Poor condition, primarily in linear assets (\$14.0 million). The 2019 Sanitary Sewerage Budget includes \$14.1 million to address these Very Poor assets as well as other priority sanitary sewer linear replacements and/or betterment needs. This represents an increase in funding of approximately \$6.9 million over 2018 (\$7.2 million), which is partially attributable to a \$2.6 million increased contribution from the Asset Management Reserve Fund (total 2019 contribution from the Asset Management Reserve Fund of \$5.1 million from \$2.5 million in 2018); and
- While approximately \$43.6 million of Regional facilities are in Very Poor condition (3.7 per cent), primarily associated with the DRLHC housing stock, previously and currently approved funding for the DRLHC housing stock is assisting in addressing needs, with an update on future needs to be refined and brought forward within the 2020 Social Housing Servicing and Financing Study and 2020 Business Plan and Budget.

3.12 The assets currently rated in Poor to Very Poor condition will continue to undergo assessment through the 2020 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.

Average Age and Remaining Life of Regional Assets

3.13 Figure 5 below summarizes the average age and estimated remaining life by asset class. Based on the average age of 29, the majority of Region's assets have 51 per cent of their useful life remaining.

Figure 5: Average Age and Remaining Useful Life²

4. Durham's Corporate Goals and Objectives

Durham Region's Strategic Plan

- 4.1 Durham Region's strategic plan, "Growing Together, Reaching Further, Aspiring Higher - A New Strategic Plan for Durham Region, 2015 to 2019", establishes the Region's vision for Durham's communities (Figure 6).
- 4.2 The Region's strategic plan includes the following direct references to asset-specific objectives that are integrated into asset planning and investment criteria. Within each asset class attachment to this report, specific strategic plan themes are identified and linked to each asset service level objective:

- Deliver Regional services in a financially prudent and sustainable manner;
- Ensure that Regional transportation infrastructure is functional, integrated, reliable and barrier free to support the movement of residents to work, school and local services;
- Demonstrate accountability and transparency by measuring performance and reporting on results;
- Demonstrate leadership in sustainable asset management and

² Remaining service life is influenced by preventative maintenance and rehabilitation. The values shown are not reflective of observed age, but are calculated based on expected remaining life and do not consider betterments that have extended the useful life of assets.

- environmentally friendly municipal practices;
- Invest in efforts to mitigate and adapt to climate change to build resiliency across the Region;
- Protect, enhance and where appropriate restore significant water resources, agricultural land, natural heritage and environmentally sensitive areas;
- Work more closely with local municipalities and other partners to manage growth through effective, progressive and integrated long-term planning; and
- Focus resources on continuous improvement and innovation.

Figure 6:
The 2015 to 2019 Durham Region Strategic Plan Themes and Goals



Recommended Corporate Strategic Asset Management Policy-Goals

- 4.3 The proposed Corporate Strategic Asset Management Policy as recommended for approval (Attachment #1), includes the following seven asset management goals and objectives. These are based on and supported by the Region's Strategic Plan and other various strategic planning documents, policies, and studies as approved by Council.
1. The Region will maintain its assets in a safe condition throughout their life cycles 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 life cycle 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 annual 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.

Asset Management Service Levels and Performance Measurement

- 4.4 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 services levels can be provided.
- 4.5 Asset management related service levels are defined through the following:
 - Approved Regional strategic and master plans, related service standards and supporting plans, policies and bylaws;
 - Regulatory compliance requirements; and,
 - Other performance expectations as defined through best practice and Regional Council direction.
- 4.6 A number of technical and non-technical service levels and performance measures are utilized to gauge progress toward achieving corporate goals. Within each asset class attachment, specific service levels, performance goals, targets and measures are highlighted. These are meant to improve analysis, efficiency, outcomes, reporting, transparency and accountability.
- 4.7 This year's asset management report includes some new service levels and performance measures for each asset class. The Region is compliant with all service level reporting requirements for water, wastewater, roads, and structures two years ahead of the specified deadlines of July 1, 2021. There are also some new and refined service levels for non-core assets (e.g. Transit) already being reported on that are not due until July 1, 2023, which places the Region in a favourable position to achieve these.
- 4.8 Moving forward, Regional staff will complete the service level reporting

requirements for storm management and report them in a future Asset Management Plan. In addition, service levels will continue to be refined to reflect evolving Regional Council approved goals, plans, policies and strategies as well as best engineering practices as part of best business practices.

Climate Change Resiliency: Integration of Climate Considerations

- 4.9 The Region's approved vision, goals and objectives to address climate change risk (climate adaptation) and mitigate impacts due to the corporate carbon footprint (climate mitigation) include the approved Corporate Adaptation Plan and Corporate Energy Conservation and Demand Management (CDM) Plan, respectively. The initiatives within these plans are updated through the Climate Change Update report.

Table 5: Asset Related Climate Change Goals and Initiatives

Corporate Adaptation Plan	Energy CDM Plan
<ul style="list-style-type: none"> • Reduce infiltration of groundwater or stormwater into the sanitary sewer collection system to mitigate flooding, inflow and infiltration (I/I) risk. • Enhance erosion protection at creek crossings to protect watermains and sanitary sewer systems. • Complete the 10-year polybutylene water service connection replacement program to enhance asset management, water protection and conservation objectives. • Continue the water meter replacement program to maintain data accuracy, prevent under-billing and support water conservation and water protection objectives. • Include consideration of climate adaptation as part of asset management (e.g. ASHRAE building standards, design, audit, inspections, hazard and risk analysis, stormwater and storm sewer management, proactive maintenance and rehabilitations, snow and ice removal, erosion control, weather information systems, emergency planning and preparedness, standby power, communications and control etc.). • Protect against service disruptions by ensuring adequate standby power, emergency planning, business continuity and timely prudent investment in infrastructure. 	<ul style="list-style-type: none"> • Enhance energy monitoring, performance, and reporting, which includes improving building and equipment monitoring capabilities and implementing targets for performance measurement. • Standardize approaches and continue integration of energy conservation measures into asset management and financial planning processes. This includes developing processes for analysis, business case development and implementing appropriate standards. • Enhance corporate energy awareness, education and information sharing, which includes establishment of an Energy Communications Plan and formalizing a process for the annual review and coordination of opportunities. • Formalize a corporate network that establishes clear lines of authority and accountability for energy management. This includes establishing energy user leads in key operational areas, implementing energy objectives through asset management and financial planning, and establishing a corporate energy network/organizational chart.

- 4.10 The Region's multi-disciplinary Asset Management Staff Working Group consults with the Climate Change Staff Working Group and its Energy Advisory and Adaptation Sub-committees to ensure both adaptation planning, and energy and water efficiency and conservation efforts, are integrated into asset management, risk management and business planning as part of best business practices.
- 4.11 Within each asset class attachment to this report, specific climate resiliency and mitigation goals are identified and linked to each asset service level. In addition, each asset class attachment also provides a more thorough description of potential climate adaptation and mitigation related goals, risks and actions being undertaken, including those in the 2019 Budgets and forecast period.
- 4.12 This assessment of climate related risks and climate adaptation and mitigation initiatives that the Region has been undertaking on an ongoing basis is consistent with the Region's recommended Corporate Strategic Asset Management Policy as well as complies with the requirement of Ontario's asset management planning regulation (O. Reg. 588/17) to consider vulnerabilities that may be caused by climate change as part of asset management planning.
- 4.13 Moving forward, Regional staff will continue to monitor and update both climate adaptation and mitigation approaches and initiatives into asset management.

Integrated and Reliable Barrier Free Infrastructure

- 4.14 The Region's Strategic Plan and other Regional policies as well as provincial and federal compliance requirements are consistent in their goals of addressing accessibility and environmental sustainability. These are necessitating the need to incorporate accessibility into designs and construction to expand asset-related service requirements, which can result in infrastructure cost increases affecting all assets and associated services.
- 4.15 Requirements include changes in built environment related to accessibility, energy efficiency, built standards and the handling of designated substances including those related to the Ontario Building Code, *Accessibility for Ontarians with Disabilities Act, 2005* (AODA), Ontario Regulation 191/11: Integrated Accessibility Standards.
- 4.16 The Region's Accessibility Advisory Committee and Accessibility Staff Working Group have responsibility for review and feedback on the planning and implementation of accessibility across program areas. While the DRT conventional bus fleet is 100 per cent accessible, 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, automatic doors and accessible reception areas, parking, entrances and washrooms etc.);

- Installation of accessible shelters at selected hard surface bus stops;
- 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.

Co-ordination of Planning and Partnerships with Other Governments

4.17 Successful co-ordination and partnerships with other governments related to asset management include:

- The Region partners with the City of Oshawa and Town of Whitby to deliver a Region-wide standardized integrated solid waste management system. Oshawa and Whitby maintain collection of garbage, white goods and organic wastes in their respective municipalities, while the Region is responsible for these collections in the other six area municipalities as well as Blue Box material collections across all eight municipalities;
- The Region has utilized alternative procurement practices, including design-build-operate (DBO) requests for proposals. DBO contracts with the private sector include the construction and operation of the Materials Recovery facility in the Town of Whitby and the Durham York Energy Centre in the Municipality of Clarington;
- The implementation of the Next Generation Interoperable Communications Platform (NextGen) was a partner project approved by Regional Council in June 2012 which allows DRPS, other Regional Departments and other stakeholders (fire services from the area municipalities) to jointly use the communication platform to improve service efficiency and achieve cost efficiencies;
- DRT/GO Transit partnerships include:
 - 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; and
 - DRT, Metrolinx and the Province work closely to allow DRT to secure provincial funding to implement the Highway 2 BRT PULSE project and service, Public Transit Infrastructure Funding projects (PTIF), and the initial business case and preliminary design for the Durham Scarborough BRT.
- The Regions of York and Durham work in partnership under the Co-Owners and Operating Agreements to operate, maintain and expand the Duffin Creek 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 partners with the Lake Simcoe Region Conservation Authority who manages the Durham Regional Forest on behalf of the Region; 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).

4.18 This best business practice used by the Region complies with the new Ontario asset management regulation requirement (O. Reg 588/17) to coordinate where possible connected and/or interrelated assets with other municipalities as well as commitment to continuous improvement. This is also consistent with the Region's recommended Corporate Strategic Asset Management Policy as attached for approval.

5. Life Cycle Optimization

5.1 Life cycle management refers to how assets are managed over their useful lives from construction to disposal. Determining and implementing the optimal type and timing of proactive maintenance, repair, renewal and rehabilitation treatments maximizes the value of the asset at its lowest possible cost over its life span. Eventually, the asset will require replacement and disposal once it reaches the end of its useful service life. Table 6 below summarizes these life cycle activities.

5.2 The focus on asset life cycle is imperative as it determines operational and cost impacts related to investment timing and implementation of these maintenance, renewal, rehabilitation, replacement, disposal and expansion activities. Proper life cycle assessment improves the ability to predict, plan and include the necessary activities into the Regional business plans and budgets to secure financing.

Table 6: Asset Life Cycle Investment Activities

Activity Type	Description
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 is expected to occur when the asset has reached the end of its useful life and renewal and/or rehabilitation activities are no longer considered an option.
Disposal	Includes activities associated with disposing of an asset.
Expansion	Includes planned activities that are required to extend or expand services to enhance service levels or meet growth demands.

- 5.3 Asset management life cycle strategies are considered, prioritized and approved on an annual basis, primarily through servicing and financing studies and business plans and budgets.
- 5.4 Table 7 highlights some of the key rehabilitation and replacement projects as identified by asset management staff for the Water Supply, Sanitary Sewerage, Transportation and Facilities areas.
- 5.5 Another key life cycle consideration is assessing when the assets came into service and based on their useful life, when in the future they would need to potentially be replaced. Figures 7 and 8 highlight the forecasted life cycle replacements based on replacement value.
- 5.6 It is also important to assess which assets are considered as operating “Beyond Useful Life” but are still functioning as designed and are assigned a condition rating of Fair to Very Good. Regional staff will continue to investigate these assets as well as current useful life assumptions.
- 5.7 Based on this year’s Asset Management Report, the Region faces significant investment needs across all assets as noted in the asset class attachments as well as in the figures below. The need for timely investments in proactive rehabilitation and treatments will continue to increase as assets continue to age.
- 5.8 Staff will continue to consider life cycle options including, expanding preventative maintenance and repair treatments, replacement when assets come due, re-examining useful life assumptions, and technical assessments as compared to using age to determine condition ratings. These will be driven by evidence-based analysis with the final investments to be recommended in servicing and financing studies and business plans and budgets.
- 5.9 The new Ontario asset management planning regulation (O. Reg 588/17) requires that life cycle management be considered in asset management planning, as well as life cycle activities, options, and estimated costs to maintain current and future service levels at lowest possible costs. Regional asset management staff will also continue to refine and improve life cycle options and costs and report in future annual asset management reports.
- 5.10 An important initiative that will continue is the implementation of a region-wide maintenance management system (EMMS) to meet the operational strategies and maintenance management needs. This system will improve data collection, analysis and subsequent decision making related to operational and lifecycle maintenance costs and facilitate enhanced analysis in support of asset life-cycle decisions.

Table 7: Key Rehabilitation/Replacement Projects For Refinement in 2020 Budget

Asset Class	Key Project(s)
Water Supply	<p>Watermains: 1.3 per cent in poor to very poor condition (\$30.7 m); 98.7 per cent in fair to very good. 2019 Water Supply Budget: \$21.0 m in watermain replacements/betterments to be updated in 2020.</p> <p>Pumping Stations: 17 of 18 are rated fair to very good condition with 1 in poor and none in very poor. Hortop rated poor condition. Replacement of Hortop water pumping station (\$10 m) scheduled in 2022/2023.</p> <p>Water Supply Plants: 10 of 14 are rated fair to very good condition, 3 are poor and 1 is very poor. Newcastle WSP (poor) to be demolished and expanded with approved funding. Bowmanville WSP (very poor) to undergo condition assessment, which will dictate rehabilitation strategy and expansion.</p> <p>\$3.1 m in water meter replacements, \$0.2 m for hydrant replacements and \$0.2 m for valves replacements in 2019 Budget.</p>
Sanitary Sewerage	<p>Linear assets: 1.3 per cent in poor to very poor condition (\$48.3 m); 98.7 per cent in fair to very good. 2019 Sewer Budget: \$14.1 m in linear asset replacements/betterments. To be updated in 2020.</p> <p>Pumping Stations: 10.4 percent (\$30.0 m) in poor to very poor condition; 89.6 per cent in fair to very good. Being effectively maintained. Various improvements in 10 year forecast to be updated during 2020.</p> <p>Water Pollution Control Plants: 9 of 11 are in fair to very good condition with 2 in poor condition. Corbett Creek WPCP: \$7.5 m recommended in 2019/2020 to rectify deficiencies. Currently in poor condition. Port Darlington WPCP Plant 1: \$7.9 m (2020-2021) for rehabilitation work. In poor condition.</p> <p>Duffin Creek WPCP: Replacement of reactors (\$171.0 m) by 2025 and digester mixing (\$24.0 m) in 2019. (Durham's total cost share for both is \$51.2 m).</p> <p>Courtice WPCP: \$1.7 for preventative maintenance (2019) and consideration of upgrades of \$8.9 m (2021-2026) once condition assessment completed.</p>
Transportation	<p>Roads: 38.1 per cent in poor to very poor condition (\$908.3 m); 61.9 per cent in fair to very good. 2019 Roads Capital Budget: \$35.9 m in road rehabilitation.</p> <p>Structures: 6.2 per cent in poor to very poor condition (\$34.3 m); 93.8 per cent in fair to very good. Only 1 structure in very poor condition which is currently being replaced and will be in service in 2019. 2019 Roads Capital Budget: \$6.0 m in Regional funding for structures.</p> <p>Traffic Signals: 24.9 per cent in poor to very poor condition (\$18.3 m); 75.1 per cent in fair to very good. 2019 Roads Capital Budget: \$3.5 m for signal replacements, modernization and accessibility.</p>
Facilities	<p>DRLHC: 17 percent (\$41.6 million) rated in very poor condition. \$4.1 m budgeted in 2019 for major repairs and renovations and capital improvements. Update to be provided during 2020 budget process</p> <p>Works Depot: Overall rated in fair condition. \$0.1 m budgeted in 2019 and various improvements identified over forecast period. To be refined during 2020 budget process.</p> <p>Daycares: 19 percent (\$2.1 m) rated in very poor condition. Edna Thompson relocation underway (to be completed in 2019).</p> <p>Various other facilities improvements in 2019 budget and forecast for Social Services, Health, DRT, DRPS, Solid Waste Management and Regional Headquarters (details provided in Attachment #6).</p>

Figure 7: Forecast Life Cycle Replacements (by Decade) Based on Replacement Value (\$million)

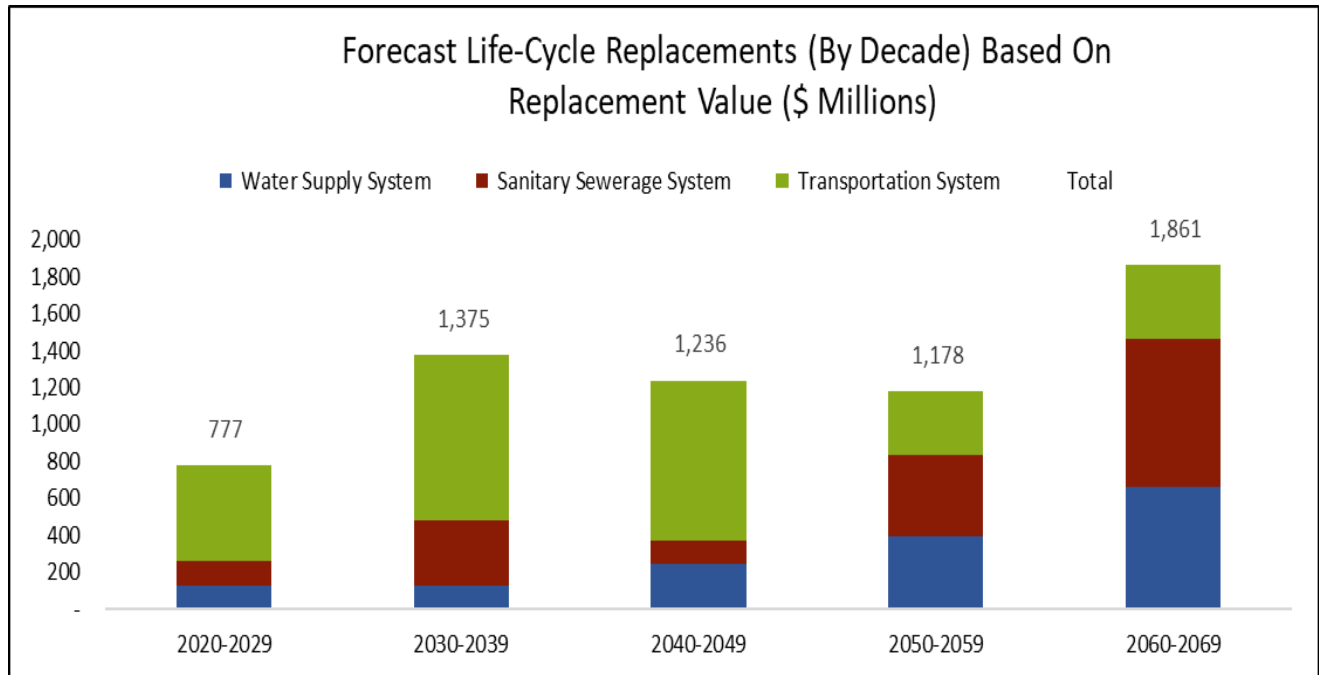
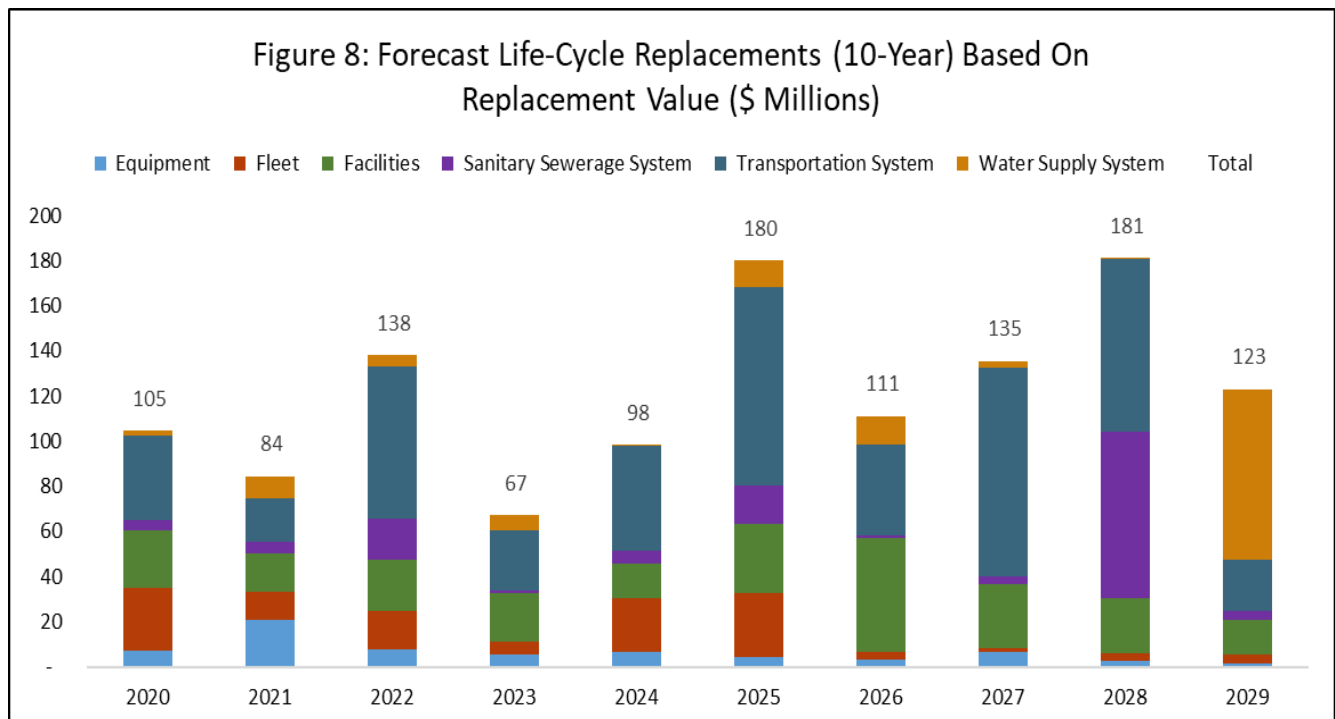


Figure 8: Forecast Life Cycle Replacements (10 Year Forecast) Based on Replacement Value (\$million)



6. Consideration of Asset Risks and Mitigation Controls

- 6.1 The Region proactively identifies and manages risk and ensures a business continuity program through its enterprise risk management program. Resources are identified and allocated through business planning to achieve risk management objectives.
- 6.2 In addition, through the annual asset management planning process, the asset management teams, in consultation with Risk Management staff, the Climate Change Staff Working Group and design, maintenance and operations staff from across program areas, update and incorporate refined potential risks to assets due to technical asset failures and climate change risks as guided by Corporate Adaptation Plan and Corporate Energy Conservation and Demand Management Plan. The probability (i.e. likelihood) and magnitude (i.e. impact) of potential risks are revisited and their subsequent potential impacts to asset performance and service levels are considered.
- 6.3 Current controls are identified and possible gaps are assessed. Based on that comparison, mitigation strategies are refined to ensure effective and coordinated response to potential risks, ensure business continuity objectives and address service interruption and quality issues.
- 6.4 The goal of conducting asset risk assessments is to ensure key risk mitigation strategies can be considered as part of the Regional Business Planning and Budget process.
- 6.5 A series of workshops were held to further develop and refine these. These workshops along with the continuous ongoing assessment of asset risks, has resulted in the identification of the following higher priority asset-related risks, which are highlighted in Table 8. These risks along with key asset management risk mitigation programs approved in Regional Budgets are detailed further in each of the asset class attachments. These include investments in asset repairs and replacements, provision of standby power, and lighting retrofits, among others.
- 6.6 Regional staff plan to undertake another round of workshops with the departmental asset management working teams, risk management staff, and Climate Change Staff Working Group and its Energy Advisory and Adaptation Sub-committees. The results will be reported in future Asset Management Plans.

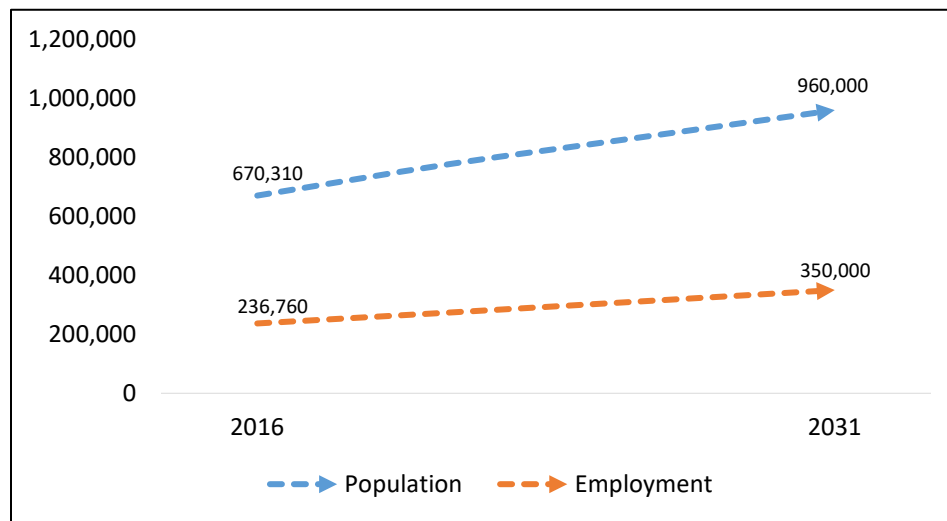
Table 8: Potential Asset-related Risks and Mitigation Measures

Potential Risk	Existing Controls	Remediation
Disruption to Water Supply	<p>Maintenance, repair and rehabilitation (e.g. cement lining and cathodic pipe protection)</p> <p>Studies, inspections, monitoring controls and systems (e.g. leak detection, SCADA alerts)</p> <p>Polybutylene service connection replacement programs</p> <p>Source water and well head protection</p>	<p>Continue condition assessments and prioritize repair, maintenance, and rehabilitation needs and programs</p> <p>Continue erosion mitigation studies and strategies, monitoring, and use of systems</p> <p>Continue to include prioritized remediation work and system improvements for funding through financial and business planning</p>
Loss of Utilities and Fuel	<p>Essential services policies and business continuity/emergency plans</p> <p>Standby power, on call service contracts, system redundancies, and re-routing plans</p> <p>Fuel delivery system and water and sewer monitoring systems</p>	<p>Continue programs to ensure facility depot standby power and fuel storage systems, water and sewer monitoring, service contracts and continuity plans</p> <p>Assess criticality of facilities/depots and continue prioritization and planning</p> <p>Continue Traffic UPS equipment</p>
Major Facility System Failures	<p>Well maintained assets and equipment (i.e. proactive maintenance programs)</p> <p>Business continuity/emergency plans</p> <p>Standby power, on call service contracts, parts inventory, and system redundancies</p> <p>Capital and financing planning</p>	<p>Continued condition assessments and maintenance and rehabilitation program</p> <p>Continue programs to ensure standby power, fuel storage systems, IT services, service contracts and continuity plans</p> <p>Prioritize remediation work and continue rehabilitation funding</p>
Disruption to Sanitary Sewerage Collection	<p>Asset condition assessments for forcemains and gravity pipes.</p> <p>Maintenance, repair and rehabilitation</p> <p>System alerts/controls and emergency response planning</p> <p>Increase contingency through pipe twinning</p>	<p>Continued condition assessments (including larger pipe inspections) and maintenance, repairs and rehabilitation programs and funding through budget process.</p> <p>Reassess contingency planning and prioritize needs and available funding</p> <p>Continue with SCADA system upgrades to improve management control during storms</p>
Sanitary Sewerage Inflow and Infiltration (I/I)	<p>I/I program, flow monitoring equipment and performance assessments during storms</p> <p>Capital investments, system repairs, and pipe joint sealing</p> <p>Household drainage surveys and education</p>	<p>Continue to prioritize I/I program strategies</p> <p>Continue to include and prioritize funding through the financial and business planning and budget process.</p>

7. Servicing Growth-Related Infrastructure Demands

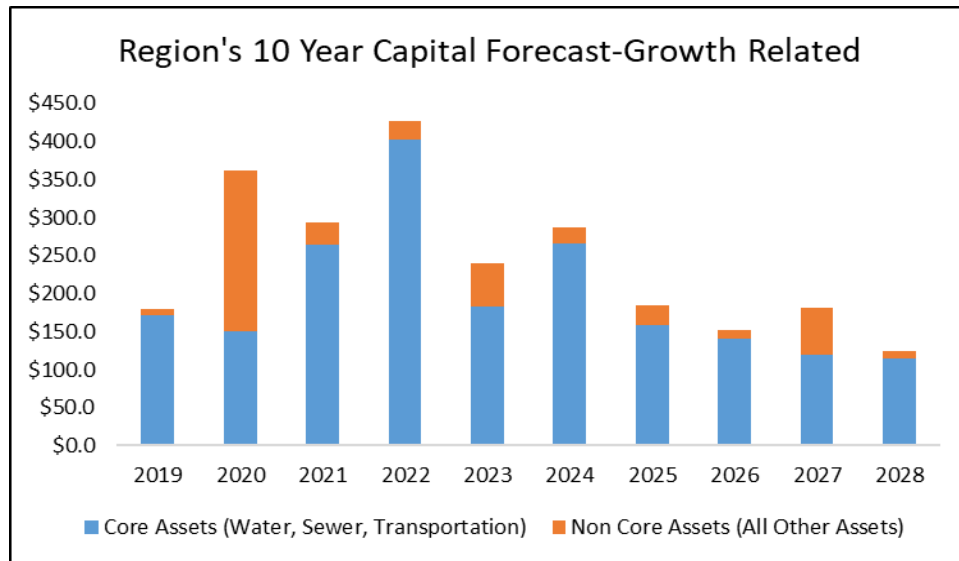
- 7.1 Growth-related infrastructure requirements are forecasted as part of the Region's business and capital planning process in conjunction with requirements for existing asset rehabilitation, replacement and renewals.
- 7.2 Based on the projections of the Durham Region Official Plan (ROP) and consistent with the Growth Plan for the Greater Golden Horseshoe, the Region is planning for phased population and employment growth to 960,000 residents and 350,000 employees by 2031. Currently, the 2016 census population and employment figures are 670,310 and 236,760 respectively as illustrated in Figure 9.

Figure 9: Forecasted Population and Employment Growth



- 7.3 Growth infrastructure and related service demands are analyzed within the Region's Development Charge (DC) By-law and supporting DC Background Study, which are updated 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 Region's current DC By-law and Background Study took effect July 2018. The DC Bylaw and Study plans for the forecasts contained within the ROP.
- 7.4 The asset management plan and subsequent business plans and budgets and long-term capital forecasts often result in refinements to growth-capital projects and financing projections, consistent with annual data updates and changing economic and financial environment.
- 7.5 The growth-related capital forecast that has been identified through the 2019 business planning and budget process is shown in Table 9: (required to be reported by O. Reg 588/17. Core assets as defined in O. Reg 588/17 are water supply, sanitary sewerage and transportation. Non-core assets are all other Regional assets e.g. DRT, DRPS, RDPS, Solid Waste Management, etc. The Region is now compliant with O. Reg 588/17 for this requirement).

**Table 9: Growth Related Capital Forecast Through 2019 Budget
(\$ million)**






7.6 These will be further updated and refined through the 2020 business planning and budget process and long-term financial planning, along with the non-growth-related asset management infrastructure renewals, repairs, replacements, and improvements. The challenge is balancing the competing infrastructure needs of renewing existing assets and constructing new growth-related assets in a financially sustainable manner. It is important to note that this work fulfills the Ontario asset management planning regulation 588/17 as well as is consistent with the Region's recommended Corporate Strategic Asset Management Policy.




8. Capital Forecast, Asset Management Strategies and Financing Options




Review of 3 Year Historical Investments (2016-2018)

- 8.1 Regional Council has supported significant investment in Regional assets, including new and expanded infrastructure, capital replacement expenditures, and maintenance expenditures. These investments were essential to maintaining the performance of existing infrastructure assets and achieving desired levels of Regional services.
- 8.2 Table 10 summarizes the capital investments and preliminary estimate of maintenance investments for water supply, sanitary sewerage, roads and traffic programs over the last three years (2016 to 2018 inclusive).
- 8.3 When comparing the three-year trend (2016 to 2018), the preliminary estimate of the total investment in maintenance has increased approximately 11 per cent from \$23.7 million (2016) to \$26.3 million (2018). The annual capital investment level has also significantly increased during 2016 to 2018. This provides context for understanding the future preliminary capital forecast as determined through the 2019 financial planning and budget process.

Table 10: Three-Year Historical Growth and Benefit to Existing (BTE) Asset Investments by Core Asset Class (Water, Sewer, Transportation)

Category	2016			
	Replacement Value \$ millions	Annual Maintenance Investment \$ millions	Annual Capital Investment \$ millions	Total Annual Investment \$ millions
Water Supply System: 				
Vertical Assets - Treatment, Pumping and Storage	773	2.1	7.5	9.5
Linear Assets - Water Distribution	3,190	6.3	39.5	45.8
Sub-Total	3,963	8.4	47.0	55.3
Sanitary Sewerage System: 				
Vertical Assets - Treatment, Pumping and Storage	1,189	2.1	35.7	37.8
Linear Assets - Sewage Collection	3,297	4.7	54.5	59.2
Sub-Total	4,486	6.8	90.3	97.0
Transportation System: 				
Roads (Arterial) and Storm Sewer	2,705	3.9	67.7	71.6
Bridges and Culverts	543	0.1	5.4	5.5
Traffic Control	106	4.4	4.1	8.5
Sub-Total	3,354	8.5	77.1	85.6
TOTAL	11,803	23.7	214.3	238.0

Category	2017			
	Replacement Value \$ millions	Annual Maintenance Investment \$ millions	Annual Capital Investment \$ millions	Total Annual Investment \$ millions
Water Supply System: 				
Vertical Assets - Treatment, Pumping and Storage	810	2.2	8.7	10.9
Linear Assets - Water Distribution	3,316	6.2	55.6	61.8
Sub-Total	4,127	8.5	64.2	72.7
Sanitary Sewerage System: 				
Vertical Assets - Treatment, Pumping and Storage	1,254	2.3	30.2	32.5
Linear Assets - Sewage Collection	3,423	5.0	30.3	35.3
Sub-Total	4,678	7.3	60.6	67.8
Transportation System: 				
Roads (Arterial) and Storm Sewer	2,787	4.2	70.0	74.3
Bridges and Culverts	566	0.1	6.0	6.1
Traffic Control	111	5.3	5.0	10.3
Sub-Total	3,464	9.6	81.1	90.7
TOTAL	12,269	25.3	205.9	231.2

Category	2018			
	Replacement Value \$ millions	Annual Maintenance Investment \$ millions	Annual Capital Investment \$ millions	Total Annual Investment \$ millions
Water Supply System: 				
Vertical Assets - Treatment, Pumping and Storage	880	1.8	68.5	70.3
Linear Assets - Water Distribution	3,563	5.3	44.5	49.8
Sub-Total	4,442	7.1	113.0	120.1
Sanitary Sewerage System: 				
Vertical Assets - Treatment, Pumping and Storage	1,307	3.3	18.3	21.7
Linear Assets - Sewage Collection	3,650	5.5	19.7	25.2
Sub-Total	4,957	8.8	38.0	46.9
Transportation System: 				
Roads (Arterial) and Storm Sewer	2,923	4.6	83.3	87.9
Bridges and Culverts	556	0.1	6.0	6.1
Traffic Control	115	5.7	5.0	10.7
Sub-Total	3,593	10.4	94.2	104.6
TOTAL	12,993	26.3	245.2	271.6

Current and Projected Infrastructure and Maintenance Needs

8.4 As approved through the 2019 business planning and budget process, capital infrastructure investments identified for water supply, sanitary sewerage, roads and traffic for 2019 has increased to \$285.5 million for both new-growth related and renewal of existing infrastructure (Region owned assets).

8.5 Looking over the longer term, the 9-year capital forecast (2020-2028) has identified an increasing need totaling over \$3.0 billion for water supply, sanitary sewerage, roads and traffic.

