



The Town of Aurora

Asset Management & Investment Plan

Securing Sustainability of our Infrastructure

Approved by Aurora council on March 26, 2019

Includes 2018 Detailed 10-Year Financial Forecast for Infrastructure Assets

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EXECUTIVE SUMMARY

In response to the Ministry of Infrastructure’s release of a ten–year infrastructure plan, “Building Together”, which focuses on building a more standardized and consistent approach to municipal asset management planning, the Town of Aurora (the “Town” or “Aurora”) has taken a pro-active approach in preparing a detailed Asset Management Plan, “AMP”, in support of its requests for provincial and federal capital funding. As the Town’s municipal assets continue to age, it becomes increasingly important to go through a formal process determining how a group of assets is to be managed over a period of time to help ensure safety standards, regulations and expected levels of service continue to be met given the Town’s financing capabilities.

This asset management plan aligns with the town’s newly created **Strategic Asset Management Policy** which is a new requirement under the province’s recently approved Asset Management Planning for Municipal Infrastructure Regulation (O. Reg 588/17). The town’s strategic asset management policy includes multiple commitments such as commitments to the utilization of levels of service information, lifecycle management, mitigation approaches to climate change and the coordination where possible with upper and neighbouring municipalities in its asset maintainance and R&R decision points.

This AMP identifies the characteristics and condition of town owned infrastructure assets, levels of service expected from them, planned actions to ensure the assets are providing the expected level of service and financing strategies to implement the planned actions. The overall intent of the AMP is to help the Town ensure investments are made at the right time, future repair and rehabilitation costs are minimized, and municipal assets are being appropriately maintained.

The Town’s AMP undergoes a full review & update and is re-approved by council once every four years, aligning with council’s term in office. The only changes made to the AMP outside of its four year review cycle is an update of its enclosed Financial Analysis and Detailed 10-Year Financial Forecast for Infrastructure Assets in order to ensure continued alignment with the Town’s most current ten year investment plan which is updated on an annual basis based upon the foundational asset repair and replacement philosophies outlined in this AMP document. The most recently included 10-Year Forecast for Infrastructure Assets covers the period of 2018 to 2028.

INTRODUCTION

Public Infrastructure is central to our prosperity and our quality of life. The Province of Ontario released in June 2011, “Building Together”, a long-term infrastructure plan for Ontario that responds to the far-reaching trends that will affect Ontario’s infrastructure needs including a more global and service-oriented economy, a larger, older and more urbanized population and the effects of a changing climate. The plan sets out a strategic framework that will guide future investments in ways that support economic growth, are fiscally responsible and respond to changing needs. A key element to this framework is ensuring good stewardship through proper asset management. Despite significant investments by all levels of government, more needs to be done to address current and emerging municipal infrastructure needs. The Province of Ontario will work together with local municipalities and the federal government to establish a municipal infrastructure strategy.

Subsequent to this plan the Province of Ontario approved an Asset Management Planning for Municipal Infrastructure Regulation (O. Reg 588/17) which introduced more prescriptive asset management requirements for its municipalities. Compliance with these new requirements will be phased in over the next six years. The first requirement under this regulation being the development and implementation of a Strategic Asset Management Policy by July 1, 2019. The policy must include seven overarching elements which include commitments to the utilization of levels of service information, lifecycle management, mitigation approaches to climate change and the coordination where possible with upper and neighbouring municipalities in its asset maintainance and R&R decision points

The Town of Aurora, like all other municipalities throughout Ontario and Canada, deliver many of the services that are critical to its residents, and these services rely on well-planned, well-built and well-maintained infrastructure. The Town’s Asset Management Plan will address the challenges of current and future infrastructure needs and guide financial and investment decisions.

Town of Aurora Asset Management Plan (“AMP”) sets out the organization’s approach to reviewing and managing its active capital assets, to ensure continued and sustainable operations, operating and service capability of each asset, and the necessary financial plan to ensure that the required investments can be made when expected.

Aurora’s Asset Management Plan is an outcome of the Town’s stewardship responsibilities: how we plan to look after what we have. However, the Town has also incorporated future growth and future asset investments into the plan to document what new assets we plan to invest in as the community grows, and how we plan to finance those investments. The growth side of the plan also becomes an input into the existing asset replacement side of the plan, as the new assets begin to require replacement, sometimes within the same 10-year period, such as for new fleet vehicle additions.

The primary objective of an AMP is to maximize benefits, control risks, and provide a satisfactory level of service to the community in a sustainable manner. Infrastructure management ensures that the Town is capable of providing the desired level of service to support attaining our ultimate goals.

TOWN OF AURORA INFRASTRUCTURE ASSETS

The Town is responsible for the following asset classes: water and wastewater, stormwater management, roads, facilities, parking lots, fleet, machinery and equipment including information technology & telecom equipment, land, parkland and land improvements. Planning and Development Services' Engineering and Capital Delivery Division is responsible for site inspections for new subdivision and assumption of new servicing. This group is also responsible for PSAB reporting for asset classes related to water and waste water, stormwater management, roads, town parking lots as well as supporting Maximo the work and asset management system software. Operational Services is responsible for the operation and maintenance for water and wastewater, stormwater management, roads, fleet, machinery, land, parkland, land improvements and all town parking lots. Community Services is responsible for facility services and fitness equipment. Corporate Services is responsible for the management of all information technology and telecommunications equipment. These infrastructure assets present particular challenges where financing can be large and timing for renewal can cause significant peaks and troughs in required expenditures.

DEVELOPMENT OF AN ASSET MANAGEMENT PLAN

The Town hired an external third party to assist in the initial preparation of its AMP. Subsequent updates to the AMP have been completed in-house. Town staff worked extensively on the plan. The following departments were involved in the development of this AMP:

- Operational Services
 - Parks and Fleet Division
 - Roads, Water and Waste Water and Solid Waste Management Divisions
- Planning & Development Services
 - Engineering and Capital Delivery Division
- Community Services
 - Facility Management Division
- Corporate Services
 - Information Technology Division
- Financial Services
 - Financial Planning Division

The AMP covers a rolling ten year time horizon and references the following resources:

- Ten Year Capital Investment Plan 2019 – 2028 with 2018 Capital Budget
- Road Needs Study, updated in April 2017
- 2018-2028 Repair and Maintenance Budget
- The Corporation of the Town of Aurora PSAB 3150 Compliance Report
- The Corporation of theTown of Aurora Audited Financial Statements (payment certificates)
- Town of Aurora Pavement Management System, April 2017
- Town of Aurora Tangible Capital Asset Policies
- The Economic Value of Natural Capital Assets Report – June 2013

BENEFITS ASSOCIATED WITH AN ASSET MANAGEMENT PLAN

Specific benefits associated with an AMP include:

- Better decision making regarding resource allocation;
- More effective communications with ratepayers, elected officials, financial rating organizations and regulatory agencies;
- Providing consistent levels of service to the public;
- Better risk management practices to the municipality;
- More effective financial planning;
- Reduced lifecycle costs;
- More efficient data management;
- Facilitates the establishment and subsequent implementation of policy objectives and the related measurement of performance;
- Avoids potential problems and crises; and
- Results in positive institutional change.

ASSET MANAGEMENT PLAN'S IMPACT ON PLANNING AND FINANCIAL BUDGETING

Planning and financial budgeting for previous periods have been constructed using the same input factors used in the development of the AMP. Conversely, the AMP lays out data in a more concise document and takes into account the financial impact. Ultimately, the AMP will assist in formulating long-term planning.

The AMP has a significant impact on the planning and financial budgeting process, which are dependent on each other. The AMP identifies the timing for asset renewal, asset maintenance, asset replacement, additions and/or disposals and the associated costs. This directly ties into the planning and financial budgeting by providing the knowledge of the timing and magnitude of future investments required to operate, maintain, renew and acquire assets.

While the AMP clearly outlines the timing and costs to maintain infrastructure assets at a certain level and condition, the capital and operating budgets ensure the acquisition and management of assets is linked to council goals and strategies, community service expectations growth and demand projects, asset life-cycle management, and operating and maintenance programs. In addition, the AMP will outline any funding shortfalls or additional funds required to be raised to maintain assets at desirable conditions.

IMPLEMENTATION AND EVALUATION OF ASSET MANAGEMENT PLAN

The current AMP was approved by Council in February, 2019. On an on-going basis the AMP will be updated to reflect any new financial information in order to ensure alignment with the Town's most current Ten Year Capital Investment plan and operating budget. The timing for asset renewal, asset maintenance, asset replacement, additions and/or disposals and other asset repair & replacement foundational philosophies contained within the AMP will be re-visited by Council and Staff once every four years (Council term).

IMPLEMENTATION SCHEDULE

Staff are committed to maintaining a continuous rolling 10 year Asset Management Plan. The plan will be used to consolidate all of the input data currently being used, along with the addition of the financing component.

Goals/ Actions	Description	Planned Implementation Date	Current Status	Expected Implementation Date
First AMP Creation & Approval by Council	Final Council Approval Obtained	October 31, 2015	Complete	November 1, 2015
Capital Asset Management Steering Committee (CAMSC) review and update of draft AMP	CAMSC to complete review and update of previously approved AMP	September 7, 2018	On-going	September 7, 2018
Presentation of draft AMP to the Executive Leadership (ELT) for its review and feedback	Town staff to complete as close as possible to final draft of the Corporation's AMP for senior management's review and feedback	October 10, 2018		October 10, 2018
Obtain senior management approval of the final draft of 2018 AMP	AMP will be presented to senior management for its final review and approval	October 24, 2018,		October 24, 2018
Presentation of final draft 2018 AMP to Budget Committee for referral to Council for formal approval	Town Staff to present final draft 2018 AMP to Budget Committee for review and referral to council	January 8, 2019		January 8, 2019
Obtain Council approval of town 2018 AMP	2018 AMP will be presented to council for its review and approval	March 26, 2019		March 26, 2019
Update of AMPs ten year capital investment plan	On an on-going basis the AMPs accompanying ten year capital asset investment plan will be reviewed and updated	Ongoing; each year		
Update of AMP core logic	Once every four years (Council term) the AMPs core logic will be reviewed and updated	Ongoing, every four years		

ASSET SCOPE

As stated above, Operational Services, Planning & Development Services, Community Services and Corporate Services are responsible for the following asset classes:

Functional Area	Asset Class
Water and Wastewater	<ul style="list-style-type: none"> • Water mains and maintenance holes • Bulk water filling station • Water pumping stations • Wastewater mains and maintenance holes • Wastewater pumping stations • All valves and appurtenances
Stormwater Management	<ul style="list-style-type: none"> • Stormwater pipes and catchbasins • Stormwater outlets

Functional Area	Asset Class
	<ul style="list-style-type: none"> • Stormponds • Oil/grit separators
Roads	<ul style="list-style-type: none"> • Municipal roads and curbs • Sidewalks • Street lights
Solid Waste Management	<ul style="list-style-type: none"> • No physical assets
Facilities	<ul style="list-style-type: none"> • Administration building • Recreation facilities • Joint Operations Centre • Armory • Library • Fire Halls • Misc properties
Parking Lots	<ul style="list-style-type: none"> • Parking lots servicing town facilities • Parking lots servicing parkland and open spaces • General street parking lots
Fleet	<ul style="list-style-type: none"> • Facilities operations • Parks operations • By-Law operations • Roads operations • Water/Wastewater operations • Solid Waste operations
Machinery & Equipment	<ul style="list-style-type: none"> • Fire Services equipment • Information Technology Equipment • Telecom Equipment • Furniture
Land, Parkland, & Land Improvements	<ul style="list-style-type: none"> • Parks • Park shade structures • Parking lots • Sports fields and courts • Trails, paths and walkways • Playgrounds • Street trees and wood lots • Line fences

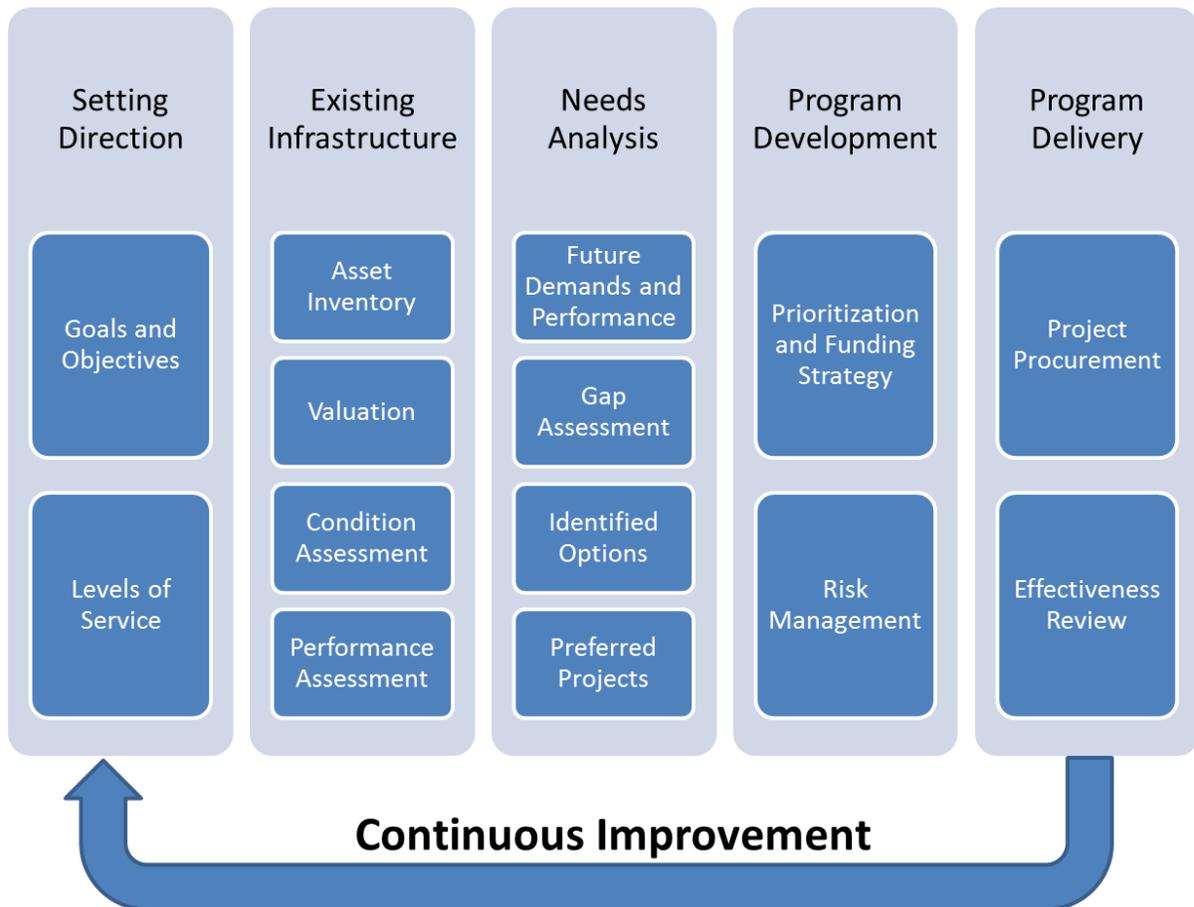
The management of these assets is governed by policies, principles and strategies outlined in this document and are based upon internationally accepted asset management practices.