Table 11: Ten-Year Projected Growth and Benefit to Existing Infrastructure Investments (2019 Budget and 2020 to 2028 Forecast)

Category	2019			2020			2021		
	Annual Maintenance Investment	Annual Capital Investment	Total Annual Investment	Annual Maintenance Investment	Annual Capital Investment	Total Annual Investment	Annual Maintenance Investment	Annual Capital Investment	Total Annual Investment
	\$ millions	\$ millions	\$ millions	\$ millions	\$ millions	\$ millions	\$ millions	\$ millions	\$ millions
Water Supply System:									
Vertical Assets - Treatment, Pumping and Storage	2.3	23.2	25.5	3.4	57.8	61.2	2.7	91.0	93.7
Linear Assets - Water Distribution	6.1	86.4	92.5	6.1	52.2	58.3	6.1	98.6	104.6
Sub-Total	8.4	109.65	118.02	9.4	110.01	119.45	8.8	189.60	198.35
Sanitary Sewerage System:									
Vertical Assets - Treatment, Pumping and Storage	2.7	23.3	26.0	5.1	45.5	50.6	4.1	23.7	27.8
Linear Assets - Sewage Collection	4.5	59.7	64.1	4.5	33.5	37.9	4.5	74.1	78.6
Sub-Total	7.2	82.92	90.13	9.6	79.01	88.57	8.5	97.86	106.39
Transportation System:									
Roads (Arterial) and Storm Sewer	4.0	81.5	85.6	4.0	94.1	98.1	4.0	112.0	116.0
Bridges and Culverts	0.1	6.0	6.1	0.1	13.0	13.1	0.1	11.6	11.7
Traffic Control	4.8	5.4	10.2	4.8	7.0	11.8	4.8	5.9	10.8
Sub-Total	8.9	93.0	101.9	8.9	114.1	123.0	8.9	129.5	138.5
TOTAL	24.5	285.5	310.0	28.0	303.1	331.1	26.2	417.0	443.2

Category	2022			2023			2024-2028		
	Annual Maintenance Investment	Annual Capital Investment	Total Annual Investment	Annual Maintenance Investment	Annual Capital Investment	Total Annual Investment	Annual Maintenance Investment	Annual Capital Investment	Total Annual Investment
	\$ millions	\$ millions	\$ millions	\$ millions	\$ millions	\$ millions	\$ millions	\$ millions	\$ millions
Water Supply System:									
Vertical Assets - Treatment, Pumping and Storage	5.5	168.0	173.5	4.1	40.1	44.2	1.9	260.2	262.2
Linear Assets - Water Distribution	6.1	54.1	60.2	6.1	34.5	40.6	30.3	190.7	221.0
Sub-Total	11.6	222.1	233.71	10.1	74.6	84.8	32.2	450.9	483.1
Sanitary Sewerage System:									
Vertical Assets - Treatment, Pumping and Storage	6.7	182.7	189.4	4.9	37.5	42.5	8.7	83.9	92.6
Linear Assets - Sewage Collection	4.5	40.2	44.7	4.5	63.2	67.7	22.4	190.8	213.2
Sub-Total	11.1	222.91	234.04	9.4	100.78	110.20	31.0	274.7	305.8
Transportation System:									
Roads (Arterial) and Storm Sewer	4.0	107.6	111.6	4.0	116.5	120.5	20.1	609.8	629.8
Bridges and Culverts	0.1	13.8	13.9	0.1	11.1	11.2	0.5	55.6	56.1
Traffic Control	4.8	5.8	10.7	4.8	6.0	10.8	24.2	28.8	52.9
Sub-Total	8.9	127.2	136.1	8.9	133.6	142.6	44.7	694.1	738.8
TOTAL	31.7	572.2	603.9	28.5	309.1	337.6	107.9	1,419.8	1,527.7






8.6 These forecasted infrastructure needs, as well as those identified through this year's asset management report, will be updated, refined and reprioritized during the 2020 business planning and budget process and long-term financial planning. Funding needs, gaps and strategies to address these infrastructure needs will also be refined through ongoing servicing and financing studies and budgets and business plans.

8.7 In addition to the major capital included within the capital forecast above,

there are also investments made annually in other capital assets based upon associated life-cycles and replacement schedules. These capital from current investments are funded through annual departmental budget amounts, which in 2019 totaled \$33.7 million:

- furniture and fixtures;
- computer hardware and infrastructure;
- building improvements;
- vehicles (fleet replacements); and
- machinery and equipment.

Table 12: 2019 Total Capital from Current (\$ millions)

Department	Furniture & Fixtures \$ 	Computer Hardware Infrastructure \$ 	Buildings/ Building Improvements \$ 	Vehicles \$ 	Other Machinery & Equipment \$ 	Total \$
Water	0.13	0.43	0.89	0.48	1.42	3.35
Sewer	0.02	0.89	0.45	0.42	2.28	4.05
	0.15	1.32	1.34	0.90	3.70	7.40
Social Services	0.09	0.43	0.08	0.00	1.35	1.95
Works	0.00	0.09	0.85	8.83	0.98	10.75
Health	0.13	0.32	0.02	1.77	0.38	2.62
Planning & Economic Development	0.03	0.05	0.00	0.00	0.00	0.08
Corporate Services	0.27	1.16	0.05	0.00	0.22	1.69
Transit	0.02	0.08	0.05	0.00	0.10	0.25
Police	0.12	1.13	0.52	1.49	0.78	4.04
DRLHC	0.12	0.00	0.12	0.05	2.44	2.72
Other	0.07	1.44	0.50	0.00	0.22	2.23
	0.85	4.70	2.18	12.14	6.46	26.32
Total	0.99	6.02	3.52	13.04	10.16	33.72

Funding Options

8.8 Table 13 provides a summary of potential infrastructure financing options and related policy and strategy initiatives employed recently by the Region that will be considered in the 2020 Financial Planning and Budget process.

Table 13

<u>Financing Options</u>	<u>Description</u>	<u>Financial Strategy</u>
Regional Roads Rehabilitation Reserve Fund	Established in 2001 to fund reinvestment in the road network, this Reserve Fund is funded through a special dedicated road rehabilitation levy.	The Regional Roads Rehabilitation Reserve Fund (\$26.1 million) that when combined with general levy financing through the Region's normal roads program (\$2.3 million) and \$7.5 million in Federal Gas Tax, provided a total road rehabilitation investment of \$35.9 million in 2019 to address road segments in Poor and Very Poor condition and ensure annual investments in pavement preservation, rehabilitation and preventative maintenance.
Regional Bridge Rehabilitation Reserve Fund	Established in 2007 following a 0.2 per cent increase in the General Purpose Tax, Regional Council established this reserve fund to address bridge rehabilitation and replacement requirements.	Annual bridge and structure maintenance, rehabilitation and replacement are crucial to addressing the aging bridge inventory. In 2019, dedicated contributions of \$5.5 million that when combined with additional funding (\$0.5 million) provided through the Region's normal roads program, provided a total of \$6.0 million in property tax-supported funding for bridge rehabilitation and maintenance.
Water Supply and Sanitary Sewerage Asset Management Reserve Fund	These reserve funds were established in 2004 to address priority capital requirements in water supply and sanitary sewerage programs.	Additional Regional funding for water supply and sanitary sewerage asset management needs are provided through the user rate-supported Water Supply and Sanitary Sewerage Capital Budgets Asset Management Reserve Fund. The 2019 Water Supply Budget included \$5.0 million in expenditures from the Asset Management Reserve Fund for watermain betterments/improvements (\$4.6 million) and condition assessments (\$0.4 million). The 2019 Sanitary Sewerage Capital Budget included \$8.2 million in expenditures for linear betterments, replacements, buildings and machinery and equipment and condition assessments funded through the Asset Management Reserve Fund.
General Levy Asset Management Reserve Fund	This reserve fund recognizes the priority of ensuring the upgrade, maintenance and/or replacement of general purpose program infrastructure with minimal impacts to taxpayers.	The Asset Management Reserve Fund is utilized for the high priority capital initiatives related to repair, rehabilitation and replacement of existing assets.
WSP/WPCP Treatment Plant Rate Stabilization Reserve Funds	These long-established reserve funds are derived from annual budget appropriations and year-end surplus contributions.	These funds serve two primary functions: they provide financial stability and serve as a contingency for unplanned circumstances (i.e. emergency capital outlays, revenue deficiencies etc.); and, they allow for potential contributions towards major capital project financing that would otherwise have a significant impact on user rates given short-term project funding needs.

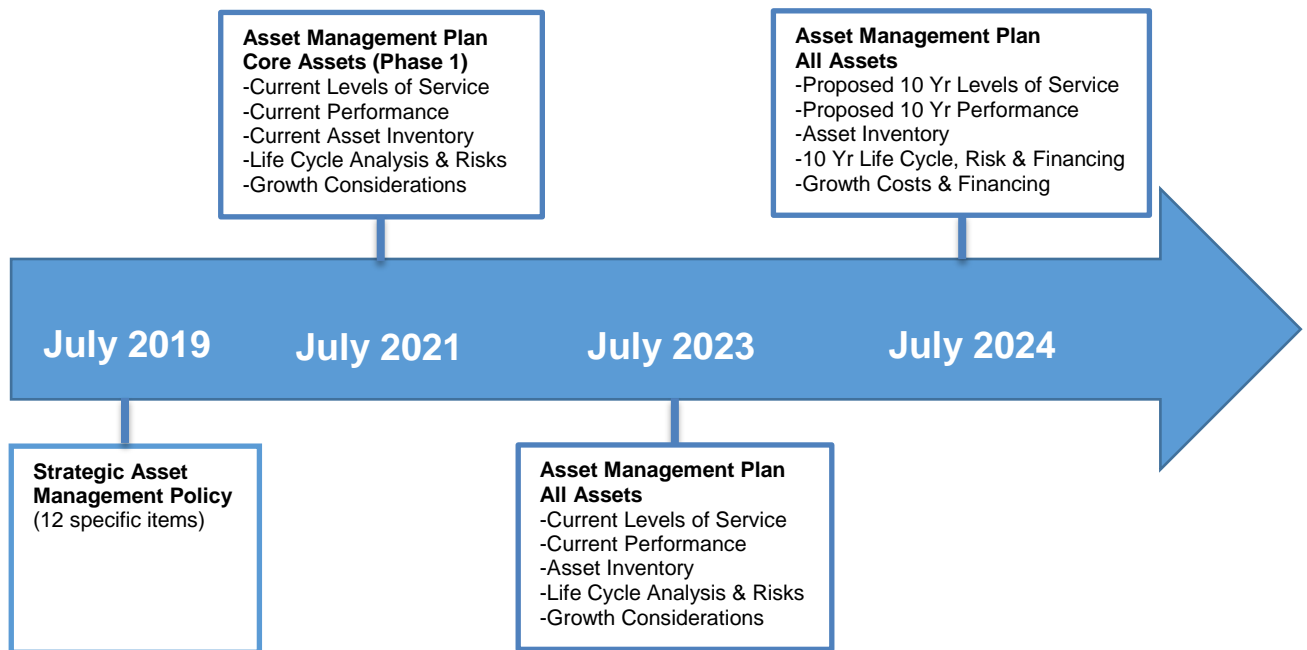
Table 13

<u>Financing Options</u>	<u>Description</u>	<u>Financial Strategy</u>
Federal and Provincial Gas Tax Revenues	<p>Provincial Gas Tax funds are provided to municipalities in Ontario to help expand and improve public transit.</p> <p>Federal Gas Tax funds are provided by the Federal Government as a source of funding for municipal infrastructure.</p>	<p>The annual Provincial Gas Tax funds (\$8.9 million in 2019) have been used to fund DRT bus replacement program (allowing the Region to reduce the average age of DRT conventional bus fleet from 13 years of age to 7 since the 2006 upload of transit services to the Region) as well as service enhancements and additional repairs/replacements of major fleet components such as engines and transmissions.</p> <p>Federal Gas Tax funding has been used to fund Solid Waste management facility infrastructure, including the Region's Material Recovery Facility and the new Durham York Energy Centre. In addition, in 2019, \$7.5 million in Federal Gas Tax funding was also used to finance road rehabilitation projects. Based on the announcement in 2019 Federal Budget, it is anticipated that Durham will receive an one-time allocation of \$19.6 million in 2019 (in addition to current \$19.6 million annual allocation).</p>
Development Charges	<p>Growth-related capital works can be funded through development charges as permitted under the <i>Development Charges Act</i> (DCA) legislation.</p> <p>Development charges are imposed on new development to recover the cost of capital for providing services related to water and sanitary sewerage, Regional roads, transit (GO and DRT), police and paramedic services, long-term care, health and social services.</p>	<p>The DCA legislation provides exemptions for specific types of development which results in funding shortfalls being addressed through alternative financing sources such as property taxes and water and sewer user rates. The Region charges residential and non-residential development charges for all major asset classes to maximize recoveries related to growth infrastructure.</p>
User Rates	<p>Water and sanitary sewer user rates are collected and used in part to finance the upgrade, rehabilitation and replacement of infrastructure assets for Regional water supply and sanitary sewerage systems.</p>	<p>On an annual basis, a portion of water and sewer user rate revenues are dedicated to the highest priority needs.</p>
Property Taxes	<p>Property taxes are levied to support property tax programs.</p>	<p>A portion of property tax revenues are utilized to finance upgrades, rehabilitation and the replacement of infrastructure assets for Regional roads, transit, and other tax-supported programs, excluding water and sewer.</p>
Debt Financing	<p>The Region utilizes debt financing where appropriate to fund major capital requirements.</p>	<p>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 use of the infrastructure asset.</p>

9. Achieving Compliance with the New Provincial Asset Management Regulation for Municipalities

- 9.1 On January 1, 2018, Ontario Regulation 588/17 Asset Management Planning for Municipal Infrastructure, under the *Ontario Infrastructure for Jobs and Prosperity Act, 2015*, took effect. This regulation requires municipal asset management plans to include the following by the required dates below:

Figure 10



- The Strategic Asset Management Policy must be approved by July 1, 2019 and include consideration of 12 specific elements required by the regulation. The strategic policy must be reviewed and updated at least once every five years;
- For each specific municipal service, the current levels of service, current performance, asset inventory analysis, life cycle activities and costs, and growth considerations must be completed by July 1, 2021 for the core assets (water supply, sanitary sewerage, roads, bridges and culverts, and stormwater) and by July 1, 2023 for non-core assets; and,
- For each specific municipal service, the proposed forecast levels of service, performance, life cycle management and costs, financial strategy, growth considerations, and key assumptions must be included in the municipality's asset management plan by July 1, 2024.

- 9.2 By July 1, 2025, municipalities will be required to undertake and complete an annual review of the asset management progress and report to Council by July 1 of each subsequent year. Municipalities are also required to review and update their asset management plan at least every five years.
- 9.3 The Region continues to advance its annual asset management planning and reporting as part of its best business practices as well as to abide to this regulation.
- 9.4 The 2019 Asset Management Plan includes a recommended Corporate Strategic Asset Management Policy (Attachment #1) for Regional Council approval. This will ensure Durham complies with this regulatory requirement by July 1, 2019.
- 9.5 Furthermore, combined with the new and refined analysis and reporting in this year's report, the 2019 Asset Management Plan already meets almost all Phase 1 new asset management regulatory requirements two years ahead of the specified deadlines.

Figure 11
Durham's Compliance with Phase 1 of the Ontario Regulation 588/17, Asset Management Planning for Municipal Infrastructure

Current Levels of Service for Core Assets by July 1, 2021						
Service Area	State of Infrastructure	Community & Technical Levels of Service	Asset Management Strategies	Life Cycle Cost	Climate Change and Risk	Financing Strategies (Asset Management and Growth)
Water	Achieved	Achieved	Achieved	In Progress	Achieved	Achieved
Wastewater	Achieved	Achieved	Achieved	In Progress	Achieved	Achieved
Roads	Achieved	Achieved	Achieved	In Progress	Achieved	Achieved
Structures	Achieved	Achieved	Achieved	In Progress	Achieved	Achieved
Stormwater	Achieved	In Progress	In Progress	In Progress	Achieved	Achieved

- 9.6 In addition to continuing to comply with Ontario Regulation 588/17 (Asset Management Planning for Municipal Infrastructure), the annual Asset Management Plan provides a consistent approach across the corporation to ensure consistency with:

- Requirements for the recording of Tangible Capital Assets (TCA);

- Federal Gas Tax Municipal Funding Agreement requirements;
- *Ontario Infrastructure for Jobs and Prosperity Act, 2015*;
- *The Smart Growth for Our Communities Act, 2015*, which requires municipalities to demonstrate how development charges (DCs) are integrated within asset management planning;
- *Development Charges Act*;
- Requirements under the *Growth Plan to support the next Municipal Comprehensive Review (ROPA)*; and
- Region's TCA Policy.

10. Next Steps

- 10.1 The infrastructure needs and challenges identified in this report will continue to be considered through the 2020 financial and business planning process.
- 10.2 Asset management staff will continue to work collaboratively to improve asset management planning, analysis, outcomes, policies and strategies as part of best business practices, as well as to work towards meeting the remaining new asset management regulatory requirements by the specified deadlines (2021, 2023, and 2024). 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 and budgets, capital forecasts, and long-term financial planning strategies;
 - Migrate reporting and analysis to be based on specific municipal service categories (as opposed to asset class category);
 - Continue to develop and refine service levels and performance measurement;
 - Continue to ensure integration of risk, climate adaptation and mitigation considerations into asset management planning, working with the Corporate Climate Change Staff Working Group;
 - Refine life cycle options, data, costing, and analysis to estimate life cycle costs to better inform timing and type of maintenance, repair, rehabilitation, replacement, disposal, and or renewal expansion decisions to optimize the life cycle of assets at the lowest possible cost to maintain service levels;
 - 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 the first step in the annual financial planning process, providing the necessary information to facilitate capital planning. Detailed collaborative servicing and financing studies build upon the results of the asset management plan to formulate detailed recommendations regarding specific requirements, preferred alternatives, required investments and sources of financing.
- 11.2 The collaborative and coordinated asset management approach has supported several successful asset management strategies and initiatives, which are summarized in the executive report as well as within each individual asset class attachments.
- 11.3 Business planning and budget documentation establishes clear links between the management of assets and:
- Approved Regional corporate as well as Council goals, objectives and service levels;
 - Compliance standards and community expectations regarding levels of service;
 - Asset life-cycle management;
 - Operating and maintenance programs;
 - Initiatives to address risk and climate adaptation and climate mitigation;
 - Growth demand projections and forecasting growth related capital investments to service growth; and
 - Annual and long-term capital forecasts and financial planning.
- 11.4 The prudent acquisition, construction, maintenance, rehabilitation and replacement of corporate assets over time enhances asset and financing efficiencies and effectiveness and promotes greater sustainability.
- 11.5 The results contained in this report meets almost all Phase 1 of the new asset management planning provincial regulatory requirements (O. Reg. 588/17) two years ahead of schedule and also ensures the Region is well positioned for grant applications and infrastructure funding.
- 11.6 Recognizing that Asset Management planning is an ongoing process, this work will continue to be updated and improved-upon as part of best business practices as well as to meet the future Phase 2 O. Reg. 588/17 regulatory requirements.



The Regional Municipality of Durham

Corporate Strategic Asset Management Policy

1. Purpose

The purpose of the Region's asset management policy is to provide a corporate framework to govern the Region's continuous year-round asset management planning process and to ensure compliance with all legislative, regulatory and grant funding reporting requirements. The corporate framework contained within this policy:

- Allows for program area specific data, information, practices, policies and strategies from across the organization to be collected, analyzed and consolidated on a consistent corporate basis;
- Provides an integrated and coordinated multi-disciplinary approach for experts across the corporation to collaboratively employ best practices in managing assets (i.e. infrastructure investment decisions) to achieve corporate goals and objectives;
- Facilitates achieving best value of the Region's assets for taxpayers and community benefit; and
- Ensures the recording and reporting of the Region's assets from across the organization on a consistent corporate basis for various internal and external requirements.

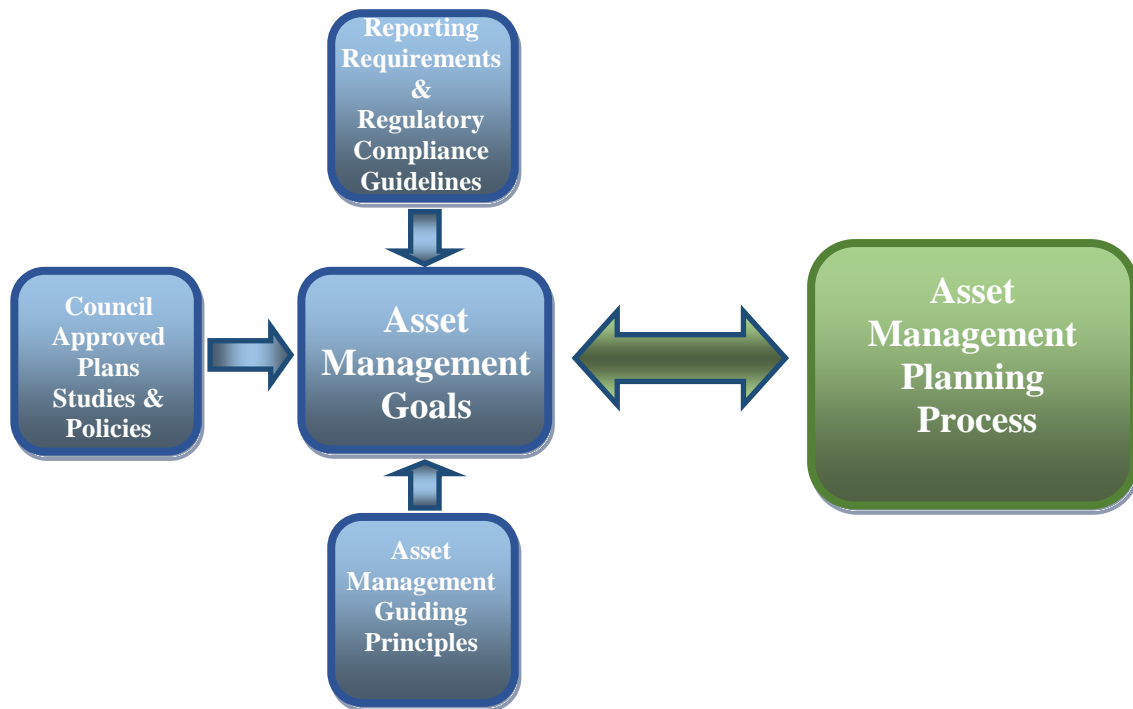
2. The Region's Asset Management Goals and Objectives

The Region's asset management goals and objectives are based on and supported by the Region's Strategic Plan¹, Regional Official Plan², master plans for specific program areas, and other various strategic planning documents³, policies, and studies, as approved by Council. They are also determined through senior government regulatory compliance requirements and guidelines (Figure 1).

¹ Growing Together Reaching Further Aspiring Higher. A New Strategic Plan for Durham Region: 2015-2019

² Durham Regional Official Plan

³ Energy Conservation and Demand Management Plan, Corporate Adaptation Plan, annual climate change update reports, and annual servicing and financing studies for major program areas.

Figure 1: Development of Durham’s Asset Management Goals/Objectives

The Region’s seven asset management goals and objectives are:

1. The Region will maintain its assets in a safe condition throughout their life cycles 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 life cycle 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

- annual 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.

3. Asset Management Guiding Principles

The Region's asset management planning and infrastructure decisions will be guided by the following nine principles as part of best business practices as well as to adhere to the principles in Section 3 of the *Infrastructure for Jobs and Prosperity Act, 2015*:

1. **Evidence Based Decisions:** Recommended infrastructure investments should be determined using an evidence-based transparent approach;
2. **Provision of Services:** Asset management planning and the resultant infrastructure investments should be guided by the need to ensure the continuation and sustainability of Regional services for community benefit;
3. **Minimize Impact on the Environment:** Asset management planning and infrastructure investments should consider minimizing the impact on the environment through mitigation approaches and be designed and built to be resilient to the effects of climate change. They should also consider the use of recycled materials when feasible;
4. **Community and Economic Benefits:** Infrastructure investments should promote community well being, economic development and business competitiveness when possible;
5. **Promote Innovation and Improvement:** Opportunities for innovation and improvements (technologies, practices, and/or processes as well as partnerships and coordination of infrastructure planning) should be explored as part of asset management planning;
6. **Prioritization and Informing Capital Budgets:** Evidence-based infrastructure investment needs resulting from asset management planning should inform and be prioritized within the Regional business plans and budgets;
7. **Long Term Financial Planning View:** Asset management planning and infrastructure investments should be assessed and prioritized over a long-term financial planning horizon, considering goals, objectives, competing priorities, growth rates, and financial and economic trends;
8. **Alignment and Compliance with Senior Government:** Asset management planning and infrastructure investments should be mindful,

consistent, and support senior government plans, policies and strategies where possible, as well as comply with regulatory and reporting requirements; and

9. **Promote Accessibility:** Ensuring accessibility for persons with disabilities will be part of the design and construction of all new assets as well as improvements to existing assets.

4. Asset Management Planning Framework

4.1 Roles and Responsibilities

The Region will use an integrated and coordinated multi-disciplinary departmental approach to asset management planning (Figure 2).

Figure 2: Durham's Asset Management Organizational/Governance Structure



The analysis and condition assessments undertaken by various Asset Management Departmental Staff Working Groups (for each specific service area), will be coordinated by the Corporate Asset Management Team (Finance Department), based on workplans endorsed by the Asset Management Steering Committee (Departmental Directors). The Region's Corporate Climate Change Staff Working Group and its subcommittees (Energy Advisory and Adaptation subcommittees), as well as Risk Management staff and the various Departmental Budget staff, will support the asset management planning process for a fully integrated and coordinated approach.

The Region's Executive Lead (Commissioner of Finance/Regional Treasurer) will be responsible for the asset management planning process and endorsing corporate asset management plans and Regional Business Plans and Budgets.

Regional Council will provide final approval of all plans and budgets.

The roles and responsibilities of the asset management planning stewards are:

Asset Management Departmental Staff Working Groups

- Departmental staff teams that are subject matter experts in their respective service areas (as identified in Figure 2 above);
- Manage, maintain, update and refine asset management data, including inventory, condition, age and replacement values, using appropriate methodologies, approaches and systems for their respective service areas;
- Develop, measure and report service levels and performance of assets for their respective service areas;
- Work with Enterprise Risk Management Staff to identify, monitor and mitigate asset related risks;
- Work with the Corporate Climate Change Staff Working Group and any of its sub committees to identify, assess and implement climate mitigation and adaption measures in response to anticipated climate change impacts;
- Develop asset management strategies based on life cycle approaches for maintaining, repairing, rehabilitating or replacing the assets in their respective service areas;
- Identify and develop best practices and continuous improvements for managing assets in their respective service areas;
- Inform respective budget and business planning areas of asset management investments to develop departmental operating and capital budget needs;
- Work closely with the Corporate Asset Management Team-Finance Department in sharing, analyzing and refining all asset related information identified above during the development of the annual corporate Asset Management Plan; and
- Work with other working groups as necessary as it relates to asset management for their respective service areas.

Corporate Asset Management Team-Finance Department

- Lead the Region's continuous year-round corporate asset management planning process to provide a consistent approach across the corporation;
- Coordinate the Asset Management Departmental Working Groups, as well as work with other working groups, including but not limited to the Corporate Climate Change Staff Working Group, Energy Advisory Sub Committee, Risk Management Staff and departmental budget staff, to ensure consideration, integration, and coordination of all asset management needs;
- Work closely with the Asset Management Departmental Working Groups in analyzing all asset data for each service area, including inventory,

- condition, age, and replacement values, as well as service levels and performance, risks and climate impacts;
- Translate all asset management data for each service area into a consistent, transparent, and measurable corporate asset management reporting framework across the corporation;
 - Develop and refine the corporate strategic asset management policy, as well as ensure asset management planning and results are consistent with corporate goals and objectives;
 - Work with the Asset Management Departmental Working Groups on continuous improvements;
 - Lead the development of the corporate Annual Asset Management Plan on an annual basis;
 - Coordinate the development of business cases for large capital investment decisions;
 - Coordinate grant applications for senior government funding opportunities;
 - Develop financing strategies using a long-term financial planning approach, that includes options analysis, life cycle costs, risks, growth and development charges;
 - Inform and analyze the Regional Business Plans and Budget of asset management investment needs and priorities;
 - Make various recommendations (from the above tasks) as necessary to the Asset Management Steering Committee for consideration/approval;
 - Ensure asset management planning and reporting complies with all regulatory, reporting and/or grant funding application requirements; and
 - Ensure asset management planning and reporting process is consistent with the Region's Tangible Capital Asset policy.

Asset Management Steering Committee-Directors

- Composed of the Directors of Financial Planning (Finance Department), Environmental Services (Works Department), Transportation and Field Services (Works Department), Business Services (Works Department), and other Directors (e.g. Transit, Durham Regional Police Service, Waste Management, etc.) as required, as well as the Manager of Corporate Asset Management;
- Ensure the integrity of asset data, strategies, approaches, implementation, targets and performance of assets for their respective service areas;
- Provide representation, support and champion their respective service area in the Steering Committees;
- Champion and support the corporate asset management process within their respective departments;
- Receive information and/or recommendations from the Corporate Asset Management Team that require their consideration, direction, endorsement and/or approvals;
- Provide direction, leadership and/or endorsement in asset management enterprise wide, including but not limited to data, strategies, resources, approaches, implementation, targets, and/or performance;

- Share asset information and best practices with other steering members for continuous improvement;
- Ensure compliance and integration with corporate goals and objectives, policies and plans, as well as the corporate strategic asset management policy;
- Ensure compliance with any regulatory service level requirements for their respective service areas;
- Review, revise and recommend the annual Asset Management Plan to the Executive Lead for endorsement;
- Make recommendations on any of the above matters to the Executive Lead;
- Prioritize infrastructure investment needs; and
- Prioritize, approve and endorse asset management investments into their respective departmental operating and capital budget submissions to be submitted as part of the annual business planning and budget process.

Executive Lead-Commissioner of Finance/Regional Treasurer

- Obtain senior management (e.g. Commissioner of Works) consensus of recommendations, planning, and annual Asset Management Plan;
- Review and submit the annual Asset Management Plan to Regional Council for approval;
- Review and submit the corporate strategic asset management policy and/or any updates as required, to proceed to Regional Council for approval;
- Accountable for the corporate asset management planning process;
- Endorses the regional business plans and budgets, servicing and financing studies and any other financial planning documents that contain asset management investments, strategies and funding to address asset management needs, to proceed to Regional Council for approval;
- Ensures asset management planning and reporting complies with all senior government regulatory, reporting and or grant funding application requirements; and
- Ensures recommendations from asset management planning are aligned, consistent and will contribute toward achieving corporate goals and or objectives as identified in corporate studies, plans and documents.

Regional Council

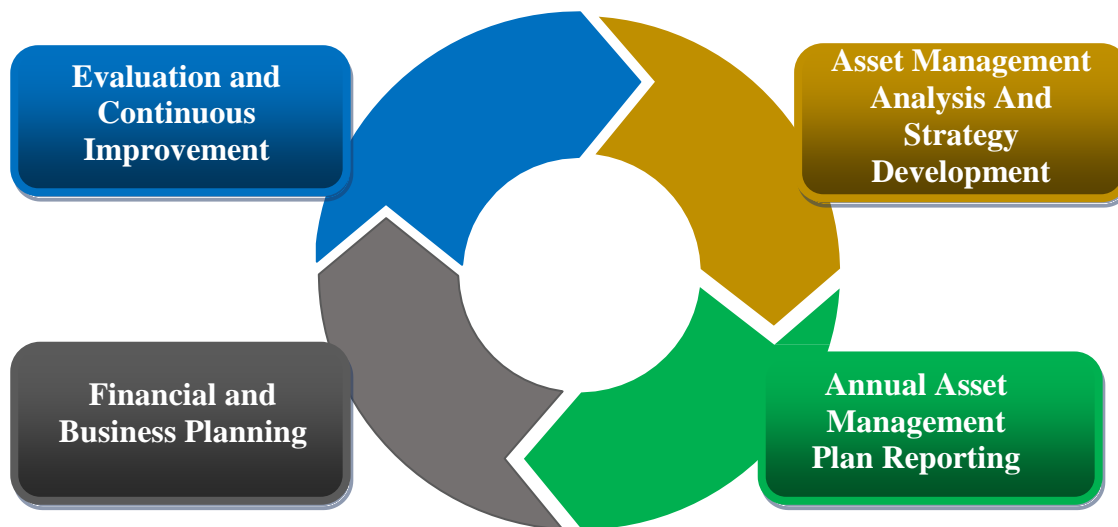
- Considers and approves the annual Asset Management Plan on an annual basis;
- Considers and approves the corporate strategic asset management policy and/or any updates as required;
- Considers and approves Regional business plans and budgets, servicing and financing studies and any other financial planning documents that include recommended asset management investments, strategies and funding to address asset management needs;

- Approve any corporate and departmental plans, policies, and studies that include priorities, goals and/or service levels that support asset management; and
- Serve as representatives of stakeholder, customers, residents and community needs.

5. The Region's Asset Management Planning Process

The Region's asset management planning process will be a continuous year-round process as highlighted in Figure 3 below:

Figure 3: Region's Asset Management Planning Process



5.1 Asset Management Analysis and Strategy Development

The coordinated process, led by the Finance Department, begins with the Region's multi-disciplinary Asset Management Staff Working Groups supported by the various other working groups, undertaking the following analyses below.

Based on the results of such analyses, asset management strategies will be identified, developed and recommended to the appropriate Departmental Steering Committee Director(s) for endorsement. Such endorsed asset management strategies will be reported in the annual Asset Management Plan for approval. For those strategies that require additional financial resources, they will be identified and further prioritized in the Regional business plans and budgets for approval by Regional Council.

1. Assess, refine and use the most appropriate and effective data collection tools and systems to gather asset data;
2. Capture, measure and document all asset data including:
 - Maintain and update inventory of all capital assets;
 - Calculate, refine and update asset replacement values;

- Assess and update asset condition ratings using the most effective and appropriate condition assessment methodologies; and
- Track, maintain and update asset ages, average age of asset categories, and the remaining useful lives of assets;
- 3. Assessment of service levels and performance measurement:
 - Defined through strategic planning and master planning documents, Regional policies, procedures, bylaws, regulatory compliance requirements and other best practice and Council-defined performance expectations;
 - Define and update asset related service levels and performance targets that are specific, measurable, achievable, realistic and time defined; and
 - Track, measure, monitor and report on the performance of asset related service levels relative to targets;
- 4. Life-cycle optimization:
 - Identify, analyze and determine the most optimal and cost-effective life cycle activities and costs, for maintenance, rehabilitation and/or replacement; and
 - Minimize life-cycle costs;
- 5. Consider asset related risks and climate change impacts to assets:
 - Identify potential asset related risks including from climate impacts;
 - Identify risk mitigation and climate adaptation and mitigation initiatives and costs (to build asset resiliency and to reduce the Region's energy use and corporate carbon footprint); and
 - Use enterprise risk management program, emergency response and emergency support, and assessments of asset criticality to ensure business continuity;
- 6. Balancing growth-related demands:
 - Use growth projections and forecasts to identify servicing needs; and
 - Consider the estimated growth-related capital expenditures and associated operating and life cycle costs to service growth;
- 7. Asset management investment needs and strategies:
 - Identify asset management investment needs and strategies based on analysis of the above tasks; and
 - Prioritize strategies and the identified capital infrastructure needs to inform the subsequent business planning and long-term financial planning process; and
- 8. Financing considerations:
 - Identify and consider available sources of financing to meet asset management needs, including for any growth-related assets; and
 - Develop financing strategies for consideration into the Region's annual servicing and financing studies, business plans and budget and long-term capital forecasts.

5.1.1 Co-ordination of Assets with Other Municipalities

The Region will consider opportunities to coordinate the planning of assets with its local municipalities, neighboring municipalities, senior government and/or its

agencies, where such assets are connected, interrelated, coexistent, and/or jointly owned and may benefit the Region. This will include:

- Consider opportunities to coordinate the planning and timing for the maintenance, rehabilitation and or replacement of existing assets as well as for the construction of new growth-related assets (e.g. Roads Capital Budget and Water and Sewer Capital Budget, Area Municipal Road Program, Ministry of Transportation (MTO) and GO Transit Projects and Seaton facilities);
- Consider potential alternative asset planning approaches, including partnerships, joint asset procurement and/or construction delivery, subject to an evidence-based or business case approach; and
- Work with local municipalities and other partners to manage growth through effective, progressive and integrated long-term asset management planning, that considers the Region's Official Plan, master plans, Ontario's land use planning framework and the Region's Development Charge Background Study.