ASSET MANAGEMENT FRAMEWORK

This asset management plan is based on a three level framework focused on establishing clear linkages between asset management activities and the organization’s strategic objectives. The goal of this plan is to achieve the following objectives:

- Link organizational strategic objectives with the asset management policies and objectives needed to deliver them
- Link organizational strategic objectives with the levels of service that assets should deliver
- Guide the asset management priorities and work required on the assets to achieve objectives and ensure that there is adequate financial resources available to support that work

The asset management framework adopted by the town provides for the key elements necessary to maintain a sustainable and affordable asset management plan. This framework is outlined in the following graphic.



This plan is presented under these five headings and from the overarching strategy for asset management. There are many other studies, reports, databases, programs, and procedures that are referenced in this plan and that form the bulk of the content and process for the day-to-day acquisition, maintenance, monitoring, testing and operation of the Town’s various assets.

SETTING DIRECTION FOR ASSET MANAGEMENT

KEY LINKAGES TO THE CORPORATE STRATEGIC PLAN

The Town of Aurora Strategic Plan was updated in 2011 and provides direction to the 2031 horizon. This is a Council endorsed plan that was created through multiple stakeholder and community group efforts and represents the current vision for the Town which is stated as follows:

An innovative and sustainable community where neighbours care and businesses thrive

The plan is based on the three pillars of sustainability being Community, Economy, and Natural Environment, and identified a number of guiding principles from which the goals and objectives were developed. As a first level linkage to the Strategic Plan, this asset management plan has adopted some of the key principles that created the 2031 vision as they have a direct relationship to the assets that support the community. The principles carried through this plan include:

- Adopting a long term perspective
- Leadership in corporate management
- Leverage partnerships
- Corporate excellence and continuous improvement

This plan directly supports the following goals and objectives both identified in the strategic plan and as identified through departmental priorities:

Goal	Objective
Supporting an exceptional quality of life for all	<ul style="list-style-type: none"> • Improve transportation, mobility and connectivity • Invest in sustainable infrastructure • Strengthen the fabric of our community
Supporting environmental stewardship and sustainability	<ul style="list-style-type: none"> • Encouraging the stewardship of Aurora’s natural resources • Promoting and advancing green initiatives
Fiscal Management	<ul style="list-style-type: none"> • Plan for long term funding reserves • Balance service needs and growth with asset condition and investment needs

TOWN OF AURORA'S ASSET MANAGEMENT POLICY

Taking leadership from the organization's Strategic Plan, the Town has developed the following asset management policy statement:

The assets of the Town of Aurora are critical to contributing to an exceptional quality of life for the community. The Town views sustainability and environmental stewardship as leading goals in preserving our assets for present and future generations.

In achieving these goals, the principles of having a long-term perspective, leadership in corporate management, leveraging partnerships, and continuous improvement will form the basis in developing asset management plans that balance short-term costs and needs with long-term sustainability and financial viability for present and future generations.

EXPECTED LEVELS OF SERVICE

UNDERSTANDING THE USER GROUPS

Service levels are often directed by a combination of the needs of the user community, the affordability level of the service, and the capacity of the existing infrastructure. As a first step in this process, the users of the various asset classes are defined to assist in guiding service level definitions and performance targets.

Functional Area	Associated Service Providers	Community Users
Water and Wastewater	<ul style="list-style-type: none"> Town Staff Contractors Regional Government 	<ul style="list-style-type: none"> Residents, businesses, industry Fire Department Internal departments/staff
Stormwater	<ul style="list-style-type: none"> Town Staff Contractors Conservation Authority Province of Ontario 	<ul style="list-style-type: none"> Community environmental stewards Conservation Authority Internal departments/staff
Roads	<ul style="list-style-type: none"> Town Staff Contractors Regional Government 	<ul style="list-style-type: none"> Residents, businesses, industry Tourists Pedestrians/cyclists Transit Emergency services
Solid Waste Management	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Households, businesses, industry
Facilities	<ul style="list-style-type: none"> Town Staff Contractors 	<ul style="list-style-type: none"> Program users Residents Regional scale programs Arts and culture Community groups Aurora Public Library Fire Department Internal departments/staff
Parking Lots	<ul style="list-style-type: none"> Town Staff Contractors 	<ul style="list-style-type: none"> Program users Residents Community Groups
Fleet	<ul style="list-style-type: none"> Town Staff Contractors 	<ul style="list-style-type: none"> Internal departments/staff

Machinery & Equipment	<ul style="list-style-type: none"> • Town Staff • Contractors 	<ul style="list-style-type: none"> • Town facility users • Fire Department • Internal departments/staff
Parks	<ul style="list-style-type: none"> • Town Staff • Contractors 	<ul style="list-style-type: none"> • Program users • Residents • Community Groups
Forestry	<ul style="list-style-type: none"> • Town Staff • Contractors 	<ul style="list-style-type: none"> • Residents • Businesses

Service levels have been defined based upon the expected needs of the various community users and form a high level set of objectives that either directly support user needs or indirectly support those needs through other requirements such as legislative compliance, sustainability or economic efficiency which eventually lead to improved customer experience. The following tables identify specific service levels for each asset class, as well as the drivers that shape the service level. From this information, performance metrics and related targets are defined which form the basis upon which asset requirements for the existing community are built.

WATER SERVICES

The Town is responsible for water distribution to the end users, consumer metering, and billing. York Region is responsible for water production and bulk distribution. Water in Aurora is 20 percent ground water source and 80 percent lake based source.

Service Level	Driver	Performance Metric	Target
Maintain system pressures in target range	Industry practices, protection of system due to reverse pressure, user experience	<ul style="list-style-type: none"> • Reported low pressure events • Water main breaks • Fire hydrant flow testing 	<p><0/year</p> <p><5/year</p> <p>Each main tested at least once every 5 years</p>
Provide safe potable water	Legislation, public health, system security	<ul style="list-style-type: none"> • Incidence of adverse water quality • Water sampling • Watermain flushing 	<p><0. 5% of total sample count</p> <p>Within provincial standards</p> <p>20% of watermains to be cleaned/year (currently the Town undertakes an uni-directional flushing program)</p>
Maximize water conservation	Sustainability, environmental protection, economic efficiency	<ul style="list-style-type: none"> • Water loss tracking to measure revenue, non-revenue, and lost water • Full system cost recovery • Annual consumption per household 	<p>Infrastructure Leakage Index (ILI)=1</p> <p>Annual operating and long term capital fully funded through rate revenues</p> <p><200m3/year /household</p>

WASTEWATER SERVICES

The Town is responsible for wastewater collection and delivery to Regional trunk infrastructure.

Service Level	Driver	Performance Metric	Target
Availability of sewer system to transmit flows	Legislation, user expectation	<ul style="list-style-type: none"> Private side backups reported per year Mainline backups reported per year 	<ul style="list-style-type: none"> <50/year <5/year
Minimize risk of discharge of untreated sewage to the environment	Legislation, public health, environmental protection	<ul style="list-style-type: none"> sewer main breaks/spill to environment Pumping station sewage by-pass/spill to environment CCTV Inspections Infrastructure integrity 	<ul style="list-style-type: none"> Zero/year Zero Inspect min once/10yrs Zero structural failures /yr
Maximize sewer transmission capacity and system efficiency	Sustainability, environmental protection, economic efficiency	<ul style="list-style-type: none"> Under review 	Under review

STORMWATER SERVICES

The Town is responsible for all storm water collected from Town owned roads. This includes pipes, ponds and oil/grit separators.

Service Level	Driver	Performance Metric	Target
Provide flood free roadways	Public safety, user expectation	<ul style="list-style-type: none"> Number of road closures due to flooding Catch basin cleaning Catch basin repairs 	<ul style="list-style-type: none"> <10/year 25% per year 50 per year
Meet storm discharge water quality and quantity objectives	Legislation, public health, environmental protection	<ul style="list-style-type: none"> Maintain storm pond design capacity and functionality 	Min 90% of design capacity

ROADS SERVICES

The Town is responsible for all local roads. Regional road maintenance is a regional responsibility. However, the Town is responsible for all streetlights except for those specifically positioned to illuminate regional intersections. All sidewalks and multiuse trails within the road allowance are Town owned and maintained.

Service Level	Driver	Performance Metric	Target
Traffic congestion and network usability	Public safety, user expectation, economic impacts	<ul style="list-style-type: none"> Number of traffic related complaints Intersection signal optimization Average traffic volume compared to road capacity 	<ul style="list-style-type: none"> <10/year 100% annually reviewed Average volume less than 80% of lane capacity –
Road condition and driver experience	Legislation, user expectations, safety, asset reliability	<ul style="list-style-type: none"> Update Pavement Condition Index (PCI) 	Updated max 5 yr cycle

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Service Level	Driver	Performance Metric	Target
		<ul style="list-style-type: none"> Average Road Network PCI Crack sealing program 	Avg. Road Network PCI = 65 --- 19 kilometers each year to maintain the Council approved level of service for the road system at PQI=65

SOLID WASTE SERVICES

The Town is responsible for waste collection and delivery to Regional facilities for further processing and disposal. This service is fully contracted and the Town owns no assets related to the delivery of this service.

Service Level	Driver	Performance Metric	Target
Waste is collected prior to end of set out day	Public safety, user expectation	<ul style="list-style-type: none"> Number of late/missed pickup calls 	<50/year
Maximize recycle material recovery rate	Sustainability, environmental benefit, economic benefit	<ul style="list-style-type: none"> Minimize over compaction of blue box material 	95% of loads >2:1 compaction
Moving to zero waste	Sustainability, economics, environmental impact	<ul style="list-style-type: none"> Avg annual collection per household 	<200kg/year

WASTEWATER SERVICES

The Town is responsible for wastewater collection and delivery to Regional trunk infrastructure.

Service Level	Driver	Performance Metric	Target
Availability of sewer system to transmit flows	Legislation, user expectation	<ul style="list-style-type: none"> Private side backups reported per year Mainline backups reported per year 	<50/year <5/year
Minimize risk of discharge of untreated sewage to the environment	Legislation, public health, environmental protection	<ul style="list-style-type: none"> sewer main breaks/spill to environment Pumping station sewage by-pass/spill to environment CCTV Inspections Infrastructure integrity 	Zero/year Zero Inspect min once/10yrs Zero structural failures /yr
Maximize sewer transmission capacity and system efficiency	Sustainability, environmental protection, economic efficiency	<ul style="list-style-type: none"> Under review 	Under review

FACILITIES SERVICES

The facilities portfolio includes property, buildings and related property with respect to administration services, community centres, library, fire services, the armory, and other miscellaneous buildings that are available for public use or lease to third party tenants. This portfolio does not include park assets such as fields, trails, park buildings or shelters, as well as, any parking lots that service the town's facilities.

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Service Level	Driver	Performance Metric	Target
Facilities are available to meet community and programming needs	User expectation, cultural support, health, economics	<ul style="list-style-type: none"> Number of unplanned facility shut downs per year (all locations) 	<10/year
Public enjoyment of pool facilities	Legislation, public health, user expectations	<ul style="list-style-type: none"> Meet public health reporting requirements Meet equipment maintenance schedules 	100% compliance 100% of planned maintenance completed
Public enjoyment of ice facilities	User expectation, cultural support, health, economics	<ul style="list-style-type: none"> Meet equipment maintenance schedules 	100% of planned maintenance completed
General acceptability of facilities	Public, users, legislation, economics, sustainability	<ul style="list-style-type: none"> Frequency of cleaning Cleaning effectiveness Environmental comfort 	Meet planned cleaning schedules 95% of time Minimum quarterly management inspections per facility <10 complaints/yr
Minimization of carbon footprint	Provincial regulations, public, economics, environmental sustainability	<ul style="list-style-type: none"> % reduction in the town's total facility energy consumption per year 	1% reduction per year

PARKING LOT SERVICES

The parking lot services portfolio includes all of the town's parking lots that service its facilities, parks and other recreations facilities, as well as, all of its general parking lots.

Service Level	Driver	Performance Metric	Target
Parking lots are maintained	User expectation, health, economics	<ul style="list-style-type: none"> Average % of parking lot spaces unavailable for use each year 	Completion of 100% of planned maintenance
Sufficient parking availability	User expectation	<ul style="list-style-type: none"> Number of times per year that parking lot demand exceeds available capacity 	Parking lot demand exceeds availability capacity no more than 5 times per year
General acceptability of town parking lots	Public, users, legislation, economics, sustainability		Minimum quarterly management inspections per facility <10 complaints/yr

FLEET SERVICES

All Town owned rolling stock is included in this portfolio.

Service Level	Driver	Performance Metric	Target
Maximize equipment up time	User expectation, sustainability, economics	<ul style="list-style-type: none"> Number of unplanned maintenance events Number of planned maintenance events Average time per service event 	<4/asset/year <7 / asset/year <3 hour
Maximize equipment capital and maintenance investment	Sustainability , cost effectiveness, economics	<ul style="list-style-type: none"> Asset replacement target 	As per planned asset life cycle or >10% value of maintenance cost per year

MACHINERY & EQUIPMENT

All Town owned machinery and small equipment, including information technology & telecom equipment is included in this portfolio.