The Region's Asset Management Staff Working Groups, working collaboratively with and as coordinated by the Finance Department, will recommend if warranted using an evidence-based approach, any changes to the planning and/or coordination of asset construction to the appropriate Director(s) in the Asset Management Steering Committee. Any such changes endorsed by the Asset Management Steering Committee will be considered for inclusion into the Region's annual Asset Management Plan and annual business plans and budgets and/or long-term capital forecast for Regional Council approval.

5.1.2 Consideration of Climate Change Vulnerabilities and Inclusion of Mitigation and Adaptation Into Asset Management Planning

The Region's asset management planning process will include consideration of the following as it relates to assets, in accordance with the goals and action plans in the Region's annual Corporate Climate Change Update report, Corporate Adaptation Plan and Corporate Energy Conservation and Demand Management Plan:

- Identification of potential impacts of climate related risks to the Region's assets, including to service level, life cycle activities, costs and risks;
- Adaptation opportunities and the associated costs to manage vulnerabilities to assets from climate impacts, while considering impacts to service levels, life cycle activities and risks;
- Mitigation strategies to reduce the Region's reliance and usage of energy and water efficiency and conservation efforts; and
- Efforts to ensure effective and coordinated response to potential risk events, ensure business continuity objectives, and address service interruption and quality issues (i.e. emergency plans).

The multi-departmental Asset Management Staff Working Groups also participate and consult with the Region's Corporate Climate Change Staff

Working Group and its sub committees including the Energy Advisory and Adaptation Sub-committees.

The findings and results will be reported in the Region's annual Asset Management Plan. Adaption and mitigation initiatives for assets that require additional and/or ongoing financial resources, if warranted based on an evidence-based approach, will be brought forward to the appropriate Directors of the Asset Management Steering Committee for endorsement. If endorsed, they may be considered during the annual business plans and budgets for approval by Regional Council.

5.1.3 Alignment and Compliance with Federal and Provincial Requirements

The Region will ensure its asset management planning and resultant annual corporate Asset Management Plan is aligned and compliant with the following:

- Ontario Regulation 588/17 (Asset Management Planning for Municipal Infrastructure) as well as the Ontario Infrastructure for Jobs and Prosperity Act by ensuring all regulatory requirements are achieved by the specified timelines and reported in the Region's annual corporate Asset Management Plan. The Region will also work to exceed these standards as part of best business practices;
- The Water Financial Plans will use similar data, methodologies and approaches as used for asset management planning, the annual Asset Management Report, and the Region's Tangible Capital Asset Policy. All these activities will also be undertaken by the Region's Finance Department, the Corporate Asset Management Team and the Departmental Asset Management working groups to ensure consistency and alignment;
- The Ontario Land Use planning framework and the Region's Official Plan (as supported by the Growth Plan, 2017) through the consideration of servicing growth, intensification, land use planning, and infrastructure costs (including on a life cycle basis), as part of the Region's asset management planning, long term financial planning, Business Plans and Budgets and long-term capital forecasts;
- The Region's Development Charge Background Study and by-law, (which projects the growth-related capital requirements and asset management needs to service growth and intensification considering land use planning, the Region's Official Plan, and the Growth Plan) will inform the Region's asset management planning and annual Asset Management Plan. This will ensure these studies' results are aligned;
- The Region's Tangible Capital Asset Policy and Federal requirements for the recording of Tangible Capital Assets (TCA). This will be achieved by following the capitalization thresholds in the Region's TCA policy to define those capital assets for inclusion into asset management planning and the annual Asset Management Plan; and
- The Region will ensure all asset management requirements for any Federal and Provincial Grant Funding programs will be achieved and

satisfied with data obtained through the Region's asset management planning and annual Asset Management Report.

5.2 Annual Corporate Asset Management Plan

The process as defined in Section 5.1 will result in the development of an annual corporate Asset Management Plan.

This annual corporate Asset Management Plan will at a minimum, include the reporting of the data, analyses and results from each of the tasks as detailed in Section 5.1 above. It will also identify infrastructure capital investment needs, asset management strategies and any recommendations.

The annual corporate Asset Management Plan will be reviewed and endorsed first by the Asset Management Steering Committee, then by other senior management (e.g. Commissioner of Works), and then by the Executive Lead. Regional Council will provide the final approval of the annual corporate Asset Management Plan.

5.3 Asset Management Planning will Inform Regional Business Plans and Budgets and Long-Term Financial Planning

The findings, results and recommendations arising from the asset management planning process and the annual Asset Management Plan will be integrated into the Region's financial and business planning process by occurring ahead of and informing the annual Regional property tax guideline, servicing and financing studies for major program areas, Business Plans and Budgets, and long-term capital forecasts.

The Asset Management Departmental Working Groups, working with the Finance Department, will participate in the preparation of the Region's servicing and financing studies, financial planning, business plans and budgets, and capital forecasts, to ensure an integrated approach.

The following findings from the Region's annual Asset Management Plan will be considered, incorporated and prioritized in the Region's business plans and budgets and long-term capital forecasts and financial plans (Figure 4):

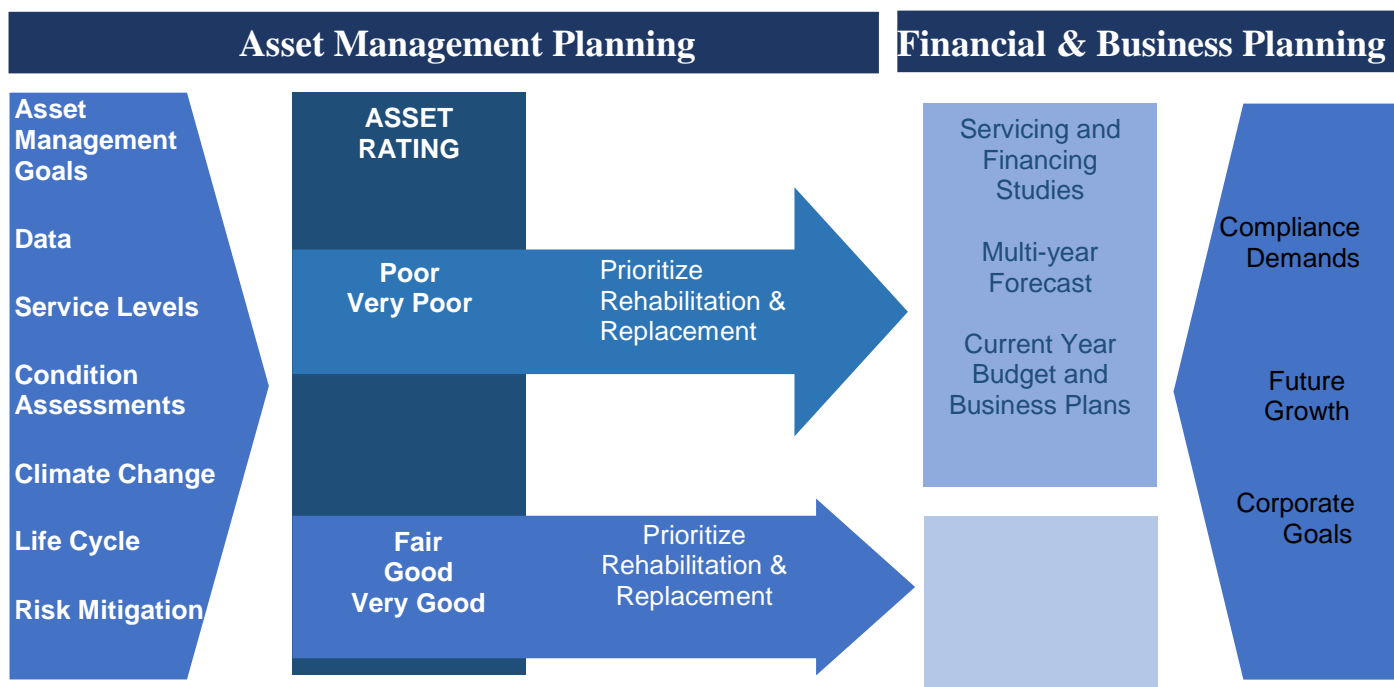
- Infrastructure investments to renew and/or replace infrastructure in poor or very poor condition or at the end of its useful life;
- Rehabilitation and/or repair investments based on life cycle analyses;
- Ongoing operating and maintenance activities to ensure the continuing functioning of assets;
- Infrastructure investments to provide and/or enhance services in accordance with Regional goals and objectives and/or to comply with any regulatory guidelines and/or requirements;
- Infrastructure investments to address accessibility;

- Infrastructure investments to reduce asset related risks and further enhance asset resiliency to climate change (adaptation) and mitigation to reduce energy usage and/or improve energy efficiency;
- Expansion of new infrastructure to service growth as well as the associated operating and maintenance costs from those new growth-related assets, based on a life cycle approach;
- Opportunities for continuous improvements, new best asset management practices and/or service delivery approaches; and
- Financing plans and strategies within the context of the economic and financial environment and other competing expenditure pressures.

This process ensures asset priorities required over a multi-year planning horizon required to deliver service levels (in accordance with corporate goals while complying with regulatory guidelines), maintain assets in optimal condition, address risk and accessibility, build resiliency and mitigate climate change impacts are addressed in a financially sustainability manner.

The Region's annual budget open houses and other communication means as implemented, including posting of these documents on the Region's website, will provide additional opportunities for public input.

Figure 4: Region's Asset Management Linkage to Financial & Business Planning



5.4 Seek Opportunities for Continuous Improvement

As part of Durham's asset management planning process, the Region's Asset Management Staff Working Groups working with the Finance Department, will seek, consider and analyze opportunities for continuous improvements through:

- Tracking performance of past and recently implemented asset management approaches, practices, and/or activities;
- Monitoring and identifying industry best practices;
- Collaborating and sharing best practices with other municipalities;
- Ongoing refinements to improve data collection, analyses and protocols to enhance data and planning accuracy, consistency, validity and asset management planning capacities and reporting;
- Consideration of alternative service delivery options to implement capital projects where appropriate, through an evidence-based approach, that could improve efficiency and effectiveness of delivering services while considering goals, costs, outcomes and risks;
- Examining potential partnership opportunities with neighboring and local municipalities, provincial agencies and public-private partnerships;
- Examining potential alternative procurement for assets, such as joint initiatives to reduce acquisition and or construction costs;
- The coordination of asset management planning for infrastructure that may be connected or is inter-related with a neighboring municipality; and
- Work with local municipalities and other partners to manage growth through effective and integrated long-term asset management planning.

Any recommended asset management improvements will be reviewed by members of the Region's Asset Management Steering Committee. If such new asset management improvements are warranted using an evidence-based approach and approved by the appropriate Director(s) of the Asset Management Steering Committee, then they may be implemented and reported in the Region's annual Asset Management Report. If additional financial resources for implementation are required, they will be included and further prioritized in the Regional business plans and budgets for approval by Regional Council.

6. Community and Stakeholder Input

The Region commits to provide opportunities for community and stakeholder input into the Region's asset management planning process through:

- The development and approval of the Region's strategic plans, official plan, master plans for specific service areas, studies, policies and/or other planning documents that include opportunities for stakeholder input during stakeholder advisory meetings, public information sessions, Regional Committee and Council meetings, and any other appropriate means. These studies inform and support the Region's asset management planning process and annual Asset Management Plan report by defining goals, service levels to be achieved and recommended practices, policies, and strategies;
- The Region's annual Asset Management Plan is brought forward annually to the appropriate Regional Committee and Council meetings for review, deliberation and approval, which are public meetings providing opportunities for community and stakeholder input;

- The Region's annual business plans and budgets, servicing and financing studies and long-term capital forecasts, which include infrastructure investments brought forward from the asset management planning process and annual Asset Management Plan. These are reviewed, deliberated and approved by Regional Committees and Council, during public meetings with the opportunity for input;
- The Region's Development Charge Background Study and by law provides opportunities for public input through the public consultation period and during Regional Committee and Council meetings. The capital forecasts to service growth related assets informs the Region's annual Asset Management Plan and Business Plans and Budgets;
- The Region will continue to hold annual budget open houses, allowing opportunities for public input during these meetings;
- The posting of all such aforementioned documents above on the Region's website, which are accessible and available for public input; and
- The Region will seek additional opportunities to foster and seek public and stakeholder input through any new additional approaches deemed appropriate for informing asset management planning at the Region.

7. TCA Policy, Including Capitalization Thresholds

The capital assets to be analyzed and included in the Region's annual Asset Management Plan will be those deemed to be capital based on the capitalization thresholds and related policies in the Region's approved TCA policy.

Capital assets are those that are used for providing services (i.e. production or supply of goods and services), have a useful economic life greater than one year, and are used on a continuing basis. The established values above which individual assets and/or pooled assets are capitalized, are summarized below in Figure 5. Assets that have a unit value below the capitalization threshold but have a material value as a group are pooled. The capitalization threshold for pooled assets is \$100,000. In addition, betterments to existing assets are also capitalized when the costs exceed the applicable threshold amount as well as enhance the service potential of the asset (i.e. increases service capacity, quality of service output, and/or extends the useful life of the asset).

Figure 5: Durham's Capitalization Threshold in TCA Policy

Asset Sub Category	Capitalization Value Threshold
Road Network	\$100,000
Bridges	\$100,000
Culverts	\$25,000
Water Network	All
Sewer Network	All
Land	All
Land Improvements	\$50,000
Buildings	\$100,000
Leasehold Improvements	\$25,000
Machinery and Equipment	\$10,000
Furniture and Fixtures	\$10,000
Vehicles	\$10,000
IT Infrastructure	\$25,000
Computer Software	\$50,000
Pooled Assets	\$100,000

8. Updates to the Asset Management Policy

The Region's Strategic Asset Management Policy will be reviewed and updated at least once every five years or sooner as required to reflect new and or revised policies and will be subject to approval by the Region's Asset Management Steering Committee, Executive Lead and Regional Council.

		Attachment 2: Summary of Regional Asset Inventory and Replacement Value					
Category		2017 Inventory		2017 Replacement Value (\$ millions)	2018 Inventory		2018 Replacement Value (\$ millions)
Water Supply System							
Vertical Assets - Treatment, Pumping & Storage							
Water Supply Plants and Well Systems		14	supply plants & well systems	\$ 551.0	14	supply plants & well systems	\$ 576.8
Water Pumping Stations		17	pumping stations	\$ 74.8	18	pumping stations	\$ 89.5
Water Storage Facilities		21	storage facilities	\$ 184.5	22	storage facilities	\$ 212.0
Water Sampling Buildings		0	Water Sampling Buildings	\$ -	3	Water Sampling Buildings	\$ 1.4
Total Vertical		52	facilities	\$ 810.4	57	facilities	\$ 879.6
Linear Assets - Water Distribution							
Mains		2,489	kilometres	\$ 2,165.2	2,556	kilometres	\$ 2,338.7
Control Valves		26,059	control valves	\$ 180.4	26,808	control valves	\$ 196.1
Specialty Valves		645	specialty valves	\$ 12.7	663	specialty valves	\$ 13.7
Service Connections		174,874	services	\$ 754.5	176,768	services	\$ 797.8
Hydrants		15,774	hydrants	\$ 154.7	16,241	hydrants	\$ 166.6
Fire Lines		1,891	fire lines	\$ 17.6	1,906	fire lines	\$ 18.6
Meters		173,455	meters	\$ 31.0	175,342	meters	\$ 31.3
Total Linear				\$ 3,316.1			\$ 3,562.8
Total Water Supply				\$ 4,126.5			\$ 4,442.4
Sanitary Sewerage System							
Vertical Assets - Treatment, Pumping & Storage							
Water Pollution Control Plants		11	treatment plants	\$ 969.7	11	treatment plants	\$ 1,012.2
Wastewater Pumping Stations		52	pumping stations	\$ 278.4	51	pumping stations	\$ 288.3
Wastewater Storage Facilities		2	storage facilities	\$ 6.2	2	storage facilities	\$ 6.5
Total Vertical		65	facilities	\$ 1,254.3	64	facilities	\$ 1,307.0
Linear Assets - Sewage Collection							
Gravity Sewers / Siphons		2,092	kilometres	\$ 2,115.5	2,140	kilometres	\$ 2,259.0
Forcemains		63	kilometres	\$ 100.7	64	kilometres	\$ 107.3
Maintenance Holes		30,314	structures	\$ 413.6	31,137	structures	\$ 444.5
Service Connections		170,746	services	\$ 793.6	172,665	services	\$ 839.5
Total Linear				\$ 3,423.5			\$ 3,650.3
Total Sanitary Sewerage				\$ 4,677.8			\$ 4,957.3
Transportation System							
Roads (arterial)							
Urban		987.2	lane kilometres	\$ 1,003.7	1,003	lane kilometres	\$ 1,069.7
Rural		1,389.5	lane kilometres	\$ 1,276.3	1,367	lane kilometres	\$ 1,314.1
Bridges and Culverts (>3m)		117	97 culverts (>3m)	\$ 566.4	118 bridges	104 culverts (>3m)	\$ 555.5
Total Roads, Bridges & Culverts				\$ 2,846.4			\$ 2,939.3
Storm Sewer System							
Storm Sewer Mains		290.2	kilometres	\$ 416.9	293	kilometres	\$ 443.8
Culverts (<3m)		33.8	kilometres	\$ 32.5	35	kilometres	\$ 34.9
Maintenance Holes		4,523.0	structures	\$ 25.9	4,597	structures	\$ 27.3
Catchbasins		5,350.0	structures	\$ 30.7	5,401	structures	\$ 32.0
Outfalls		436.0	outfalls	\$ 0.9	399	outfalls	\$ 0.8
Total Storm Sewer				\$ 506.9			\$ 538.8
Traffic Control System							
Traffic Control Signals and Flashing Beacons		458.0	signals	\$ 69.3	464	signals	\$ 73.3
Traffic Control Systems		3.0	systems	\$ 5.6	3	systems	\$ 5.5
Intelligent Transportation Systems		23.0	systems	\$ 2.0	23	systems	\$ 2.1
Communication Infrastructure		274.5	kilometres	\$ 9.7	318	kilometres	\$ 10.4
Regulatory, Warning and Information Signs		22,178.0	signs	\$ 4.1	22,275	signs	\$ 4.3
Roadside Protection (Steel Beam, guiderail and guide posts)		100.9	kilometres	\$ 18.5	103	kilometres	\$ 19.3
CCTV		92.0	intersections	\$ 0.3	95	intersections	\$ 0.3
Total Traffic Control				\$ 109.5			\$ 115.1
Total Transportation				\$ 3,462.8			\$ 3,593.3
Regionally Owned Facilities							
Durham Regional Local Housing Corporation (DRLHC)		23	buildings	\$ 240.8	23	buildings	\$ 251.6
Durham Regional Police Service (DRPS)		8	buildings	\$ 108.0	8	buildings	\$ 113.0
Regional Works Depots		5	buildings	\$ 49.5	5	buildings	\$ 51.8
Region of Durham Paramedic Services (RDPS)		7	buildings	\$ 25.2	8	buildings	\$ 30.9
Regional Owned Child Care Facilities		5	buildings	\$ 10.4	5	buildings	\$ 10.9
Waste Management Facilities		7	buildings	\$ 243.1	7	buildings	\$ 254.3
Long Term Care (LTC) Facilities		4	buildings	\$ 242.3	4	buildings	\$ 253.5
Durham Region Transit (DRT) Maintenance Facilities		3	buildings	\$ 75.3	3	buildings	\$ 78.8
Durham Region Transit (DRT) Pads and Shelters		2,739	bus stop pads and shelters	\$ 5.6	2,391	bus stop pads and shelters	\$ 8.6
Administration Facilities		3	buildings	\$ 113.4	3	buildings	\$ 118.7
Parking Structure		1	buildings	\$ 20.6	1	buildings	\$ 21.5
Centennial Building		1	buildings	\$ 4.3	1	buildings	\$ 4.5
Other		1	buildings	\$ 1.5	1	buildings	\$ 1.6
Total Facilities		68		\$ 1,140.1	69		\$ 1,199.7
Fleet							
Transit		234	Vehicles	\$ 117.3	242	Vehicles	\$ 121.0
Works		351	Vehicles	\$ 32.6	352	Vehicles	\$ 39.8
Durham Regional Police Service (DRPS)		345	Vehicles	\$ 19.0	354	Vehicles	\$ 19.9
Region of Durham Paramedic Services (RDPS)		76	Vehicles	\$ 10.8	84	Vehicles	\$ 10.8
Total Fleet		1,006		\$ 179.7	1,032	Vehicles	\$ 191.5
Equipment							
Information Technology				\$ 67.7			\$ 67.20
DRPS Equipment				\$ 41.6			\$ 29.2
LTC & RDPS Equipment				\$ 13.8			\$ 14.9
Waste Equipment				\$ 10.9			\$ 10.9
Works Equipment				\$ 15.9			\$ 18.3
Furniture and Fixtures				\$ 6.3			\$ 6.7
Other miscellaneous equipment				\$ 9.1			\$ 9.8
Total Equipment				\$ 165.3			\$ 157.0
GRAND TOTAL				\$ 13,752.2	GRAND TOTAL		\$ 14,541.1

1. Attachment #3: Water Supply Asset Class Report

1.1 Description of Water Supply System Assets:

Water supply system assets include watermains, feeder mains, valves, chambers, hydrants, service connections, fire lines, meters, water supply plants (WSPs), municipal well systems, pumping stations, water storage facilities and water sampling buildings.

1.2 Water Supply System Inventory:

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. The inventory of the main components of the water supply system are provided in Table 1 below and highlights include:

- The commissioning of the new Brock Road water pumping station and reservoir (City of Pickering) in 2018, has increased the number of pumping stations and water storage facilities by 1 respectively;
- A new water asset class, water sampling buildings, was added this year to encompass sites that are not covered by the other 3 vertical asset classes; and
- There were minor year over year increases (1 to 3 per cent) in the linear assets inventory attributed to continued growth.

Table 1: Water Supply System Inventory Change

Asset Type	Asset Group	Inventory		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Vertical Assets	Water Supply Plants and Well Systems	14	14	0	0.0%
	Water Pumping Stations	17	18	1	5.9%
	Water Storage Facilities	21	22	1	4.8%
	Water Sampling Buildings	n/a	3	n/a	n/a
Linear Assets	Mains (km)	2,489.4	2,556.0	66.6	2.7%
	Control Valves	26,059	26,808	749	2.9%
	Specialty Valves	645	663	18	2.8%
	Service Connections	174,874	176,768	1,894	1.1%
	Hydrants	15,774	16,241	467	3.0%
	Fire Lines	1,891	1,906	15	0.8%
	Meters	173,455	175,342	1,887	1.1%

1.3 Water Supply System Replacement Cost

The year-end 2018 estimated replacement cost for water supply system assets totals approximately \$4.44 billion, a \$315.8 million (7.7 per cent) increase from 2017 due to:

- An 8.5 per cent increase in vertical asset replacement value attributable to the addition of the new Brock Road pumping station and reservoir (\$30.1 million) and water sampling buildings (\$1.4 million), as well as to upgrades to existing sites and increased benchmark construction costs; and
- A 7.4 per cent increase in linear assets attributed to growth and increased benchmark construction costs.

Table 2: Water Supply System Replacement Value (\$ Millions)

Asset Type	Asset Group	Replacement Costs		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Vertical Assets	Water Supply Plants and Well Systems	551.0	576.8	25.7	4.7%
	Water Pumping Stations	74.8	89.5	14.7	19.6%
	Water Storage Facilities	184.5	212.0	27.4	14.9%
	Water Sampling Buildings	-	1.4	1.4	n/a
	Replacement Value Sub-total	810.4	879.6	69.2	8.5%
Linear Assets	Mains	2,165.2	2,338.7	173.5	8.0%
	Control Valves	180.4	196.1	15.7	8.7%
	Specialty Valves	12.7	13.7	1.0	7.8%
	Service Connections	754.5	797.8	43.3	5.7%
	Hydrants	154.7	166.6	11.9	7.7%
	Fire Lines	17.6	18.6	1.0	5.4%
	Meters	31.0	31.3	0.3	1.0%
	Replacement Value Sub-total	3,316.1	3,562.8	246.7	7.4%
TOTAL		4,126.5	4,442.4	315.8	7.7%

1.4 Water Supply System Condition Assessment Ratings

For vertical assets, site-specific condition assessments were recently completed for the Duffs Road Reservoir, Quaker Hill Reservoir, Taunton Pumping Station and Reservoir, Thicksen Road Pumping Station and Greenbank wells. In addition, the legislated annual inspections at the Region's nine water towers/standpipes were also completed in September of 2018. These build upon the previously completed condition site assessments at Newcastle Water Supply Plant WSP and Whitby WSP.

For the other vertical facilities, they have been assessed using a high level scoring methodology completed by Operations staff based on the condition review of the process related equipment and tanks and by Facilities staff for the buildings and building related services. This high-level survey was updated in March 2018 with some additional updates completed recently. The average of the assessment scores and condition ratings are shown in Table 3 below.

Moving forward, condition assessments are planned to be completed for all vertical assets/facilities. The next locations to be completed are tentatively Ajax WSP, Thicksen Road Reservoir, Bowmanville WSP clearwells, Newcastle WSP clearwells, Beaverton

WSP highlift tanks, Oshawa WSP intake wells and various other reservoir tanks. Previously approved funding (\$0.8 million), along with a preliminary estimate of \$2.3 million requested over 2020-2028, will allow these condition assessments to continue over the next 9 years. In addition, \$0.2 million has also been budgeted in 2019 (funded from the Asset Management Reserve Fund), along with \$1.2 million over forecast period (2021-2028) for water storage facility condition assessments and rehabilitation work.

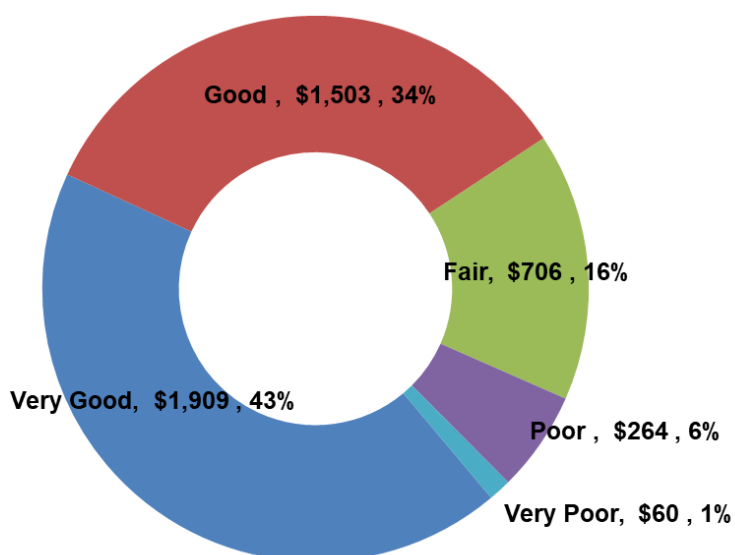
For linear assets, the condition ratings are done using the available data specific to each asset class. For the condition of watermains, the number of breaks and break history, material type, age of the pipe, whether it has been lined or cathodically protected and any additional information or concerns from Maintenance Operations are considered. Detailed condition assessments for major feeder mains is a priority over the 10-year forecast. Previously approved funding (\$0.4 million) combined with \$0.2 million approved in 2019 from the Asset Management Reserve Fund will allow these detailed assessments to proceed. A preliminary estimate of \$1.7 million has been identified over 2020-2028 to continue these assessments over the next 9 years.

The condition ratings of hydrants and fire lines are based on age. For control valves, specialty valves, and service connections, their condition rating is based on the adjacent watermain condition scores. For water meters, their condition rating is also based on age using a 20-year lifespan.

The overall condition rating for vertical water assets increased slightly as the new Brock Road water pumping station and reservoir (Very Good condition) came into service in 2018 while the condition ratings for the other vertical assets remained fairly consistent year over year overall. Linear assets remained in Good condition (same as last year), resulting in the same overall condition rating for all water assets as last year (Good).

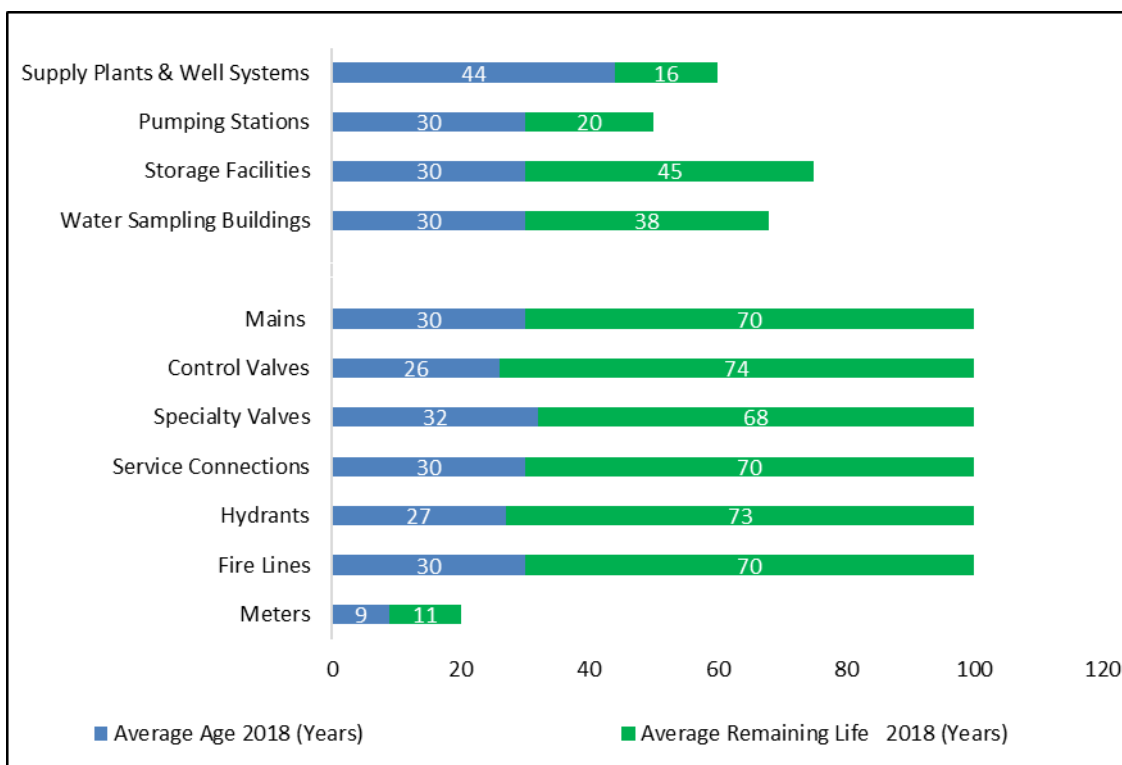
Table 3: Water Supply System Condition Ratings

Asset Type	Asset Group	Condition Rating	Condition Rating	Year-Over-Year Trend
		2017	2018	
Vertical Assets	Water Supply Plants and Well Systems	C-	C-	⇒
	Water Pumping Stations	C+	C+	⇒
	Water Storage Facilities	C+	B-	↑
	Water Sampling Buildings	n/a	B-	⇒
	Vertical Consolidated Ratings	C-	C	↑
Linear Assets	Mains	B+	B+	⇒
	Control Valves	B+	B+	⇒
	Specialty Valves	B+	B+	⇒
	Service Connections	B+	B+	⇒
	Hydrants	B+	B+	⇒
	Fire Lines	B+	B+	⇒
	Meters	B+	B+	⇒
Linear Consolidated Ratings		B+	B+	⇒
Overall Water Supply System Condition Rating		B	B	⇒

Figure 1: Water Supply Condition Rating by Replacement Value (\$ millions)

1.5 Water Supply System Average Age and Remaining Useful Life

The average age and remaining asset life of the water supply system is below.

Figure 2: Water Supply System Average Age and Remaining Useful Life

1.6 Water Supply System Levels of Service and Performance Measurement

The Works Department is responsible for the water supply system that provides for the treatment and distribution of safe drinking water across the Region. Municipal water services are 100 per cent user rate supported (not funded from property taxes).

The service level objectives for the water supply system are shown in Table 4:

Table 4

Service Level Objectives
<ul style="list-style-type: none"> To provide a safe and sufficient water supply to Durham Region 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.

These service level objectives are supported by the following Regional Council approved plans, studies, policies and procedures, as well as through meeting and or exceeding regulatory compliance requirements and guidelines (Table 5).

Table 5

Regional Plans, Studies, Policies, & Procedures	Regulatory Compliance Requirements and Guidelines
<ul style="list-style-type: none"> 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 Durham Region Strategic Plan Durham Region Official Plan 	<ul style="list-style-type: none"> Ontario Safe Drinking Water Act 2002 and associated Regulations: <ul style="list-style-type: none"> O. Reg. 169/03 Ontario Drinking Water Quality Standards O. Reg. 170/03 Drinking Water Systems O. Reg. 128/04 Certification of Drinking Water System Operators and Water Quality Analysts O. Reg. 188/07 Licensing of Municipal Drinking Water Systems O. Reg. 453/07 Financial Plans O. Reg. 248/03 Drinking Water Testing Services Clean Water Act 2006

<ul style="list-style-type: none"> • Corporate Climate Adaptation Plan • Energy Conservation and Demand Management Plan (CDM) • 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 • Servicing and Financing Studies 	<ul style="list-style-type: none"> • Ontario Water Resources Act, R.S.O. 1990 and associated Regulations: <ul style="list-style-type: none"> • R.R.O. 1990, Reg. 903: Wells • O. Reg. 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 O. Reg. 332/12 Building Code • O. Reg. 319/08 Small Drinking Water Systems • Canadian Drinking Water Guidelines • Environmental Management Standard ISO14001 • Quality Management Standard ISO 9001:2000 • Technical Support Document for Ontario Drinking Water Standards, Objectives, and Guidelines.
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Water Supply Service Community Levels of Service

One of the key service levels for the Region's water supply system is to provide a safe and sufficient water supply to Durham's residents and businesses while complying with all Provincial and Federal Acts and regulations. The Region complies with all provincial legislation by having a Drinking Water Quality Management System that meets these standards. A Drinking Water License is maintained which requires various supporting information and approvals including, but not limited to, operational plan, financial plan, accredited operating authority as well as Permit to Take Water (PTTW).

The drinking water quality system meets the regulatory requirements of the *Safe Drinking Water Act*. The Region co-owns with York Region, an accredited Environmental Laboratory, located at the Duffin Creek Water Pollution Control Plant (WPCP) in the City of Pickering. All bacteriological parameters along with many organic and inorganic parameters are tested at this facility. Drinking water operators are licensed through the Ministry of the Environment, Conservation and Parks (MECP) certification examination and licensing programs.

The Drinking Water Systems Regulation 170/03 requires continuous on-line monitoring, as well as various types of sampling and testing performed weekly, quarterly, annually and every three and five-years at the drinking water treatment plants and in the distribution system. The Region's sampling and analysis exceeds the Regulation.

All of Durham Region's water supply systems are accredited to:

- the Environmental Management Standard ISO 14001:2004; and,
- the Quality Management Standard ISO 9001:2000.

Boil water advisories are to protect the water users from potential health risks and can be issued due to adverse water quality testing results or suspected contaminants. Due to the Region's rigorous and thorough water treatment and testing process, there were zero boil advisory days in 2018. This is also reported in Table 6 (technical service levels) and complies with the newly approved reporting requirements in the Provincial Regulation, Asset Management Planning for Municipal Infrastructure (O. Reg. 588/17).

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. Figure 3 (Water System) identifies the areas that are connected to the Region of Durham's water supply system. Approximately 92 percent of Durham's population is supplied with Regionally treated water. This is also reported in Table 6 (technical service levels) as well as complies with the newly approved reporting requirements in the Provincial Asset Management Regulation (O. Reg. 588/17).

To ensure the continued provision of a safe water supply, the Works Department maintains the water infrastructure in accordance to the updated water maintenance and operations standards as per Report 2016-COW-64. This ensures that all the water assets are inspected and maintained to an optimal condition standard that complies with all regulatory requirements. The Region's inspection and maintenance programs increase the life expectancy and integrity of the water system assets while increasing the quality of drinking water by reducing unpleasant tastes, offensive odours and discolouration of water. In 2018, there were 105 watermain breaks that caused service interruptions to about 1048 customers. When compared to the 176,768 total water customers in the Region, customers had water service available 99.99 percent of the time. The Region makes every effort to limit the number of customers impacted by watermain breaks. This is done by closing the valves nearest to the break and by completing the repairs as soon as possible. Fast repair and restoration of water supply is a priority service level for the Region's water supply system. This is also reported in

Table 6 (technical service levels) as well as complies with the newly approved reporting requirements in the Provincial Asset Management Regulation (O. Reg. 588/17).