Service Level	Driver	Performance Metric	Target
Maximize equipment up time	User expectation, sustainability, economics	<ul style="list-style-type: none"> Number of unplanned maintenance events Number of planned maintenance events Average time per service event 	<p><4/asset/year</p> <p><7 / asset/year</p> <p><3 hour</p>
Maximize equipment capital and maintenance investment	Sustainability , cost effectiveness, economics	<ul style="list-style-type: none"> Asset replacement target 	As per planned asset life cycle or >10% value of maintenance cost per year
IT & telecom Network availability	User expectation, sustainability, economics	<ul style="list-style-type: none"> Percentage of time network is available 	As per planned asset life cycle

PARKS SERVICES

Service Level	Driver	Performance Metric	Target
High quality Facilities are available to meet community needs, public enjoyment, and general acceptability of facilities	<p>User expectation, cultural support, health & safety , economics, legislation, sustainability</p> <p>Parks Maintenance Standard Service Levels</p>	<ul style="list-style-type: none"> Number of unplanned maintenance events Number of planned maintenance events Frequency of maintenance and repair Facility inspections / effectiveness Adherence to maintenance /repair standards 	<p>≤10/year overall parks system</p> <p>As per parks service level standards</p> <p>Meet planned maintenance and repairs 95% of the time</p> <p>Minimum 12 per asset /year</p> <p>≤20 complaints/yr</p>

URBAN FORESTRY SERVICES

Service Level	Driver	Performance Metric	Target
Street Trees and woodlots remain in safe condition Limiting public risk	User expectation, cultural support, health, economics, legislation, sustainability	<ul style="list-style-type: none"> Number of unplanned maintenance events Number of planned maintenance events 	<p>≤30/year/variable due to environmental conditions</p> <p>As per urban forestry policy</p>
Respond to emergency forestry issues	Urban Forest Management Plan UFORE Study	<ul style="list-style-type: none"> Frequency of maintenance and repair Effectiveness 	<p>Meet planned maintenance functions 95% of the time</p> <p>Limit & mitigate public liability issues ≤ 24 hours after detection ≤ 3 days</p>
Routine maintenance of street tree inventory		<ul style="list-style-type: none"> process work orders and customer communication in a timely fashion 	<10 complaints/yr

EXTERNAL TRENDS OR ISSUES

External trends that may affect the Expected Levels of Service or the Town’s ability to meet them include:

- Climate change
- Changing accessibility standards
- Taxpayer concerns on service levels
- Tax levy, Federal and Provincial Government funding availability
- Growth and requirement for additional/new services

CURRENT PERFORMANCE RELATIVE TO TARGET PERFORMANCE

Functional Area	Service Level	Performance Metric	Target Performance	Current Performance
Watermain	Maintain system pressures in target range	Reported low pressure events	0 /year	average 0 calls per year
		Water main breaks	<5 /year	average 6 per year
		Fire hydrant flow testing	Each new main tested before use	Target met
	Provide safe potable water	Incidence of adverse water quality	<0.5% of total sample count	Average 8 adverse samples out of 900 samples per year (last three years)
		Water chemistry	Within provincial standards	Target met
		Watermain flushing	20% /5 years of watermains to be cleaned /year (currently the Town undertakes a uni-directional flushing program).	Target met
	Maximize water conservation	Water loss tracking to measure revenue, non-revenue, and lost water	Infrastructure Leakage Index (ILI)=1	ILI = 1.07
		Full system cost recovery	Annual operating and long term capital fully funded through rate revenues	Town started the water meter replacement program in 2014. Since then approximately 4500 meters were replaced.
		Annual consumption per household	<200 m3/year/household	208.5 m3/year/household
	Wastewater	Availability of Sewer System to transmit flows	Private side backups reported per year	<10 /year
Mainline backups reported per year			<10 /year	Average 1 per year or less
Minimize risk of discharge of untreated sewage to the environment		Sewer main breaks/spill to environment	Zero /year	Average 1 every 5 year or less
		Pumping station sewage by-pass/spill to environment	Zero	Target met
		CCTV inspections	Inspect at least once /10years	In 2018 the Town started a CCTV Inspections program. The budget for this program is \$400,000.00 /year,
		Infrastructure integrity	Zero structural failures /year	Based on CCTV Inspections

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Functional Area	Service Level	Performance Metric	Target Performance	Current Performance
	Maximize sewer transmission capacity and system efficiency	Under review	Under review	N/A
Stormwater	Provide flood free roadways	Number of road closures due to flooding Catch basin cleaning on four (4) years cycle	<10 /year 25% per year	0 /year 25% a year -- \$90,000 a year for Catch Basin Cleaning
Roads	Traffic congestion and network usability	Number of traffic related complaints	<10 complaints/year	<5 complaints/year
		Intersection signal optimization	100% annually reviewed	Signal optimization is done only when there is a need. This can be changed to be done annually
		Update Pavement Quality Index (PQI)	Updated max 5 year cycle	Updated every 3 to 5 years
	Road condition and driver experience	Update Pavement Quality Index (PQI)	Updated max 5 year cycle	Updated every 3 to 5 years
		Average PQI	Network average 65	Network average 65 as the approved standard service level
Solid Waste	Waste is collected prior to end of set out day	Number of late/missed pickup calls	<50 calls/year	68 calls/year -- 27 late calls, 41 missed calls
	Maximize recycle material recovery rate	Minimize over compaction of blue box material	>95% of loads have less than 2:1 compaction	93.6% of loads have less than 2.5:1 compaction
	Moving to zero waste	Average annual collection per household	< 200 kg/year	373 kg/year
Facilities	Facilities are available to meet community and programming needs	Number of unplanned facility shut downs per year (all locations)	< 10 /year	0 /year
	Public enjoyment of pool facilities	Meet public health reporting requirements	100% compliance	100% compliance
		Meet equipment maintenance schedules	100% of planned maintenance completed	100% of planned maintenance completed
	Public enjoyment of ice facilities	Meet equipment maintenance schedules	100% of planned maintenance completed	100% of planned maintenance completed
	General acceptability of facilities	Frequency of cleaning	Meet planned cleaning schedules 95% of time	Target met
		Cleaning effectiveness	Minimum quarterly management inspections per facility	Target met
		Environmental comfort	<10 complaints/year	Target met
Minimization of carbon footprint	Provincial regulations, public, economics, environmental sustainability	% reduction in the town's total facility energy consumption per year	1% reduction per year	

Asset Management Plan | 2018

Functional Area	Service Level	Performance Metric	Target Performance	Current Performance
Parking Lots	Parking lots are maintained	User expectation, health, economics	Average % of parking lot spaces unavailable for use each year	Completion of 100% of planned maintenance
	Sufficient parking availability	User expectation	Number of times per year that parking lot demand exceeds capacity	Parking lot demand exceeds availability capacity no more than 5 times per year
	General acceptability of town parking lots	Public, users, legislation, economics, sustainability	<5 complaints/yr	Minimum quarterly management inspections per facility <10 complaints/yr
Fleet	Maximize equipment up time	Number of unplanned maintenance events	<4 /asset/year	8/asset/year (for fleet 3 years or older)
		Number of planned maintenance events	<7 /asset/year	7/asset/year
		Average time per service event	<3 hours	4 hours
	Maximize equipment capital and maintenance investment	Asset replacement target	As per planned asset life cycle or >10% value of maintenance cost per year	N/A
Machinery & Equipment	Maximize equipment up time	Number of unplanned maintenance events	<4 /asset/year	8/asset/year (for fleet 3 years or older)
		Number of planned maintenance events	<7 /asset/year	7/asset/year
		Average time per service event	<3 hours	4 hours
	Maximize equipment capital and maintenance investment	Asset replacement target	As per planned asset life cycle or >10% value of maintenance cost per year	N/A
	IT & telecom Network availability	Percentage of time network is available	99.9%	Target met
Parks Services	High quality facilities are available to meet community needs, public employment and general acceptability of facilities	Number of unplanned maintenance events	≤10/year overall parks system	Target met
		Number of planned maintenance events	As per parks service level standards	Target met
		Frequency of maintenance and repair	Meet planned maintenance and repairs 95% of the time	Target met
		Facility inspections / effectiveness	Minimum 12 per asset /year	Target met
		Adherence to maintenance /repair standards	≤20 complaints/year	Target met
Urban Forestry Services	Street trees and woodlots remain in safe condition limiting public risk	Number of unplanned maintenance events	≤30 /year/variable due to environmental conditions	Target met
		Number of planned maintenance events	As per urban forestry policy	Target met

Functional Area	Service Level	Performance Metric	Target Performance	Current Performance
	Respond to emergency forestry issues	Frequency of maintenance and repair	Meet planned maintenance functions 95% of the time	Target met
	Routine maintenance of street tree inventory	Effectiveness	Limit & mitigate public liability issues ≤ 24 hours after detection	Target met
		Process work orders and customer communication in a timely fashion	≤ 3 days	Target met

STATE OF LOCAL INFRASTRUCTURE

Annually, as part of their operations, Departments conduct a general assessment of the condition of their assets. This general assessment is used in the development of priorities for the current year budget. More detailed and broad condition assessments are completed on a cyclical basis based on industry standards for the asset class. For the purpose of Asset Management planning, asset condition information will be updated when the broad assessments are completed for each functional area.

An overall condition assessment **as of December 31, 2017** is provided.

Functional Area	Asset Type	Inventory / Quantity / Extent	Financial Accounting Valuation	Replacement Cost Valuation	Average Asset Age (Years)	Estimated Average Useful Life (Years)	Overall Asset Condition
Watermain	Water Mains	216.6 kilometers	\$56,042,584.77	\$203,027,001	23.8	67.0	Good
	Water Valves	4152 valves	\$3,120,616.69	\$7,204,581	22.5	30.0	Poor
	Underground Enclosures	665 enclosures	\$2,394,239.77	\$6,218,077	22.7	50.0	Good
	Fire Hydrants	1479 hydrants	\$3,994,084.37	\$6,980,753	22.5	30.0	Fair
	Service Connections	15063 services	\$5,366,053.02	\$19,111,335	26.4	67.0	Fair
	Bulkwater filling station	1	\$56,841.52	\$	20	19	Very good
	Booster Stations	1 station	\$94,556	\$167,384	19.8	30.0	Fair
Wastewater	Sewers	188.9 kilometers	\$42,324,148.76	\$240,378,285	30.5	67.0	Good
	Maintenance Chambers	2778 chambers	\$14,369,062	\$39,556,321	30.1	50.0	Fair
	Laterals	14445 laterals	\$6,213,658.46	\$21,906,822	27.7	67.0	Good
	Equalization Tanks	2 tank	\$290,354.10	\$751,217	23.0	50.0	Good
	Pumping Stations	6 stations	\$781,600	\$1,347,625	15.3	30.0	Fair
Stormwater	Sewers	217.8 kilometers	\$52,462,065.26	\$187,206,528	24.9	67.0	Good
	Maintenance Chambers	2747 chambers	\$10,824,153	\$27,584,618	25.8	50.0	Good
	Catchbasins	4951 catchbasins	\$8,444,225.46	\$21,949,932	24.2	50.0	Fair
	Laterals	11010 laterals	\$5,399,082	\$19,266,201	24.8	67.0	Good

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	Oil Grit Separators	30 filters	\$1,115,573	\$1,924,969	10.6	30.0	Very Good
	Cleanouts	12 cleanouts	\$5,541.05	\$14,121	25.0	50.0	Very Good
	Headwalls	225 headwalls	\$1,138,420	\$2,901,187	24.8	50.0	Good
	SWM Ponds	64 ponds	\$13,539,340	\$17,692,402.31	22.0	25.0	Fair
	Equalization Tanks	32 tanks	\$2,370,458	\$5,647,558	29.6	55.0	Fair
	Bridges & Culverts	161 crossings	\$6,889,954	\$12,293,809	24.3	Inspected every 2 years	Fair
Roads	Pavement & Curbs	193.9 centerline kilometers	\$68,634,324	\$121,892,876	22.8	Pavement inspected every 3-5 years	Fair
	Pedestrian Paths	205.2 kilometers	\$10,013,610	\$17,726,236	20.8	30.0	Poor
	Road Luminaires	4813 luminaires	\$11,043,075	\$16,687,957	17.6	20.0	Very Good
	Signage	6918 signs	\$387,044	\$687,376	22.6	Reflectivity Test Conducted Annually	Good
	Traffic Signals	16 signal intersections	\$1,220,172	\$1,487,383	20.9	Inspection conducted bi-annually (fall and spring)	Very Good
Solid Waste		contracted service	N/A	N/A	N/A	N/A	N/A
Facilities		21 facilities and buildings	\$97,526,209.03	\$240,888,230.54	28.7	28.3	Fair
Parking Lots		26 parking lots	\$6,692,987	\$16,531,574.23	28.7	27.5	Fair
Fleet		Approximately 90 vehicles and related pieces	\$9,993,889	11,802,733	4.6	9.8	Fair
Machinery & Equipment		Various pieces	\$8,377,041	9,463,672	5.2	8.5	Poor
		IT & Telecom Equipment		N/A	4.5	7.0	Good
Land, Parkland & Land Improvements		<ul style="list-style-type: none"> ● 700 acres of combined open space and parkland ● land associated with each Municipal Facility ● land maintained for environmental purposes ● 57 kilometers of off-road trails. 	\$22,773,729	\$41,702,132	10.5	28.09	Good

Age to Useful Life Ratio (PQI Range)	Condition
90 to 100	Excellent
70 to 89	Good
50 to 69	Fair
30 to 49	Poor
0 to 29	End of Life

ASSET INVENTORY AND VALUATION

Assets have been inventoried in compliance with accounting standards which provide for a statement of assets owned, a simple life cycle assessment, historic costs, and an annual depreciation value that complies with regulatory reporting requirements and provides one basis to forecast for asset replacement.

However, the accounting records are not an asset management plan and have a number of shortfalls that hinder its usefulness for sustainable asset management. These include historic cost valuation which does not account for current replacement costs, asset condition factors, or changes in materials and technology which influences asset life and performance.

The asset list developed for financial accounting does however provide an accurate foundation of what is owned and is the base information for the development and support of the overlaying asset management strategies. The following is a summary of the asset inventory.

ASSET CONDITION AND PERFORMANCE ASSESSMENT

Specific condition and performance techniques are applied to each asset class based on the nature of the asset, and the criticality and risk associated with the asset. The following table outlines the assessments applied to each asset class based on three categories of condition assessment, performance assessment, and risk assessment.

Functional Area	Condition Assessment Approach	Performance Assessment Approach	Risk Management Approach
Water System	Based on the number of watermain breaks per year	Water quality and chlorine residual monitoring. Pressure monitoring. Water loss monitoring.	Proactive maintenance and replacement to manage risk of failure and maintain performance Routine testing to ensure water quality Material and age based evaluation
Wastewater system	Visual inspection via CCTV	Inflow/infiltration studies, smoke and dye testing Leak tracking through CCTV	Proactive maintenance and replacement to manage risk of failure and maintain performance Material and age based evaluation
Stormwater System	Visual inspection of pipes via CCTV Visual inspection of ponds and separators	Discharge water quality assessments Design capacity assessments	Proactive maintenance Technical studies to assess overall system priorities
Roads System	Routine road patrols for emerging and acute condition deficiencies. Pavement Quality Index rating system to priorities replacements.	Traffic capacity studies	Traffic capacity studies
Solid Waste	No assets in this class	Compliance with contract terms	Compliance with contract terms Public education and promotion programs
Facilities	Visual inspections as per the ASTM standard.	Testing and monitoring programs Energy usage tracking Feedback from facility operators	Reliability centred maintenance practices Equipment age and obsolescence. Application of the ASTM standard. Undertaking of regular facility condition assessments
Parking Lots	Visual inspections	Parking lot general conditions observed such as cracking, etc.	Proactive maintenance Routine condition assessments undertaken
Fleet	Scheduled maintenance program with condition assessment	Benchmark to expected service level from equipment	Age, repair history, type of use, public and employee safety

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Functional Area	Condition Assessment Approach	Performance Assessment Approach	Risk Management Approach
Machinery & Equipment	Scheduled maintenance program with condition assessment	Benchmark to expected service level from equipment	Age, repair history, down time
Parks	Planned monthly visual inspections	expected service life cycling of individual asset	Proactive maintenance and repair to maintain users safety and manage risks and maintain performance over asset life span

The following summarizes the overall asset score based on a letter grading scheme. As this rating applies to differing asset classes, consideration may be given to all or some of the rating targets based on the evaluation team’s familiarity and knowledge of the assets being rated. This approach is applied to each class as a general rating, however, there will be assets within each sub-class that will rate higher or lower than the reported score. Detailed asset replacement plans are maintained as supporting documentation to these summaries and are updated on regular basis.

Score	Description
A	Asset has at least 80 percent of useful life remaining. Performance maintained to 90 percent or greater of design level. Energy efficiency within 90 percent of current market availability for similar equipment. Maintenance costs less than 5 percent of asset book value per year Asset in overall excellent condition
B	Asset has at least 75 percent of useful life remaining. Performance maintained to 80 percent or less of design level. Energy efficiency within 75 percent of current market availability for similar equipment. Maintenance costs 5-10 percent of asset book value per year Asset in overall good condition
C	Asset has at least 50 percent of useful life remaining. Performance maintained to 70 percent or less of design level. Energy efficiency within 50 percent of current market availability for similar equipment. Maintenance costs 5-10 percent of asset book value per year Asset in overall moderate condition
D	Asset has at least 25 percent of useful life remaining. Performance maintained to 50 percent or less of design level. Energy efficiency within 40 percent of current market availability for similar equipment. Maintenance costs 10-20 percent of asset book value per year Asset in overall poor condition
E	Asset has reached the end of its life. Expected useful life. Performance does not meet intended design level. Energy efficiency less than 40 percent of current market availability for similar equipment. Maintenance costs exceed 20 percent of asset book value per year Asset in overall poor to unserviceable condition

ASSET RATING SUMMARY

The following table summarizes the asset rating for each asset sub-class.

Asset Class/Sub-Class	Score	Future Considerations
Water		
Water Mains	B	Continue with CCTV and relining program
Pumping Stations	C	The maintenance of pumping station is conducted by a specialized contractor.
Valves/chambers/PRV	C	Perform detailed valve performance assessment and prioritize replacements
Fire Hydrants	B	
Commercial Meters	C	
Residential Meters	E	Majority exceeding design life and vulnerable to failure. Approximately 4500 meters were replaced in the last 5 years. The program will continue through 2018 and 2019,
Wastewater		
Mains	B	Continue with relining and CCTV program
Manholes	C	Continue with inspections and relining as warranted
Laterals	D	Continue to maintain the public side and facilitate the inspection on private side, subject to owner cost.
Pumping Stations	C	The maintenance of the pumping stations is conducted by a specialized contractor.
Forcemains	C	Confirm inspection schedule for forcemains and siphons
Stormwater		
pipes	B	Review inspection program and update condition assessments
catchbasins	C	Review cleaning program and update condition assessments. Commencing a four year cleaning cycle, 25% each year, full inspection of inventory.
manholes	C	Review inspection program and update condition assessments. Continue with in house condition assessments.
Outfalls/headwalls	D	Review inspection program and update condition assessments
Ditches/culverts	C	Review inspection program and update condition assessments
Oil/grit separators	C	Review inspection program and update condition assessments
Storm ponds	C	Initiate recommendations from updated masterplan
Roads		
Pavement/curbs	B	Consider alternative condition assessment approaches to augment PQI program and potentially reduce life cycle costs. Step up annual crack sealing to conform to PQI and stated road surface service life cycle.
Sidewalks	B	Annual inspection and maintenance program using external contractor and sidewalk software program commencing in 2018 to meet requirements of O.Reg. 239/02 Provincial Minimum Maintenance Service Level Standards
Bridges	B	Maintain compliance with inspection requirements
Multiuse paths	B	Review service levels and community needs
Street lights	B	Retrofitted to LED Town-wide
Solid Waste		
Fleet	D	In year 7 of 10 year contract. Initiate scope for retender. Entered into new contract with N6 Municipalities in 2018.
Facilities		
Foundation, Superstructure	C	Third party assessment recently completed, required ongoing maintenance and multi-year capital repair and replacement plan defined.
Exterior Walls, Windows & Doors	C	Third party assessment recently completed, required ongoing maintenance and multi-year capital repair and replacement plan defined.
Roof Coverings	B	Third party assessment recently completed, required ongoing maintenance and multi-year capital repair and replacement plan defined.
Ice Rink Systems	B	Review program maintenance and upgrade schedules
Pool systems	B	Review program maintenance and upgrade schedules

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Asset Class/Sub-Class	Score	Future Considerations
HVAC	C	Third party assessment recently completed, required ongoing maintenance and multi-year capital repair and replacement plan defined.
Mechanical	C	Phase 1 energy retrofit program nearing completion
Electrical	B	Phase 1 energy retrofit program nearing completion
Plumbing/Water Distribution	B	Third party assessment recently completed, required ongoing maintenance and multi-year capital repair and replacement plan defined.
Elevators	C	Third party assessment recently completed, required ongoing maintenance and multi-year capital repair and replacement plan defined.
Fire Protection	B	Review status relative to industry advancements; multiple updates have been undertaken to date.
Security & Communication Systems	B	Review status relative to industry advancements
Accessibility	C	A town wide accessibility assessment has been completed and the recommended facility enhancements are being implemented over the short term.
Parking Lots		
Parking pavement	D	Majority of parking lots at end of useful life; scheduled to be replaced over short to medium term based upon priority and funding availability.
Lighting	B	Most parking lot lighting has recently been converted to LED lighting.
Sidewalks	D	Majority of parking lots at end of useful life; scheduled to be replaced over short to medium term based upon priority and funding availability.
Curbs & Gutters	D	Majority of parking lots at end of useful life; scheduled to be replaced over short to medium term based upon priority and funding availability.
Fleet		
Light duty vehicles	B	
Heavy duty vehicles	C	
Tractors/loaders	C	
Machinery & Equipment		
Small equipment	B	
Information Technology Equipment	B	Majority of IT equipment with at least 50% useful life remaining. Assets are reviewed annually. As part of this process, assets with increasing repairs are candidates for early replacement.
Telecom Equipment	D	Telecom Equipment and Infrastructure has reached its maximum useful life and has been identified as needing replacement in 2019.
Parks		
Playground equipment	C	Majority within useful life of at least 50% remaining, major review of asset on an annual basis
Trails/Bridges	B	Maintain compliance with inspection requirements and annual maintenance program
Sports fields/pathway lighting	C	Maintain industry standards for lighting levels, review performance and assessment of latest LED sport field lighting equipment for potential future retrofit
Outdoor sports facilities and courts	C	Sports facilities generally compliant with industry standards, continue to monitor and maintain and retrofit facilities in accordance with life cycling schedule
Park pavilions / shelters / washroom facilities / out buildings	C	Majority within useful life of at least 50% remaining, major review of asset on an annual basis, continue to monitor assets falling below "B" rating and update replacement forecast as required
Line fences	D	Significant deterioration in many areas and end of useful service life particularly where fence lines exceed 30 years

ASSET MANAGEMENT STRATEGY - NEEDS ANALYSIS

FUTURE DEMANDS AND GAP ANALYSIS

Future asset demands are driven by community growth pressures, obsolescence, changes to technology, and economic changes in the broader environment. These demands are typically forecasted through various studies and planning exercises from which the demand for new infrastructure is identified. Studies are also completed for various assets in order to assess their current condition and operational/maintenance needs. All of this information is used to develop the various operational, maintenance and capital plans. The following table provides a summary of the key study & planning documents utilized by the town for this purpose.

Study / Plan	Assets Affected	Comments
Transportation Master Plan	<ul style="list-style-type: none"> • Road network • Sidewalks/multiuse paths • Intersections/traffic lights 	Plan is updated on a 5 year cycle and identifies capacity constraints and infrastructure gaps. Growth related needs are reported in Development Charges Background Study and 10 yr capital plan
Water/wastewater hydraulic modeling	<ul style="list-style-type: none"> • Water system • Wastewater system 	Periodic model updates identify system constraints in growth areas that are captured in DC background study and 10 yr capital plan
Stormwater Master Plan	<ul style="list-style-type: none"> • Stormwater system 	Updated every 5 years and identified maintenance and growth related impacts to existing asset base as well as opportunities for effluent improvement based on changes to technology and regulations. Projects captured in 10 yr capital plan, Develop and fund an annual inspection and maintenance program to ensure continued functionality of SWM Ponds and retain an external consultant to develop this plan.
Pavement Condition Assessment	<ul style="list-style-type: none"> • Road network 	Pavement inspection consists off identification, classification and measurement of individual pavement distresses. The Pavement Quality Index (PQI) provides an overall indication of the condition of a pavement with regard to present and future service to the user. The PQI incorporates pavement roughness measurements and surface distresses (type, quantity, severity) The PQI system uses a 0 to 100 (Failed to Excellent) scale to describe pavement condition. The Town's approved standard service level for the roads system is maintaining an average PQI of 65. The Town's current protocol calls for the local street system to be re-inspected on a regular cycle (every 3 to 5 years).
Sidewalk and Blvd condition assessment	<ul style="list-style-type: none"> • Sidewalks, Blvd and multiuse paths 	Annual inspections form basis for annual maintenance and repairs. External Service provider to conduct annual inspection and maintenance plan
Parks and Recreation Master Plan	<ul style="list-style-type: none"> • Parks and Facilities 	Growth related facilities identified in plan and captured in DC background study and 10 yr capital plan, Updated on 5yr. cycle
Trails Master Plan	<ul style="list-style-type: none"> • Trails 	Growth related facilities identified in plan and captured in DC background study and 10 yr capital plan
Official Plan	<ul style="list-style-type: none"> • Roads • Water/wastewater/storm • Solid waste • facilities 	Growth related facilities identified in plan and captured in DC background study and 10 yr capital plan Subdivision related development results in assumption of developer constructed assets

Study / Plan	Assets Affected	Comments
Promenade Study	<ul style="list-style-type: none"> Roads, sidewalks, lighting 	Community based plan to improve downtown character in support of economic revitalization. Projects defined in study captured in DC study and 10 yr capital plan
Fleet management report	<ul style="list-style-type: none"> Fleet 	No formal management plan to guide decision making. Lifecycling of vehicles revised in 2018 to reflect operational needs and to minimize down time and repair expenditures Replacement requirements captured in DC background study and 10 yr capital plan.
Winter Maintenance Management Plan	<ul style="list-style-type: none"> Roads Fleet 	Updated on 5 yr cycle. Provides direction of snow management, asset impacts and maintenance requirements. Capital requirements captured in 10 yr capital plan
IT Strategic Plan	<ul style="list-style-type: none"> Information Technology & Telecom Equipment 	Updated on a 5 year cycle. Provides direction on technology governance, infrastructure planning, life cycle targets, asset service levels, user technology needs and relevant studies.
Integrated Solid Waste Master Plan	<ul style="list-style-type: none"> Waste Collection 	Focus on reducing waste generation and operating/capital costs of program. Minimal asset impact due to contracted services, however drives initiatives that improve overall system performance and long term collection targets

OPERATIONS AND MAINTENANCE STRATEGY

The operations and maintenance strategy provides guidance for these functions resulting in the development of an annual work plan and operating/maintenance budget. The strategic objectives for O&M are:

- Provide adequate capacity to balance user service level expectations with cost for new infrastructure
- Maintain public health and safety as a priority
- Invest based on life cycle awareness of extending the useful life at the optimal cost while meeting desired service levels
- Recommend asset replacement when O&M costs exceed target thresholds for sustainable operation.
- Consider both demand side and supply side capacity management opportunities when investing O&M dollars (i.e. fixing leaks before building more pipes)
- Consider sustainability and environmental opportunities in O&M decisions where appropriate
- Consider emergency response planning requirements and alternative operating modes in response to known emergency conditions.
- Ensure adequate skills are available through training and mentorship
- Ensure systems are in place to support data management and O&M recording and reporting to assist in long term asset decision making
- Periodically review asset functionality to ensure intended purpose is met
- Focus on proactive maintenance planning and execution through use of maintenance management software
- Identify appropriate mode of operation based upon asset class (RCM, run to failure, risk based redundancy etc.)
- Define standard work flow and work procedures for improved consistency and efficiency

OVERVIEW OF RISKS ASSOCIATED WITH STRATEGY

The largest risk in generating expected service levels are financial in nature. The achievement of a desired level of service is dependent upon resource availability. Historically and currently the town has not had sufficient resources to meet service level expectations, resulting in the town regularly experiencing infrastructure deficits. Other risks relate to the town's potential required unplanned action stemming from updated engineering and other study results. In addition, because different vendors are utilized for study updates, the risk of incomparable assessment results being received exist. The town is exploring the possibility of a long term agreement so that there is more consistency in the studies with the same vendor providing the updates.

OPTION ANALYSIS

The options for expected level of service must be compared based on:

1. **Lifecycle cost** - total cost of constructing, maintaining, renewing, and operating an infrastructure asset throughout its service life;
2. **Future costs** - must be discounted and inflation must be incorporated;
3. **All other relevant direct/indirect costs and benefits associated with each option** - i.e. municipal wellbeing and health, amenity value, value of culturally or historically significant sites, municipal image.

The expected levels of service are captured in the Appendix. Based upon the projected levels of growth for the Town, the town does not foresee significant changes in service levels and as a result, a more comprehensive option analysis was not required. These expected service levels have been incorporated in the current financial forecast.

FINANCING STRATEGY - PROGRAM DEVELOPMENT

OPERATIONS PLAN AND FINANCIAL STRATEGY

The primary objective in regards to the town's operations plan is to develop an operations & maintenance (O&M) program that meets the short to intermediate needs of the town's existing assets while maintaining a relatively stable annual cost profile. This objective's goal is to allow for the effective maintenance of the town's assets while minimizing the disruptive impact of wide swings in annual operating budget requirements. Achieving stability in this annual cost profile helps to minimize the impact to the tax rate from costs of this nature in any given year. The current approach to developing the operations plan is as follows:

- Assess the O&M needs for each of the asset classes
- Establish a funding target that balances level of service requirements with asset condition/serviceability
- Monitor annual effectiveness of O&M program to meet set criteria
- Forecast budget adjustments in out years as needed to maintain service level/O&M program balance
- Identify anomalous expenditure requirements for inclusion in the 10 year capital plan
- Identify the importance of the O&M in the life cycle of an asset

- Recognize that a 10-year capital replacement plan for any asset is based on the underlying regular maintenance work for that asset and identify the required/necessary O&M funds for this (e.g. crack sealing, side walk maintenance and repairs catch basin restoration and curb & gutter repairs O&M needs/funding to maintain the approved minimum standard level of service for the Town's road system or the on-going O&M need for the underground infrastructure)

CAPITAL PLAN AND FINANCIAL STRATEGY

The Town's capital plan is presently forecasted over a 10 year time horizon and is reported through a corporate financial planning document referred to as the 10 Year Capital Investment Plan. In this plan's development, the assurance of sufficient project delivery capacity and applicable reserve health over the intermediate to long term is a cornerstone of its financial strategy. All future year requirements have been indexed as per the most recently available inflation rate projections. The capital planning process is as follows:

- Review all master plans and other study results to ensure continued alignment with ten year capital plan
- Review existing capital plan as per established capital asset service standard targets and in consideration of all other applicable key R&R decision point variables
 - For example, for linear assets, review forecasted construction year based on asset life, condition, growth pressures, maintenance record, coordination the related assets, risk considerations, and corporate priorities
- Make necessary annual priority adjustments
- Verify in year projects through condition and performance review and defer projects that can be extended without long term impact to asset value and produce an economic benefit by deferral
- Review forecast cost estimates
- Assign appropriate funding sources
- Review overall cash flow impact with an intent of ensuring the ongoing financial health of applicable contributing reserves or, ensure alternative funding strategy in place in the event of insufficient funding availability. If required, planned capital project work will be adjusted accordingly based upon priorities.
- As part of reserve health analysis staff will define the required level of reserve fund replenishing contributions that are necessary in order to maintain desired reserve financial health. If required contribution is not financially feasible, will trigger adjustment of capital plan accordingly.
- Recommend overall 10 year forecast and in year capital projects for Council acceptance and general support

RISK MANAGEMENT

Risk management is currently applied in an informal manner except for in the case of water supply which is evaluated as per Drinking Water Quality Management System requirements. Future plans include the development of a risk based prioritization plan for the town's various asset classes and a progression toward risk registries for each asset sub-class. This will ensure that known risks are recognized and appropriate risk management techniques employed as necessary to both protect public health and safety and mitigation of risks in accordance with corporate tolerance.