Proximity to a hydrant is another benefit of being connected to the water supply system for fire protection. There are over 16,000 fire hydrants in Durham Region. Fire hydrants are inspected annually to ensure an adequate and reliable source of water in the event of a fire. There is 100 per cent fire flow in the Region of Durham with 92 per cent of residents having direct supply from hydrants. This is reported in Table 6 and is also a reporting requirement of the newly approved Provincial Asset Management Regulation (O. Reg. 588/17).

In summary, the Region is fully compliant with all applicable water supply service level reporting requirements two years ahead of the mandated July 1, 2021 deadline in the Provincial Asset Management Planning Regulation (O. Reg. 588/17).

Regional staff will continue to refine service levels and performance measures in future asset management plans to improve asset management planning, strategies, and reporting as part of best business practices.

Technical Service Levels and Performance Measures

Asset management staff have identified technical service levels and performance measures as reported in Table 6. These include all the technical service level reporting requirements for water supply specified in the Provincial Asset Management Regulation (O. Reg. 588/17).

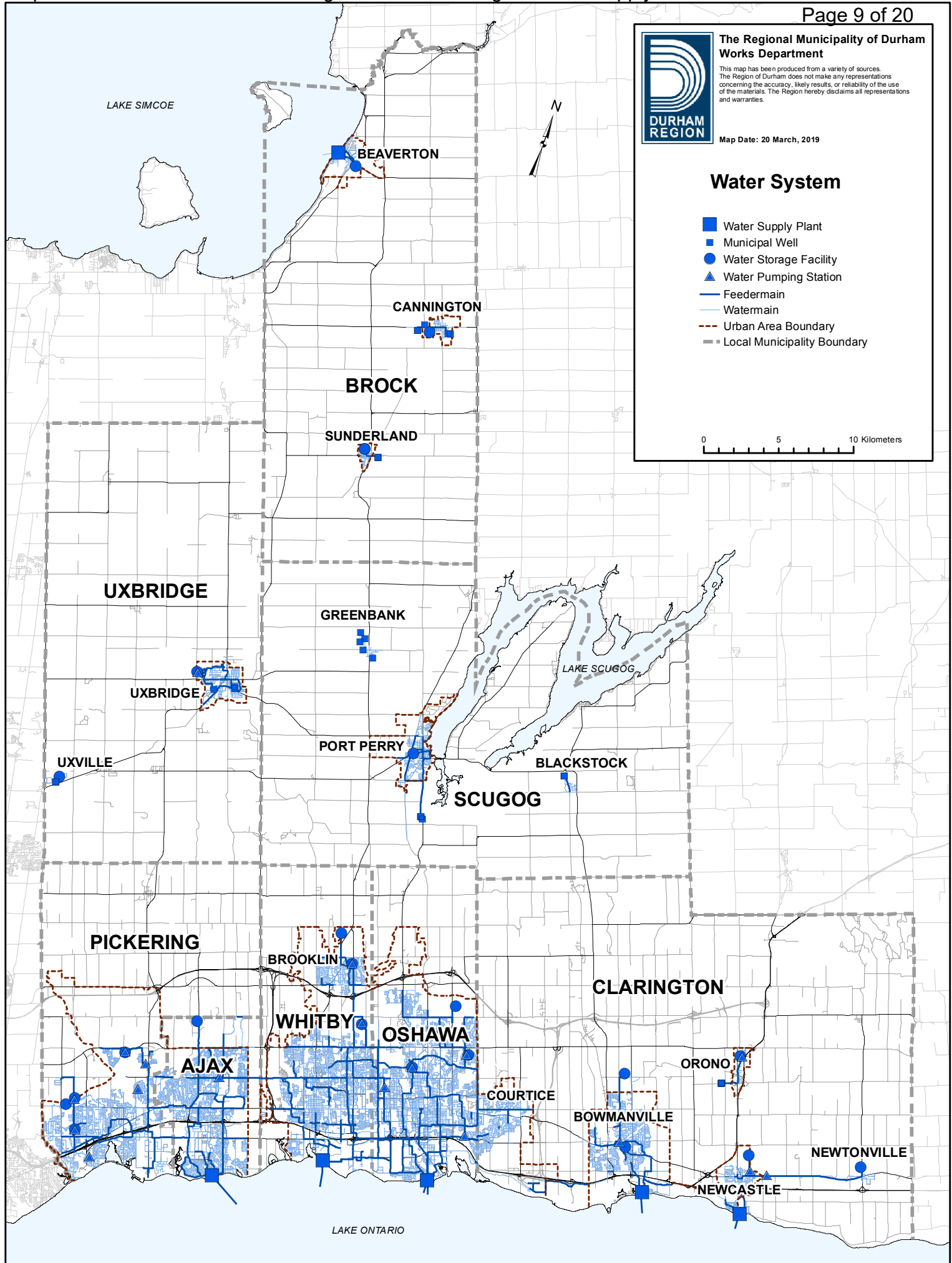


Table 6-Technical Service Levels and Performance Measures - Water Supply System

Water Supply System Linear											
Objectives/ Level of Service ¹	Corporate Strategic Plan Goals and Strategies ²	Corporate Adaptation and Climate Mitigation Goals ³	Ref	Performance Measure	Measure Type	Target	Year of Measure				
							2014	2015	2016	2017	201
To provide a safe and sufficient water supply to Durham Region while complying with all Provincial and Federal Acts and Regulations.	Demonstrate leadership in sustainable asset management and environmentally friendly municipal practices.	Invest in preventative maintenance and rehabilitation when most beneficial.	1A	Condition Index Rating	Asset Health - Technical	0.2% of linear assets rated as very poor.	0.60%	0.50%	0.40%	0.50%	
				Measure identifies the % 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.							
				Share of Water Meters Overdue for Replacement	Asset Health - Technical	0% overdue for replacement - 16/19mm (20 year life)	3.70%	2.90%	2.20%	1.70%	1.64%
						0% overdue for replacement - 25mm (10 year life)	0.70%	1.70%	13.10%	12.64%	10.73%
						0% overdue for replacement - 38mm (10 year life)	14.40%	13.40%	13.20%	22.90%	5.60%
0% overdue for replacement - 51mm (8 year life)	25.10%	22.20%	14.50%			5.84%	5.43%				
Measure identifies the percentage of meters overdue for replacement based on age with target to maintain all water meters at or below the age for replacement as per Durham Service Level. Larger meters than the ones noted in the chart are tested and repaired as follows: 3 years for 75 mm, 2 years for 100 mm, 1 year for 150 mm and 6 months for 200 and 250 mm. % values include units due at end of year and calculated only within that size category.											
To support the coordination of growth and achieve and maintain an optimal condition standard for all existing and new water supply system assets.	Invest in efforts to mitigate and adapt to climate change to build resiliency	Expand asset management planning to consider and address risk, including climate and optimize asset life cycle.	1C	Replace all Polybutylene Service Connections	Asset Health - Technical	100% of planned poly service connections tendered in the budget year	87.80%	95.20%	98.70%	94.70%	95.80%
				100% of poly connections replaced as per Regional Council-endorsed strategy	23.90%	33.90%	39.10%	58.70%	97.00%		
				Measures progression in replacing polybutylene service connections. Replacement will reduce water service disruptions and emergency work necessary to address poly related breaks. The total number of poly replacements (approximatley 13,900) has been confirmed by field verification work.							
				Infrastructure Leakage Index (ILI)	Operational - Technical	Infrastructure Leakage Index 1.5 annually	2.08	2.00	1.88	1.82	1.96
				Infrastructure Leakage Index (ILI): This is the ratio of current annual real losses (CARL) to the unavoidable annual real losses (UAR) and measures how well the system is being managed for control of real losses.							

Notes

Objectives/Levels of Service are derived from a combination of approved internal plans, policies and studies as well as external regulatory guidelines and requirements

² Supported by the Regional Council approved strategic plan, "Growing Together Reaching Further Aspiring Higher: New Strategic Plan for Durham Region 2015-2019"

³ Supported by the Regional Council approved Corporate Climate Adaptation Plan, Energy Conservation and Demand Management Plan, and 2017 Regional Program Climate Change Update.

Table 6-Technical Service Levels and Performance Measures - Water Supply System

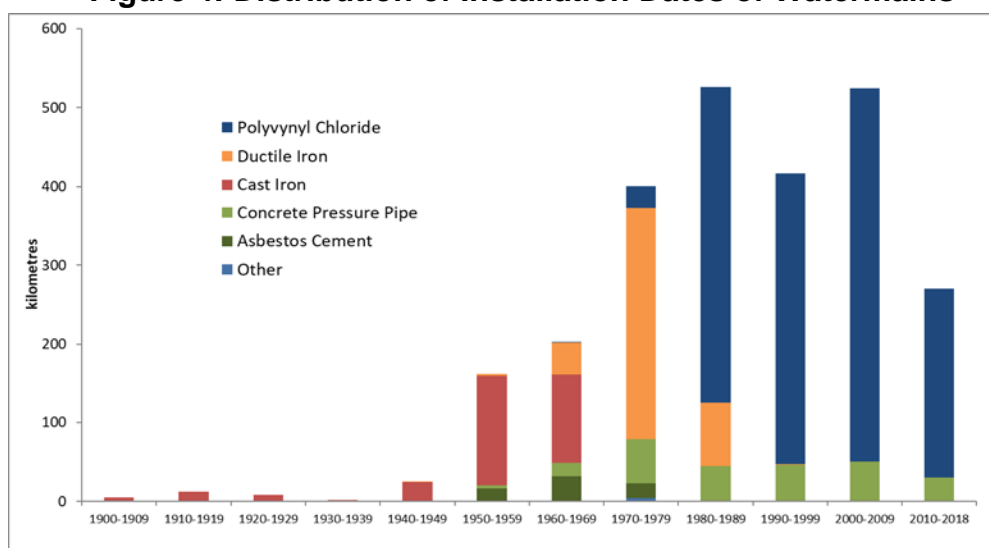
Water Supply System General											
Objectives/ Level of Service ¹	Corporate Strategic Plan Goals and Strategies ²	Corporate Adaptation and Climate Mitigation Goals ³	Ref	Performance Measure	Measure Type	Target	Year of Measure				
							2014	2015	2016	2017	2018
To provide a safe and sufficient water supply to Durham Region while complying with all Provincial and Federal Acts and Regulations. To protect the environment and the quality and quantity of ground and surface water.	Demonstrate leadership in sustainable asset management and environmentally friendly municipal practices.	Invest in preventative maintenance and rehabilitation when most beneficial.	3A	Percentage of Number of Watermain Breaks to Total Properties Connected to Region Water Supply	Community - Technical	0.01% of Watermain Breaks to Properties Connected.	n/a	n/a	n/a	0.01%	0.00%
	Protect, enhance, and where appropriate restore significant water resources, agricultural land, natural heritage and environmentally sensitive areas.	Protect water quality, prevent water losses and implement source water protection		This measures the percentage of available treated water service. The target is to ensure that residents and businesses have water service available 99.99% of the time. This complies with the reporting requirements in the Provincial regulation, Asset Management Planning for Municipal Infrastructure (O. Reg. 588/17).							
To support the coordination of growth and achieve and maintain an optimal condition standard for all existing and new water supply system assets.	Invest in efforts to mitigate and adapt to climate change to build resiliency	Expand asset management planning to consider and address risk, including climate and optimize asset life cycle.	3B	Percentage of Properties Where Fire Flow is Available	Community - Technical	100% of Properties Where Fire Flow is Available	n/a	n/a	n/a	100%	100%
				This measures tracks the percentage of properties that have fire flow in the Region. There is 100% fire flow in the Region of Durham, with 92% of residents having direct supply from fire hydrants. This measure complies with the reporting requirements in the Provincial regulation, Asset Management Planning for Municipal Infrastructure (O. Reg. 588/17).							
			3C	Percentage of Properties Connected to Region's Water Supply System	Community - Technical	92% of Durham's properties	n/a	n/a	n/a	92.00%	92.00%
				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 many properties in rural areas. This measure complies with the reporting requirements in the Provincial regulation, Asset Management Planning for Municipal Infrastructure (O. Reg. 588/17).							
Notes											
¹ Objectives/Levels of Service are derived from a combination of approved internal plans, policies and studies as well as external regulatory guidelines and requirements											
² Supported by the Regional Council approved strategic plan, "Growing Together Reaching Further Aspiring Higher: New Strategic Plan for Durham Region 2015-2019"											
³ Supported by the Regional Council approved Corporate Climate Adaptation Plan, Energy Conservation and Demand Management Plan, and 2017 Regional Program Climate Change Update											

1.7 Water Supply System: Life-cycle Considerations

Linear Assets

Figure 4 provides the distribution of installation dates for the watermains (currently in service). Overall, the water linear system¹ is relatively young with an average remaining life of 70 years.

Figure 4: Distribution of Installation Dates of Watermains



As indicated in Figure 4 above, there are two types of watermain materials that were installed mainly before 1970. These cast iron and ductile iron mains are showing the most deterioration. The Region is actively rehabilitating and replacing these pipes due to high break rates and impending end of useful life. Maintenance activities and rehabilitation strategies such as cement mortar lining with cathodic protection and more recently structural lining are extending the useful life of these watermains. Those selected for cement lining and cathodic protection are typically mid-way through their expected useful life and have shown some signs of deterioration, usually in the form of a few breaks and/or reduced flow due to mineral deposit on the inner pipe walls. Pipes selected for this rehabilitation option must still have good structural integrity. Cement lining restores the inner pipe condition, which improves water quality and fire flow. Cathodic protection provides corrosion resistance and reduces the frequency of breaks. Structural lining technologies, such as cured-in-place pipe, provide almost all of the benefits of a brand-new pipe and can be performed on watermains in poor condition. These rehabilitation methods have the benefit of improving the condition of the watermains while limiting the amount of disruption to residents.

There was a large quantity of new material polyvinyl chloride (PVC) watermain installations over the 30-year period from 1980 to 2010. Given this large quantity of

¹ Average does not include water meters

installations to accommodate growth, financial planning strategies will be undertaken in the annual Water Supply and Sanitary Sewerage Servicing and Financing study to ensure prudent investment strategies to address the need for eventual replacement of these watermains and related assets as they age.

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. At year-end 2018, there was approximately \$10.6 million identified in Very Poor condition, and another \$20.1 million in Poor condition. The Regional Council approved 2019 Water Business Plan and Budget includes \$21.0 million for watermain replacements and or betterments, which is an increase of \$6.6 million from 2018 (\$14.4 million). This increase was possible due to the allocation of funding from the completed polybutylene water service connections in 2019 to further address priority watermain replacements and betterments. As well, the Asset Management Reserve Fund is contributing \$4.6 million as part of the total \$21.0 million watermain replacement and betterment budget for 2019. This is an example of a successful asset management strategy.

The Region has been proactively replacing all polybutylene water service connections that were installed in the 1980's, due to a very high and pre-mature rate of failure. This strategy resulted in a lower replacement cost per unit, reduced service disruptions due to breaks, reduced maintenance costs and reduced water losses. At the end of 2011, there was an estimated 19,900 connections remaining to be replaced. Based on this, Regional Council approved a financing plan in 2011 to replace the remaining connections over a 10-year period. During the first seven years (2012-2018), approximately \$92.6 million was approved in the 2012-2018 Water Supply Budgets to replace nearly 13,900 connections. Recent field verification work completed by Works staff confirmed that many of the streets thought to have polybutylene service connections had copper connections and did not need replacement, resulting in a revised estimate of 13,900 connections requiring replacement. With the approved funding in the 2018 Water Supply Capital Budget being sufficient to complete the remaining polybutylene service connection replacements, funding in 2019 was allocated to replace and improve watermains based on an asset management approach as described above. This is an example of a successful asset management strategy.

Prior to 1952, service connections could be constructed of lead or galvanized iron. The Region has been budgeting for the replacement of the public owned portions of services when homeowners provide proof that lead services on private property have been replaced. The Regional Council approved 2019 Water Supply Business Plan and Budget includes \$1.0 million for the testing, data review, education and replacement of lead water service connections and water filters.

The Region's water meter repair and replacement program ensures meter accuracy, cost effectiveness and protection of user rate revenues used to fund water and sewer programs. Rapid growth in the installation of water meters during the 1980's has been a driver for recent acceleration of the replacement program. The Regional Council approved 2019 Water Supply Business Plan and Budget includes \$3.1 million to

address the inventory of meters greater than 20 years of age.

Lastly, the 2019 Water Supply Budget also included \$0.2 million for the replacement of hydrants as well as another \$0.2 million for the replacement of control valves.

Vertical Assets

Life-cycle considerations of vertical assets include analysis of the timing for key asset management activities, including inspection, maintenance, repair, replacement and disposal to optimize asset life-cycle costs.

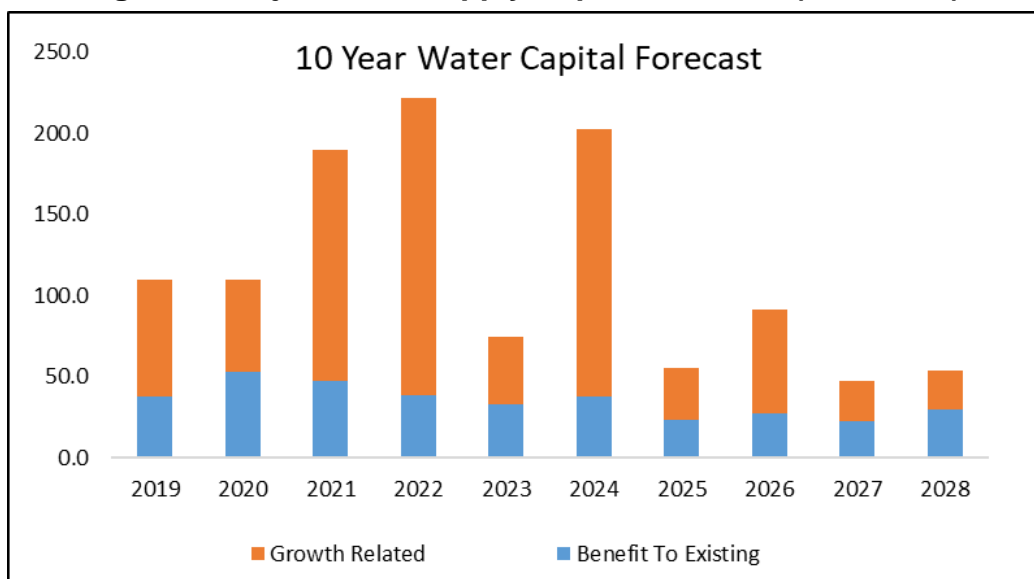
Major rehabilitation investments for water supply vertical assets approved in the 2019 Water Supply Capital Budget include:

- \$10.2 million in additional funding (\$43.9 million in previously approved funding) for the replacement as well as expansion of the Newcastle WSP;
- \$3.0 million for rehabilitation work at the Oshawa WSP;
- \$0.9 million for condition assessment, rehabilitation and replacement of equipment at the Bowmanville WSP; and
- \$0.4 million for repair and rehabilitation of Orono WSP standpipe storage tank.

Water Capital Forecast

Major capital investments for water supply services identified through the 2019 business plans and budgets (rehabilitation and growth related) totals \$1.16 billion.

Figure 5: Major Water Supply Capital Forecast (\$ millions)



It has also been estimated that the preliminary 10-year maintenance related costs for the water supply capital is approximately \$80.5 million, or an annual average of \$8.5 million. This is a preliminary estimate and will be refined in future Asset Management Plans.

The Region is implementing a new Enterprise Maintenance Management System (EMMS), which will enhance asset management capabilities. The new EMMS will allow for improved analysis to ensure timely investments and optimize asset life cycle costs. Moving forward, Regional staff will be further refining life cycle costing analyses for both linear and vertical water supply assets that will be reported in future asset management plans. These will further inform future Water Supply and Sanitary Sewerage Servicing and Financing study and Business Plans and Budgets to ensure prudent investment strategies to address asset management needs.

Useful Lives

Staff continue to review the expected asset life span for water system assets. Some assets are exceeding current life span estimates and others not lasting as long. For linear assets, certain materials have been shown to last longer than others (e.g. some watermain identified in Poor condition are not the oldest within the system).

Regional staff are planning to review useful lives as part of a review and potential update to the Region's Tangible Capital Asset Policy. Based upon these ongoing reviews, asset useful lives may be adjusted.

1.8 Risk Assessment

Regional staff investigate potential risks to water supply assets on an ongoing basis, considering probability, potential consequence and suitability of risk mitigation controls. The following table includes some of the identified potential risks and a sample of some of the ongoing and new mitigation initiatives and controls, which are addressed through annual business planning, asset management and risk management.

Table 7: Risk Mitigation Strategies

Potential Risk Impact	Mitigation Goals
Loss of external utilities	<p>Standby generation assessments, options analysis and implementation.</p> <p>Uninterrupted Power Supply (UPS) systems and upgrades.</p> <p>Update depot-specific contingency plans and training programs.</p> <p>Essential services policies, contingency plans, and continuity plans.</p> <p>Capital redundancy and work around programs. (e.g. twinning, looping, etc.)</p>
Disruption to water supply and water quantity losses	<p>Maintenance and infrastructure rehabilitation and replacement programs.</p> <p>Inspections, risk assessments and source water protection practices.</p> <p>Capital redundancy and continuity programs (e.g. twinning, looping, etc.)</p> <p>Engineering, hydrology, design and erosion mitigation studies and strategies.</p> <p>Water meter replacement and funding strategy.</p> <p>Polybutylene connection replacement strategy.</p> <p>Wellhead protection and management program.</p> <p>Cement lining and cathodic pipe protection strategy.</p> <p>Bulk water dispensing strategy.</p> <p>Leak detection program.</p> <p>SCADA alerts and controls.</p>
Potential for water contamination	<p>Regional source water protection plans and wellhead protection programs.</p> <p>Water quality testing and SCADA alerts and controls.</p> <p>Lead pipe strategy.</p> <p>Sewer Use By law and Backflow Prevention Program and Bylaw.</p> <p>Maintain effective emergency, contingency, and continuity plans.</p> <p>Spill control procedures.</p> <p>Maintenance and infrastructure rehabilitation and replacement programs.</p>

1.9 Climate Change

Significant climate change initiatives are underway within the water supply area. The following sections identify some current climate mitigation measures, to reduce GHG emissions related to water supply as well as current climate adaptation measures to ensure resiliency to the risks from the already changing climate. Future capital investments will be assessed through evidence based technical, environmental and financial assessments supporting long-term sustainability.

Climate Mitigation

The following energy conservation measures are assisting the Region in realizing energy savings and reducing GHG emissions across water supply operations:

- Management and monitoring of energy usage at water supply plants and pumping stations to identify and implement energy savings and optimization initiatives, including refilling standpipes and reservoirs after hours;
- Continued work on thermodynamic pump efficiency and performance tests following refurbishment of large water pumping stations and plants; and
- Several measures to reduce water loss and energy requirements:
 - The completion of replacing all polybutylene service connections (last contract to complete work recently issued) to reduce breakages and water losses;
 - Replace watermains in coordination with local municipalities regional road reconstruction (\$21.0 million approved in 2019);
 - Ongoing educational programs with respect to lawn watering and conservation, including distribution of rain gauges;
 - The replacement of old water meters to ensure accurate registration and promotion of water conservation (the 2019 budget includes \$3.1 million to address the inventory of meters greater than 20 years of age); and
 - The 2019 Water Supply Budget includes \$0.2 million for the replacement of control valves which will reduce risk of potential water loss.

Climate Adaptation and Resiliency: Water Supply

The Region will continue to enhance its ability to moderate potential damages, take advantage of opportunities, and cope with the consequences of climate change through the integration of adaptation considerations into annual corporate risk management, asset management and financial planning processes. These will continue to be addressed through the Business Planning Cycle, including risk management, asset management and long-term financial planning processes to ensure a well-positioned and proactive approach.

Through asset management, the Region aims to proactively invest in preventative maintenance and rehabilitation activities when most beneficial, in order to maximize asset lives and reduce risk, including potential impacts from climate change. A number of plans, improvements, capacity expansions, studies and infrastructure initiatives have significantly enhanced resiliency and the Region's capacity to adapt to the changing climate (see the annual Regional Program Climate Change Update Report 2017-COW-216).

In addition, the Durham Community Climate Adaptation Plan 2016 "Towards Resilience" (DCCAP) was approved in principle (as amended) by Regional Council on December 14, 2016 (2016-COW-103) and was referred to the Region, local municipalities, electrical utilities, conservation authorities and senior government agencies for the review and consideration by all stakeholders. The DCCAP identifies climate related risks and suggests several risk mitigation programs/strategies for consideration. These include the following actions outlined under the objective "...to reduce the severity and frequency of flooding..."

- Protection of critical services from overland flow;
- Protection of facilities subject to flood damage;
- Asset design standards review and update; and
- Addressing pollution resulting from flooding to reduce the risks of pollution hazards;

Annual and forecast business planning priorities have included climate risk mitigating measures meant to help address water supply system impacts due to: more intense and frequent precipitation; heightened erosion potential (e.g. creek pipe crossings); higher surface water ambient temperatures and increased threat of algae growth; and potential disruptions to water supply caused by potential extended power outages (e.g. extreme storms).

For example, as identified in the approved 2019 Water Supply Budget, some initiatives include:

- Wellhead protection (\$0.8 million) and well interference work (\$0.4 million);
- A new well and pumphouse with standby power for the Sunderland system (\$0.6 million in 2019 and \$3.8 million identified in 2020-2021); and
- Replacement of the chlorine lines at the Beaverton Water Supply Plant (\$0.3 million).

The Region will continue to assess and implement climate change initiatives related to the water supply system through the 2020-2028 Business Planning Cycle, including risk management, asset management and long-term financial planning processes to ensure a well-positioned and proactive approach.

1. Attachment #4: Sanitary Sewerage System Asset Class Report

1.1 Description of Sanitary Sewerage System Assets:

Sanitary sewerage assets include sanitary sewers (gravity and forcemains), maintenance holes, chambers, service connections, water pollution control plants (WPCP), sanitary sewage pumping stations (SSPS) and wastewater storage facilities.

1.2 Sanitary Sewerage System Inventory:

Durham's sanitary sewerage system assets consist of vertical and linear assets. Vertical assets refer to facilities that treat sanitary sewage, pump the sewage and store excess sewage (water pollution control plants, pumping stations and wastewater storage facilities respectively). Linear assets collect sanitary sewage and provide a piped route from the customers to the treatment plant. The main components of the sanitary sewerage system inventory are provided in Table 1 and key highlights include:

- The inventory for vertical assets decreased by 1 as the Dunlop sanitary sewerage pumping station was decommissioned in 2018; and
- There were minor year over year inventory increases (ranging between 0 and 3 per cent) in linear assets due to new infrastructure to accommodate growth.

Table 1: Sanitary Sewerage System Inventory Change

Asset Type	Asset Group	Inventory		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Vertical Assets	Water Pollution Control Plants	11	11	0	0.0%
	Wastewater Pumping Stations	52	51	-1	-1.9%
	Wastewater Storage Facilities	2	2	0	0.0%
Linear Assets	Gravity Sewers / Siphons (km)	2,092.2	2,140.4	48.2	2.3%
	Forcemains (km)	63.4	63.5	0.1	0.2%
	Maintenance Holes/Chambers	30,314	31,137	823	2.7%
	Service Connections	170,746	172,665	1,919	1.1%

1.3 Sanitary Sewerage System Replacement Costs

The total year end 2018 estimated replacement cost of the sanitary sewerage assets is \$4.96 billion, an increase of \$279 million or 6 per cent over 2017 (\$4.68 billion) due to:

- The increased replacement cost for the new linear assets to accommodate growth as well as increased benchmark construction costs for existing linear asset; and
- The increased replacement cost for vertical assets based on rising benchmark construction costs for all facilities, partially offset by the decommissioning of the Dunlop sanitary pumping station (\$1.6 million decrease in replacement value).

Table 2: Sanitary Sewerage System Replacement Value (\$ Millions)

Asset Type	Asset Group	Replacement Costs		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Vertical Assets	Water Pollution Control Plants	969.7	1,012.2	42.5	4.4%
	Wastewater Pumping Stations	278.4	288.3	9.9	3.6%
	Wastewater Storage Facilities	6.2	6.5	0.3	5.1%
	Replacement Value Sub-total	1,254.3	1,307.0	52.7	4.2%
Linear Assets	Gravity Sewers/Siphons	2,115.5	2,259.0	143.5	6.8%
	Forcemains	100.7	107.3	6.6	6.5%
	Maintenance Holes/Chambers	413.6	444.5	30.9	7.5%
	Service Connections	793.6	839.5	45.9	5.8%
	Replacement Value Sub-total	3,423.5	3,650.3	226.8	6.6%
TOTAL		4,677.8	4,957.3	279.5	6.0%

1.4 Sanitary Sewerage System Condition Assessment Rating

For vertical assets, a site-specific condition assessment of Plant 1 at the Port Darlington WPCP and the Duffin Creek WPCP is currently underway. A site-specific condition assessment for the Newcastle WPCP is expected to be initiated in 2019. These build upon the previously completed assessments of the Water Street Sanitary Sewerage Pumping Station (SSPS) and the Uxbridge Brook WPCP.

For the other vertical assets, they have been assessed using a high-level scoring methodology completed by Plant Operations staff based on the condition review of the process-related equipment and tanks and by Facilities staff for the buildings and building related services. This high-level survey was updated in March 2018 with the average of the condition ratings shown in Table 3 below.

Moving forward, condition assessments are anticipated to be completed for all vertical assets. Previously approved funding (\$1.0 million), along with a preliminary estimate of \$2.7 million requested over 2020-2028 will allow these detailed asset management assessments to continue over the forecast period.

For linear assets, the condition assessment scoring is done using the available data specific to each asset class. For the gravity sanitary sewers, the 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. The condition of the forcemains also includes any break history. For the maintenance holes and chambers only age is used for the scoring. Service connections are assigned the same score as the gravity sewer that they are connected to.

CCTV inspections can only be done in smaller diameter pipes with lower flow (larger diameter sewers have high flows within the pipe preventing the use of CCTV inspections. There are other inspection technologies available for the larger trunk gravity sewers and forcemains to collect better condition data for these pipes.

Previously approved funding (\$0.6 million) combined with \$0.2 million in 2019 from the Asset Management Reserve Fund will allow these assessments to continue through 2019. A preliminary estimate of \$1.8 million has been identified over 2020-2028 to continue these over the next 9 years.

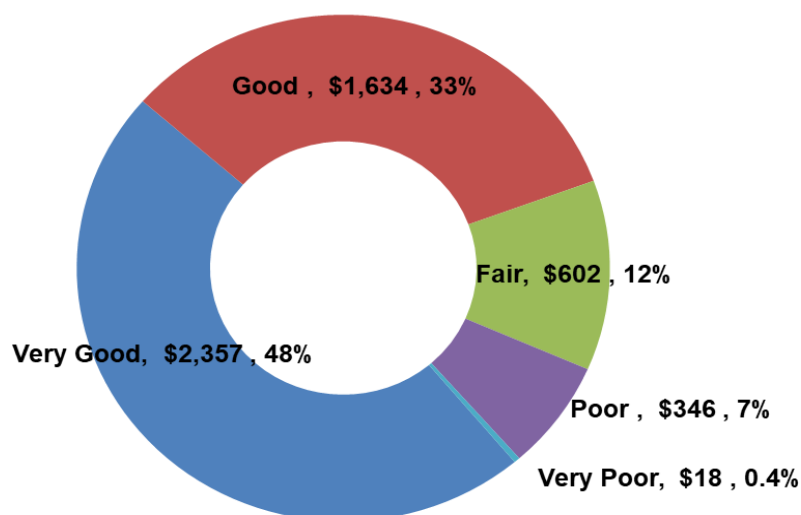
More frequent specific inspections are regularly undertaken by operations staff for both vertical and linear infrastructure, scheduled through preventative maintenance and capital programs or as part of mandatory inspections to ensure regulatory compliance.

The condition ratings for vertical and linear assets remained the same as last year, being Fair and Very Good respectively, resulting in an overall condition rating of Good for all sanitary sewerage assets.

Table 3: Sanitary Sewerage System Condition Ratings

Asset Type	Asset Group	Condition Rating	Condition Rating	Year-Over-Year Trend
		2017	2018	
Vertical Assets	Water Pollution Control Plants	C+	C+	⇒
	Wastewater Pumping Stations	C+	C+	⇒
	Wastewater Storage Facilities	A	A	⇒
	Vertical Consolidated Ratings	C+	C+	⇒
Linear Assets	Gravity Sewers /Siphons	A-	A-	⇒
	Forcemains	A-	A-	⇒
	Maintenance Holes	B+	B+	⇒
	Service Connections	A-	A-	⇒
	Linear Consolidated Ratings	A-	A-	⇒
Overall Sanitary Sewerage System Condition Rating		B+	B+	⇒

Figure 1: Sanitary Sewerage Condition Rating by Replacement Value (\$millions)¹

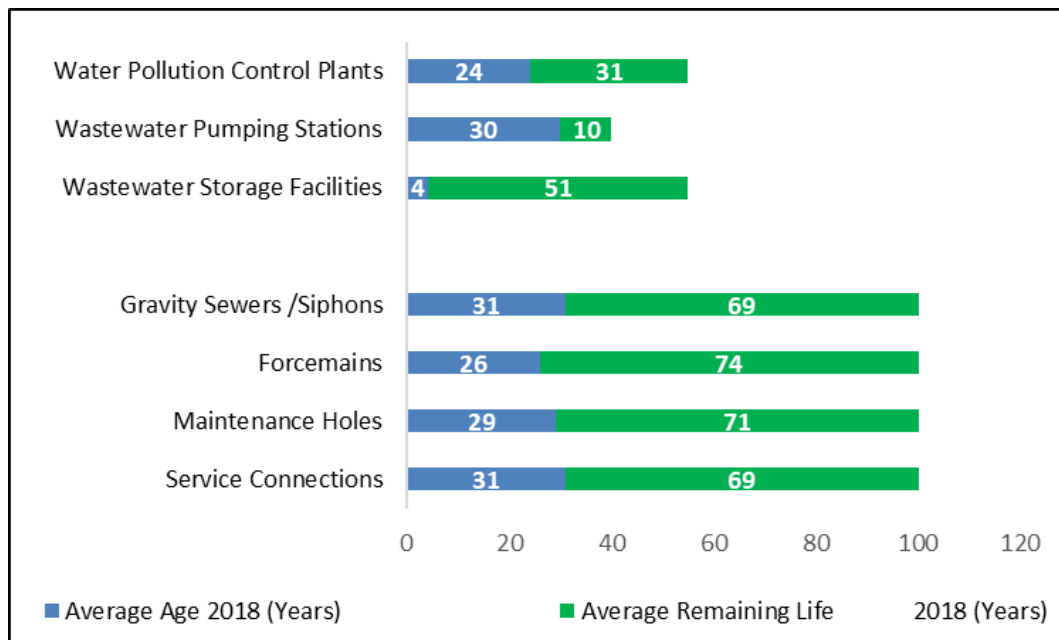


¹ Percentage total may not add due to rounding.

1.5 Sanitary Sewerage System Average Age and Remaining Useful Life

Figure 2 summarizes the average age and remaining asset life of sanitary sewer assets.

Figure 2: Sanitary Sewerage System Average Age and Remaining Useful Life



1.6 Sanitary Sewerage System Levels of Service and Performance Measurement

The Works Department is responsible for the collection and treatment of sanitary sewerage. The costs are 100 per cent user rate supported and not funded from property taxes.

The service level objectives for sanitary sewerage are:

Table 4

Service Level Objectives
<ul style="list-style-type: none"> 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.

These service levels are supported by the following Regional Council approved plans, studies, policies and procedures, as well as through meeting and or exceeding regulatory compliance requirements and guidelines (Table 5).

Table 5

Regional Plans, Studies, Policies, & Procedures	Regulatory Compliance Requirements and Guidelines
<ul style="list-style-type: none"> 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 Strategic Plan Regional Official Plan Corporate Climate Adaptation Plan Energy Conservation and Demand Management Plan (CDM) Servicing and Financing Studies 	<ul style="list-style-type: none"> 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 Environment Protection Act Fisheries Act Ontario Regulation 129/04 Licencing of Sewage Works Operators Ontario Regulation 248/03 Drinking Water Testing Services Clean Water Act

Sanitary Sewerage Community Levels of Service

One of the key community service level objectives is to provide safe and reliable wastewater collection and treatment for the Region. Figure 3 (Durham Region Sanitary Sewerage System Map) identifies the areas within Durham Region that are connected to the Regional wastewater system. All wastewater leaving residential dwellings, institutions, and businesses enters the Region's vast network of pipes known as the sanitary sewerage collection system. The sewage is conveyed by gravity and/or pressure to one of the Region's 11 WPCP for treatment.