Asset Management Plan | 2018

EXPENDITURE ANALYSIS

	YEAR	NON- INFRASTRUCTURE SOLUTIONS	CULTURAL SERVICES ACTIVITIES	MAINTENANCE ACTIVITIES	RENEWAL/REHABILITATION ACTIVITIES	REPLACEMENT ACTIVITIES	DISPOSAL ACTIVITIES	EXPANSION ACTIVITIES	TOTAL AMOUNT
APPROVED BUDGET	2016	374,800	-	5,610,100	2,612,900	5,276,900	409,500	6,207,000	20,491,200
	2017	35,000	100,000	5,271,400	3,697,200	7,881,900	768,900	15,556,700	33,311,000
	2018	605,000	115,000	5,511,500	7,155,822	10,926,307	987,322	23,453,246	48,844,197
EXPENDITURE FORECASTS	2019	980,000	125,000	5,769,600	4,523,255	5,418,300	579,646	48,952,550	66,333,350
	2020	251,200	135,000	6,033,500	7,795,398	11,482,777	2,311,635	46,685,430	74,694,940
	2021	294,200	100,000	6,184,900	8,841,675	6,258,406	1,472,109	5,551,430	28,702,719
	2022	32,100	110,000	6,335,900	4,947,483	3,654,507	718,263	2,160,200	17,868,453
	2023	476,000	100,000	6,391,800	4,253,956	5,258,047	919,308	5,378,900	22,778,010
	2024	519,200	115,000	6,447,400	3,489,335	8,915,867	1,462,666	2,121,450	23,013,718
	2025	182,200	100,000	6,503,400	4,966,546	6,419,625	1,201,731	7002,610	26,376,112
	2026	300,000	110,000	6,559,000	4,966,546	5,527,950	909,523	96,000	16,579,711
	2027	243,900	40,000	6,624,600	4,717,396	6,739,515	1,653,362	96,000	20,114,773
	2028	-	25,000	6,692,500	712,000	1,150,358	17,750	96,000	8,693,608

Asset Management Plan | 2018

REVENUE ANALYSIS

	YEAR	SPECIAL PURPOSE RESERVES	REPAIR & REPLACEMENT RESERVE	GROWTH & NEW RESERVE	WATER / SEWER / STORM RESERVES	STUDIES & OTHER	DEVELOPMENT CHARGES	GRANTS	EXTERNAL FUNDING	OPERATING BUDGET	OTHER REVENUE	TOTAL AMOUNT
ACTUAL	2016	2,312,300	5,472,800	879,700	1,532,600	54,800	3,262,900	865,000	-	6,111,100	-	20,491,200
	2017	3,028,900	4,755,900	1,106,500	4,822,400	35,000	8,757,900	1,803,700	3,669,200	5,271,400	60,000	33,311,000
	2018	1,702,135	10,965,426	271,780	5,318,385	448,334	12,155,831	2,472,306	7,044,500	5,511,500	1,100,000	46,990,197
REVENUE FORECASTS	2019	300,054	3,868,100	515,800	4,510,000	880,000	11,636,250	15,751,046	-	5,769,600	21,600,000	64,830,850
	2020	842,554	11,156,300	4,571,045	7,402,851	151,200	31,155,955	2,795,612	-	6,033,500	100,000	64,209,017
	2021	623,550	8,064,964	673,341	5,471,613	194,200	1,237,099	2,795,612	-	6,184,900	100,000	25,345,279
	2022	374,150	2,741,041	152,210	3,458,600	32,100	1,878,840	2,795,612	-	6,335,900	100,000	17,868,453
	2023	222,620	2,994,008	1,188,000	4,714,422	403,267	3,968,280	2,795,612	-	6,391,800	100,000	22,778,009
	2024	149,670	7,337,944	75,255	3,734,312	262,000	1,809,625	2,795,612	-	6,447,400	100,000	22,711,818
	2025	49,710	6,167,827	104,990	3,624,463	182,200	6,847,910	2,795,612	-	6,503,400	100,000	26,376,112
	2026	48,000	4,012,834	58,000	2,706,265	300,000	-	2,795,612	-	6,559,000	100,000	16,579,711
	2027	48,000	3,339,784	48,000	5,016,073	243,900	-	2,795,612	-	6,624,600	40,000	18,155,969
	2028	48,000	-	73,000	1,043,300	-	-	2,795,612	-	6,692,500	-	10,652,412

KEY ASSUMPTIONS

Asset Management Plan forecasts are based upon projected growth and levels of service as they exist at the time of the plan's update. Key assumptions made included the following:

- Assume that the municipality will continue to receive gas tax grant indefinitely;
- Assume that the municipality will continue to receive the Ontario Capital Infrastructure Fund (OCIF) grant indefinitely;
- Assume that the municipality will fully collect planned development charge revenue;
- Assume that the municipality will be able to increase its tax Levy allocation towards its Reserves by approximately one percent per annum; and
- Where inflation was deemed appropriate, an inflation rate of 2% for 2018 and on-going was utilized

PROGRAM DELIVERY

PROJECT PROCUREMENT

Both operating and capital funded programs follow the same project procurement process which complies with the town's purchasing and financial reporting requirements. All linear asset project procurement is managed through a centralized procurement resource where a common set of standards, procedures and templates are employed. Any related processes are well documented and reviewed on a regular basis and involve the cooperation of various support departments for execution.

Project procurement follows these steps:

Timing	Previous year	Current year
Q1	-	Tender preparation and issuance
Q2	Dept'l review & update of 10 year capital plan	Project start
Q2	Upcoming year's capital projects determined	Project execution
Q3	Senior management review and prioritization of upcoming year's projects	-
Q3 – Q4	Upcoming year's capital project budget presentation and approval by council	Project closeout or carry forward as required

EFFECTIVENESS REVIEW

The town's linear asset management is delivered with the support from Operations Services (Roads, Water and Waste Water), the Engineering and Capital Delivery Division, as well as from other areas of the corporation. Linear assets are overseen by an asset management steering group which was established as an asset management core function in 2011. This group's capacity has been slowly developing over time. The current linear asset management structure is as follows:



The support functions have not all been formalized at this point but are performed to varying degrees based on risk and priority. These functions are performed by the various designated staff with reporting occurring on an as required basis. The asset management project team consists of three staff in Engineering and Capital Delivery Division and Financial Analysts from Financial Services that work closely together to support asset related functions. The central application is currently Maximo with plans to expand into other asset areas both through further development of this tool and augmentation with additional practices based on continuous improvement opportunities.

Overall, the town’s Capital Asset Management Steering Committee (CAMSC) which includes representation from every major asset category within the town’s ownership oversee the town’s capital asset management framework. The CAMSC coordinates the on-going maintenance of the Town’s asset management plan; as well as, any other overarching asset management processes and procedures. This group is also responsible for ensuring the town’s on-going compliance with all applicable provincial capital asset management requirements. This group strives to maximize synergies that can be achieved across capital asset categories. CAMSC will meet on a quarterly basis; additional meetings of the committee will be called as required.

The Engineering & Capital Delivery Division provides overall guidance and direction specifically in regards to the linear asset management plan. The Engineering & Capital Delivery Division undertakes linear asset related discussions twice a month and reviews each of these asset category needs and priorities at least twice a year. Specific discussions also occur throughout the year as required. Topics include budget reviews, reserve fund reviews, annual capital project prioritization and scheduling reviews, risk management reviews, environmental scan and industry opportunity reviews.

For the purposes of achieving projected asset life cycles ,The Roads, Water and Waste Water Division provides overall guidance and direction on all ongoing maintenance related operational needs including annual condition assessments following asset inventory , Sidewalks , Curbs/Gutters, Storm Water Catch Basins , Manholes , Sanitary Sewer and Storm Sewer systems , Operations staff are engaged in the collection and recording of condition assessment data that is required to inform annual maintenance and repair budgets . Operations will prepare annual infrastructure maintenance programs and will be the primary division for implementing, supervising and administering infrastructure repair and maintenance contracts

In regards to the town's IT and telecom equipment asset management plan, the Executive Information Technology Steering Committee (EITSC) performs a similar function to that the Linear Asset Management Steering Group. The EITSC committee was formed in 2009, recognizing the need to prioritize and support the strategic functions of IT Services. The committee currently meets quarterly . The committee's role is multifaceted. The following summarizes the group's intent:

1. To reinforce the application of the agreed upon IT principles in all IT decision making;
2. To provide direction and strategic leadership for the use of IT at Aurora and ensure IT decision making is aligned with corporate goals;
3. To review and prioritize technology dependant projects and resolve resource allocation issues;
4. Facilitate better corporate use (and re-use) of technology systems and corporate resources;
5. Ensure open communications and partnership between the IT division and the other work units of the town so as to promote collaboration;
6. Act as a conduit for information to other management levels within the Town to ensure that the decisions and rationale for priorities and resource allocation (funding) are communicated to all departmental staff;
7. Build a learning organization that can leverage IT knowledge and experience more effectively across the organization;

CONTINUOUS IMPROVEMENT STRATEGY

The continuous improvement strategy for asset management is measured against twenty four criteria that touch on the various aspects of the plan. The purpose of this self-assessment is to identify areas where there is relative opportunity for improvement and plan projects focused on improving the maturity level and application of the various criteria. The following table outlines the definitions for the relative scores.

Score	Description
0	not performed
1	aware of need and risk
2	informal application and undocumented processes
3	partial documented processes partial use
4	application of documented processes
5	Best practice

The following spider graph is a summary of scores for the various criteria across all asset classes. In recent years, significant effort has been made in advancing asset management at the Town including the development of a capital delivery process, a greater degree of focus on asset condition assessments, development and implementation of a software data collection system to enable an improved inspections and quantification of all infrastructure in need of maintenance or repair , Implementation of a formal sidewalk and boulevard inspection/maintenance program, quality management systems for water supply, development of salt management plan for environmental sustainability, completion of an asset registry, implementation of asset and work management system, development of first level key performance indicators, digitization and categorization of all linear asset related drawings.



APPENDIX 1 – ASSET MANAGEMENT STRATEGIES

ROADS

INVENTORY:	There are approximately 193.9 centerline kilometers of roads within the Town of Aurora or approximately 398 lane-kilometers of roadways.
ANTICIPATED ASSET LIFE CYCLE:	<p>The useful life of transportation infrastructure ranges from 15 to 50 years. The useful life of road infrastructure is dependent on the type of surface, climate conditions, and level of service.</p> <ul style="list-style-type: none"> Arterial – 33 years Collector – 34 years Local – 36 years
INTEGRATED:	Roads are integrated with other buried assets located in the utility corridor such as: water, sewer, storm sewers, hydro, telephone, natural gas and cable. They have an impact on street lighting, traffic signals and sidewalks.
REHABILITATION AND REPLACEMENT CRITERIA:	<p>The Town of Aurora uses AECOM’s pavement management software system licensed for Town use. The last pavement management system study has been completed by AECOM in October 2010 and represents a network-level analysis intended to serve as a tool for long-term pavement improving planning.</p> <p>Aurora began formal pavement management with AECOM in 2002 using AECOM’s INFRA/PAVE software system that is based on the non-proprietary pavement evaluation system, PCI, which is supported by the Canadian Public Works Association (CPWA).</p> <p>Aurora’s street system is comprised of flexible (asphalt) pavements that are about two thirds Local and one third Collector or Arterial functional classification. This breakdown is common among municipal street systems. The vast majority of local roads have an urban cross section (curb/gutter). Local roads with rural cross section are anticipated to be upgraded to urban cross section with their next capital improvement.</p> <p>Pavement Class – Standard Engineering Usage:</p> <ul style="list-style-type: none"> Arterial – serves primarily mobility between point A and point B Collector – collects local traffic to feed into the Arterial system – partly mobility and partly land access Local – serves primarily land access <p>Pavement Type - Standard Engineering Usage</p>

- Asphalt – petroleum-based asphaltic concrete or “flexible” pavement
- Concrete – Portland cement concrete or “rigid” pavement
- Composite – Asphalt overlay or concrete pavement
- Brick – brick pavement
- Paver Block – concrete blocks designed for pavement application
- Gravel – unbound aggregate material
- Natural – unimproved right-of-way

Pavement Age

Often, an asphalt pavement that is designed and constructed for the traffic loading it receives can be expected to last about 15-20 years before major rehabilitation. Experience in Ontario has shown that higher volume roads often needs resurfacing at 15-17 years of age while subdivision roads may last for 20-22 years before the first major rehabilitation. The average age of the Town’s pavement system is approaching these age ranges.

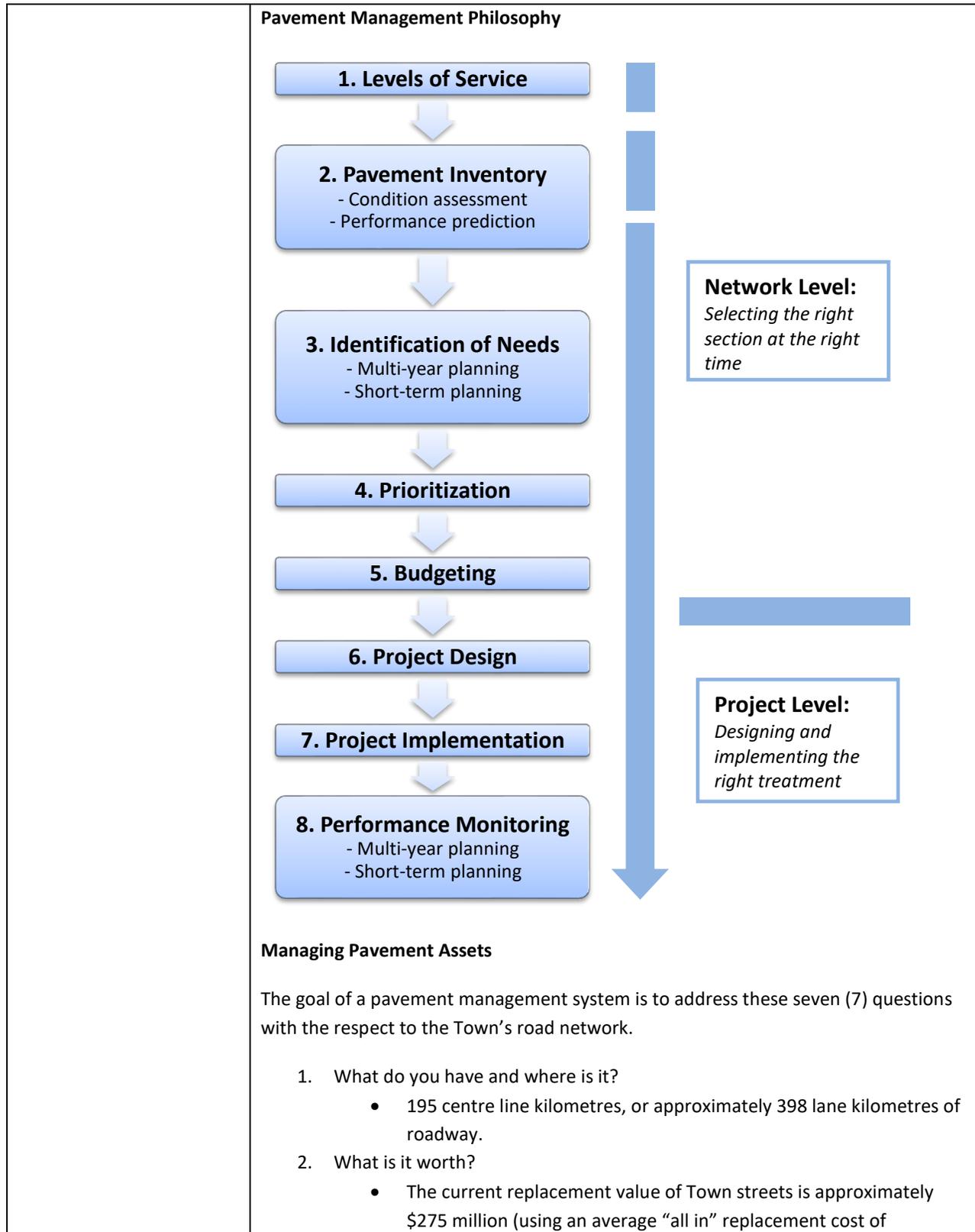
In June 2015, The Town has procured Stantec’s RoadMatrix, a Commercial-of-the-shelf pavement management software to replace the INFRA/PAVE software system. Pavement condition data collection was done town-wide in the summer of 2015 by the Infrastructure Management Services (IMS).

The RoadMatrix software system has the ability to provide:

- the overall pavement condition summary,
- individual pavement condition breakdown,
- future deterioration condition based on different funding scenarios (e.g. “no funding”, “defined funding” and “required funding for maintaining current overall condition”),
- Determined 3, 5 and 10-year road capital reconstruction plans.

For the pavement data collection, IMS will use the Laser Road Surface Tester (RST), enhanced with digital imagery and GPS capabilities. The RST, with its 11 camera array, is capable of collecting a full suite of pavement condition data in real time, complete with high accuracy GPS coordinates and multiple view digital images for both rigid and flexible pavements as it traverses the Town’s roadways. An integrated Digital Direct Condition Rating System (DDCRS) supplements the RST data for additional distress data elements, quality assurance and inventory information. Specialized data processing, using GIS, allows the pavement data to be quickly checked for completeness and quality.

When completed, the 2015 pavement condition survey data will be loaded into RoadMatrix and a pavement management report will be issued highlighting the current roads condition, future condition based on different funding scenarios, estimated needs based on a 3, 5 and 10-year horizons and recommended road treatments for each time horizon.

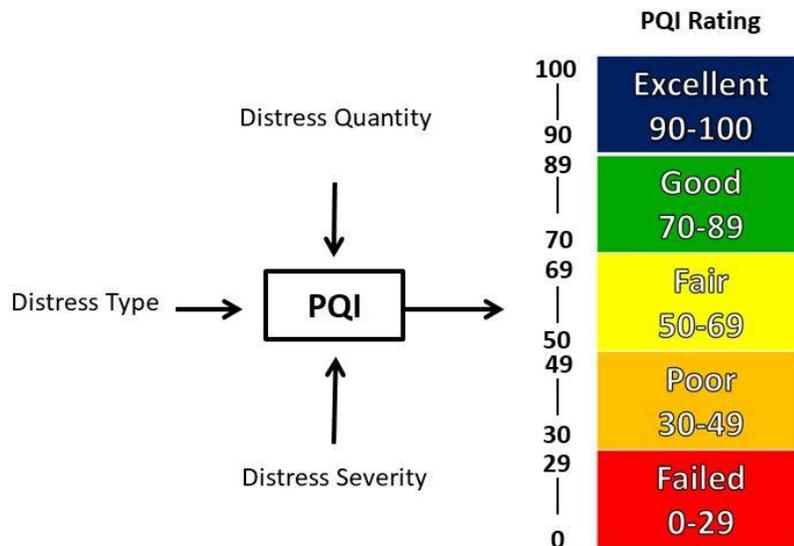


\$160/sq.m).

3. What is its condition?
 - Measured by the Pavement Quality Index (PQI).
 - The average PQI for the Town of Aurora road network was PQI = 65 in 2016. Knowing and tracking the PQI allows the Town to assess if the road network is deteriorating over time under the current funding practices.
4. What needs to be done?
 - The pavement management philosophy is to: “apply the right treatment to the right road at the right time”.
5. When do you need to do it?
 - A cost-benefit approach is used to identify and prioritize when maintenance and rehabilitation (M&R) treatments should be applied to the various road segments throughout the Town.
6. How much does it cost?
7. How do you ensure long-term affordability?
 - Various budget scenarios are being analyzed to determine whether or not current or anticipated funding is sufficient to maintain the Town’s network at an acceptable level of service.

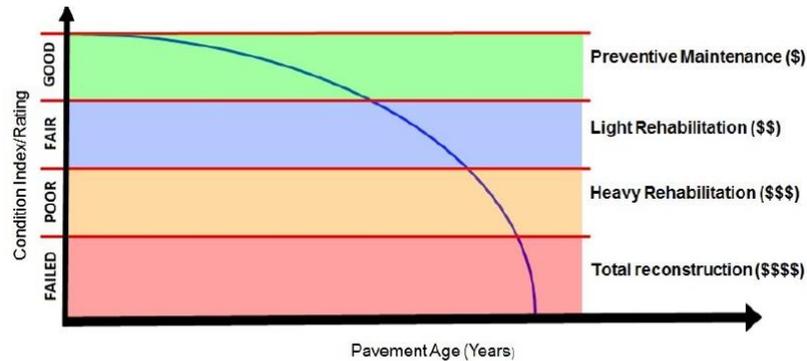
Pavement Quality Index (PQI)

The Pavement Quality Index (PQI) rating provides an overall condition of a pavement. It incorporates pavement roughness measurements and surface distresses (type, quantity, severity). It is expressed on a 0 to 100 scale as illustrated below:



Pavement Condition vs Time

Pavement Management Systems use a cost benefit approach to identify and prioritize when M&R treatments should be applied. Roads that are earlier on in their deterioration trend are selected first in order to extend their lifecycle. This way treatment options are less expensive than heavy rehabilitation or reconstruction options.



Trigger Points for M&R Activities, and their Relative Costs

Pavement Management Systems

A pavement management system is simply an organized process to help agencies:

- Warehouse pavement information
- Assess and accurately predict pavement conditions (PQI)
- Identify cost-effective strategies for preserving a pavement network (preventive maintenance, light/heavy rehabilitation, total/full-depth reconstruction)

Pavement management systems used in Aurora:

- INFRA/PAVE (Earthtech/Aecom proprietary) used from 2002-2010
- RoadMatrix (Stantec proprietary) purchased in 2015

Pavement Condition – Data Collection

Manual pavement condition ‘evaluation’ involves assessing and evaluating apparent pavement distresses by visual observation. This methodology was used by Aurora in 2002, 2005 and 2010. In 2015, Aurora contracted Infrastructure Management Services (IMS) to do the “raw” data collection using their digital survey vehicles. This high speed network level pavement condition evaluation involves:

- Digital Survey Vehicles (DSV)
- Collection of high resolution right of way (ROW) images
- Network level assessment where large amounts of data are collected in a

relatively short time

- Safer way of collecting data
- Pavement distresses are measured using laser sensors (more precise)
- Pavement distresses measured and recorded: roughness, rutting, patching, potholes, longitudinal cracking, edge cracking, block cracking, transverse cracking, alligator cracking, ravelling and shoving

Pavement Condition – Data Processing

The raw data collected from IMS was uploaded to the pavement management system (RoadMatrix). Using the built-in analysis tools within RoadMatrix the Town is able to determine the overall Pavement Quality Index (PQI) rating for the road network system. As of December 2015, the Town’s road network has a PQI of 67.8. The pavement condition assessment has determined that the Town’s road network is currently operating at a “Fair” level as indicated by the average overall PQI of 67.8. The network PQI Summary is shown in the table below

PQI Range	Description	Sections	Lane-km	% of Network
90 - 100	Excellent	23	12.2	3.1%
70 - 89	Good	382	147.4	37.1%
50 - 69	Fair	619	219.8	55.3%
30 - 49	Poor	38	18.3	4.6%
0 - 29	Failed	0	0	0.0%
Totals:		1062	397.7	100%

Roads R&R Analysis

The maintenance and rehabilitation of Aurora’s road system follows the principles of sustainable asset management strategy.

- Move from “worst roads first” policy to a toolbox of road preservation and rehabilitation treatments in conjunction with road reconstruction
- Road reconstruction will not be given priority over preventive maintenance
- Roads as municipal assets should be seen as assets with an intrinsic value but also with an ability to deliver a cost-effective service to the public
- Maintaining the existing network PQI of 65 was approved by Council in 2017 as the standard service level for the Roads R&R Program
- Scenario of PQI = 65 is run to maintain a network PQI of 60.15 for 2018 and beyond
- The scenario was extended an additional 10 years to confirm long-term stability
- Based on the 10 year term, the annual average required budget is \$4.8M

	<p style="text-align: center;">Pavement Management Philosophy</p> <div style="display: flex; justify-content: space-around; text-align: center;"> <div style="width: 45%;"> <p><u>Past</u></p> <div style="border: 1px solid black; background-color: #e1eef6; padding: 5px; margin-bottom: 10px;">"Worst roads first policy"</div> <div style="font-size: 2em; color: #8eb9e2;">↓</div> <div style="border: 1px solid black; background-color: #e1eef6; padding: 5px;">Road Reconstruction (full-depth)</div> </div> <div style="width: 45%;"> <p><u>Present</u></p> <div style="border: 1px solid black; background-color: #e1eef6; padding: 5px; margin-bottom: 10px;">"Apply the right treatment to the right road at the right time"</div> <div style="font-size: 2em; color: #8eb9e2;">↓</div> <div style="border: 1px solid black; background-color: #e1eef6; padding: 5px; margin-bottom: 10px;">Preventive Maintenance + Capital Planning + Optimization Strategies</div> <div style="font-size: 2em; color: #8eb9e2;">↙ ↘</div> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; background-color: #e1eef6; padding: 5px; width: 40%;">Longer term analysis</div> <div style="border: 1px solid black; background-color: #e1eef6; padding: 5px; width: 40%;">Coordinate with other projects</div> </div> </div> </div>
<p>REHABILITATION AND REPLACEMENT STRATEGY:</p>	<p>Using the planning parameters described above, the 10-year capital road reconstruction and resurfacing plan is being developed. The most effective engineering solutions for the existing pavement network may not be achievable under budget limits, operational considerations, capacity requirements, etc. These constraints to planning can include funding source mix, funding limitations, public approval of projects, coordination with other infrastructure work, construction closure limits, traffic capacity needs as well as other considerations unique to Aurora.</p>
<p>LIFE CYCLE CONSEQUENCES:</p>	<p>A final recommended 10-yr capital road reconstruction plan is a living document, the result of integrated planning and iterative processes. Road Matrix provides candidate project lists and multi-year plans with performance (PQI) and budget impacts. Town of Aurora professional engineering staff determines the final plan then that advances selected projects to design construction. The 10-yr Capital Road Reconstruction Plan is part of the Town's 10-yr Capital Investment Plan.</p> <p>If road conditions and maintenance is not adequate, level of service is affected and</p>

	risks and liabilities are increased, for example: to maintain the Council approved level of service for the road system at PQI=65, a crack sealing program, with required funding needs to be implemented and delivered every year. This demonstrate very clearly the importance of the O&M program and budget in the life cycle of the asset
INTEGRATED ASSET PRIORITIES:	A road rehabilitation project drives the replacement of underground water and sewer infrastructure if the infrastructure is near the end of its life cycle.
CORPORATE/CONSULTING REPORTS ON SUBJECT:	<ul style="list-style-type: none"> • Public Sector Accounting Board (PSAB) – s. 3150 • Town of Aurora Pavement Management Analysis Report, 2016 (prepared by Stantec Consulting Ltd.) • 10-yr Capital Investment Plan 2018-2028 • Audited Financial Statements (payment certificates)
ESTIMATED COST:	Total Cumulative Estimated 10-yr Capital Cost for repair and replacement projects for roads and related for the ten year period covering 2018 to 2028 is \$67,356,245

WATERMAIN SYSTEMS

INVENTORY:	The Town of Aurora has 219.3 kilometers of watermain
ANTICIPATED ASSET LIFE CYCLE:	<p>The anticipated asset lifecycle ranges between 20 and 100 years. Examples:</p> <ul style="list-style-type: none"> • Watermain <ul style="list-style-type: none"> ○ PVC – 80 years ○ Ductile Iron – 67 years ○ Cast Iron – 50 years ○ Concrete Pressure – 100 years • Valves – 30 years • Valve Chamber Structures – 50 years • Hydrants – 30 years • Water Meters – 20 years
INTEGRATED:	May be integrated with road reconstruction projects
REHABILITATION AND REPLACEMENT CRITERIA:	<p>Condition Assessment Approach</p> <p>Condition assessments are completed on an annual basis based on the number of</p>

	<p>watermain breaks which will help identify optimal rehabilitation or replacement technique..</p> <p>Performance Assessment Approach</p> <p>This is accomplish through:</p> <ul style="list-style-type: none"> • Water quality and chlorine residual monitoring • Pressure monitoring • Water loss monitoring <p>Risk Assessment Approach</p> <p>Proactive maintenance and replacement to manage risk of failure and maintain performance</p> <p>Routine testing to ensure water quality</p> <p>Material and age based evaluation</p>
REHABILITATION AND REPLACEMENT STRATEGY:	Rehabilitation/renewal and expansion activities are scheduled as per the “Ten Year Capital Investment Plan, 2018 to 2028”
LIFE CYCLE CONSEQUENCES:	If the life cycle of the water system were reduced, the level of service is lowered and safety may be compromised.
INTEGRATED ASSET PRIORITIES:	A road rehabilitation project drives the replacement of underground water system infrastructure if the said infrastructure is near the end of its life cycle.
CORPORATE/CONSULTING REPORTS ON SUBJECT:	<ul style="list-style-type: none"> • Public Sector Accounting Board (PSAB) – s. 3150 • 10-yr Capital Investment Plan 2018-2028 • Audited Financial Statements (payment certificates)
ESTIMATED COST:	Total estimated cumulative capital cost for the 10 year period covering 2018 to 2028: \$13,769,060