To protect the environment while complying with all regulatory requirements, the Region's sanitary sewage is treated in accordance with Ontario Ministry of the Environment, Conservation and Parks (MECP) requirements regulating the quality of the effluent. Effluent is the sewage that has been treated at one of the Region's water pollution control plants and discharged into the approved receiving water body for the plant. The Region's effluent undergoes the full train of unit processes as listed in the Environmental Compliance Approval for that plant. Provincial compliance requirements related to the Region's sanitary sewerage system are discussed extensively in the Water Supply and Sanitary Sewerage Servicing and Financing Study.

The Federal Government also establishes regulations related to wastewater

management and pollution prevention and works with the Canadian provinces and territories and the U.S. federal government and states, establishing mandatory minimum standards to protect water resources.

The Duffin Creek WPCP in the City of Pickering is accredited to ISO 14000 for the Environmental Management System (EMS) in place. It is anticipated that the EMS will be implemented at remaining Regional WPCPs in future years.

These service levels described above also comply with the reporting requirements in the newly approved Provincial Asset Management Regulation (O. Reg. 588/17).

Another sanitary sewerage service level objective is to reduce the amount of storm water Inflow and Infiltration (I&I) into the Region's sanitary sewerage system so that clean rainwater or groundwater does not make its way to the sewerage plant for treatment. The additional volume being treated increases costs and may cause sewage volumes to prematurely exceed design capacity. Storm water can enter the sanitary sewer system in a number of ways. Infiltration can occur at poor joints in the pipe or at lids of maintenance holes along the sewer system. Inflow is a direct connection to the sanitary sewer that should not be connected such as a storm water sewer or house foundation drains. To reduce infiltration and inflow, the Region's policy prohibits the practice of foundation drains connected to the sanitary sewerage system. In addition, the Region has completed additional flow monitoring work on key sewers and extensive smoke testing on selected sanitary sewers to identify cross connections from the storm drainage system and rainwater downspouts. The Region has delivered newsletters and had public information meetings educating the public on the disconnect program to encourage the residents in older homes to disconnect their foundation drains. The Region has also implemented an annual I&I reduction program to continue work on identifying potential storm water entry points in the sanitary sewerage system. The 2019 Sanitary Sewerage Capital Budget includes \$0.4 million in previously approved funding as well as \$0.5 million annually over the forecast period to conduct I&I studies and complete remedial works as required in various locations.

The Region's inspection and maintenance programs extends the useful life and maintains the integrity of the sanitary sewerage infrastructure. The Works Department maintains the sanitary sewerage infrastructure in accordance to the updated sewer maintenance and operations standards (Report 2016-COW-64). This ensures that all the wastewater assets are inspected and maintained to an optimal condition standard.

With all these service levels (including the technical measures reported in Table 6), the Region is fully compliant with all the applicable sanitary sewerage service level reporting requirements two years ahead of the deadline of July 1, 2021 in Provincial regulation, Asset Management Planning for Municipal Infrastructure (O. Reg. 588/17).

Technical Service Levels and Performance Measures

Technical service levels and performance measures are summarized in Table 6.

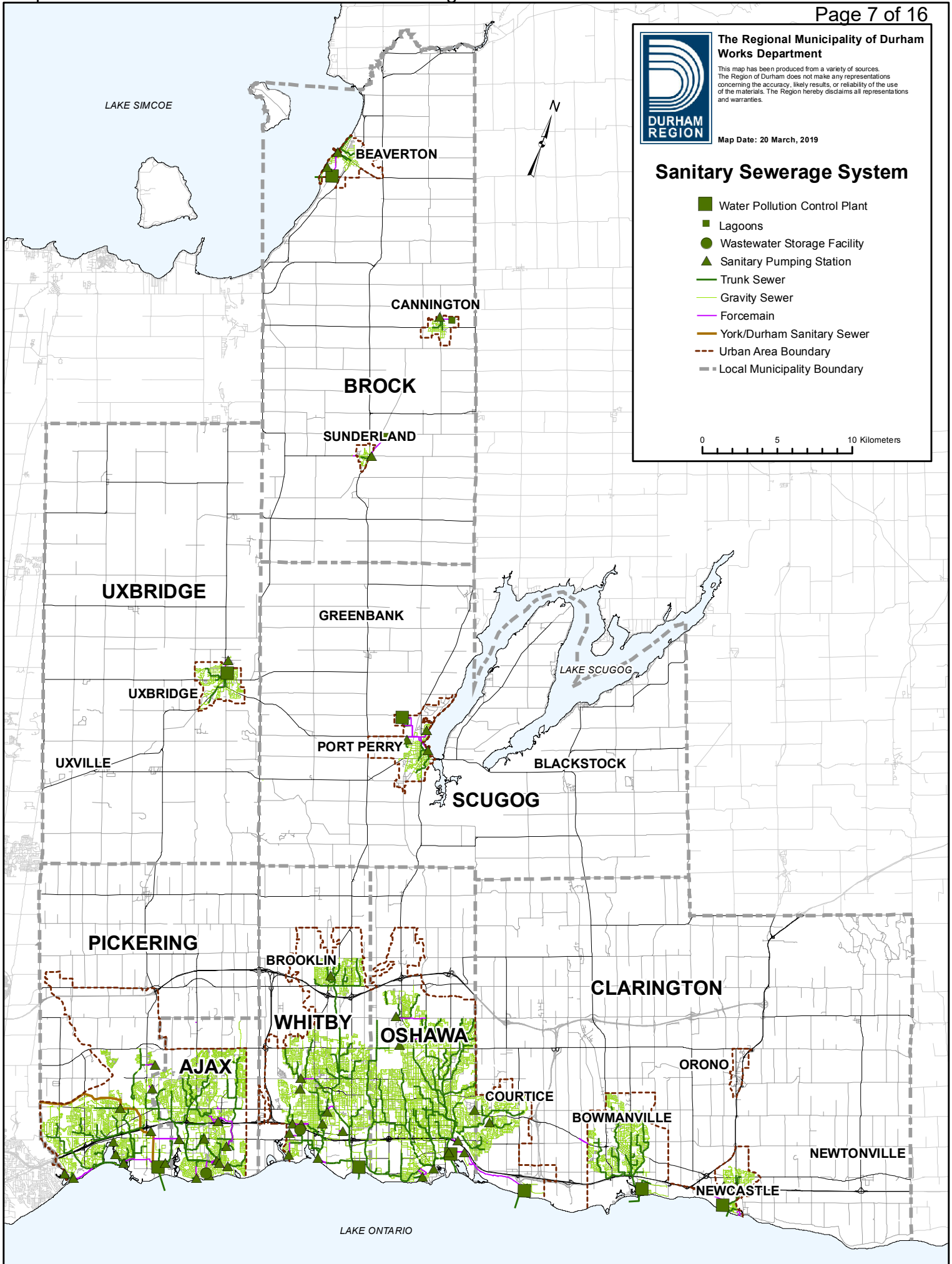


Table 6-Technical Service Levels and Performance Measures - Sanitary Sewerage Supply System

Sanitary Sewerage System-Linear Assets											
Objectives/ Level of Service ¹	Corporate Strategic Plan Goals and Strategies ²	Corporate Adaptation and Climate Mitigation Goals ³	Ref	Performance Measure	Measure Type	Target	Year of Measure				
							2014	2015	2016	2017	2018
To provide safe and reliable wastewater treatment for all Durham customers.	Protect, enhance, and where appropriate restore significant water resources, agricultural land, natural heritage and environmentally sensitive areas.	Reduce the inflow and infiltration of groundwater or storm water into the sanitary sewer collection system	1A	Condition Index Rating	Asset Health-Technical	0.1% of linear assets rated as very poor	0.00%	0.10%	0.10%	0.30%	0.40%
				Measure identifies the % 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 (Closed Circuit Television) inspection score and Operational staff input.							
To protect the environment, improve the quality of effluent discharged and comply with all Provincial and Federal Acts and Regulations.	Demonstrate leadership in sustainable asset management and environmentally friendly municipal practices	Continue to improve the quality of sanitary sewerage effluent through treatment process improvements and WPCP upgrades and replacements	1B	Mainline Sewer Inspections	Operational-Technical	10% of sanitary sewers inspected by CCTV per year	8.20%	7.90%	7.90%	7.76%	7.01%
				Measures % of sanitary sewers inspected by CCTV (camera) every year as per Durham Service Levels. The target is 10% of gravity sewers only (not including siphons) per year so a number 10 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.							
To support the coordination of growth and maintain an optimal condition standard for all existing and new sanitary sewerage system assets	Invest in efforts to mitigate and adapt to climate change to build resiliency across the Region.	Expand asset management planning to consider and address risk, climate and optimize life cycle. Invest in preventative maintenance and rehabilitation.	1C	Sanitary Maintenance Hole Inspections	Operational-Technical	50% of maintenance holes inspected annually	28%	27%	34%	43%	42%
				Measures the % of maintenance holes inspected on a two year cycle as per Durham Service Levels. The target is 50% inspected each year. It is a preventative maintenance procedure which validates condition.							
			1D	Mainline Sewer Cleanings	Operational-Technical	50% of ≤375mm diameter sewers cleaned annually	55%	53%	43%	48%	43%
				Measures % of sewers cleaned based on size as per Durham Service Levels. A value in the chart above 50% 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.							
Notes											
¹ Objectives/Levels of Service are derived from a combination of approved internal plans, policies and studies as well as external regulatory guidelines and requirements											
² Supported by the Regional Council approved strategic plan, "Growing Together Reaching Further Aspiring Higher: New Strategic Plan for Durham Region 2015-2019"											
³ Supported by the Regional Council approved Corporate Climate Adaptation Plan, Energy Conservation and Demand Management Plan (CDM) and 2017 Regional Program Climate Change Implementation Plan											

Table 6-Technical Service Levels and Performance Measures - Sanitary Sewerage Supply System

Sanitary Sewerage System-Vertical Assets											
Objectives/ Level of Service ¹	Corporate Strategic Plan Goals and Strategies ²	Corporate Adaptation and Climate Mitigation Goals ³	Ref	Technical Performance Measure	Measure Type	Target	Year of Measure				
							2014	2015	2016	2017	2018
To provide safe and reliable wastewater treatment for all Durham customers.	Protect, enhance, and where appropriate restore significant water resources, agricultural land, natural heritage and environmentally sensitive areas.	Reduce the inflow and infiltration of groundwater or storm water into the sanitary sewer collection system	2A	Condition Index Rating	Asset Health - Technical	0% of vertical assets rated as very poor	0.00%	0.00%	0.00%	0.30%	
				Measure identifies the % of plants, pumping stations and sewage storage facilities which have very poor rating. The assessments were updated in March 2018 by plant operation staff for the process equipment and facilities staff for the building condition to provide an overall high level score. The condition % is calculated on replacement value. It is anticipated that detailed condition assessments of all facilities will be done over the next 7 to 10 years.							
				Odour Complaints	Community-Technical	0 valid odour complaints per year	4	0	3	1	0
To protect the environment, improve the quality of effluent discharged and comply with all Provincial and Federal Acts and Regulations.	Demonstrate leadership in sustainable asset management and environmentally friendly municipal practices	Continue to improve the quality of sanitary sewerage effluent through treatment process improvements and water pollution control plant upgrades and replacements	2B	Odour complaints can be indicative of the operating process at the sewerage treatment plants. Zero valid odour complaints from the public annually is the target.							
				Compliance with MECP Regulatory Requirements	Operational-Technical	0% wastewater by-passed treatment annually	0.00%	0.00%	0.03%	0.00%	0.05%
				Measures the % of untreated wastewater in accordance with wastewater by passes as reported to the MECP (numerator) as a share of total megallitres of treated wastewater plus estimated megallitres of untreated wastewater (denominator).							
To support the coordination of growth and maintain an optimal condition standard for all existing and new sanitary sewerage system assets	Invest in efforts to mitigate and adapt to climate change to build resiliency across the Region.	Expand asset management planning to consider and address risk, climate and optimize life cycle. Invest in preventative maintenance and rehabilitation.	2D	Energy Consumption per ML treated	Operational-Technical	Energy used kWh/e / ML treated	781	798	832	822	924
				Reduce annual energy consumption by 1% annually		-7.2%	2.1%	4.4%	-1.2%	12.3%	
				This standard unit of measure (kilowatt-hour equivalent or kWh/e) is the total amount of energy used (electric, natural gas, diesel and furnace oil) to operate the sanitary treatment plants and pumping stations over the volume of sewerage treated. (Duffin Creek WPCP are gross numbers including York's share.) Energy conservation programs are underway to replace lighting fixtures and equipment to reduce consumption.							
			2E	Back up Power Capabilities	Operational-Technical	100% of plants & pumping stations with back-up generators	98%	98%	96%	96%	
				100% of generators newer than 30 years in age		71%	71%	71%	67%		
				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 generators currently in place.							

Notes¹ Objectives/Levels of Service are derived from a combination of approved internal plans, policies and studies as well as external regulatory guidelines and requirements² Supported by the Regional Council approved strategic plan, "Growing Together Reaching Further Aspiring Higher: New Strategic Plan for Durham Region 2015-2019"³ Supported by the Regional Council approved Corporate Climate Adaptation Plan, Energy Conservation and Demand Management Plan (CDM) and 2017 Regional Program Climate Change Update

Table 6-Technical Service Levels and Performance Measures - Sanitary Sewerage Supply System

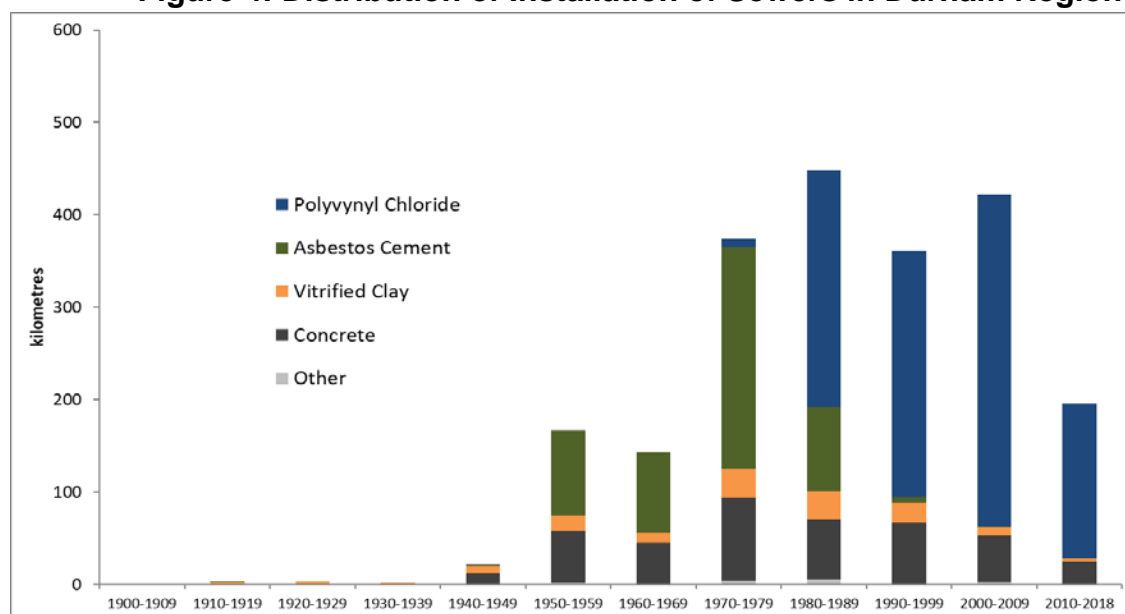
Sanitary Sewerage System-General										
Objectives/ Level of Service ¹	Corporate Strategic Plan Goals and Strategies ²	Corporate Adaptation and Climate Mitigation Goals ³	Ref	Performance Measure	Measure Type	Target	Year of Measure			
							2014	2015	2016	2017
To provide safe and reliable wastewater treatment for all Durham customers.	Protect, enhance, and where appropriate restore significant water resources, agricultural land, natural heritage and environmentally sensitive areas.	Reduce the inflow and infiltration of groundwater or storm water into the sanitary sewer collection system	3A	Percentage of Properties connected to Region's Wastewater System	Community- Technical	87% of Properties to be Connected to Regional Wastewater System	n/a	n/a	n/a	87.00%
				Measures the percentage of properties connected to the Region of Durham's wastewater system. Only properties within an Urban Boundary can be potentially connected to a sewage system. Durham has many rural properties. This measure complies with the reporting requirements in the Provincial regulation, Asset Management Planning for Municipal Infrastructure (O. Reg 588/17)						
To protect the environment, improve the quality of effluent discharged and comply with all Provincial and Federal Acts and Regulations.	Demonstrate leadership in sustainable asset management and environmentally friendly municipal practices	Continue to improve the quality of sanitary sewerage effluent through treatment process improvements and WPCP upgrades and replacements	3B	Number of Effluent Violations Per Year to Total Number of Properties Connected to Region Wastewater System	Community- Technical	0% of Effluent Violations to Properties Connected to Region's Wastewater System	n/a	n/a	n/a	0%
				This measures the percentage of effluent violations compared to the total number of properties connected to the Region's wastewater system. This measure complies with the reporting requirements in the Provincial regulation, Asset Management Planning for Municipal Infrastructure (O. Reg 588/17)						
To support the coordination of growth and maintain an optimal condition standard for all existing and new sanitary sewerage system assets	Invest in efforts to mitigate and adapt to climate change to build resiliency across the Region.	Expand asset management planning to consider and address risk, climate and optimize life cycle. Invest in preventative maintenance and rehabilitation.	1C	Number of Wastewater Backups to Total Number of Properties Connected to Region Wastewater System	Community- Technical	0% of Wastewater Backups to Properties Connected to Region's Wastewater System	n/a	n/a	n/a	0%
				This measures the percentage of wastewater backups compared to the total number of properties connected to the Region's wastewater system. This measure complies with the reporting requirements in the Provincial regulation, Asset Management Planning for Municipal Infrastructure (O. Reg 588/17)						
Notes ¹ Objectives/Levels of Service are derived from a combination of approved internal plans, policies and studies as well as external regulatory guidelines and requirements ² Supported by the Regional Council approved strategic plan, "Growing Together Reaching Further Aspiring Higher: New Strategic Plan for Durham Region 2015-2019" ³ Supported by the Regional Council approved Corporate Climate Adaptation Plan, Energy Conservation and Demand Management Plan (CDMP) and 2017 Regional Program Climate Change Update										

1.7 Sanitary Sewerage System Life-cycle Considerations

Linear Assets

Figure 4 shows the distribution of the dates of sewer installations (currently in service) by pipe material. Overall, the sewer collection system is considered relatively young, with an average remaining life of approximately 69 years.

Figure 4: Distribution of Installation of Sewers in Durham Region



The CCTV inspection program, which is done on 10 per cent of the gravity sewer network annually, provides a clear picture of a sewer's condition. This assessment provides the necessary information to allow for targeted and timely repairs and rehabilitation work to extend the useful life at the lowest life cycle cost. This includes pipe liners, ream and seal technology, and pipe segment replacements. Full sewer replacements are preferred when the sewer condition is Very Poor or when there is an opportunity to coordinate with other infrastructure work such as road reconstruction or watermain replacement.

Forcemains within the sanitary sewerage network have similar life cycle characteristics to watermains as they are both pressurized. Targeted and timely repairs and rehabilitation work extend the useful life. Replacements are made when a forcemain is in Very Poor condition. Where redundancy is provided by twinned forcemains, the work can be planned with other infrastructure work and be more cost effective.

At year-end 2018, there was approximately \$14.0 million (0.4 per cent) of the linear system identified in Very Poor condition, and another \$34.3 million (0.9 per cent) in Poor condition. The Regional Council approved 2019 Sanitary Sewer Budget includes \$14.1 million to address priority sanitary sewer linear asset replacements/betterments, which was an increase of approximately \$6.9 million over 2018 (\$7.2 million). This increase was partially attributable to the increased contribution from the Asset Management Reserve Fund of \$2.6 million for a total 2019 contribution of \$5.1 million (from \$2.5

million in 2018).

Vertical Assets

Life-cycle considerations for vertical assets include analysis of the timing to carry out key asset management activities including inspection, maintenance, repair, and replacement to optimize life-cycle costs.

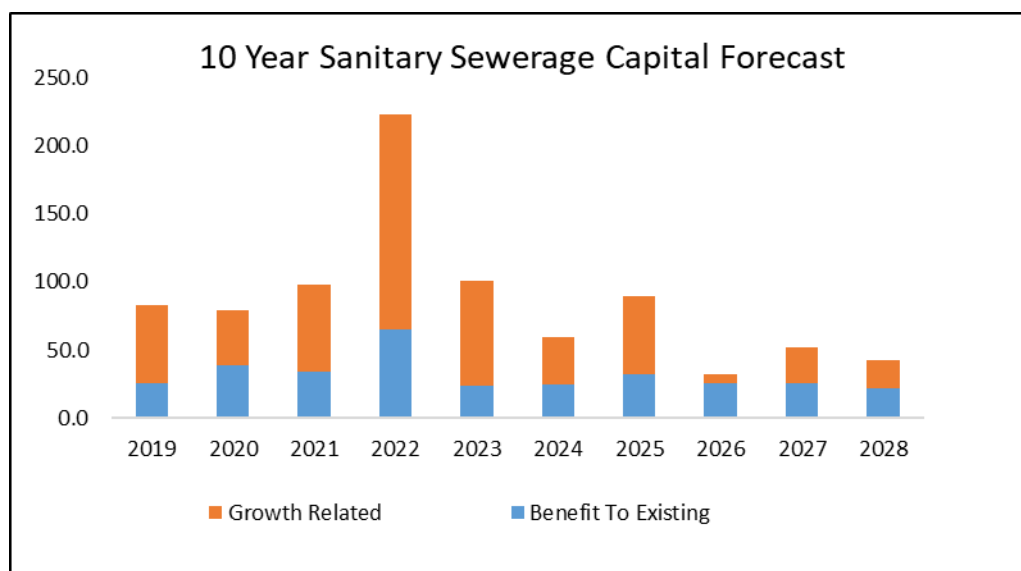
Major rehabilitation investments for sanitary sewerage vertical assets approved in the 2019 Sanitary Sewerage Capital Budget include:

- \$2.5 million for repair, rehabilitation and remediation work at the Corbett Creek WPCP;
- \$2.5 million for rehabilitation works, upgrades and optimization review at the Uxbridge WPCP;
- \$1.7 million for rehabilitation work at digester no.1, performance improvements for the grit tank, and refurbishment of the mixers at the Courtice WPCP (funded by \$1.7 million from the Asset Management Reserve Fund); and
- \$1.6 million (Durham's share) for the replacement of reactors no.1 and no.2 at the Duffin Creek WPCP.

Sanitary Sewerage Capital Forecast

Major capital investments for sanitary sewerage services identified through the 2019 business planning and budget process (rehabilitation and growth) total \$0.9 billion.

Figure 5: Sanitary Sewerage Capital Forecast (\$ millions)



It has also been estimated that the preliminary 10-year maintenance related cost for sanitary sewerage is approximately \$76.9 million, or an annual average of \$7.7 million. This preliminary estimate will be further refined in future Asset Management Plans.

The Region is implementing a new Enterprise Maintenance Management System (EMMS), which will enhance asset management capabilities. The new EMMS will allow for improved analysis to ensure timely investments and optimize asset life cycle costs. Moving forward, Regional staff will be further refining life cycle costing analyses for both linear and vertical water supply assets that will be reported in future asset management plans. These will further inform future Water Supply and Sanitary Sewerage Servicing and Financing studies and Business Plans and Budgets to ensure prudent investment strategies to address asset management needs.

Useful Life

Staff continue to review expected asset useful life as part of condition assessments. Some assets are lasting longer than the currently projected useful life while some other assets may be falling short of their estimated useful life. For linear assets, certain pipe material types have been shown to last longer than others.

Regional staff are planning to review useful lives as part of a review and potential update to the Region's Tangible Capital Asset Policy. Based upon these ongoing reviews, asset useful lives may be adjusted.

1.8 Risk Assessments

Regional staff investigate potential risks to sanitary sewerage system assets on an ongoing basis, considering probability of occurrence, potential consequence as well as the suitability of existing risk mitigation controls. The following table includes a sample of identified potential risks to the sanitary sewerage system that continue to be monitored and assessed, with mitigation controls addressed through annual business planning, asset management and risk management.

Table 7: Risk Mitigation Strategies

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

1.9 Climate Change

The following sections identify current climate mitigation measures, to reduce GHG emissions related to the sanitary sewerage system as well as climate adaptation measures to ensure resiliency to the risks of the changing climate.

Climate Mitigation: Sanitary Sewerage Strategies to Reduce GHG Emissions

Current climate mitigation priorities in the area of sanitary sewerage are focused on reducing energy and fuel usage and associated GHG emissions, as well as maximizing opportunities provided under provincial, federal and utility incentive programs and grants.

Regional staff also continue the investigation of renewable fuel opportunities. For example, an Integrated Resource Recovery Study (IRR) to consider uses of bio gas including potential combined-heat and-power (CHP) options, which could utilize digester gas to generate electricity, is currently commencing for Duffin Creek WPCP. In addition, an IRR study is also ongoing for the Courtice WPCP and is nearing completion.

Examples of some upgrades included in the 2019 Sanitary Sewerage Budget that will improve energy efficiency are:

- Remediation work at digester No. 1, performance improvements for the grit tank and refurbishment of the mixers at the Courtice Water Pollution Control Plant (\$1.7 million);
- Replacement of capacitor bank at the Courtice WPCP (\$0.15 million);
- Mechanical screen replacement at the Bayly St. Sanitary Sewage Pumping Station (\$1.5 million); and
- Pump replacement at various water pollution control plants and pumping stations (\$0.20 million)

The Region also works collaboratively with electricity and natural gas local distribution companies to leverage available programs, technical resources and energy savings incentives. A major initiative in sanitary sewerage was the Region's participation in the Embedded Energy Manager (EEM) program at Duffin Creek WPCP. The program provides an on-site, full-time staff position dedicated to energy management. Since 2017, the EEM initiative at Duffin Creek WPCP surpassed its mandated program savings of over 2 million kWh.

Climate Adaptation: Sanitary Sewerage Strategies to Increase Resilience to Climate changes

The focus of corporate climate adaptation work based upon staff assessments of climate risk and existing Regional program mitigation controls in place are to:

- Ensure adequate standby power, redundancies, business continuity and supervisory control and data (SCADA) systems throughout program areas;
- Reduce potential infiltration of groundwater or stormwater into the sanitary sewer collection system to mitigate flooding and inflow risk;

- Enhance erosion protection at creek crossings to protect watermain and 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.

As an example of ensuring adequate standby power, there was previously approved funding (\$0.3 million) for the design of standby power at Carruthers Creek pumping station with construction currently scheduled for 2020 (\$1.7 million).

Localized and intense rainfall activity has resulted in stormwater entering and overloading the sanitary collection system, putting a burden on the Region's sanitary sewer infrastructure and treatment facilities. The Region has taken significant steps to reduce inflow and infiltration (I&I) through the assessment of existing systems and understanding the performance of the system under extreme storm events. The 2019 Sanitary Sewerage Capital Budget includes \$0.4 million in previously approved funding as well as \$0.5 million annually over the forecast period to conduct I&I studies and complete remedial works as required in various locations. This work will ensure a continued understanding of where the Regional sanitary sewerage system may be at risk, and to implement appropriate plans to mitigate risks as part of the Region's overall long-term asset management strategy.

The Region has major sewer infrastructure crossing or adjacent to water courses throughout its area. As river and creek beds erode and meander over time, especially during large storm events, infrastructure can be exposed and left unprotected, potentially resulting in failure. The Region has developed an inventory of where all sanitary sewers cross creeks or rivers. A condition assessment program has been implemented to ensure the protection of infrastructure at water crossings. Any remediation work is identified during these inspections and subsequently programmed as a repair or budgeted as a larger capital project. Once the first round of inspections is complete, an annual inspection will be done at locations that are deemed to be at a higher risk for erosion. The remaining crossings will be inspected at a less frequent interval.

Climate adaptation will continue to be addressed through the Business Planning Cycle, including risk management, asset management and long-term financial planning processes to ensure a well-positioned and proactive approach.

1. Attachment #5: Transportation System Asset Class Report

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); structures consisting of bridges and culverts; storm sewers, maintenance holes, catch basins, and outfalls, which capture storm water flows from Regional roads; and, traffic control systems (including traffic control signals, flashing beacons, signs, roadside protection, intelligent transportation systems and communication infrastructure), which control and monitor the safe and efficient flow of traffic throughout the Region.

1.2 Transportation System Inventory

The 2018 year-end inventory of transportation assets is summarized in Table 1:

Table 1: Transportation System Inventory Change

Asset Type	Asset Group	Inventory		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Road Network (arterial)	High Volume Urban (Lane km)	770.0	840.0	70.0	9.1%
	Low Volume Urban (Lane km)	217.2	162.8	(54.4)	-25.0%
	High Volume Rural (Lane km)	412.5	407.8	(4.7)	-1.1%
	Low Volume Rural (Lane km)	977.0	959.0	(18.0)	-1.8%
	<i>Total Road Network (Lane km)</i>	<i>2,376.7</i>	<i>2,369.6</i>	<i>(7.10)</i>	<i>-0.3%</i>
Structures	Bridges	117	118	1	0.9%
	Culverts >3m	97	104	7	7.2%
Storm Sewer	Storm Sewer Mains (km)	290.2	293.3	3.1	1.1%
	Culverts <3m (km)	33.8	34.5	0.7	2.2%
	Maintenance Holes	4,523	4,597	74	1.6%
	Catchbasins	5,350	5,401	51	1.0%
	Outfalls	436	399	-37	-8.5%
Traffic Control	Traffic Control Signals and Flashing Beacons	458	464	6	1.3%
	Traffic Control Systems	3	3	0	0.0%
	Intelligent Transportation Systems	23	23	0	0.0%
	Communication Infrastructure (km)	274.5	317.6	43.1	15.7%
	Regulatory, Warning and Information Signs	22,178	22,275	97	0.4%
	Roadside Protection (km)	100.9	103.4	2.5	2.5%
	CCTV	92	95	3	3.3%

The 2018 year-end inventory for the transportation system assets compared to 2017 changed as follows:

- **Roads** – The road inventory marginally decreased by 7.1 lane km or 0.3 percent as newly completed road expansions into the 2018 inventory were offset by road transfers to the Province of Ontario for Highway 407 and Highway 418, and a road transfer from the Region within the City of Pickering (related to Brock Road by pass). There was a reclassification of some road segments (mostly from low volume urban to high volume urban) reflecting updated traffic volumes and urbanization projects;

- **Structures** – The total number of bridges increased by one structure as a new structure was constructed and commissioned in 2018. The total number of culverts increased by seven, resulting from new culverts constructed and commissioned in 2018 as well as existing culverts added to the inventory based on refinement of the structures and storm sewer inventory;
- **Storm Sewer** – The increase to some of the storm sewer asset groups was due to urbanizing projects and year over year refinements in the storm inventory reflecting improving data collection and quality. Refinements to the data can be expected through future updates as staff continue to assess and improve storm data systems and methodologies; and
- **Traffic Control** – The increase in traffic signals resulted from existing unsignalized intersections meeting traffic signal warrant criteria as traffic volumes increase over time and expansion of the road network as a result of development. CCTV camera installations have proven to be an important tool for monitoring/managing traffic issues, and three new CCTV installations came into service in 2018. The sign inventory increased as new signs were installed to cater to growth and improve safety. The change in communication infrastructure inventory was due to improvements in data collection.

1.3 Transportation System Replacement Value

The total 2018 year-end estimated replacement value for transportation system assets is \$3.59 billion, an increase of \$130.4 million or 3.8 percent compared to 2017.

Table 2: Transportation System Replacement Value (\$ Millions)

Asset Type	Asset Group	Replacement Costs		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Road Network (arterial)	High Volume Urban	775.2	889.6	114.4	14.8%
	Low Volume Urban	228.5	180.1	(48.4)	-21.2%
	High Volume Rural	364.9	375.1	10.2	2.8%
	Low Volume Rural	911.4	939.0	27.6	3.0%
	Replacement Value Sub-total	2,280.0	2,383.8	103.8	4.6%
Structures	Bridges and Culverts (>3m)	566.4	555.5	(10.9)	-1.9%
Storm Sewer	Storm Sewer Mains	416.9	443.8	26.9	6.5%
	Culverts (<3m)	32.5	34.9	2.4	7.4%
	Maintenance Holes	25.9	27.3	1.4	5.4%
	Catchbasins	30.7	32.0	1.3	4.2%
	Outfalls	0.87	0.84	(0.03)	-3.4%
	Replacement Value Sub-total	506.9	538.8	32.0	6.3%
Traffic Control	Traffic Control Signals & Flashing Beacons	69.3	73.3	4.0	5.8%
	Traffic Control Systems	5.6	5.5	(0.1)	-1.1%
	Intelligent Transportation Systems	2.0	2.1	0.1	3.5%
	Communication Infrastructure (km)	9.7	10.4	0.6	6.4%
	Regulatory, Warning and Information Signs	4.1	4.3	0.2	4.4%
	Roadside Protection	18.5	19.3	0.8	4.1%
	CCTV	0.29	0.29	0.00	1.7%
	Replacement Value Sub-total	109.6	115.1	5.6	5.1%
Transportation System Replacement Value Totals		3,462.9	3,593.3	130.4	3.8%

The 3.8 percent year over year change in the estimated replacement cost for the transportation asset class is primarily attributed to benchmark construction cost increases. Year over year changes to the individual transportation asset types are:

- **Roads** – The replacement value for roads increased approximately 4.6 percent (or \$103.8 million), reflecting an increase in benchmark construction costs and shifts among the four types of roads, primarily the increase of high-volume urban roads (which have a higher replacement unit cost);
- **Structures** – The replacement value for structures decreased by 1.9 percent, with some increases in actual construction costs offset by refined technical reassessment of replacement values of some structures;
- **Storm Sewer** – The replacement value for the storm sewer system increased 6.3 percent, reflecting an increase in inventory, increased benchmark construction costs, and some technical reassessments of replacement values; and
- **Traffic Control** – The replacement value for traffic assets increased approximately 5.1 percent in 2018 over 2017 and is primarily due to increases in benchmark as well as actual construction costs for traffic signals.

1.4 Transportation System Condition Assessment Approach and Rating

Roads

For Regional roads, the Works Department undertakes an assessment of the pavement condition of the regional road network at least once every two years (or approximately 50 per cent of the road network per year). This results in an annually updated Pavement Condition Index rating (PCI), which is then converted into a condition rating grade for the Regional road network. The Durham PCI is based on an assessment of the surface condition of the road (i.e. ride) and structural adequacy (i.e. distress).

Structures

For Regional structures (bridges and culverts greater than 3 metres), the Works Department undertakes an inspection and assessment of the bridges and culverts once every two years (or approximately 50 per cent of the inventory per year). Based on the inspection of each structure, a Condition Rating and a Bridge Condition Index (BCI) is provided for all structures as described below.

The Condition Rating for each structure is based on the assessment and weighting of four factors: soundness (40 percent), functionality (30 percent), maintenance costs (15 percent), and asset age (15 percent). Results are then converted to a condition grade.

For BCI, each element of the structure is inspected in accordance with the Ministry of Transportation (MTO) Ontario Structure Inspection Manual (OSIM, 2008) and is rated according to 4 condition states (Very Good, Good, Fair and Poor). A Bridge Condition Index (BCI) is then calculated using the MTO Bridge Condition Index Manual (2009) and is a weighted average of all structure elements and their condition states.

Traffic

For traffic control signals, in 2016, the Works Department initiated a comprehensive condition assessment project that involves rating each signalized intersection based on condition. To date, approximately 86 percent of the signals have a condition assessment completed. The updated condition ratings are included in this year's report.

For signs, the condition ratings are based on continually ongoing visual condition assessments including testing for reflectivity. For roadside protection (i.e. guiderails), condition audits are completed.