WASTEWATER SYSTEMS

INVENTORY:	The Town of Aurora has 188.3 kilometers of sanitary sewers
ANTICIPATED ASSET LIFE CYCLE:	<p>The anticipated asset lifecycle ranges between 50 and 100 years.</p> <ul style="list-style-type: none"> • Sewers <ul style="list-style-type: none"> ○ PVC – 80 years ○ Ductile Iron – 67 years ○ Cast Iron – 50 years ○ Concrete – 50 years ○ Asbestos Cement – 67 years ○ High Density Poly Ethylene – 100 years ○ Vitrified Clay – 50 years • Maintenance Chambers <ul style="list-style-type: none"> ○ Concrete – 50 years ○ Brick – 100 years
INTEGRATED:	May be integrated with road reconstruction projects
REHABILITATION AND REPLACEMENT CRITERIA:	<p>Condition Assessment Approach</p> <p>Condition assessments are completed on an annual basis through visual inspection through CCTV which will help identify optimal rehabilitation or replacement year.</p> <p>Performance Assessment Approach</p> <p>This is accomplish through:</p> <ul style="list-style-type: none"> • Inflow/infiltration studies • Dye testing • Leak tracking through CCTV <p>Risk Assessment Approach</p> <p>Proactive maintenance and replacement to manage risk of failure and maintain performance</p> <p>Material and age based evaluation</p>
REHABILITATION AND REPLACEMENT STRATEGY:	Rehabilitation/renewal and expansion activities are scheduled as per the “Ten Year Capital Investment Plan, 2018 to 2028”

LIFE CYCLE CONSEQUENCES:	If the life cycle of the water system were reduced, the level of service is lowered and safety may be compromised.
INTEGRATED ASSET PRIORITIES:	A road rehabilitation project drives the replacement of underground water system infrastructure if the said infrastructure is near the end of its life cycle.
CORPORATE/CONSULTING REPORTS ON SUBJECT:	<ul style="list-style-type: none"> • Public Sector Accounting Board (PSAB) – s. 3150 • 10-yr Capital Investment Plan 2018-2028 • Audited Financial Statements (payment certificates)
ESTIMATED COST:	Total estimated cumulative capital cost for the 10 year period covering 2018 to 2028: \$3,669,610

STORMWATER SYSTEMS & CULVERTS

INVENTORY:	The Town of Aurora has 216.3 kilometers of storm sewers, 64 stormwater management facilities and 30 oil/grit separators
ANTICIPATED ASSET LIFE CYCLE:	<p>The anticipated asset lifecycle ranges between 20 and 80 years</p> <p>Examples include:</p> <ul style="list-style-type: none"> • Sewers <ul style="list-style-type: none"> ○ PVC – 80 years ○ Ribbed PVC – 80 years ○ Corrugated Pipe – 30 years ○ Concrete – 50 years ○ Asbestos Cement – 67 years ○ Vitrified Clay – 50 years • Maintenance Chambers <ul style="list-style-type: none"> ○ Concrete – 50 years ○ Brick – 100 years • Headwalls – 50 years • Catchbasins <ul style="list-style-type: none"> ○ Concrete – 50 years ○ Brick – 100 years • Stormwater management facilities – no defined lifecycle in PSAB
INTEGRATED:	May be integrated with road reconstruction projects

<p>REHABILITATION AND REPLACEMENT CRITERIA:</p>	<p>Condition Assessment Approach</p> <ul style="list-style-type: none"> • For storm sewers is completed on an annual basis through visual inspection through CCTV which will help identify optimal rehabilitation or replacement year. • for culverts is completed by visual inspection • for stormwater management facilities is completed by visual inspection as well as according to the operation and maintenance manuals • recommend adding a SWM pond condition assessment and the establishment of a maintenance management protocol whereby the SWM ponds are evaluated for performance and any barriers of issues impacting performance including a schedule of maintenance required at each facility and its estimated cost .Also included would be a staff training component such that in-house staff could be properly trained in SWM Pond inspections and preparing maintenance and repair reports <p>Performance Assessment Approach</p> <p>This is accomplish through:</p> <ul style="list-style-type: none"> • Discharge water quality assessments • Design capacity assessments <p>Risk Assessment Approach</p> <p>Proactive maintenance</p> <p>Technical studies to assess overall system priorities</p>
<p>REHABILITATION AND REPLACEMENT STRATEGY:</p>	<p>Rehabilitation/renewal and expansion activities are scheduled as per the “Ten Year Capital Investment Plan, 2018 to 2028”</p>
<p>LIFE CYCLE CONSEQUENCES:</p>	<p>If the life cycle of the stormwater systems were reduced, the level of service is lowered and safety and property value may be compromised due to the risk of flooding.</p>
<p>INTEGRATED ASSET PRIORITIES:</p>	<p>A road rehabilitation project drives the replacement of underground stormwater system infrastructure if the said infrastructure is near the end of its life cycle.</p>
<p>CORPORATE/CONSULTING</p>	<ul style="list-style-type: none"> • Public Sector Accounting Board (PSAB) – s. 3150 • 10-yr Capital Investment Plan 2018-2028

REPORTS ON SUBJECT:	<ul style="list-style-type: none"> Audited Financial Statements (payment certificates)
ESTIMATED COST:	Total estimated cumulative capital cost for the 10 year period covering 2018 to 2028: \$23,097,900

FACILITIES

INVENTORY (As of the end of 2017)	The Town has 21 facilities and buildings.
ANTICIPATED ASSET LIFE CYCLE:	<p>Facilities and their components (roof, HVAC, etc.) have an assessed useful life ranging from 15 to 50 years.</p> <ul style="list-style-type: none"> Building foundation/superstructure – 50 years Exterior walls/windows/doors – 50 years Electrical – 40 years Elevators – 40 years Plumbing/water distribution – 35 years Ice Rink systems – 25 years Roof coverings – 25 years HVAC – 20 to 25 years Mechanical – 20 to 25 years Fire protection – 20 years Pool systems – 15 years <p>Security & communication systems – 15 years</p>
INTEGRATED:	Individual asset component repair and replacement requirements are reviewed; where reasonable and practical to do so, projects are lumped together per asset in order to take advantage of the “economies of scale” principle. Also, when possible, an effort is made to minimize the disruption to town operations as a result of the delivery of a given capital project.
REHABILITATION AND REPLACEMENT CRITERIA:	On a regular basis through a 3 rd party consultant every town owned facility is assessed as per the industry standard ASTM E2018-15 standard which defines a physical deficiency as a conspicuous defect or significant deferred maintenance of a site’s material systems, components, or equipment as observed during the site assessor’s walkthrough site visit. Included within the scope of this assessment are the facility’s material systems, components, or equipment that are approaching, have reached, or have exceeded their typical expected useful life (EUL), or whose

	<p>remaining useful life (RUL) should not be relied upon in view of the actual or effective age, abuse, excessive wear and tear, exposure to the elements, lack of proper or routine maintenance, etc. This definition specifically excludes deficiencies that may be remedied with routine maintenance, miscellaneous minor repairs, normal operating maintenance, etc. and excludes conditions that generally do not constitute a material physical deficiency of the site. However, the town will modify its annual maintenance plans accordingly in response to consultant findings. Every facility and its asset components are assigned a condition evaluation of Poor, Fair or Good.</p>
REHABILITATION AND REPLACEMENT STRATEGY:	<p>The facility assessment evaluations are subsequently utilized by the consultant and staff to establish and prioritize the ten year capital repair and rehabilitation plan for all town owned facilities. In addition, asset service level performance is a key consideration in all associated capital project prioritizations. Staff will also utilize facility assessment findings to further enhance existing annual maintenance plans for the town's facilities. Financial feasibility/affordability is another important consideration in the ten year R&R plan's creation as well.</p>
LIFE CYCLE CONSEQUENCES:	<p>Consequences include the increased deterioration of town owned facility asset components to the extent where a significant rise in the town's risk of not meeting its established service standards is experienced, including health and safety concerns, inefficient operation, higher operating costs, and the accelerated depreciation of Town assets.</p>
INTEGRATED ASSET PRIORITIES:	<p>Facility asset repair and replacement decisions are driven by condition assessments and the risks generated from non-replacement on defined service standard performance. Wherever, repair and rehabilitation work can be consolidated in order to achieve financial and project delivery efficiencies, the town will do so.</p>
CORPORATE/CONSULTING REPORTS ON SUBJECT:	<ul style="list-style-type: none"> • Public Sector Accounting Board (PSAB) – s.3150 • 10-yr Capital Investment Plan 2018-2028
ESTIMATED COST:	<p>Total estimated cumulative capital cost for the 10 year period covering 2018 to 2028: \$21,462,710, including \$1,275,000 in planned accessibility R&R costs.</p>

PARKING LOTS

<p>INVENTORY (As of the end of 2017)</p>	<p>The Town has 26 parking lots servicing the town facilities, parks & open spaces and general parking needs (ie. Green P).</p> <p>The Town is currently investigating options for a comprehensive inventory and assessment of all Town owned parking lots.</p>
<p>ANTICIPATED ASSET LIFE CYCLE:</p>	<p>Parking Lots and their components (retaining walls, curbs, lighting, fences, etc.) have an assessed useful life ranging from 20 to 35 years. Some examples include:</p> <ul style="list-style-type: none"> • Parking Lot – 35 years • Sidewalks – 30 years • Curbs & Gutters – 35 years • Lighting – 20 years
<p>INTEGRATED:</p>	<p>Individual asset components are reviewed on a regular basis and where practical to do so, projects are lumped together in an effort to take advantage of the “economies of scale” principle. Consideration is also given to the minimization of the disruption of operations to a given asset over time.</p>
<p>REHABILITATION AND REPLACEMENT CRITERIA:</p>	<p>A formal town parking lot inspection system will be developed over the course of 2018 with implementation expected to commence in 2019. This system will include a 3rd party consultant or staff inspection of all parking lot asset components on regular cycle (every 3-5 years).</p> <p>These inspections will include a general assessment of each applicable parking lot asset category’s condition. These assessments will include the generation of a condition score for each applicable asset.</p>
<p>REHABILITATION AND REPLACEMENT STRATEGY:</p>	<p>Using the planning parameters described above, the 10-year capital parking lot rehabilitation & replacement plan is developed. The most effective engineering solutions for the existing town parking lots may not be achievable due to budget limitations, operational considerations, capacity requirements, etc. These constraints to planning can include funding source mix, funding limitations, public approval of projects, coordination with other infrastructure work, construction closure limits, as well as other considerations unique to Aurora.</p>

LIFE CYCLE CONSEQUENCES:	<p>A final recommended 10-yr capital town parking lot reconstruction plan is a living document, the result of integrated planning and iterative processes. The Engineering Division determines the final plan then that advances selected projects to design and then to construction.</p> <p>If parking lot conditions and maintenance is not adequate, their level of service is affected and consequently town risks and liabilities are increased.</p>
INTEGRATED ASSET PRIORITIES:	A parking lot rehabilitation project drives the replacement of underground water and sewer infrastructure if the infrastructure is near the end of its life cycle.
CORPORATE/CONSULTING REPORTS ON SUBJECT:	<ul style="list-style-type: none"> • Public Sector Accounting Board (PSAB) – s.3150 • 10-yr Capital Investment Plan 2018-2028
ESTIMATED COST:	Total estimated cumulative capital cost for the 10 year period covering 2018 to 2028: \$1,816,800.

VEHICLES

INVENTORY:	The Town has approximately 100 vehicles and related pieces.
ANTICIPATED ASSET LIFE CYCLE:	<p>The useful life of a vehicle varies depending on the service area and vehicle type, size and cost. The assessed range is between 5 and 12 years. Examples include:</p> <ul style="list-style-type: none"> • Pick-up trucks- 8 years • Heavy Trucks(Dump, Plow, Tandem)- 8 years • Vans- 8 years • Loaders-/backhoes- 10 years • Tractors- 12 years
INTEGRATED:	Integrated with technical advances and financial plans, environmental regulations, operational changes, and service increases or decreases.
REHABILITATION AND REPLACEMENT CRITERIA:	Lifecycle cost analysis considering depreciation, fuel, repairs, insurance, downtime costs, etc. will identify optimal replacement year for vehicle classes.

REHABILITATION AND REPLACEMENT STRATEGY:	Review usage to warrant replacement, repair costs should not exceed normal levels for the type of vehicle involved. Review lease, seasonal rental opportunities, refurbishing strategies and possibility of contracting services to third party.
LIFE CYCLE CONSEQUENCES:	As cost per kilometer increases, increased downtime requiring more spare units or work schedules to be lengthened, increasing manpower costs, resulting in a loss of production.
INTEGRATED ASSET PRIORITIES:	Replacement is based on actual condition, the point in time within its life cycle, and the availability of resources to complete the replacement with minimal disruption to the program/service delivery within the asset.
CORPORATE/CONSULTING REPORTS ON SUBJECT:	<ul style="list-style-type: none"> • Public Sector Accounting Board (PSAB) – s. 3150 • 10-yr Capital Investment Plan 2017-2027 • Town of Aurora Tangible Capital Asset Policy •
ESTIMATED COST:	Total estimated cumulative capital cost for the 10 year period covering 2018 to 2028: \$3,043,400

MACHINERY & EQUIPMENT

INVENTORY:	<p>Equipment includes furniture and fixtures, generators, mowers, trimmers, saw chippers, pumps, nozzles hoses, air packs, specialty water rescue, safety clothing, ladders, communications, technology, extrication and fuel power for all departments. Equipment also includes all items necessary for transportation services, protection services and recreation and culture services. Equipment may be fixed or movable tangible capital asset used for operations.</p> <p>Equipment also includes information technology and telecom equipment such as IT Ethernet cabling, fibre optic cabling, servers, switches & hubs, firewalls, routers, UPS's, desktops, laptops, tablets, server room cooling and fire suppression systems, printer fleet, telephony network cabling, and equipment, handsets.</p>
ANTICIPATED ASSET LIFE CYCLE:	<p>The useful life of equipment ranges from 5 to 25 years. Some examples include:</p> <ul style="list-style-type: none"> • Playground equipment- 10-20 years • Ice Resurfacers- 10 years • Mowers - 5 years • Solar Powered Signs – 8 years

	<ul style="list-style-type: none"> • Air Compressor – 8 years • Computers, printers, monitors & accessories – 5 years • Servers, routers & accessories – 7 years • IT Network Equipment – 5 years • Telephone Lines & Cables – 30 years • Telephone system – 10 years
INTEGRATED:	Individual assets are kept on a replacement schedule roughly matching the useful life ranges. In instances where performance has not yet begun to deteriorate, IT and telecommunication equipment replacements will be delayed in order to more effectively manage resource requirements. They are placed so as not to disrupt the operations.
REHABILITATION AND REPLACEMENT CRITERIA:	The only criterion above useful life is when the asset’s productivity decreases.
REHABILITATION AND REPLACEMENT STRATEGY:	Review usage to warrant replacement, repair costs should not exceed normal levels for the type of equipment involved. Review lease, seasonal rental opportunities, refurbishing strategies and possibility of contracting services to third party.
LIFE CYCLE CONSEQUENCES:	Consequences include disruption of the operation and potential increased maintenance costs depending on the equipment involved.
INTEGRATED ASSET PRIORITIES:	Replacement is based on actual condition, the point in time within its life cycle, and the availability of resources to complete the replacement with minimal disruption to the program/service delivery within the asset.
CORPORATE/CONSULTING REPORTS ON SUBJECT:	<ul style="list-style-type: none"> • Public Sector Accounting Board (PSAB) – s. 3150 • 10-yr Capital Investment Plan 2017-2027 • IT Equipment Evergreen plan •
ESTIMATED COST:	Total estimated cumulative capital cost for the 10 year period covering 2018 to 2028: \$5,538,417 ; this amount includes \$2,050,567 in IT and telecom equipment planned R&R costs.