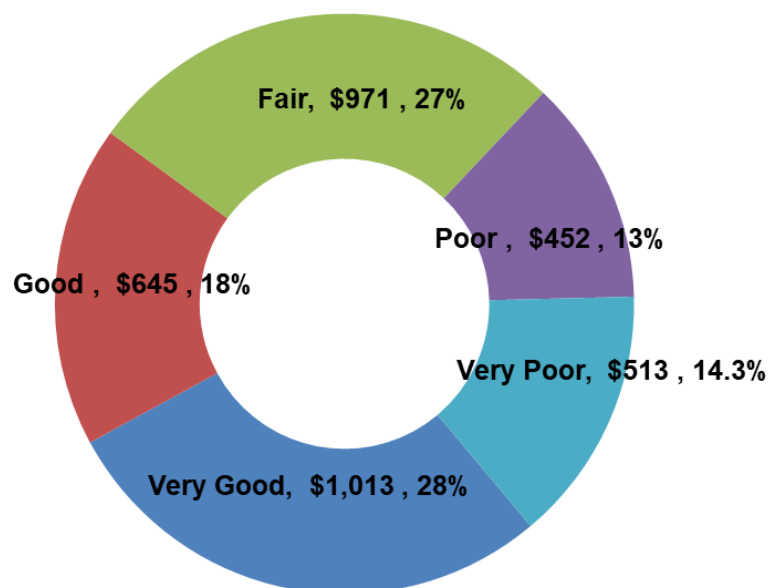
In late 2016, the legacy traffic control system (Fastracs) was upgraded to ARIA to meet the current needs of the Region. The transitioning of the signalized intersections from Fastracs to ARIA is nearing completion, with the condition ratings starting to improve this year, with this trend to continue and be reported next as the balance of Fastracs is decommissioned.

For the remaining traffic assets, a combination of condition assessments and age-based assessments are used to determine condition ratings.

Table 3: Transportation System Condition Rating

Asset Type	Asset Group	Condition Rating	Condition Rating	Year-Over-Year Trend
		2017	2018	
Road Network (arterial)	High Volume Urban	B-	C+	↓
	Low Volume Urban	B-	C+	↓
	High Volume Rural	B-	C	↓
	Low Volume Rural	C	C	⇒
	Roads Consolidated Ratings	C+	C+	⇒
Structures	Bridges and Culverts (>3m)	B	B	⇒
Storm Sewer	Storm Sewer Mains	C	C	⇒
	Culverts (<3m)	C	C	⇒
	Maintenance Holes	C	C	⇒
	Catchbasins	C	C	⇒
	Outfalls	C	C	⇒
	Storm Sewer Consolidated Ratings	C	C	⇒
Traffic Control	Traffic Control Signals & Flashing Beacons	C+	C+	⇒
	Traffic Control Systems	D+	C-	↑
	Intelligent Transportation Systems	B	B	⇒
	Communication Infrastructure	B-	B-	⇒
	Regulatory, Warning and Information Signs	A-	A-	⇒
	Roadside Protection	A-	A-	⇒
	CCTV	B	C+	↓
	Traffic Consolidated Ratings	B-	B-	⇒
Overall Transportation Condition Rating		C+	C+	⇒

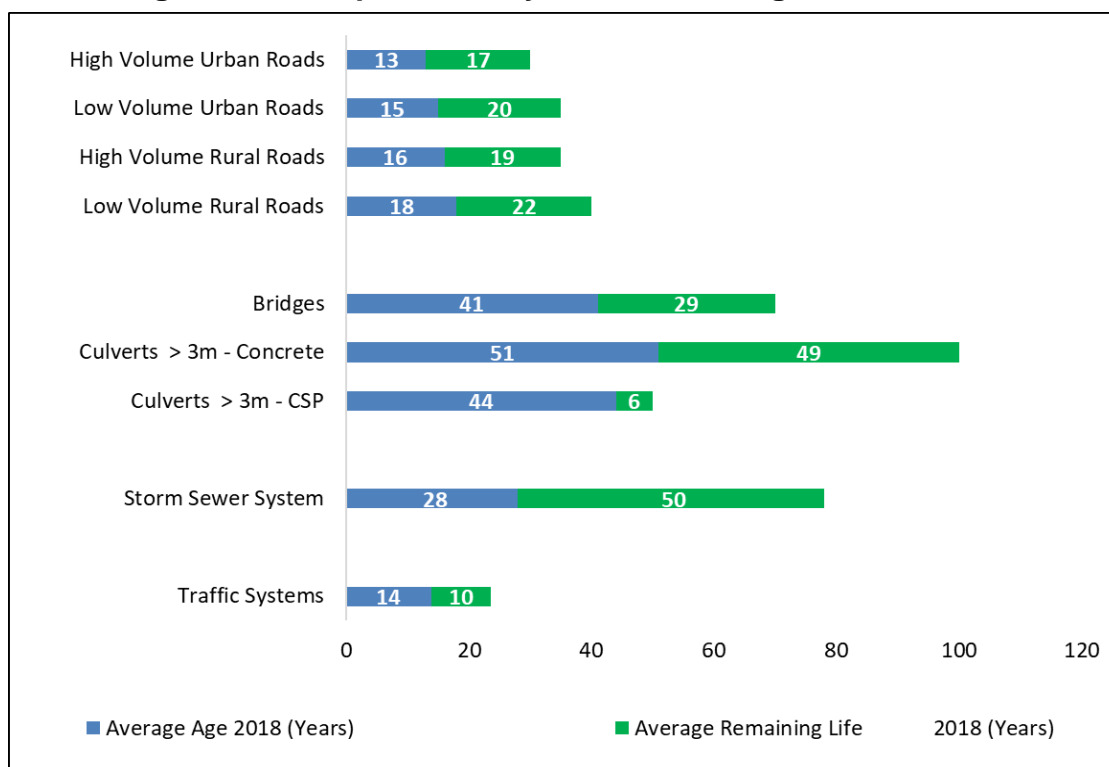
Figure 1: Transportation System Asset Class Condition Rating and Replacement Value (\$ millions)



1.5 Transportation System Average Age and Remaining Useful Life

Figure 2 summarizes the average age and remaining life of the transportation system.

Figure 2: Transportation System Remaining Useful Life



1.6 Levels of Service and Performance Measurement

The service level objectives for transportation are:

Table 4: Service Level Objectives

Service Level Objectives
<ul style="list-style-type: none"> • 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.

These have been set through Regional Council approved corporate plans, area specific master plans, studies, policies and procedures as well as regulatory guidelines.

Table 5

Regional Plans, Studies, Policies, & Procedures	Regulatory Guidelines and Requirements
<ul style="list-style-type: none"> • 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 • Region Strategic Plan • The Regional Official Plan • Corporate Climate Adaptation Plan • Energy Conservation and Demand Management Plan (CDM) 	<ul style="list-style-type: none"> • Minimum Maintenance Standards for Municipal Highways (O. Reg. 239/02) • Standards for Bridges (O. Reg. 104/97) • 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

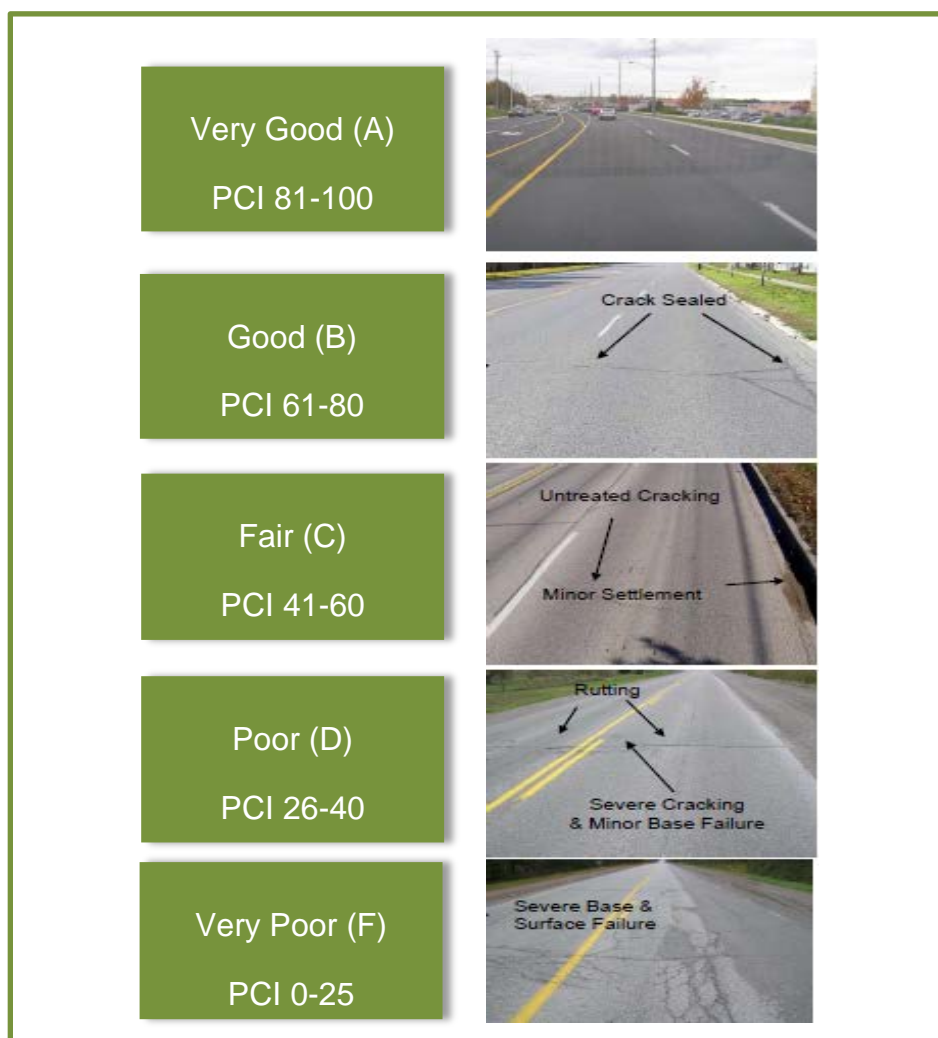
Road Network Community and Technical Levels of Service

Two key service level objectives for Durham's road network are that Regional roads will be continuous and connected as well as will be functional, reliable and serve as many users as possible. Map 1 shows all the Regional roads and highways within Durham and their connections, which provides a measure of these service level objectives. These service level objectives are included in the Region's Strategic Plan and Transportation Master Plan and comply with the approved reporting requirements in the Provincial regulation, Asset Management Planning for Municipal Infrastructure (O. Reg. 588/17).

Another service level objective is that Regional roads will be expanded and grow to provide capacity for users, which is also supported by the Region's Strategic Plan and Transportation Master Plan. To measure this, the Region tracks the number of lane kilometres of Regional roads per square kilometre of the Region's land area, which also provides compliance with the approved reporting requirements in the Provincial regulation (O. Reg. 588/17). As identified in Table 6, the Region's number of lane km (2,370) per land area (2,537 square kilometres) is approximately 0.93. Based on the recommended road expansion network in the approved Transportation Master Plan, the target is to achieve 1.1 lane km per square km of land area. Progression toward this target will occur over time as Durham's roads are expanded to address requirements capacity through the Regional business plans and budgets.

Another measure the Region uses to track the performance of the Regional road network is the Pavement Condition Index (PCI) of the road network. Figure 3 below illustrates the different levels of road classification pavement condition used by the Region. The Region has been rating and reporting the PCI as a performance measure of this service level in each year's annual Asset Management Plan report, making the Region already compliant with the approved Provincial regulation (O. Reg. 588/17). As identified in Table 6, the network average PCI service level target the Region currently strives to achieve is 65. For 2018, the Regional road network had an average PCI of 54. Regional road rehabilitation continues to be a priority and the 2019 Roads Capital Budget approved \$35.9 million for road rehabilitation work. This included \$7.5 million in federal gas tax funding to address road segments mostly in Very Poor condition. The approved 2019 road rehabilitation funding level (\$35.9 million) represents an increase of \$2.7 million over 2018 (\$33.2 million) and a total increase of \$12.4 million from 2017 levels (\$23.5 million).

The Region is fully compliant with all the applicable road network service level reporting requirements two years ahead of the mandated deadline of July 1, 2021 in the Provincial regulation (O. Reg. 588/17). Regional staff will continue to refine service levels and performance measures in future asset management reports to improve asset management planning, strategies, performance measurement and reporting as part of best business practices.

Figure 3: Regional Road Condition Index Rating

Structures (Bridges/Culverts) Community and Technical Levels of Service

The Region's bridges and culverts are designed, built and currently 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. Currently, there is only one Regional bridge that has loading restriction. This bridge is currently being replaced (utilizing previously approved funding) and is anticipated to be in service mid-2019. This measure is also reported in Table 6. The reporting of these complies with the approved reporting requirements in the Provincial regulation (O. Reg. 588/17).









The Region uses the condition of structures as a technical service level measure. As detailed in Section 1.4 above, each Regional structure is given a condition rating based on the assessment and weighting of four factors: soundness (40 percent); functionality (30 percent); maintenance costs (15 percent); and asset age (15 percent). Results are then converted into a condition grade. There is only one bridge in the Region's inventory

that is rated as Very Poor condition (the same bridge that has a loading restriction per above) and is currently being replaced (anticipated to be in service mid-2019).

The Region also measures and tracks a Bridge Condition Index (BCI) for each bridge and culvert as part of best business practice for assessing structure condition. This practice also complies with the requirement to report the BCI for bridges and culverts by 2021 in the approved Provincial regulation (O. Reg. 588/17). Figure 4 below describes the Region's BCI rating categories for structures. The BCI is calculated using the MTO Bridge Condition Index Manual (2009) and is a weighted average of all bridge elements and all condition states. Each element is inspected in accordance with the MTO Ontario Structure Inspection Manual (OSIM) and is rated according to 4 condition states. It should be noted that 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. As identified in Table 6, the Region aims to have a network weighted average BCI of 70. For 2018, the Region had a weighted average BCI of 74.7 for bridges and 72.1 for culverts.

The Region is fully compliant with all the applicable bridge and culvert service level reporting requirements two years ahead of the mandated deadline of July 1, 2021 in the Provincial regulation (O. Reg. 588/17). Regional staff will continue to refine service levels and performance measures in future asset management reports to improve asset management planning, strategies, performance measurement and reporting as part of best business practices.

Figure 4: Structure BCI Condition Ratings

Rating	Bridge Condition	Culvert Condition	Description
Very Good (BCI 80-100)			New bridge or culvert, no signs of deterioration
Good (BCI 70-79)			Minor signs of deterioration, minor levels of maintenance required
Fair (BCI 60-69)			Signs of deterioration, exceeding levels of maintenance
Poor (BCI <60)			Significant deterioration, approaching end of service life

Map 1: Map of Durham Region Road Network



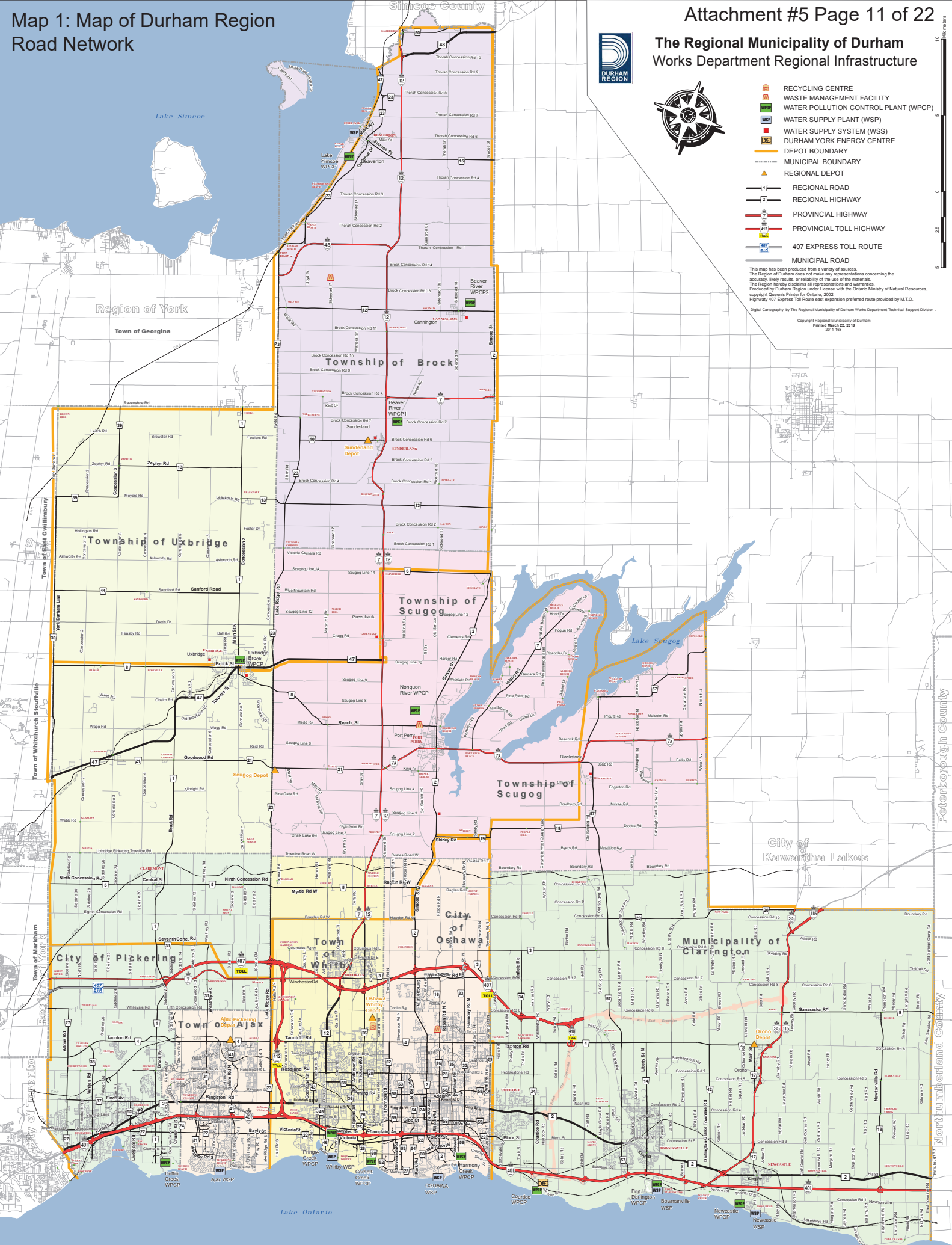
The Regional Municipality of Durham
Works Department Regional Infrastructure



- RECYCLING CENTRE
- WASTE MANAGEMENT FACILITY
- WATER POLLUTION CONTROL PLANT (WPCP)
- WATER SUPPLY PLANT (WSP)
- WATER SUPPLY SYSTEM (WSS)
- DURHAM YORK ENERGY CENTRE
- DEPOT BOUNDARY
- MUNICIPAL BOUNDARY
- REGIONAL DEPOT
- REGIONAL ROAD
- REGIONAL HIGHWAY
- PROVINCIAL HIGHWAY
- PROVINCIAL TOLL HIGHWAY
- 407 EXPRESS TOLL ROUTE
- MUNICIPAL ROAD

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Traffic Operations Community and Technical Levels of Service

The management and operation of the computerized central traffic control systems, Regional Traffic Management Centre and traffic control signals all assist the Region in maximizing the reliability, functioning and carrying capacity of the roadways for all users. It also helps improve the environment by reducing vehicle stops and delays which produce unnecessary pollutants and improving the quality of life for the motoring public by maintaining traffic flows.

This requires traffic control signal assets be maintained in an acceptable condition standard to ensure continued operation. The performance measure is that 5 percent or less of the traffic control signal inventory be in Very Poor condition. Currently, as of 2018, 4.2 per cent of the traffic control signal assets are in Very Poor condition, which is within the performance target.

Another service level to facilitate the continued operation of traffic signals is that 20 traffic signals are to be equipped with uninterruptable power supply (UPS) annually to continue to provide traffic services in the event of a loss power. As well, it is also desired to have all traffic control signals with UPS over the next 10 years. Currently, 6.7 per cent of traffic signals have been equipped with UPS as of year-end 2018, which is an increase from 4 per cent in 2017 as installations of UPS continue.

Service Level Performance Measures

Asset management staff have identified key asset related technical service levels and performance measures as reported in Table 6. These all comply with the service level reporting requirements for roads, bridges, and culverts in the Provincial regulation, (O. Reg. 588/17).

Table 6 - Technical Service Levels and Performance Measures - Transportation System

Roads											
Objectives/Level of Service ¹	Corporate Strategic Plan Goals and Strategies ²	Corporate Adaptation and Climate Mitigation Goals ³	Ref	Performance Measure	Measure Type	Target	Year of Measure				
							2014	2015	2016	2017	2018
Achieve and maintain an acceptable condition standard for all Regional roads, structures and traffic assets to ensure service levels.	Demonstrate leadership in sustainable asset management and environmentally friendly municipal practices.	Invest in preventative maintenance and rehabilitation when most beneficial.	1A	Network Average Pavement Condition Index (PCI)	Technical	Network Average PCI Rating of 65	62	61	61	58	54
Measure summarizes PCI 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. Measure can also be influenced by amount of growth-related road improvements constructed each year, as growth-related improvements contribute to the overall PCI. This service level is to be reported per Ontario Reg. 588/17.											
Continue to plan asset management infrastructure investments in a manner that recognizes implications for service level standards	Invest in efforts to mitigate and adapt to climate change to build resiliency.	Expand asset management planning to consider and address risk, climate and optimizing asset life cycles.	1B	Road Condition Distribution	Technical	No more than 25% of Inventory remain in <i>Poor-to-Very Poor</i> Condition	27%	27%	29%	31%	38%
Measure identifies % 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 % of total lane kms.											
Regional roads will be continuous and integrated and will serve all modes and users	Ensure that Regional Transportation infrastructure is functional, integrated, reliable and barrier free to support the movement of residents to work, school, and local services.		1C	Number of Lane Km's of Regional Roads Per Durham's Land Area (square km).	Technical	To achieve a target of 1.1	n/a	n/a	n/a	0.93	0.93
This measure reports the number of Regional road lane kilometres as a proportion to the size of the Region's land area (2,537 km ²). This measure can identify the growth in the Regional road network over time relative to its land size. This service level is to be reported per Ontario Reg. 588/17											
Notes											
¹ Objectives/Levels of Service for transportation assets are derived from the Regional Council approved Durham Transportation Master Plan 2017											
² Supported by the Regional Council approved strategic plan, "Growing Together Reaching Further Aspiring Higher: New Strategic Plan for Durham Region 2015-2019"											
³ Supported by the Regional Council approved Corporate Adaptation Plan, Energy Conservation and Demand Management Plan, and 2017 Regional Program Climate Change											

Table 6 - Technical Service Levels and Performance Measures - Transportation System

Structures											
Objectives/Level of Service ¹	Corporate Strategic Plan Goals and	Corporate Adaptation and Climate Mitigation	Ref	Performance Measure	Measure Type	Target	Year of Measure				
							2014	2015	2016	2017	2018
Achieve and maintain an acceptable condition standard for all Regional roads, structures and traffic assets to ensure service levels.	Demonstrate leadership in sustainable asset management and environmentally friendly municipal practices.	Invest in preventative maintenance and rehabilitation when most beneficial.	2A	Weighted Average Bridge Condition Index Value for Structures	Technical	Network Weighted Average BCI Rating of 70 for Bridges	N/A	N/A	N/A	73.3	74.7
				Network Weighted Average BCI Rating of 70 for Culverts		N/A	N/A	N/A	67.9	72.1	
					This measure summarizes the average bridge condition index (BCI) value for bridges and culverts. This service level and performance measure is new and is to be reported per Ontario Regulation 588/17. BCI is calculated using the MTO Bridge Condition Index Manual (2009) and is a weighted average of all bridge elements and all condition states. Each element is inspected in accordance with the MTO Ontario Structure Inspection Manual (OSIM) and each element is rated according to four condition states (Excellent, Good, Fair and Poor). BCI is a good measure of the overall condition of the bridge, but other factors are not considered into this rating index, including: traffic, economic importance, dimensional restrictions, geometrics, service life, maintenance costs, etc.						
Continue to plan asset management infrastructure investments in a manner that recognizes implications for service level standards	Invest in efforts to mitigate and adapt to climate change to build resiliency.	Expand asset management planning to consider and address risk, climate and optimizing asset life cycles.	2B	Structure Condition for Bridges and Culverts	Community-Technical	85% of Structures Rated Good to Very Good	77.8%	87.2%	85.5%	84.1%	85.1%
					In 2015 the standardized structure condition rating system was updated. Still based across the four factors: soundness; functionality; maintenance costs; and asset age, but the weights for each factor were revised to better represent the structures overall condition grade (soundness 40%; functionality 30%; maintenance costs 15%; and asset age 15%). Values from 2014 summarize the % of structures where the primary components are rated Good to Very Good and recognizes that implementation of additional funding generally is phased over time. The condition of a bridge or culvert means the condition of the primary load bearing components and includes deck, beams, girders, abutments and foundations.						
Regional roads will be continuous and integrated and will serve all modes and users	Ensure that Regional Transportation infrastructure is functional, integrated, reliable and barrier free to support the movement of residents to work, school, and local services.		2C	Percentage of Bridges with Loading Restrictions	Technical	To have no bridges with loading restrictions	N/A	N/A	N/A	1	1
Regional roads will be expanded and grow to provide capacity for all users					This measure summarizes the number of bridges that have loading restrictions. The target is 0 to ensure the transportation network is fully accessible, functional, and available for all users.						
Notes											
¹ Objectives/Levels of Service for transportation assets are derived from the Regional Council approved Durham Transportation Master Plan 2017											
² Supported by the Regional Council approved strategic plan, "Growing Together Reaching Further Aspiring Higher: New Strategic Plan for Durham Region 2015-2019"											
³ Supported by the Regional Council approved Corporate Adaptation Plan, "Energy Conservation and Demand Management Plan, and 2017 Regional Program Climate Change Update"											

1.7 Transportation System: Life-cycle Considerations

Roads

A key component of asset management strategy is to invest in preventative maintenance and rehabilitation activities at the most beneficial times during the life cycle of the road. This involves identifying the appropriate treatment at the optimal time that maximizes the life span of the road at the lowest possible cost and risk.

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

Table 7: Road Treatment General Guidelines

RURAL ROAD TREATMENTS	PCI Criteria
Rural Overlay	PCI>75<=80
Rural Grind Overlay	PCI>65<=75
Surface Treatment and Slurry Seal	PCI<=45
Rural Road Stabilization	PCI>60<=65
Rural Upgrade	PCI>35,<=60
Rural Major Upgrade	PCI=>20<=35
Rural Reconstruction	PCI<20
URBAN ROAD TREATMENTS	PCI Criteria
Urban Overlay	PCI>70<=80
Urban Grind Overlay	PCI>45<=70
Urban Major Upgrade	PCI>30<=45
Urban Reconstruction	PCI=<30

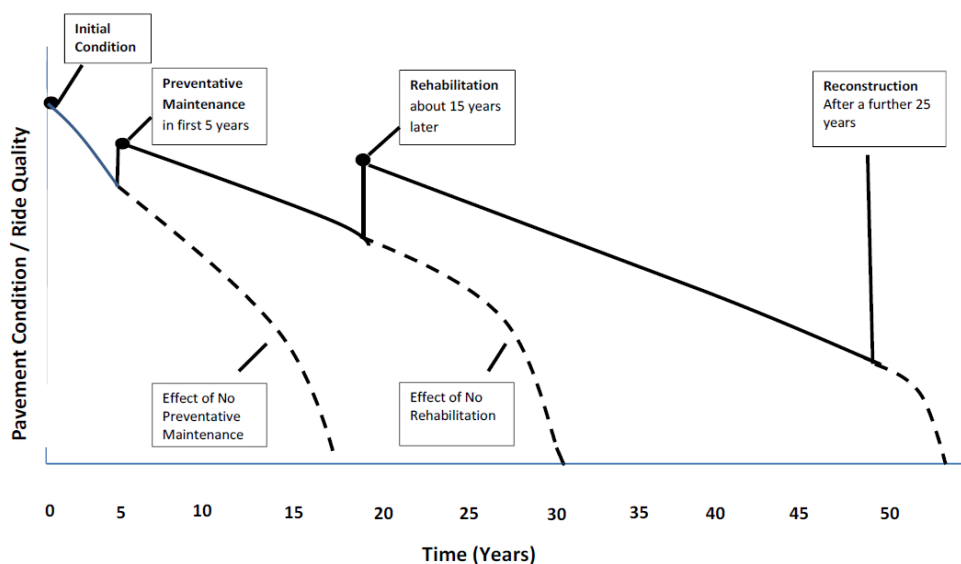
It is important to note that the above general guidelines for treatment timing and types vary depending on the characteristics of each individual road segment and can be influenced by other factors, including car and truck volume. For instance, roads with higher traffic volume and in particular with heavy truck traffic, can accelerate the need for road rehabilitations and maintenance, as compared to lower volume roads with less heavy trucks. In addition, there may be instances where it is more beneficial to allow the road pavement condition of a particular road to reach the next suggested treatment type and timing before rehabilitation occurs.

Employing these treatments can ensure the road segments provide the desired service levels over their full-service life at the lowest possible cost and defer the premature need for full road reconstructions.

These guidelines and consideration of other factors, along with the optimization software program, informs the Region's annual road rehabilitation program. In 2019, \$35.9 million was budgeted for road rehabilitation work, which includes a mixture of different types of road rehabilitation treatments for various road segments. Most of this approved \$35.9 million was budgeted to address road segments that were in Poor and Very Poor condition.

Moving forward, Regional staff will further refine annual road rehabilitation investment needs to improve the condition of the regional road network to achieve the targeted service level PCI of 65. Regional staff will also be further refining life cycle costing analysis for the Regional roads and will provide updated analyses, results and recommendations in future annual Asset Management Plans to be considered in future Regional budgets.

Figure 5: Preventative Maintenance/Rehabilitation Defers Road Reconstruction



Structures

Similar to roads, timely inspections and rehabilitation of key bridge components optimizes the lifecycle of bridges. The age distribution of Durham's bridge network shows that the majority of Durham's bridges are over 40 years of age (see Figure 6). Some of these structures are showing deterioration of components such as decks, expansion joints, bearings, barrier walls and sidewalks.

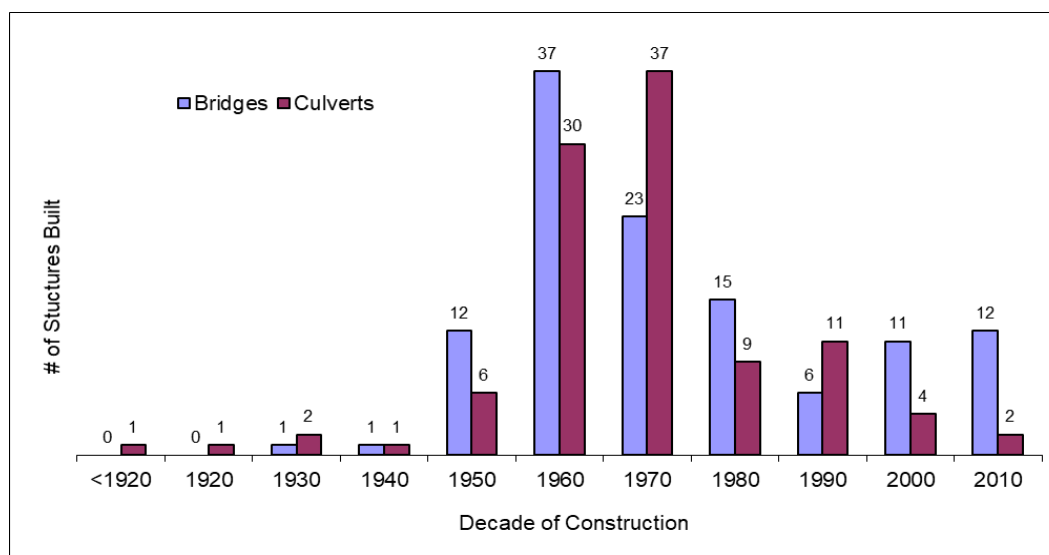
The Region's bridge investigations and repair programs (\$0.5 million budgeted in 2019), including deck repair program, expansion joint replacement program, and culvert repair program, are essential to maintaining Durham's bridge network throughout its life cycle.

Timely implementation of rehabilitation strategies on structures, based on condition assessments through regular and ongoing inspections, is important in ensuring public safety, prolonging the lifespan of a structure and in turn, deferring the significant costs of replacement. For example, a leaking expansion joint left unrepaired has the potential to seriously degrade load bearing structural elements such as girders. Significant rehabilitation and replacement needs are also recognized, and a robust program has been established through the business planning and reporting process to address these needs (\$6.0 million in Regional funding budgeted in 2019).

When structures have reached the end of their service life and/or are in Very Poor condition, they may require replacement. The Region's only bridge (Gamebridge Bridge) that is in Very Poor condition is currently being replaced through the utilization of previously approved structure funding through the Region's Roads Capital Budgets and is anticipated to be in service mid-2019.

Moving forward, Regional staff will be further refining full life cycle costing analysis for structures and will provide updated analyses, results and recommendations in future annual Asset Management Plans to be considered in future Regional budgets.

Figure 6: Distribution of Construction Dates of the Region's Culverts and Bridges



Traffic Signal Control

Decision making in the maintenance, operation and capital investment of traffic signal infrastructure is based on the Division's Electronic Work Order (EWO) system, annual Maintenance Summary, a Signal Inventory Management System (SIMS) and a cost database, which provide historical and current maintenance and infrastructure information. These systems are actively managed to provide key information including; maintenance treatments, timing and costs; equipment usage; and service history which assists in the development of service strategies and the prioritization of investments.

Traffic control signals and mechanical components, including underground signal infrastructure, poles, support arms, etc., have a 25-year useful service life. As staff have undertaken a comprehensive condition assessment which began in 2016 (further detailed in Section 1.4 above), this assessment has helped further inform, refine, and determine optimal maintenance and/or capital replacement strategies to address priority traffic signal infrastructure.

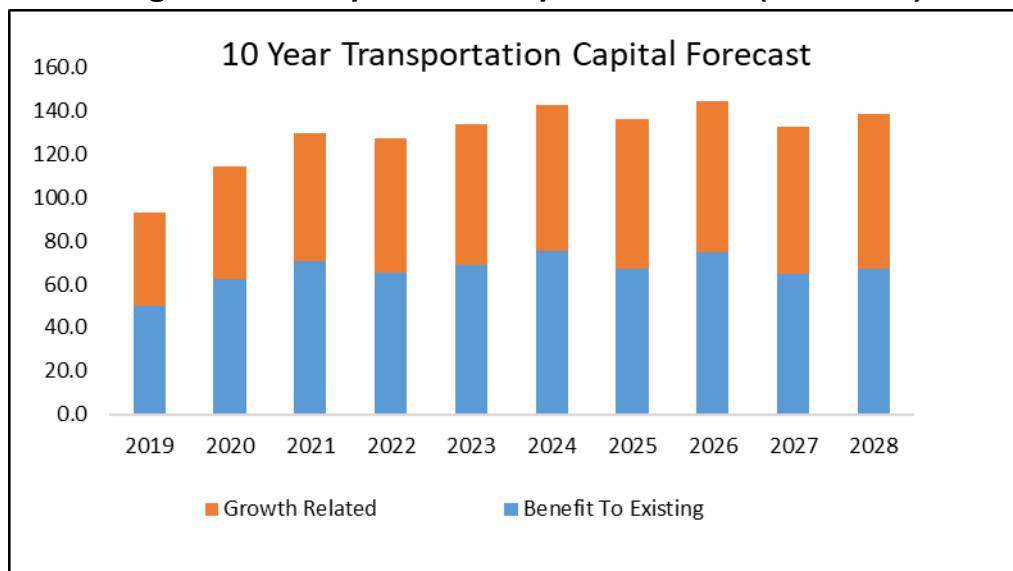
Based on this approach, the approved 2019 Roads Capital Budget includes \$1.7 million to rebuild and install new traffic control signals and required supporting infrastructure at 6 traffic signal locations (signal installation program). These are prioritized locations based on rehabilitation needs through condition and age assessments as well as signal

warrant justifications. In addition, the 2019 Roads Capital Budget also includes \$1.2 million for the replacement of approximately 20 traffic signal controllers, 20 per cent of the Region's LED signal indicators, and other associated modernization work. This 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.

Transportation Capital and Preliminary Maintenance Forecast

Major capital investments for transportation (rehabilitation and growth-related expansion needs) identified through the 2019 business plans and budgets totals \$1.29 billion.

Figure 7: Transportation Capital Forecast (\$ millions)



It has also been estimated that the preliminary 10-year maintenance related costs for transportation capital is approximately \$89.4 million, or an annual average of \$8.9 million. This preliminary estimate will be further refined in future Asset Management Plans.

1.8 Risk Assessment

The following Table 8 includes transportation program risks, climate vulnerabilities and mitigation goals and strategies identified by transportation, traffic and maintenance operations staff in consultation with asset and risk management teams and the Climate Change Staff Working Group.

Table 8: Risk Mitigation Strategies

Potential Risk Impact	Mitigation Goals/Actions
Extended Power outage	<p>Ensure standby power at traffic intersections and Traffic Operations Centre.</p> <p>Ensure effective emergency, contingency and business continuity plans.</p>
Asset structural failures or impacts to asset effectiveness	<p>Optimization of asset life cycles, proactive maintenance and cleaning.</p> <p>Asset Management database, inspections and patrols.</p> <p>Pest control programs (e.g. beaver damage to culverts, bridges).</p> <p>Design considerations for future storm events.</p> <p>Effective emergency, contingency and business continuity plans.</p> <p>Adequate redundancies and proactive detours and closures where required.</p>
Extreme wind events and storms beyond existing capacity/response capability affecting roads, structures and sites.	<p>Adequate redundancies and proactive detours and closures where required.</p> <p>Effective emergency, contingency and business continuity plans (REMS).</p> <p>Post-storm clean-up protocol, assessments and improvements.</p>
An increase in winter freeze-thaw cycles and temperatures at or near 0°C	<p>Extensive winter control programs (e.g. salt management plan).</p> <p>State-of-the-art weather systems and Roadway Condition Advisory system.</p> <p>Optimization of asset life cycles including proactive maintenance.</p> <p>Design considerations and erosion control (roads, shoulders, structures).</p>
Potential for road washouts/ditch flooding and overland flooding that could cause contaminant migration (e.g. road salt, oil, grease)	<p>Optimization of asset life cycles, proactive maintenance and cleaning.</p> <p>Inspections and patrols.</p> <p>Effective emergency, contingency and business continuity plans (REMS).</p> <p>Adequate redundancies and proactive detours and closures where required.</p> <p>Design considerations and erosion control (roads, shoulders, structures).</p>
Motor vehicle road incidents	<p>Design, inspection and maintenance standards.</p> <p>Road signage, roadside protection and inventory assessments.</p> <p>Effective emergency, contingency and business continuity plans.</p> <p>Extensive Winter Control Program (RCAS) and Roadway Event Management System (e.g. speed and condition warnings).</p> <p>Proactive detours and closures where required for safety.</p>

1.9 Climate Adaptation

A number of Regional plans, improvements, capacity expansions, studies and infrastructure initiatives have significantly enhanced the Region's resiliency and capacity to adapt to the changing climate (climate adaptation) or have resulted in reductions to greenhouse gas emissions from transportation programs (climate mitigation). Additional information and details on initiatives within Regional program areas is found in:

- Region's Climate Change Update (Report 2017-COW-216); and
- The Durham Community Climate Adaptation Plan 2016 "Towards Resilience" (DCCAP), was approved in principle (as amended) by Regional Council on December 14, 2016 (2016-COW-103). The DCCAP identified community wide climate related risks and suggested the implementation of mitigation programs/strategies for consideration, including for transportation networks (local and Regional), specifically programs for resilient asphalt, road embankments and, adaptive culverts and bridges.

Regional staff continue to assess these highlighted transportation strategies to mitigate against climate change and have already integrated several considerations into Regional business and financial plans.

Risk and climate related mitigation programs in the 2019 Roads Capital Budget include:

- Continuation of the uninterrupted power supply (UPS) Signal Installation Program to ensure adequate backup power for key intersections (\$0.2 million);
- Bridge/structure investigations (\$0.1 million);
- Traffic Signal installations and modernization, including LED and mounting hardware replacement (\$2.9 million);
- Paved shoulders for rural road construction projects where feasible (as recommended in the Transportation Master Plan); and
- Other ongoing traffic initiatives including \$0.9 million for ITS projects, \$0.6 million for accessible pedestrian signal installations, and \$0.7 million for roadway safety program. Currently, the Strategic Road Safety Action Plan is being finalized.

Moving forward, Regional 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: The monitoring and assessment of the impacts of climate changes on the performance of asphalt and concrete products used in the construction of Regional roads, with product specifications adjusted as necessary to mitigate and enhance materials' performance;
- Proactive maintenance and rehabilitations, including patching of potholes, ruts and depressions, major rehabilitations and replacements through business and asset management planning;

- Adaptive Structures (culverts, bridges and storm sewers): Monitoring of the impacts from increased storm intensity on the capacity and integrity of Regional structures. Ongoing programs also support resilience through proactive maintenance, including evidence-based proactive maintenance and repair supported by cleaning programs and visual and closed circuit camera inspections. The Region is consultation with the conservation authorities is currently undertaking a vulnerability assessment of the regional storm structures against the longer term (2040-2050) impact of extreme storm events;
- Embankment and erosion control: Adjusting specifications and design criteria to ensure long term capacity needs and mitigate erosion potential, the Region strives to ensure adequate ditch, embankment and road maintenance to reduce potential for deterioration and increase effective drainage. Road shoulders are currently primed with liquid asphalt and liquid calcium chloride to control dust and erosion and utilize recycled asphalt grindings, with more frequent inspections of erosion prone areas. The Region is currently undertaking a study to review the best practices and available adaptation measures to improve the resilience of its critical regional road assets against the longer term (2040-2050) impact of extreme storm events;
- Road safety and response: Utilization and maintenance of state-of-the-art road weather information systems to monitor weather/pavement conditions (e.g. infrared road temperature sensors) and ensure proper training to effectively utilize the technology and analyze results and implement effective control programs;
- Maintenance of roadside visibility and safety: Tree removal and trimming, mowing of rural roadside grass and urban boulevards during the cutting season as well as cleaning/re-grading of ditches and catch basins and cleaning of the entrance culverts (on a cost-recovery basis); and
- New technologies are identified in the Region's Salt Management Plan, including use of liquid salt brine for pre-wetting and anti-icing. The pre-wet salt application enables salt to work more efficiently. Anti-icing operations include hills, curves, bridges and sheltered areas prone to frost and "black ice" at intersections.

As directed by Regional Council, climate risks and mitigation initiatives related to the Regional transportation network, including risks identified through the DCCAP, will continue to be addressed through the Business Planning Cycle, including risk management, asset management and long-term financial planning processes to ensure a well-positioned and proactive approach.

Asset management plans will continue to be key to ensuring a long-term and effective response to future climate changes and to ensuring long-term sustainability.

1. Attachment #6: Region Owned Facilities Asset Class Report

1.1 Description of Region Owned Facilities Assets:

Region-owned facilities includes Durham Regional Local Housing Corporation (DRLHC) housing stock, Durham Regional Police Service (DRPS) facilities, Works depots, Region of Durham Paramedic Service (RDPS) stations, Regionally owned childcare facilities, waste management facilities, long-term care facilities, Durham Region Transit (DRT) maintenance facilities and corporate facilities (e.g. Regional Headquarters).

1.2 Facility Inventory (Excluding Water Supply and Sanitary Sewer facilities):

At year-end 2018, there is a total of 69 Regionally owned facilities as listed in Table 1. The water supply and sanitary sewerage vertical assets can be found within the water supply and sanitary sewerage asset class Attachments #3 and #4.

The 2018 total year-end inventory increased by 1 from 2017 as the completion of the new Paramedic Services Station in Sunderland was commissioned and placed into service in 2018.

Table 1: Facilities Asset Inventory

Asset Type	Asset Group	Inventory (# of Buildings)		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Regionally Owned Facilities	Durham Regional Local Housing Corporation (DRLHC)	23	23	0	0.0%
	Durham Regional Police Service (DRPS)	8	8	0	0.0%
	Regional Works Depots	5	5	0	0.0%
	Region of Durham Paramedic Services (RDPS)	7	8	1	14.3%
	Regionally-Owned Child Care Facilities	5	5	0	0.0%
	Waste Management	7	7	0	0.0%
	Long Term Care Home (LTC)	4	4	0	0.0%
	Durham Region Transit (DRT) ¹	3	3	0	0.0%
	Administration Facilities	3	3	0	0.0%
	Parking Structure	1	1	0	0.0%
	Centennial Building	1	1	0	0.0%
	Other	1	1	0	0.0%
Total Facilities Inventory		68	69	1	1.5%

Note 1: DRT Facilities are also reported in Attachment #7.

1.3 Facilities Replacement Cost (Excluding Water Supply and Waste Water):

The total 2018 year-end replacement cost for Facilities assets is \$1.199 billion, which is an increase of \$59.5 million (5.2 per cent), from 2017 (\$1.140 billion) due to:

- The addition of the new Paramedic Services Station in Sunderland into the 2018 year-end inventory, which has a replacement value of \$4.6 million;
- An increase in actual benchmark construction costs (4.6%); and
- The sale of the one of the units in the Cedar/Carleton/Wasaga DRLHC housing

stock, which resulted in a minor adjustment in replacement value, offset by the increase in benchmark construction costs for the other units.

Table 2: Region-Owned Facilities Replacement Value (\$ millions)

Asset Type	Asset Group	Replacement Costs		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Regionally Owned Facilities	Durham Regional Local Housing Corporation (DRLHC)	240.8	251.6	10.8	4.5%
	Durham Regional Police Service (DRPS)	108.0	113.0	5.0	4.6%
	Regional Works Depots	49.5	51.8	2.3	4.6%
	Region of Durham Paramedic Service (RDPS)	25.2	30.9	5.7	22.6%
	Regionally-Owned Child Care Facilities	10.4	10.9	0.5	4.6%
	Waste Management	243.1	254.3	11.2	4.6%
	Long Term Care Home (LTC)	242.3	253.5	11.1	4.6%
	Durham Region Transit (DRT) ²	80.9	87.4	6.5	8.1%
	Administration Facilities	113.4	118.7	5.2	4.6%
	Parking Structure	20.6	21.5	0.9	4.6%
	Centennial Building	4.3	4.5	0.2	4.6%
	Other	1.5	1.6	0.1	4.6%
Facilities Replacement Value Totals		1,140.1	1,199.7	59.5	5.2%

Note 2: Replacement values for DRT include replacement values for bus stop pads and shelters. All DRT related values for inventory and replacement costs are also reported in Attachment #7.

1.4 Facilities Condition Assessment Rating

In 2012, the Works Department - Facilities Design Construction and Asset Management (DCAM) staff established a plan and schedule for the completion of full Building Condition Assessments (BCA) for all vertical assets. The Region purchased and implemented a capital asset management and planning software system (CAMPs), Ameresco Asset Planner to assist with the collection, management, and reporting of BCA data as well as forecasting current and future needs.

To-date, 48 BCAs have been completed or are in progress, with 19 to be performed over the next 5 years (by 2023). Individual facility BCAs are typically updated on a 10-year cycle. Previously approved Regional Business Plans and Budgets as well as the 2019 Regional Business Plan and Budget includes \$0.2 million to continue these BCA's.

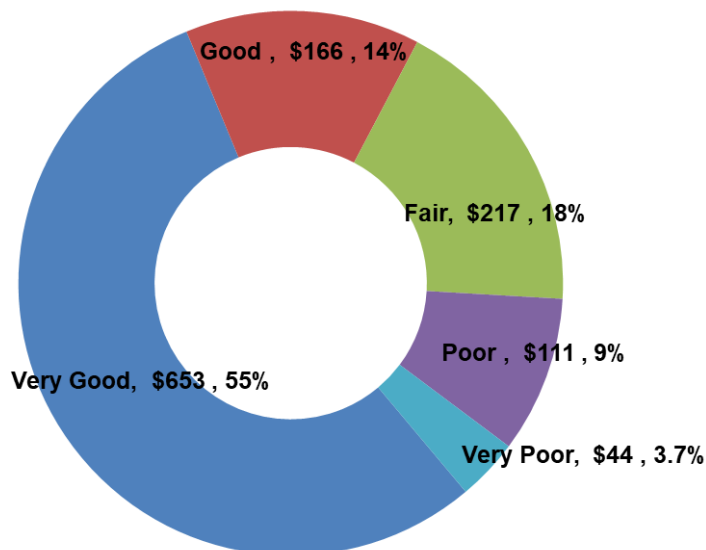
The condition rating for each facility is based on the BCA results of the identified capital needs and associated costs and timing for them (derived from the life cycle of the building components) as a proportion of its total replacement value. These two values are used to develop a condition assessment rating for the facility. In addition, 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's. Table 3 and Figure 1 below provides the current condition rating breakdown.

The overall condition rating for all Regional facilities is Good. The condition of the Region's Parking Structure improved from Poor to Good as the recoating and rehabilitation of the decks and other structure improvements were completed in 2018 using previously approved funding (\$3.6 million). For DRLHC, previously approved funding along with funding approved in the 2019 DRLHC for capital investments and major repairs and renovations (\$4.1 million) is addressing identified needs, which will be updated in the 2020 Social Housing Servicing and Financing Study. For the Region's

Child Care Facilities, the Edna Thompson Child Care Centre is currently in the process of being relocated from its current location at 156 Church Street in Bowmanville to leased space with the Knox Christian School using previously approved funding. In addition, the roof of the Ajax Child Care Centre is being replaced utilizing previously approved funding. It is anticipated that once these projects are completed in 2019, the condition rating for the Region's Child Care Facilities will improve.

Table 3: Facility Condition Rating

Asset Type	Asset Group	Condition Rating		Year-Over-Year Trend
		2017	2018	
Regionally Owned Facilities	Durham Regional Local Housing Corporation (DRLHC)	C-	D+	↓
	Durham Regional Police Service (DRPS)	A-	B+	↓
	Regional Works Depots	C	C	⇒
	Region of Durham Paramedic Services (RDPS)	A-	B+	↓
	Regional Owned Child Care Facilities	C-	D+	↓
	Waste Management	A	A	⇒
	Long Term Care (LTC)	A	A-	↓
	Durham Region Transit (DRT)	A-	A-	⇒
	Administration Facilities	A-	A-	⇒
	Parking Structure	D	B	↑
	Centennial Building	B	B	⇒
	Other	C	D	↓
Overall Facilities Condition Rating		B+	B	↓

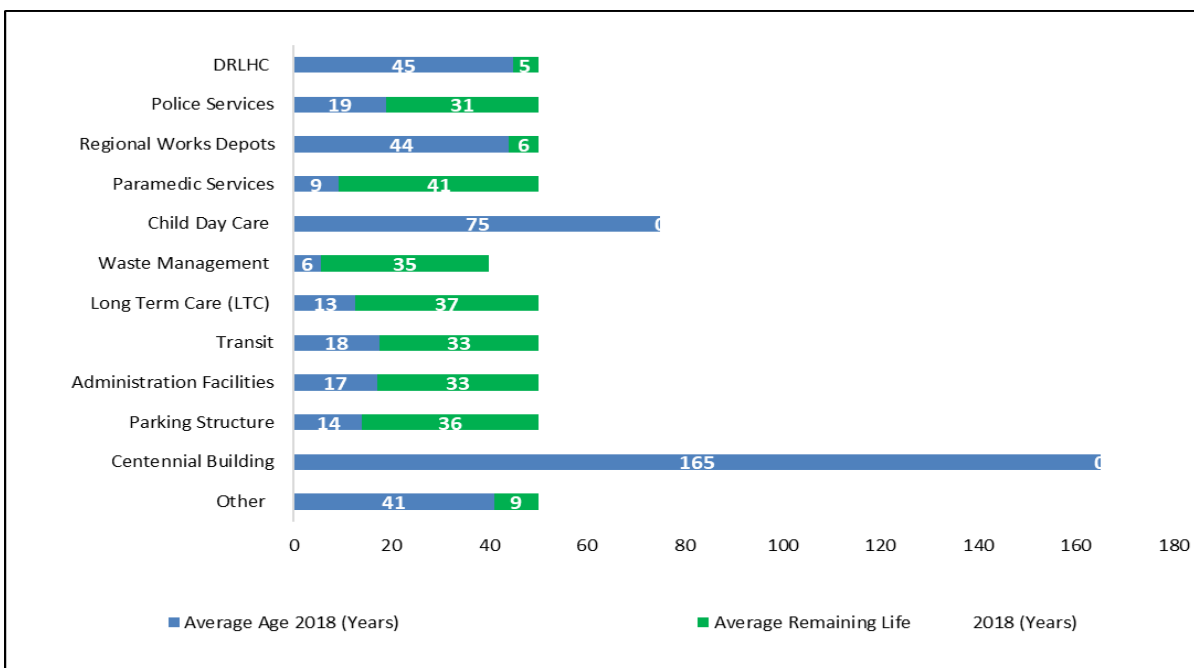
Figure 1: Facilities Asset Class Condition Rating (\$ millions)

Note: Totals do not include replacement values for bus stop pads and shelters

1.5 Facilities Average Age and Remaining Useful Life

The following average ages and remaining useful lives for the facility assets are:

Figure 2: Regionally Owned Facilities Remaining Useful Life



1.6 Facilities Levels of Service and Performance Measurement

Regional facilities (DRLHC housing stock, DRPS facilities, Works depots, RDPS stations, Regional owned childcare facilities, waste management facilities, long-term care facilities, DRT maintenance facilities and corporate facilities), are crucial to the various program areas to deliver their respective service levels to the community. The service level objectives for Regional facilities are broadly defined in Table 4 below:

Table 4

Service Level Objectives
<ul style="list-style-type: none"> 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 for new facilities and to maintain existing facilities in a good state of repair. Maintain the security of all facilities, 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 effort on staff and the delivery of their programs.

These service level objectives have been set through the following Regional council approved plans, studies, policies and procedures, as well as any regulatory and or compliance guidelines.

Table 5

Regional Plans, Studies, Policies, & Procedures	Regulatory Compliance/Guidelines
<ul style="list-style-type: none"> • Design Standards and Specifications (American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standards) • Local Building Code Standards • Regional Facilities Design Standards and Specifications (based on ASHRAE) • Various Regional Departmental program area plans, policies and procedures • Strategic Plan • The Regional Official Plan • Corporate Climate Adaptation Plan • Energy CDM Plan 	<ul style="list-style-type: none"> • Ontario Building Code Standards • Ontario Fire Code Requirements • Accessibility for Ontarians with Disabilities Act (AODA) • Environmental Assessment • The Green Energy Act (O. Reg 397/11) • Ministry of Labour Worker Safety/Training requirements • Canadian Environmental Assessment Act • Canadian Environmental Protection Act

Community Levels of Service

The primary levels of service for facilities are based on achieving and maintaining an acceptable condition standard for all Regionally owned facilities to allow the various program areas to deliver their respective service levels to the community. 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. It is the Region's target to have all facilities rated as Fair or better by 2023. As of year-end 2018, 13 per cent of Regional facilities are in Very Poor or Poor condition, as reported in Table 6 below.

Achieving and maintaining an acceptable condition standard for facilities requires regular and ongoing capital and preventative maintenance programs based on a life cycle approach of prioritizing investments. This covers all elements of the building systems including the site and site services. To achieve this comprehensive life cycle capital/maintenance service level, the Works Department's DCAM staff performs BCA's to capture the present condition of the facility and identify capital and maintenance needs. DCAM is targeting to complete BCA's on all Regionally owned facilities by 2023.

At year-end 2018, a total of 48 detailed BCAs had been completed or are in progress, an increase of 3 from 2017. The 3 BCA's completed in 2018 were for the Oshawa South, Oshawa North, and Courtice paramedic stations. This translates into approximately 72 per cent of the Regionally owned facilities having a completed BCA, an increase of 5% from 2017 (when 67 per cent of facilities had a completed BCA), as reported in Table 6. This leaves 19 BCA's to be performed over the next 5 years.

The Facilities Maintenance and Operations Depot located at 289 Water Street will be demolished to accommodate the expansion of the Whitby Water Supply Plant expected to commence in 2020, so no further BCA's are planned as a result. In addition, a BCA was provided as part of the construction of the new Sunderland Paramedic Station so a BCA will not need to be undertaken for another 10 years.

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. Moving forward, the 2019 Regional Business Plan and Budget includes \$0.2 million to continue these BCA's.

To better manage these assessments and address future infrastructure needs to ensure services continue to be provided, the Region purchased and implemented a capital asset management and planning software system (CAMPs), Ameresco Asset Planner. This system assists with the collection, management, and reporting of BCA data as well as forecasting current and future needs. This is further discussed in the following life cycle consideration section.

Another service level objective is to support the coordination of growth, provide diverse facility requirements and to plan, oversee and implement innovative designs and standards. The 2019 Regional Business Plan and Budget includes a forecasted total of \$17.9 million over the next 5 years (2019-2023) to re configure the existing Regional Headquarters to better optimize the existing space (i.e. improve efficiency of space usage) as well as to accommodate growth.

Technical Service Levels and Performance Measures

Asset Management Staff has 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 6.

Table 6 - Technical Service Levels and Performance Measures - Regionally-Owned Facilities

Objectives/Level of Service	Corporate Strategic Plan Goals and Strategies ¹	Corporate Adaptation and Climate Mitigation Goals ²	Ref	Technical Performance Measure	Measure Type	Target	Year of Measure			
							2014	2015	2016	2018
Achieve and maintain an acceptable condition standard for all Regionally-owned facilities that meets the needs/ established service levels of the core users.	Demonstrate leadership in sustainable asset management and environmentally friendly municipal practices.	Invest proactively in preventative maintenance and rehabilitation when most beneficial.	1A	Facility Condition Index	Asset Health-Technical	0% of facilities rated as either <i>Poor</i> or <i>Very Poor</i> by 2023	6.5%	5.0%	4.3%	13.0%
				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.						
Ensure a life cycle asset management approach to prioritize investments and maintain existing facilities in acceptable condition.	Invest in efforts to mitigate and adapt climate change to build resiliency across the Region.	Expand asset management planning to consider and address risk, climate change and optimizing life cycle. Ensure standby power and replacements	1B	% of Facilities with completed Building Condition Assessments	Asset Health-Technical	100% of Facilities to have a completed BCA by 2023	17%	56%	64%	72%
				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.						
Support the coordination of growth as well as provide diverse facility requirements		Reduce Regional Program energy use								
Continuous improvement in building/office design, including energy conservation.		Continue investigations of renewable energy and renewable fuel								

Notes
 1 Supported by the Regional Council approved strategic plan, "Growing Together Reaching Further Aspiring Higher: New Strategic Plan for Durham Region 2015-2019"
 2 Supported by the Regional Council approved Corporate Climate Adaptation Plan, Energy Conservation and Demand Management Plan (CDM) and 2017 Regional Program Climate Change Update.

1.7 Facilities: Life-cycle Considerations

Facilities deteriorate by component rather than as a whole. Decisions on maintenance and renewal of components drive asset life cycle considerations.

Staff in the Facilities area of the Works Department undertakes maintenance, repair and rehabilitation activities for these components at optimal times to allow the assets to provide service levels at lowest risk in the most cost-effective manner. The type and timing of these maintenance, repair, rehabilitation and or replacement activities are determined through a number of considerations.

Table 7 below provides a summary of some useful life guidelines for facility 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 life-cycle costs. These decisions are further refined through the recent implementation and ongoing utilization of computerized maintenance management systems (CMMS) and capital asset management planning software system Ameresco (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 coincide long-term asset management planning, including for 5-year operating and 10-year capital forecasts. These lifecycle activities are considered as part of annual business planning and budget processes, and ensure facilities are maintained in a good state of repair to enable the program areas to provide their targeted level of service to the community.

Table 7

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

A sample of some of the repair, rehabilitation and replacement activities for facilities (based on life cycle considerations) that were included in the Region's 2019 business plans and budgets includes:

- For DRLHC, \$1.4 million has been budgeted for repairs and renovations along with \$2.7 million for capital replacements to the building structures and their building components to maintain the DRLHC housing stock (total of \$4.1 million);
- Approximately \$0.1 million for major repairs and renovations to the Region's Scugog Depot, Oshawa Whitby Depot, and Sunderland Depot;
- \$0.3 million for capital replacements for the Regional headquarters building;
- \$0.2 million for replacements and upgrades to Hillsdale Terraces, long term care facility;
- \$0.1 million for the replacement of telecommunication systems at the Ajax Family Services location;
- For DRPS, approximately \$0.5 million for facility repairs and renovations;
- For DRT, approximately \$0.2 million has been budgeted in 2019 for repairs and renovations of related building components; and
- \$1.1 million for replacement of building related components at the Oshawa, Scugog, and Brock Waste management facilities.

Moving forward, Regional staff will further refine full life cycle costing analyses for Regional owned facilities and will provide updated analyses, results and recommendations in future annual Asset Management Plans to be considered in future Regional business plans and budgets.

1.8 Risk Assessment

Regional staff investigate potential risks, including those resulting from climate change, on an ongoing basis considering probability of occurrence and the potential consequence, as well as the suitability of existing risk mitigation controls. The following table includes identified risks to facilities with mitigation controls implemented as needed through the Region's annual business planning and budget process.

Table 8: Risk Mitigation Strategies

Potential Risk Impact	Mitigation Goal
Loss of External Utilities/Fuel	Ensure adequate standby power at Regional facilities.
	Essential services and/or rerouted programs and services.
	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.
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.
Facility Site Hazards	Maintain effective emergency, contingency and continuity plans.
	Security programs and protocols.
	Health and Safety Programs.
	Warning protocols and signage.
	Proactive maintenance, rehabilitations and capital replacements.
	Inspections and condition assessments.
	Winter control programs for adequate de-icing and snow removal.
	Maintain effective emergency, contingency and continuity plans.

Climate Adaptation: Increasing the Resiliency of Regional Facilities to Climate-related Risk

The current focus of corporate climate adaptation work is to maintain the levels of service to the public. 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).

The Region's building standards also ensure new facilities are built at a level comparable to or higher than Leadership in Energy and Environmental Design (LEED) Silver Certification, through construction to the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 90.1 (2007) Energy Standard. On a case by case basis, staff also consider elements of ASHRAE 189.1 (2009) for the design of new buildings. Within this approach the recently completed Fairview Lodge attained LEEDS Gold certification and the newly commissioned (in 2017) DRT Raleigh Maintenance Facility (715 Farewell Street) was built to LEED Silver Standards with energy efficiencies. In addition, the Clarington Police Complex was also built to LEEDS Silver Standards.

Climate Change Mitigation: Reducing GHG Emissions

Current facilities' climate mitigation (GHG emission reduction) priorities are focused on reducing facility energy and fuel usage. In addition, staff review opportunities for renewable energy on a case-by-case basis based on technical and financial feasibility considerations as part of the annual business planning and asset management planning processes.

The Region works collaboratively with its respective electrical and natural gas local distribution companies (LDCs) to leverage available programs, technical resources and incentives to assist with project implementation and validation of energy savings to help manage energy costs and reduce potential GHG emissions.

Staff have undertaken numerous utility-related initiatives across facilities' locations, including: conduct facility energy site assessments and audits, equipment replacement and retrofits and energy project evaluations/verifications. To date, the Region has experienced notable success in participation with the LDCs with total incentives and implemented measures totaling in excess of \$1 million corporate-wide (including water supply and sanitary sewer facilities).

Energy conservation is central to the Region's best-practice decision-making, reporting and approvals processes. As such, Regional staff undertake building construction and major renovation/upgrade projects with a goal of improved energy management and conservation, as well as taking the client master planning and servicing needs into consideration.

In efforts to reduce energy consumption and associated GHG emissions, facility upgrades and initiatives either underway or recently completed or planned include, but are not limited to:

- Numerous LED lighting retrofits and upgrades across the Region's DRLHC housing stock, Child Care Centres, Long Term Care Facilities, Paramedic Stations, Social Assistance Offices, Police Stations, DRT Facilities, and Works Depots (SaveONenergy Small Business Lighting Program). There is also \$0.1 million included in the Region's 2019 Business Plan and Budget for lighting upgrades at Regional Headquarters;
- Significant building enhancements including but not limited to, upgrades to insulation, cladding, windows, and doors at 155 King St (Oshawa), through the Social Housing Apartment Improvement Program (SHAIP). In total, SHAIP funding of \$3.8 million has been allocated to 155 King St (Oshawa) to support energy efficiency improvements to the building;
- Participation in Enbridge's 'Home Winterproofing Program,' involving the Region's Malaga family housing units in Oshawa (e.g. basement insulation);
- Various other investments across the Region's DRLHC housing stock to improve energy efficiency including appliance (Home Assistance Program) and hot water tank upgrades, replacement of four water service systems, replacement of air units and exhaust fans, programmable thermostats and boiler replacement;
- A new embedded energy manager (EEM) with focus on Social Services and Regional Headquarters with a targeted program savings of 2 million kWh;
- Energy efficiency upgrades completed or near completion on DRPS facilities, including BAS and system upgrades at the North (Port Perry) and West (Pickering) Divisions (HVAC upgrade), LED parking lot lighting upgrades and roof replacement at Centre East Division (Oshawa), and collaboration with local utilities to implement other energy savings measures across DRPS sites;
- Various other investments including at Lakeview Manor (insulation upgrades), roof improvements (at DRT Facilities, Ajax Child Care Centre, and specific DRLHC units) and at Works Depots (expansion/renovations and equipment renewals).

1. Attachment #7: Durham Region Transit Asset Class Report

1.1 Introduction

Durham Region Transit (DRT) assets include maintenance and storage facilities, bus stop pads and shelters and transit fleet vehicles (conventional and specialized services buses and non-revenue vehicles).

1.2 Durham Region Transit Inventory

The 2018 total year-end inventory for Durham Region Transit assets is identified in Table 1 below. Key year over year changes in inventory include:

- There was no change in the number of DRT facilities;
- Revised number of DRT bus stop pads and shelters for 2018 due to improved and refined data collection and quality; and
- The DRT fleet grew by approximately 8 vehicles (3.4 per cent) reflecting the inclusion of new fleet additions and disposals.

Table 1: DRT Fleet and Facilities Inventory

Asset Group		Inventory		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Transit	DRT Westney Maintenance Facility, 110 Westney Rd, Ajax	1	1	0	0.0%
	DRT Raleigh Maintenance Facility, 715 Farewell St, Oshawa	1	1	0	0.0%
	DRT Raleigh Administration and Bus Storage Facility, Oshawa	1	1	0	0.0%
	DRT Pads, Shelters and Stops	2,739	2,391	-348	-12.7%
Total		2,742	2,394	-348	-12.7%

Asset Group		Inventory (# of Vehicles)		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Transit	Conventional Buses	190	194	4	2.1%
	Specialized/Mini Buses	30	32	2	6.7%
	Supervisory Vehicles/Service Trucks	14	16	2	14.3%
Total Transit Inventory		234	242	8	3.4%

1.3 Replacement Costs

The estimated 2018 year-end replacement values for DRT fleet and facilities totals \$208.4 million, an increase of \$10.2 million or 5.1 per cent from 2017 (\$198.2 million). This is highlighted in Table 2 below.

Table 2: DRT Owned Facilities and Fleet Replacement Values (\$ millions)¹

Asset Group		Replacement Value		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Transit	DRT Westney Maintenance Facility, 110 Westney Rd, Ajax	35.0	36.6	1.6	4.6%
	DRT Raleigh Maintenance Facility, 715 Farewell St, Oshawa	27.7	29.0	1.3	4.6%
	DRT Raleigh Administration and Bus Storage Facility, Oshawa	12.6	13.2	0.6	4.6%
	DRT Pads, Shelters and Stops	5.6	8.6	3.0	54.1%
Total		80.9	87.4	6.5	8.0%

Asset Group		Replacement Costs		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Transit	Conventional Buses	110.6	114.4	3.8	3.4%
	Specialized/Mini Buses	6.0	5.5	(0.5)	-8.3%
	Supervisory Vehicles/Service Trucks	0.7	1.1	0.4	57.1%
Transit Replacement Value Totals		117.3	121.0	3.7	3.2%

The year over year increase in replacement values are due to:

- An increase in actual benchmark construction costs (4.6 per cent) for the three DRT facilities;
- Revised benchmark replacement costs for DRT bus stop pads and shelters reflecting the most current up to date information (updated vendor pricing); and
- Revised replacement costs for conventional and specialized fleet reflecting recent vendor pricing and additional upfitting costs for supervisory vehicles and service trucks.

1.4 DRT Condition Assessment Rating

Facilities

In 2012, the Works Department - Facilities Design Construction and Asset Management staff established a plan and schedule for the completion of full Building Condition Assessments (BCA) for all facility vertical assets to be completed by 2023. This plan gets updated and refined annually.

An updated BCA was completed for the DRT Westney Facility in 2016 while an internal condition assessment was completed for the DRT Raleigh Facility at 710 Raleigh Avenue. The new DRT Maintenance Facility at 715 Farewell Street was commissioned for service in June 2017 and does not require a BCA at this time.

¹ Note that DRT-related inventory, replacement costs and average age as well as remaining useful life measures are also reported in Attachment #6 for Facilities. DRT fleet is excluded from Attachment #8 (Fleets).

The condition rating is based on the BCA report 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 the respective facility's total replacement value. These two values are used to develop a condition assessment rating (Facility Condition Index FCI). This FCI index ranks the facilities from *Very Good*, *Good*, *Fair*, *Poor*, and *Very Poor* based on these calculations. In addition, 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.

The DRT Westney Facility was expanded in 2013 and had improvements completed to the existing building structure and its components. As a result, the condition rating for this facility is rated as Very Good. The new DRT Maintenance Facility at 715 Farewell Street, which just came into service June 2017, also has a condition rating of Very Good. The existing Raleigh Facility at 710 Raleigh Avenue has undergone some improvements over the last two years, with further improvements to the existing portions of the facility planned to continue with the previously approved funding. As a result, this facility has a condition rating of Good.

Fleet and Bus Stop Pads and Shelters

A condition rating for DRT's fleet and bus stop and pads and shelters is currently being developed and will be reported in future annual Asset Management Plans.

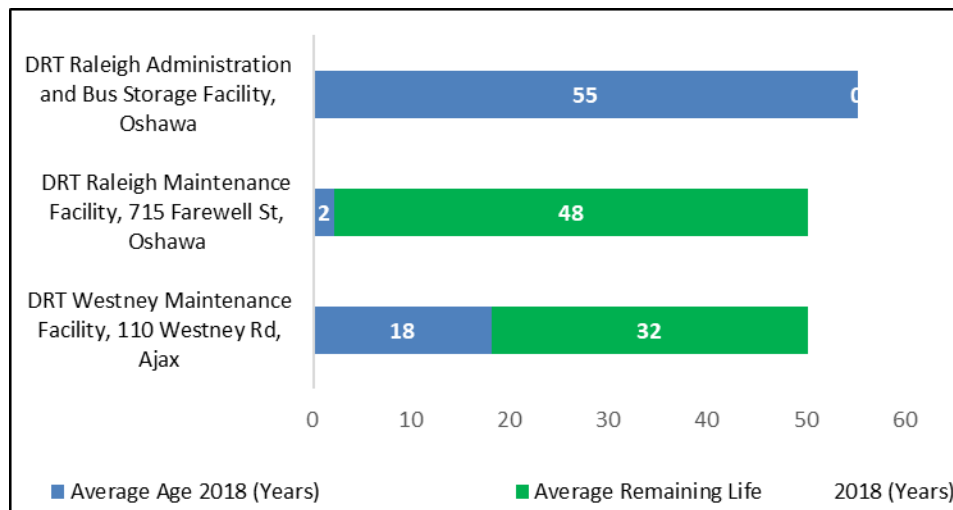
Table 3: DRT Asset Class Condition Rating

Asset Group	Condition Rating		Year-Over-Year Trend
	2017	2018	
DRT Westney Maintenance Facility, 110 Westney Rd, Ajax	A	A	⇒
DRT Raleigh Maintenance Facility, 715 Farewell St, Oshawa	A	A	⇒
DRT Raleigh Administration and Bus Storage Facility, Oshawa	B	B	⇒
Overall DRT Facilities Condition Rating	A-	A-	⇒

1.5 DRT Average Age and Remaining Useful Life

The expected remaining useful lives of DRT facility assets are as follows:

Figure 1: DRT Facilities Average Age and Remaining Useful Life



The average age and remaining useful life of DRT's fleet and bus stop and pads and shelters will be reported in future annual Asset Management Plans.

1.6 Durham Region Transit Levels of Service and Performance Measurement

Durham Region Transit (DRT) is responsible for the provision of transit services, including fixed route conventional services, bus rapid transit, specialized services, and on-demand services across the Region. DRT's service level objectives are:

Table 4: DRT's Service Level Objectives

Service Level Objectives
<ul style="list-style-type: none"> • Increase ridership and enhance customer experience. • To 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.

These have been set through the following Regional Council approved plans, studies, and policies, as well as through following regulatory and or compliance guidelines.

Table 5:

Regional Plans, Studies, Policies, & Procedures	Regulatory/Compliance Guidelines
<ul style="list-style-type: none"> • DRT Five Year Service Plan • DRT North Service Strategy • Transportation Master Plan • 2019 DRT Business Plan and Budget • Regional Transit 2017 Development Charge Background Study and By-law • DRT Servicing Financing Studies • Facility Needs Study • Regional Facilities Design Standards and Specifications • Strategic Plan • The Regional Official Plan • Corporate Climate Adaptation Plan • Energy Conservation and Demand Management Plan (CDM) 	<ul style="list-style-type: none"> • Ministry of Transportation 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 • AODA • Environmental Assessment • Ontario Fire Code

DRT Community Levels of Service

DRT service level objective is to increase ridership and enhance customer experience as well as operate a transit system that is available, consistent, direct, frequent and seamless as an attractive alternative to the personal car.

DRT's Five-Year Service Plan identified the following specific key service levels:

- Bus route improvements and expansions, informed by minimum service frequency, area coverage, and span of service;
- Route alignments be direct as possible in order to offer travel times that compete with the personal car;
- Service be available within a reasonable walking distance, defined by 80 percent of households in the urbanized areas being within 400 metres walking distance of a bus stop during morning peak; and

- Serving new growth areas as early as possible.

In order to continue meeting these service level objectives, continued investment in maintaining the fleet and facilities assets in optimal condition is required.

DRT maintains the condition of its fleet assets using a three phased approach:

- Annual review of major powertrain components;
- A preventative maintenance (PM) schedule based on:
 - The original equipment manufacturers (OEM's) recommended best practice and
 - The semi-annual vehicle safety inspection process as regulated by the Ontario Ministry of Transportation (MTO), Commercial Vehicle Safety Requirements, National Safety Code 11, Part B (NSC11B).
- Required unscheduled repairs and running repairs.

The annual powertrain review consists of a bus by bus analysis that includes total number of kilometres, annual kilometres, number of hours of engine service, year and model of the engine and whether a previous major component overhaul or replacement has taken place. Similar to a facility, the deterioration of a bus occurs by component, rather than holistically and the asset must be maintained as such. Preventative maintenance of the fleet is scheduled when kilometres have accumulated to the prescribed target. During nightly fuelling and servicing process, daily operated kilometres are manually recorded into the fuel reporting software for each bus. The information is transferred to the maintenance work order software system and based on accumulated kilometres, preventative maintenance is scheduled.

Table 6: Preventative Maintenance Schedules for DRT Conventional Fleet

New Flyer Industries		Nova Bus	
A Inspection	Every 10,000km	A Inspection	Every 10,000km
B Inspection	Every 20,000km	B Inspection	Every 24,000km
C Inspection	Every 40,000km	C Inspection	Every 48,000km
D Inspection	Every 80,000km	D Inspection	Every 100,000km

Semi-annual MTO Commercial Vehicle Safety Inspections are based on the date of the previous inspection, plus six months. This is a mandatory inspection subject to review by an agent of MTO and ensures the fleet is in safe operating condition.

When buses have reached the end of their useful life, they are decommissioned and replaced. Currently, the average age of DRT's conventional fleet is 6.9 years of age and there is only one conventional bus older than 12 years of age (representing approximately 0.5 per cent of the total conventional fleet). These are in line with the performance targets for these two measures as identified in Table 7. In addition, the average age of the DRT's Specialized bus fleet is 3.1 years of age, well below their useful life of seven years.

In 2017 and 2018 as part of the Regional Business Planning and Budget process, DRT purchased 41 new conventional buses using senior government funding and matching Regional funding to replace existing conventional buses that have exceeded their useful life. It takes approximately one year to receive and place the new bus into service and as such, the last 24 of the 41 new conventional bus replacements are now reflected in this year's fleet inventory as at December 31, 2018. This continued investment has decreased the average age of DRT's conventional fleet from 7.5 years of age in 2017 to 6.9 years of age in 2018.

For facilities, they must be maintained in an acceptable condition standard to be able to effectively maintain DRT's fleets to allow DRT to provide expected community transit service levels. 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 provide this comprehensive capital/maintenance program, the Regional Works Staff perform building condition assessments (BCA).

To better manage these BCA assessments and address infrastructure needs through innovative solutions, the Works Department – Facilities Design, Construction and Asset Management implemented a new capital asset management & planning software system (CAMP), Ameresco Asset Planner. This system assists with the collection, management, and reporting of BCA data as well as identifies the need for future work, timing and costs.

It is the Region's goal to have all facilities rated as Fair or better by 2023. DRT's facilities currently have an overall condition rating of Good, with two facilities in Very Good condition while portions of the existing Raleigh Facility are now in Poor condition, until repair and rehabilitation work can be completed with previously approved funding.

Technical Service Levels and Performance Measures

Asset management staff have identified key asset related technical service levels and performance measures as noted in Table 7.

1.7 DRT Life-cycle Considerations

Fleet

DRT targets conventional buses to have an expected useful life of approximately 12 years of age.

Bus manufacturers undertake rigorous testing on conventional buses for a 12 year life cycle, including changes to existing models, and or new models. Through this testing process, the industry and manufacturer standard for the useful life of conventional buses has been identified at 12 years of age (without any significant mid-life structural refurbishment required). Beyond 12 years of age, a bus can require significant structural refurbishment as major components begin to wear and the bus becomes more costly to repair. As a result, maintenance costs increase significantly while impacting bus reliability. Eventually, the bus will become a spare and used only when necessary.

In order to ensure the conventional buses can reach 12 years of age, DRT also employs a rigorous preventative maintenance schedule based on:

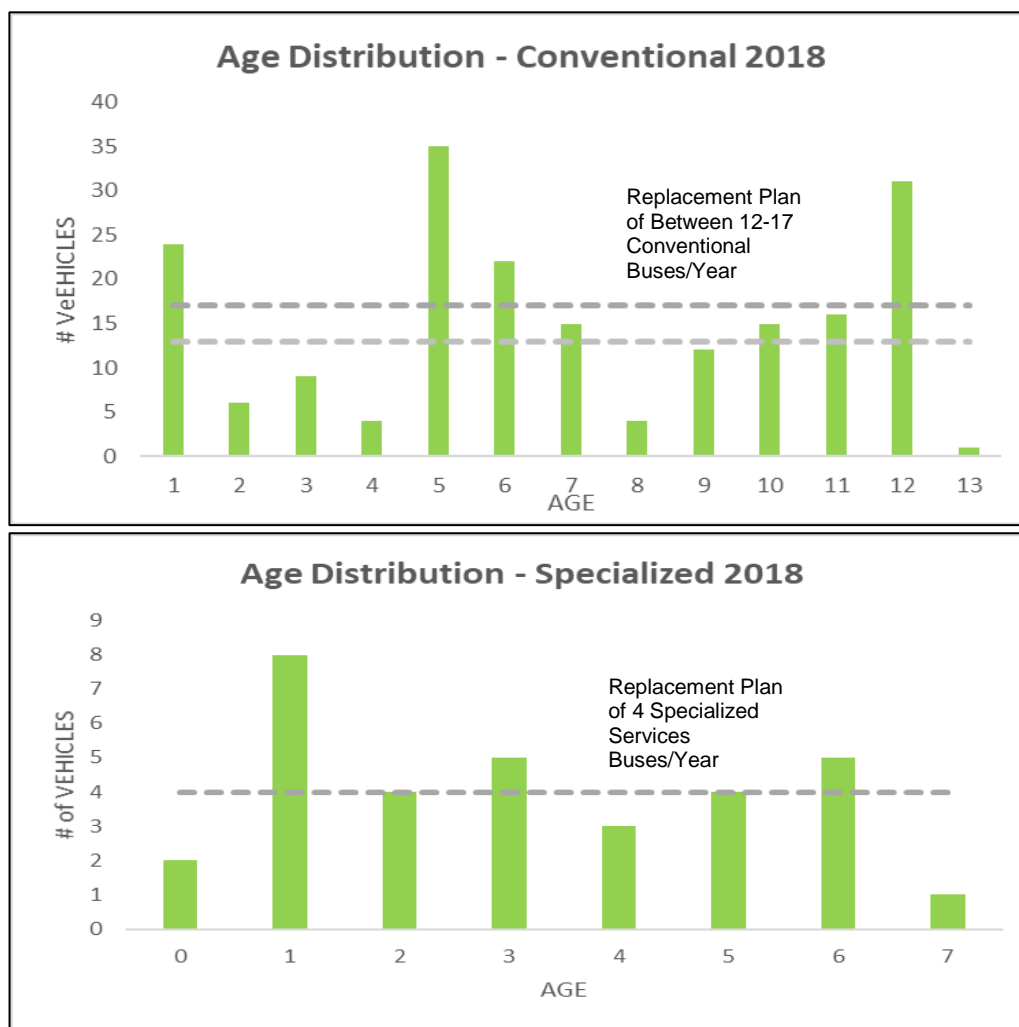
- The original equipment manufacturers (OEM's) recommended best practice and
- The semi-annual vehicle safety inspection process as regulated by the Ontario Ministry of Transportation (MTO), Commercial Vehicle Safety Requirements, National Safety Code 11, Part B (NSC11B).

Based on the above considerations, DRT makes fleet investment decisions to ensure the fleet is maintained in an optimal condition at the lowest possible life cycle cost.

The 2019 DRT Business Plan and Budget included a \$0.6 million increase for major repairs in 2019 (for a total 2019 allocation of \$1.5 million) over 2018 (\$0.9 million). These major repairs are necessary to ensure the conventional buses can achieve their planned 12 years of useful life, using a life cycle asset management approach.

As conventional buses reach 12 years of age and are based on the condition of major components, they are identified for potential replacement. DRT's fleet replacement plan includes a fairly consistent and smooth annual conventional bus replacement schedule to maintain the target age of seven years of age. In accordance with this plan, DRT's 9-year capital forecast (2020-2028) has identified the need to replace between 12 and 17 conventional buses (or an approximate average of 15) and four specialized services buses annually at a combined cost of between \$7.8 million and \$10.7 million (or an annual approximate average of \$9.6 million). For 2019, six BRT buses (\$5.6 million) that would be used for both replacement and new service capacity, along with the potential of nine replacement buses with BRT buses (\$5.4 million) in 2020 will be undergoing further review and analysis to determine the optimal type, number and function, and may be subject to change.

This fleet replacement plan will be refined and updated as part of the 2020 Regional financial planning process.

Figure 2: DRT Conventional and Specialized Services Fleet – 2018

Typically, the life cycle cost (total cost of ownership) would include the initial capital acquisition cost, plus the operating, maintenance and repairs costs, less the auction proceeds on disposal. Life cycle costs of DRT fleet will be updated and refined in future asset management reports. Table 8 below, provides a sample of DRT's estimated fleet maintenance and fuel measures for 2018 conventional buses.

Table 8: Sample of DRT Estimated Maintenance and Fuel for Conventional Buses

Year	Vehicle	Annual KM	Maintenance/Repair Cost		Fuel Cost		Total Cost	Cost/KM
			Annual Cost	\$/KM	Annual Cost	\$/KM		
2018	193	14,653,779	\$13,066,309	\$0.89	\$7,696,321	\$0.53	\$20,762,630	\$1.42
2017	190	14,299,313	\$12,240,111	\$0.86	\$6,445,758	\$0.45	\$18,685,869	\$1.31
2016	186	13,747,559	\$12,138,753	\$0.88	\$5,409,710	\$0.39	\$17,548,463	\$1.28

Facilities

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.

DRT Facilities deteriorate by components rather than as a whole and decisions on maintenance and renewal of components drive asset life cycle considerations.

The staff in the Works Department – Facilities Design, Construction and Asset Management undertake maintenance, repair and rehabilitation activities for these components at optimal times to allow DRT to provide uninterrupted transit services at lowest risk in the most cost-effective manner.

Table 9 below provides a summary of some useful life guidelines for facility 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, return on investment and other specific needs of DRT are also considerations in facility infrastructure decisions. These decisions are further refined through the recent implementation and ongoing utilization of computerized maintenance management systems (CMMS) and capital asset management planning software system Ameresco (CAMPs). Works staff can better identify and refine forecasted future repair, maintenance, and rehabilitation needs and subsequent cost estimates using these systems.

The CAMPs system is capable of producing up to a 25-year work plan to coincide long-term asset management planning, including for five year operating and 10 year capital forecasts. These lifecycle activities, are considered as part of annual business planning and budget processes, and ensure these DRT facilities are maintained in a good state of repair to enable DRT to provide services.

Table 9

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

1.8 Risk Assessment

Regional staff investigate potential risks on an ongoing basis, considering probability of occurrence and the potential consequence, as well as the suitability of existing risk mitigation controls. The following table includes identified DRT risks. Regional staff monitor and assess risks and vulnerabilities with mitigation controls implemented through annual business planning processes as required.

Table 10: DRT Risk Mitigation Strategies

Potential Risk Impact	Mitigation Goal
Chargeable Equipment Failure (e.g. engine and or transmission failure, emission control systems)	<p>Preventative maintenance, repairs, replacements and proper storage of vehicles and equipment.</p> <p>Inspections and maintenance of operational and compliance standards.</p> <p>Inventories of critical parts and spare vehicles and re-scheduling/re-routing.</p> <p>Maintenance protocols and warranties.</p> <p>Driver training and protocols.</p>
Loss of External Utilities or Fuel	<p>Maintain effective up-to-date emergency, contingency and continuity plans.</p> <p>Ensure adequate standby power at DRT facilities and partnership with Region Facilities.</p> <p>Development of fuel shortage plans.</p> <p>Essential services policies and procedures.</p>
Vehicle Accident	<p>Supervisory oversight.</p> <p>Driver screening, training and recertification programs.</p> <p>Compliance and licensing standards.</p> <p>Maintain effective emergency and contingency plans.</p>
Security Breach (e.g. theft, vandalism, terrorism)	<p>On-site/on-bus safety systems and protocols.</p> <p>Geographical Positioning System technology on buses and other vehicles.</p> <p>Durham Region Transit Security Strategy.</p> <p>Maintain effective up-to-date emergency, contingency and continuity plans.</p>
Weather Related (e.g. Winter ice/cold and more frequent freeze-thaw cycles)	<p>Winter control program (e.g. vehicle, shelter and facility warming and/or de-icing and snow removal etc.).</p> <p>In-bus water/ice slip hazard identification and mitigation.</p> <p>Asset management – preventative maintenance (e.g. in-bus HVAC).</p> <p>Post-storm clean-up.</p> <p>Condition audits and inspections.</p> <p>Maintain effective up-to-date emergency, contingency and continuity plans.</p>

1.9 Climate Change

Mitigation

Current climate mitigation priorities related to DRT are focused on:

- Maximizing the efficiency of energy and fuel usage;
- Maximizing opportunities provided under provincial, federal and utility energy and fuel incentive programs and grants;
- Contributing to community wide GHG reduction benefits through transit ridership expansion and service integration; and,
- Continuing to investigate renewable energy and fuel opportunities.

While transit's share of the overall corporate carbon footprint may increase as the DRT fleet expands, DRT continues to explore and implement alternative service delivery options and right sizing the fleet to enhance and optimize capacity and bring transit to more parts of the region, thereby reducing the need for personal vehicles. This includes the provision of On-Demand services in north Durham (North Durham Service Strategy), reduced vehicle sizes where appropriate, and expanded per bus capacity (e.g. the feasibility of articulated buses are currently being reviewed) for high demand routes to mitigate bus full occurrences. In addition, DRT is also successfully increasing energy efficiency and reducing corporate GHG emissions through continuous improvements in vehicle fuel efficiencies from the DRT fleet replacement program, which replaces older buses with new more fuel efficient lower emission emitting buses. This is evidenced by the increase in fuel economy of DRT conventional fleet from 1.84 km per litre in 2013 to 2.0 km per litre in 2018 (see Table 8). Through these measures, GHG emissions can be reduced.

DRT has also been implementing solar powered lighting on specific DRT shelters based on site-specific assessments and is developing a retrofit program as well as new solar shelter plan moving forward through the business planning process. As part of the most recent tender for shelters and passenger amenities, DRT included the provision to include solar lighting at new locations and retrofitting existing shelters as well. Solar lighting of shelters can offer cost savings compared to electrical connection and provide security lighting in areas where electrical connection is not viable creating risk mitigation co-benefits. DRT's 2019 Capital Budget includes \$0.8 million for bus stop passenger amenity improvements, including to retrofit 100 existing shelter locations and 46 new shelters with solar lighting.

For DRT facilities, the newly commissioned (in 2017) DRT Raleigh Maintenance Facility (715 Farewell Street) was built to LEED Silver Standards with energy efficiencies. Also, the DRT Raleigh Bus Storage Facility (710 Raleigh Avenue) and the DRT Westney Facility had a number of lighting retrofits and improvements implemented in 2018 as well as a number underway and planned that are anticipated to improve the energy efficiency of these facilities.

DRT is also investigating alternative fuel and electric vehicle (EV) technologies. Electric

vehicles, including battery-electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEV) which offer the option to operate in electric mode with charged battery, may be the most energy-efficient and lowest emission choices available. New to Canada in 2018 are the hydrogen-fuel cell vehicles that use hydrogen fuel to produce electricity without combustion thus producing zero emissions. The Canadian Urban Transit Research and Innovation Consortium (CUTRIC) is leading a project for demonstrating Battery Electric Buses in Canada. The consortium, made up of partners including bus manufacturers, utilities, transit agencies and research organizations, is looking to produce evidence of the viability of electric buses in reducing GHG emissions. DRT is closely following the CUTRIC Phase 1 in Toronto, Brampton, York Region and Vancouver. DRT is monitoring opportunities to participate in Phase II of the project, which supports Canada's climate change goals in displacing diesel technologies with lower carbon propulsion technologies.

In addition to assessing the potential feasibility of utilizing electric and or hybrid vehicles, the Region is also currently exploring biogas utilization as well. In November 2018, Works and Finance jointly retained the consulting services of consultants WSP Canada Group Ltd. and Change Energy Services (CES) to assist staff in a CNG/RNG fueling demand-side assessment and analysis. Utilization of CNG/RNG as a vehicle fuel captures methane and converts it into a high energy fuel and while regulations and treatment for transportation uses of RNG compared to natural gas and fossil fuel options are not yet established in Canada, given that natural gas is currently priced significantly less than gasoline and diesel fuel, there is notable market interest in utilizing compressed or liquefied natural gas for light and heavy duty vehicles (i.e. buses).

The demand-side analysis is intended to provide an overview of what Regional fleet operations may be best-suited for alternative fueling technologies such as CNG/RNG. As part of the CNG/RNG fueling assessment, in addition to evaluation of fleet conversion and life cycle cost impacts, Regional staff and the project consultant have undertaken on-site review of several Regional facilities, including all Transit maintenance facilities, in order to assess their suitability for hosting and fueling CNG/RNG vehicles on-site. With the transit fleet representing the single largest fleet fuel user for the Region, representing almost 75 per cent of total fleet fuel litres consumed annually, there is considerable interest in assessing alternative fuel options which may yield operational cost and environmental co-benefits versus conventional fuel types. The study is anticipated for completion in 2019 and results and any recommendations will be brought forward to Regional Council for consideration.

Adaptation

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. increased freeze-thaw events and a higher frequency of extreme

storms) in addition to the usual impacts of cold and ice related to winter weather.

Climate adaptation requirements are assessed within the asset management planning process, which includes the annual reporting of asset inventory and valuations; state of infrastructure reviews; and vulnerability and risk assessments, which are utilized to inform DRT. These are incorporated into the Regional Business Planning and Budget process, with the following key items included in the approved 2019 DRT Business Plan and Budget:

- Operations and preventative maintenance programs, including \$1.5 million for major repairs and \$3.7 million for vehicle parts and supplies;
- \$2.4 million for route maintenance services;
- \$0.8 million to continue to improve bus stop passenger amenities, including hard surface paving (currently 80 per cent of bus stops have hard surfacing);
- Total rehabilitation, replacement and expansion capital investments (\$11.3 million);
- Inventory management planning;
- Redundancy and contingency planning; and,
- Business continuity and emergency planning.

1. Attachment #8: Fleet Asset Class Report

1.1 Description of Fleet Assets:

Regional fleet assets include transit vehicles (e.g. conventional and specialized service buses and supervisory vehicles), Region of Durham Paramedic Services (RDPS) vehicles (e.g. ambulances, rapid response vehicles, emergency support vehicles and emergency response and command vehicles), Works vehicles (e.g. trucks, vans, plows, trailers etc.), and Durham Regional Police Service (DRPS) vehicles (e.g. police cruisers, trailers and all-terrain vehicles or ATVs). Data and information relating to transit vehicles is contained within Attachment #7.

1.2 Fleet Inventory:

Durham Region owns 790 non-transit vehicles, as outlined in Table 1. This represents an increase of 18 vehicles (2.3 per cent) compared to 2017¹. Inventory adjustments are attributed to fleet additions, disposals and retentions throughout the year.

Table 1: Fleet Inventory Change

Asset Type	Asset Group	Inventory (# of Vehicles)		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Fleet	Works	351	352	1	0.3%
	Durham Regional Police Service (DRPS)	345	354	9	2.6%
	Region of Durham Paramedic Services (RDPS) ²	76	84	8	10.5%
Total Fleet Inventory		772	790	18	2.3%

Note ²: Adjustment in RDPS fleet from 2017 to 2018 is to reflect a reclassification of existing fleet from equipment i.e. trailers, gator.

Per Table 2, the total estimated replacement cost for the Region's non-transit fleet assets is \$70 million, an increase of \$8 million, or 12.9 per cent. The replacement cost increase is attributed to increases in inventory and refined replacement unit cost values based on recent updated acquisition costs.

Table 2: Regional Fleet Replacement Value (\$ Millions)

Asset Type	Asset Group	Replacement Costs		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Fleet	Works	33	40	7	22.0%
	Durham Regional Police Service (DRPS)	19	20	1	4.7%
	Region of Durham Paramedic Services (RDPS)	11	11	-	0.0%
Fleet Replacement Value Totals		62	70	8	12.9%

¹ Note that all DRT-related values for inventory and replacement cost are now reported in Attachment #7.

1.3 Fleet Condition Ratings and Average Ages

A corporate reporting method for the condition the Region's fleets is currently being developed and will be reported in future annual Asset Management Plans, along with the average ages and remaining useful lives of the Region's various fleets.

1.4 Works' Fleet:

Life-cycle Management and Replacements

The Region's Works' fleet is subject to harsh operating conditions and is typically utilized over extended shifts, increasing body and mechanical deterioration rates. The Region maintains its fleet using a proactive and robust fleet maintenance and repair program in accordance with best industry standards, regulatory requirements and manufacturers specifications.

Replacement decisions involve an assessment of each Works' fleet vehicle, based on historical maintenance and costs, current mechanical and structural condition, mileage and operating hours, performance/obsolescence, replacement costs, and other factors. Managing the replacement of a diversified fleet requires balancing investment in new vehicles with repair costs. Financing for vehicle replacements is provided throughout the life-cycle of each vehicle through an annual reserve contribution, allowing for varying costs and providing flexibility for replacements without cost spikes. This strategy has provided for a safe, operationally suitable fleet of vehicles that are in good condition overall.

Moving forward, Regional staff will be further refining full life cycle costing analysis for fleet and will provide updated analyses, results and recommendations in future annual Asset Management Plans.

1.5 RDPS Fleet:

Life-cycle Management and Replacements

RDPS has two main vehicle types: emergency response vehicles (ERV) and management support vehicles. These vehicle types are managed differently given their use in operations. ERVs include ambulances, rapid response vehicles (RRV), emergency support units (ESU) and command vehicles, which provide operational oversight to emergency and non-emergency requests for pre-hospital medical care across the Region.

The Region has a rigorous preventative maintenance program to keep vehicles in peak working condition while optimizing cost efficiency by maintaining versus repairing. Ambulances receive these preventative maintenance programs in accordance with provincial standards.

As the RDPS fleet is funded 50/50 with the Ministry of Health and Long-Term Care (MOHLTC), specific funding requirements can influence the fleet replacement program.

Vehicles for example must be kept for a minimum of 54 months before being replaced. As such, given the varying service demands by vehicle type and senior government influence on fleet replacement, RDPS uses a staged approach to vehicle deployment where:

- For the first 3 years (36 months), an ambulance or emergency response vehicle is used as a front line vehicle;
- After 36 months it becomes a spare/contingency vehicle for one year;
- After approximately 4 years, the vehicles then become secondary spares, and are used less frequently as front line vehicles and utilized more in support of contracted event services (e.g. Canadian Tire Motorsport Park, Tribute Communities Centre events); and
- After 54 months, vehicles are classified as pending decommission, and are replaced shortly thereafter subject to RDPS Division Business Plan and Budget approvals and how many vehicles reach 54 months in a given year.

Vehicles that have demonstrated a higher prevalence of mechanical issues and maintenance requirements and/or unusually high kilometres of travel or engine hours are replaced first. Retired RRVs and Command vehicles and management support vehicles can be used administratively, based on their individual mechanical condition, 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 provide transportation for incoming paramedics to change tours of duty with on-duty paramedic crews who are not able to return to their originating paramedic response station in a timely fashion due to operational requirements.

Typically, the life cycle cost (total cost of ownership) includes the initial capital acquisition cost, plus the operating, maintenance and repairs costs, less the auction proceeds on disposition. RDPS has identified the following preliminary estimated fleet maintenance and fuel measures for 2017 and 2018.

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

Year	Annual Vehicle Availability	Annual Kilometers Drive	Maintenance Cost		Fuel Cost	
			Annual Cost	\$/KM	Annual Total	\$/Km
2017	98%	1,968,098	\$700,439	\$0.35	\$793,893	\$0.40
2018	98%	2,265,124	\$619,696	\$0.27	\$915,784	\$0.40

Table 4: Estimated RDPS Maintenance and Fuel for Management Response Vehicles

Year	Annual Vehicle Availability	Annual Kilometers Drive	Maintenance Cost		Fuel Cost	
			Annual Cost	\$/KM	Annual Total	\$/Km
2017	98%	80,603	\$26,215	\$0.33	\$26,857	\$0.33
2018	98%	142,752	\$28,052	\$0.20	\$42,572	\$0.30

In keeping with RDPS fleet replacement plan, the 2019 Budget includes the replacement of 9 ambulances in 2019 (\$1.5 million) and between 10 and 12 ambulance replacements per year (\$1.7 million to \$2.1 million) over the forecast period (2020-2028) to replace aging fleet as they come due to replacement.

Moving forward, RDPS will continue to monitor, track, and refine life cycle costing for internal fleet management, investment decisions through business planning and budgets, external / internal reporting, and to comply with the future requirements in the newly approved asset management regulation (O. Reg 588/17). Updates will be reported in future annual Asset Management Plans.

1.6 DRPS Fleet:

Life-cycle Management and Replacements

DRPS utilizes two main types of rated vehicles for the provision of policing services. The first vehicle type used is classified as a primary response vehicle. These primary response vehicles are modified to perform better under the rigors of providing police services including being engineered to repetitively stop in a shorter distance, accelerate faster, and handle better than the base platform. The second main type of rated vehicle used for the provision of police services is classified as secondary response vehicles. These vehicles are typically used for Administrative assignments, Detectives, and other Units, not classified as front line/primary response. These vehicles are not marked Police Vehicles and are representative of the vehicles purchased by the general public and whenever possible Hybrid vehicles.

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. DRPS vehicles are maintained in accordance with the guidelines based on manufactures service program.

In terms of eventual replacement, DRPS employs the following life cycle 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 rationale for this replacement schedule is to ensure that vehicles are available for officers to serve the public, while minimizing the total cost of ownership of the vehicles over their useful life. It is worth noting that 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. This also factors in deciding fleet replacements.

In keeping with fleet replacement plan, the Regional Council approved 2019 DRPS Business Plan and Budget includes the replacement of 32 marked patrol vehicles (\$1.4 million) and the replacement of 2 unmarked vehicles (\$0.1 million).

Typically, the life cycle cost (total cost of ownership) includes the initial capital acquisition cost, plus the operating, maintenance and repairs costs, less the auction proceeds on disposition. DRPS has identified the following preliminary estimated fleet maintenance and fuel measures for 2017 and 2018.

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

Year	Annual Vehicle Availability	Annual Kilometers Drive	Maintenance Cost		Fuel Cost	
			Annual Cost	\$/KM	Annual Total	\$/Km
2017	98%	4,696,790	\$809,047	\$0.17	\$823,879	\$0.18
2018	98%	4,969,058	\$993,783	\$0.20	\$1,212,538	\$0.24

Table 6: DRPS Maintenance and Fuel Measures for Secondary Response Vehicles

Year	Annual Vehicle Availability	Annual Kilometers Drive	Maintenance Cost		Fuel Cost	
			Annual Cost	\$/KM	Annual Total	\$/Km
2017	98%	3,644,793	\$519,700	\$0.14	\$475,087	\$0.13
2018	98%	3,750,856	\$490,937	\$0.13	\$606,753	\$0.16

Moving forward, DRPS will continue to monitor, track, and refine life cycle costing for internal fleet management, investment decisions through business planning and budgets, external / internal reporting, and to comply with the future requirements in the newly approved asset management regulation (O. Reg 588/17). Updates will be

reported in future annual Asset Management Plans.

1.7 Fleets: Levels of Service and Performance Measurement

DRPS provides police services to ensure the safety and security of citizens, property and the community for people to live, work and play.

RDPS provides high quality land ambulance and pre-hospital medical care services to the residents of Durham Region.

The Works Department provides fleet management and maintenance services for all Regional vehicles (except for DRPS and DRT) to assist in the provision of transportation, water and sewer, waste and program services to the residents of Durham Region.

Table 7: Service Levels Objectives for Fleet

Service Level Objectives
<ul style="list-style-type: none"> • 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 and participate in joint procurement projects where appropriate and beneficial.

These service levels objectives have been set through the following Regional Council approved master plans, studies, policies and procedures, as well as through the following regulatory and or compliance guidelines.

Table 8

Regional Plans, Studies, Policies, & Procedures	Regulatory/Compliance Guidelines and Requirements
<ul style="list-style-type: none"> • Various Regional Departmental program area studies, plans, policies and procedures • Strategic Plan • The Regional Official Plan • Corporate Climate Adaptation Plan 	<ul style="list-style-type: none"> • Highway Traffic Act • Motor Vehicle Inspection Station Licencing and Standards • Motor Vehicle Repair Standards • Truck and Bus National Safety Code

	<ul style="list-style-type: none"> • 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)
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For RDPS, ambulances receive preventative maintenance programs in accordance with provincial standards. As a result, as reported in the RDPS 2019 Business Plan and Budget, ambulances and vehicles are available 98 percent to provide services.

For DRPS, their fleet preventative maintenance programs ensured that in 2018, 98 per cent of vehicles were available for service.

For 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 the vehicles are able to continue to assist in providing water, sewer, transportation and traffic services.

Moving forward, as new detailed appendices are created for the remaining individual municipal services, including for RPDS and DRPS, in the annual Asset Management Plan, staff will further refine service levels and performance measures to comply with the future reporting requirements in the newly approved asset management regulation (O. Reg 588/17). These will also 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 annual Asset Management Plans.

1.8 Risk Assessment

The following table includes a sample of identified risks to fleets with mitigation controls addressed through annual business planning. Risks and program vulnerabilities to climate change are continuously monitored, reassessed and updated to ensure any identified gaps are adequately addressed through the current business cycle and/or multi-year plans where prudent.

Table 9: Risk Mitigation Strategies

Potential Risk Impact	Mitigation Goal
Loss of Fuel	<p>Maintain effective and up-to-date emergency, contingency and continuity plans.</p> <p>Ensure adequate standby power.</p> <p>Essential services policies and procedures.</p> <p>Fuel deliveries and re-routed programs/services and redundancies.</p> <p>Mobile services and on-call service contracts.</p>
Security Breaches and Theft	<p>On-site safety systems and protocols (e.g. surveillance, patrols, fencing, emergency training, policies and plans).</p> <p>Geographical Positioning System technology on vehicles.</p> <p>Maintain effective and up-to-date emergency, contingency and continuity plans.</p>
Vehicle Accident	<p>Supervisory oversight.</p> <p>Driver screening, training and recertification programs.</p> <p>Compliance and licensing standards.</p> <p>Maintain effective emergency and contingency plans.</p>
Equipment Failures	<p>Preventative maintenance and capital replacement programs and plans.</p> <p>External service contracts.</p> <p>Safety codes, warranties and guidelines.</p> <p>Inspections, checklists and accreditations.</p> <p>Proper equipment and vehicle storage.</p> <p>Fleet maintenance re-scheduling and redundancies (e.g. spare vehicles and parts inventory).</p>
Winter ice/cold and more frequent freeze-thaw cycles	<p>Winter control program (e.g. vehicle, shelter and facility warming and/or de-icing and snow removal etc.)</p> <p>Slip hazard identification and mitigation.</p> <p>Inspections.</p> <p>Maintain effective and up-to-date emergency, contingency and continuity plans.</p>

Climate Change

Climate Change mitigation: Reducing GHG emissions from Fleets

A priority is to reduce fleet energy and fuel usage as well as investigate potential renewable energy/fuel opportunities for Regional fleets and associated facilities.

A goal is to maximize potential fuel efficiencies, which is a consideration both for decisions around fleet vehicle purchases as well as fleet management practices. Implementation of hybrid and electric vehicle (EV) technologies or other technologies depends upon feasibility. Other considerations affecting implementation decisions include maintenance and replacement requirements, life-cycle costs, compliance and service requirements (particularly for emergency response DRPS and RDPS vehicles which must maintain a specific public safety response capability), and operating reliability.

DRPS uses four cylinder and hybrid vehicles for non-patrol fleet functions (approximately 12 per cent of the DRPS fleet) and in 2019 will include an additional 15 hybrid patrol cars which will replace six-cylinder and eight-cylinder models (for a total of 57). DRPS has also reduced diesel generator requirements by using inverter generators on Incident Command, Public Order and Forensic Identification scene vehicles, whenever shore power is available.

A continuing focus across all Regional fleets is to reduce engine idling, which increases fuel and engine efficiencies and decreases GHG emissions and noise pollution. Driver training includes adherence to 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.

Works fleet equipment are equipped with GPS monitoring systems and speed alerts.

In addition to assessing the potential feasibility of utilizing electric and or hybrid vehicles, the Region is also currently exploring biogas utilization as well. In November 2018, Works and Finance jointly retained the consulting services of consultants WSP Canada Group Ltd. and Change Energy Services (CES) to assist staff in a CNG/RNG fueling demand-side assessment and analysis. Utilization of CNG/RNG as a vehicle fuel captures methane and converts it into a high energy fuel and while regulations and treatment for transportation uses of RNG compared to natural gas and fossil fuel options are not yet established in Canada, given that natural gas is currently priced significantly less than gasoline and diesel fuel, there is notable market interest in utilizing compressed or liquefied natural gas for light and heavy duty vehicles.

The demand-side analysis is intended to provide an overview of what Regional fleet operations may be best-suited for alternative fueling technologies such as CNG/RNG. As part of the CNG/RNG fueling assessment, in addition to evaluation of fleet conversion and life cycle cost impacts, Regional staff and the project consultant have undertaken on-site review of several Regional facilities in order to assess their suitability

for hosting and fueling CNG/RNG vehicles on-site. Of note is that any decision to proceed with such technology may not necessarily be dependent on making the notional linkage to RNG produced as there may be a value proposition in proceeding based on potential operational and environmental benefits of CNG versus conventional fuel types. The study is anticipated for completion in early 2019 and results and any recommendations will be brought forward to Regional Council for consideration.

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 life cycle 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. Attachment #9: Equipment Asset Class Report

1.1 Description of Equipment Assets:

The equipment asset class includes information technology (IT) equipment (laptops, desktops, servers, printers etc.), DRPS equipment, long-term care equipment (beds, ceiling lifts, kitchen equipment etc.), RDPS equipment (stretcher, 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 is approximately \$157 million, as shown in Table 1.

Table 1: Equipment Replacement Value (\$ Millions)

Asset Type	Asset Group	Replacement Costs		2017 to 2018 Change	2017 to 2018 % Change
		2017	2018		
Equipment	Information Technology	67.7	67.2	(0.5)	-0.7%
	Durham Regional Police Service (DRPS)	41.6	29.2	(12.4)	-29.7%
	Long Term Care (LTC) and Region of Durham Paramedic Services (RDPS)	13.8	14.9	1.1	8.0%
	Waste	10.9	10.9	0.0	0.3%
	Works	15.9	18.3	2.4	15.3%
	Furniture and Fixtures	6.3	6.7	0.4	6.2%
	Other Miscellaneous Equipment	9.1	9.8	0.7	7.3%
Equipment Replacement Value Totals		165.3	157.0	(8.3)	-5.0%