LAND, PARKLAND & LAND REHABILITATION / IMPROVEMENTS

INVENTORY:	The Town of Aurora covers 49 square kilometers, located in the centre of the Regional Municipality of York. The town owns approximately 700 acres of combined open space and parkland, in addition to land associated with Municipal Facilities and land maintained for environmental purposes (storm water ponds). There are also approximately 57 kilometres of off-road trails, 44 playgrounds, 13 tennis courts, 18 basketball courts, 20 baseball diamonds, 55 soccer fields, 5 Splash Pads and 14 outbuildings/shelter/washrooms.
ANTICIPATED ASSET LIFE CYCLE:	<p>Land usually has an indefinite useful life that exceeds the useful lives of the buildings, roads or structures situated on the land. The cost of the acquired land is not amortized as land normally maintains its value over time. Land improvements (such as landscaping, fencing, etc.) have a useful life ranging from 20-30 years.</p> <ul style="list-style-type: none"> • Out Buildings, Washrooms and Park Shade Structures - 20-30 years • Parking Lots- 20 -30 years • Sports Fields/Courts- 20-30 years • Trails Paths/Bridges- 25-35 years • Line Fencing- 20-35 years
INTEGRATED:	Land and land improvements are integrated with roads, buildings, bridges & culverts, as well as, water and sewers.
REHABILITATION AND REPLACEMENT CRITERIA:	Based on life cycle and visual inspections.
REHABILITATION AND REPLACEMENT STRATEGY:	Assets are reviewed annually and maintenance, rehabilitation/renewal, and expansion activities scheduled as required in the 10 year plan.
LIFE CYCLE CONSEQUENCES:	Land has an indefinite life cycle. However, there is a potential increase in maintenance and rehabilitation costs depending on the improvements involved.
INTEGRATED ASSET PRIORITIES:	Land improvement rehabilitation forecasts should be compared to transportation infrastructure forecasts. The integration of projects occurs internally and externally.
CORPORATE/CONSULTING REPORTS ON SUBJECT:	<ul style="list-style-type: none"> • Public Sector Accounting Board (PSAB) – s. 3150 • 10-yr Capital Investment Plan 2018-2028 • The Economic Value of Natural Capital Assets Report (June 2013)

ESTIMATED COST:	Total estimated cumulative capital cost for the 10 year period covering 2018 to 2028: \$5,554,650
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URBAN FORESTRY & STREET TREES

INVENTORY:	The Town of Aurora currently maintains an extensive inventory of urban street trees totaling 23,098 trees. The Town of Aurora also has approximately 50ha of woodlot property.
ANTICIPATED ASSET LIFE CYCLE:	Due to locations and environmental impacts 0.85% of the street tree inventory requires replacement on an annual basis. Mortality of street trees is attributed to a number of factors including vehicle collision, insect/disease infestations and poor site conditions. Surviving street trees have a useful life ranging from 30-70 years. Woodlands are ever changing and evolving life cycle although management must occur to ensure long term viability, diversity of species and public safety.
INTEGRATED:	Street Trees are integrated with roads and general urban streetscape, in conjunction with pedestrian and vehicular traffic. Woodlands are integrated with parks and public spaces.
REHABILITATION AND REPLACEMENT CRITERIA:	Based on life cycle, environmental impacts, mechanical injury and visual inspections.
REHABILITATION AND REPLACEMENT STRATEGY:	Street Trees are inspected annually and pruned on a 6-year cycle, with replacement and removal through work order system. Rehabilitation / replacement of street trees based on historic service level and as required by newly emerging threats (i.e. Emerald Ash Borer) and are scheduled as required in the 10 year plan where possible.
LIFE CYCLE CONSEQUENCES:	Consequences include greater public liability risk with defective street trees, diminished quality of urban streetscape, reduced property values, increased maintenance costs and greater risk of further decline of urban forest due to a wide variety of environmental factors.
INTEGRATED ASSET PRIORITIES:	Street tree replacement and maintenance is based on a number of factors including: <ul style="list-style-type: none"> • actual condition of the asset;

	<ul style="list-style-type: none"> • the point in time within its life cycle; and • the availability of resources to complete the necessary functions with minimal disruption to the program/service delivery <p>The integration of projects occurs internally and externally.</p>
CORPORATE/CONSULTING REPORTS ON SUBJECT:	<ul style="list-style-type: none"> • Public Sector Accounting Board (PSAB) – s. 3150 • 10-yr Capital Investment Plan 2017-2027 • EAB Management Strategy Reports • Aurora Woodlands Managed Forest Plan • UFORE Study • Urban Forestry Management Plan • The Economic Value of Natural Capital Assets Report (June 2013)
ESTIMATED COST:	<p>Total estimated cumulative capital cost for the 10 year period covering 2018 to 2028, Broken down by:</p> <p>EAB Treatment \$1,180,000</p> <p>Rehabilitation & Repair: Nil</p>

APPENDIX 2 – LINEAR ASSET INVENTORY REPORT

With the reporting requirements of PSAB 3150, the Town of Aurora submits an inventory of all tracked assets that are owned and maintained by the town. These assets are categorized and required attributes are captured for each category to ensure that there is a proper valuation of the asset for future lifecycle purposes. The critical attribute fields submitted in the PSAB reports are listed below with descriptions and samples for each asset category.

ROADS

PAVEMENT AND CURBS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STR-RD-1035-11	STR-RD-1035-12
Project ID	Notes all projects that are involved with installation/improvements	31048	31048-2013
Location Description	Assists with asset identification	Catherine to Centre	Mark Street to Batson Drive
Road Length (m)	Centreline length of the road	119.50	642.10
Road Width (m)	From edge to edge of asphalt	7.5	8
Road Area (m2)	Quantity retrieved from GIS	938.23	5590.38
Road Type	Determined based on traffic volume and speed limit	Local	Local
Right of Way Width	From property line to property line	22	20.12
Lane Count	number of vehicle lanes on ROW	2	2
Date Constructed	Year of last asphalt construction/remediation	2012	2013
Life Span	Estimated years of useful service	36	36
Construction Cost	Original cost to install asset	\$75,022.93	\$428,592.82

SIDEWALKS & PATHS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STR-SW-3110-03	STR-SW-3110-04
Project ID	Notes all projects that are involved with installation/improvements	31104-2013	31104-2013
Length (m)	Quantity retrieved from GIS	155.0	65.9
Width (m)	From edge to edge	1.5	1.5
Area (m2)	Based on length and width	232.44	98.88
Material	Defined material affects lifecycle and asset purpose	Concrete	Concrete
Date Constructed	Year of installation	2013	2013

Asset Management Plan | 2018

	Description	Sample	Sample
Life Span	Estimated years of useful service	30	30
Construction Cost	Original cost to install asset	\$17,617.45	\$7,494.19

STREET LUMINAIRES

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STR-LI-1620-03	STR-LI-1620-04
Project ID	Notes all projects that are involved with installation/improvements	N/A	N/A
Pole Material	Asset material, design, and/or function	Trafalgar	Trafalgar
Date Constructed	Year of installation	2005	2005
Life Span	Estimated years of useful service	30	30
Construction Cost	Original cost to install asset	\$5,057.36	\$5,057.36

STREET LUMINAIRES – ELECTRICAL COMPONENTS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STR-EC-5010-01	STR-EC-5010-02
Project ID	Notes all projects that are involved with installation/improvements	IES2014-12	IES2014-12
Component	Asset material, design, and/or function	Handwell	Handwell
Date Constructed	Year of installation	2014	2014
Life Span	Estimated years of useful service	50	50
Construction Cost	Original cost to install asset	\$949.77	\$949.77

STREET LUMINAIRES – ELECTRICAL WIRING

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STR-EW-5010-08	STR-EW-5010-09
Project ID	Notes all projects that are involved with installation/improvements	IES2014-12	IES2014-12
Wire Type	Wire location details	Underground	Underground
Wire Length	Quantity retrieved from GIS	43.178358	70.435432
Date Constructed	Year of installation	2005	2005
Life Span	Estimated years of useful service	67	67
Construction Cost	Original cost to install asset	\$1,919.00	\$3,130.40

SIGNAGE

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STR-SN-3110-39	STR-SN-3110-40
Project ID	Notes all projects that are involved with installation/improvements	31104-2013	31104-2013
MTO Code	Regulatory reference type code	RA-1	RA-1T
Date Constructed	Year of installation	2013	2013
Life Span	Estimated years of useful service	10	10
Construction Cost	Original cost to install asset	\$375.87	\$41.76

RETAINING WALLS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STR-RW-2190-04	STR-RW-2190-05
Project ID	Notes all projects that are involved with installation/improvements	IES2015-89	IES2015-89
Material	Defined material affects lifecycle and asset purpose	Cast in Place Concrete	Precast Concrete
Length	Quantity retrieved from GIS	20	62
Width	Measurement as per design	1	1.5
Height	Measurement as per design	4.9	4
Date Constructed	Year of installation	2015	2015
Life Span	Estimated years of useful service	30	30
Construction Cost	Original cost to install asset	\$166,983.505	\$3,130.40

TRAFFIC SIGNALS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STR-TS-1010-01	STR-TS-1155-01
Project ID	Notes all projects that are involved with installation/improvements	D11-07-08	IES2013-81
Date Constructed	Year of installation	2008	2014
Life Span	Estimated years of useful service	20	20
Construction Cost	Original cost to install asset	\$136,459.00	\$80,955.00

WATERMAIN SYSTEMS

WATERMAINS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	WTR-LN-3220-06	WTR-LN-3220-07
Project ID	Notes all projects that are involved with installation/improvements	31078	31078
Length	Quantity retrieved from GIS	57.6	78.7
Diameter	Size of watermain pipe diameter	200	200
Material	Defined material affects lifecycle and asset purpose	Polyvinyl Chloride	Polyvinyl Chloride
Date Constructed	Year of installation	2010	2010
Life Span	Estimated years of useful service	80	80
Construction Cost	Original cost to install asset	\$19,022.29	\$26,014.13
Date Lined	Year of full length remediation	N/A	N/A
Liner Life Span	Estimated years of useful service of liner	N/A	N/A
Liner Cost	Original cost to install liner	N/A	N/A

WATERMAIN VALVES

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	WTR-WV-4005-02	WTR-WV-4005-03
Project ID	Notes all projects that are involved with installation/improvements	31030	31030
Diameter	Size of watermain pipe diameter the valve is attached to	150	150
Valve Type	Purpose of valve function	Line Valve	Line Valve
Valve within Chamber	Whether the valve is enclosed in an underground chamber or has an access sleeve	No	No
Date Constructed	Year of installation	2006	2006
Life Span	Estimated years of useful service	30	30
Construction Cost	Original cost to install asset	\$2,328.98	\$2,328.98

HYDRANTS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	WTR-HY-1080-01	WTR-HY-1085-01
Project ID	Notes all projects that are involved with installation/improvements	CP2013-1	CP2013-1
Date Constructed	Year of installation	2007	2007
Life Span	Estimated years of useful service	30	30
Construction Cost	Original cost to install asset	\$4,875.87	\$4,875.87

WATER CHAMBERS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	WTR-UE-2740-01	WTR-UE-2740-02
Project ID	Notes all projects that are involved with installation/improvements	S2015-2	S2015-2
Dimensions	Diameter or measurements of chamber	1200mm	2400mm x 1800mm
Date Constructed	Year of installation	2012	2012
Life Span	Estimated years of useful service	50	50
Construction Cost	Original cost to install asset	\$9,658.27	\$14,510.91

WATER BOOSTER STATIONS – ELECTRICAL SYSTEMS

	Description	Sample
ID	Unique identifier - not to be recycled	WTR-CP-2190-01
Project ID	Notes all projects that are involved with installation/improvements	N/A
Specifications	Electrical system configuration	3 Phase - 600 Volts
Date Constructed	Year of installation	1998
Life Span	Estimated years of useful service	25
Construction Cost	Original cost to install asset	\$50,000.00

WATER BOOSTER STATIONS – GENERATORS

	Description	Sample
ID	Unique identifier - not to be recycled	WTR-GN-2190-01
Project ID	Notes all projects that are involved with installation/improvements	N/A
Specifications	Generator details	125 Kw Diesel
Date Constructed	Year of installation	1998

	Description	Sample
Life Span	Estimated years of useful service	25
Construction Cost	Original cost to install asset	\$100,000.00

WATER BOOSTER STATIONS – PUMPS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	WTR-PU-2190-02	WTR-PU-2190-03
Project ID	Notes all projects that are involved with installation/improvements	N/A	N/A
Specifications	Pump size details	200mm Pump	250mm Pump
Date Constructed	Year of installation	1998	1998
Life Span	Estimated years of useful service	25	25
Construction Cost	Original cost to install asset	\$15,384.62	\$19,230.77

WATER BOOSTER STATIONS – STRUCTURES

	Description	Sample
ID	Unique identifier - not to be recycled	WTR-ST-2190-01
Project ID	Notes all projects that are involved with installation/improvements	N/A
Dimensions	Diameter or measurements of the structure	17.8m x 5.2m x 3.7m
Date Constructed	Year of installation	1998
Life Span	Estimated years of useful service	25
Construction Cost	Original cost to install asset	\$150,000.00

WASTEWATER SYSTEMS

SANITARY SEWERS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	SAN-LN-4110-05	SAN-LN-4110-06
Project ID	Notes all projects that are involved with installation/improvements	31077-2013	31077-2013
Length	Quantity referenced from design schematic	34.5	4.7
Diameter	Size of sewer pipe diameter	300	375
Depth	Average depth of pipe below grade	3.0	1.2
Material	Defined material affects lifecycle and asset purpose	Polyvinyl Chloride	Concrete Pipe
Upstream MH ID	Reference ID for asset located at the upstream of the sewer	SAN-MH-4110-06	SAN-MH-4110-04
Upstream Inverts	Elevation of the sewer at the point of entry	256.55	252.68
Downstream MH ID	Reference ID for asset located at the downstream of the sewer	SAN-MH-4110-05	SAN-MH-4110-07
Downstream MH Inverts	Elevation of the sewer at the point of exit	254.85	252.66
Date Constructed	Year of installation	2011	2011
Life Span	Estimated years of useful service	80	55
Construction Cost	Original cost to install asset	\$10994.49	\$1,950.62
Date Lined	Year of full length remediation	N/A	N/A
Liner Life Span	Estimated years of useful service of liner	N/A	N/A
Liner Cost	Original cost to install liner	N/A	N/A

SANITARY MAINTENANCE CHAMBERS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	SAN-MH-4110-03	SAN-MH-4110-04
Project ID	Notes all projects that are involved with installation/improvements	31077-2013	31077-2013
Diameter	Distance between the chamber walls	1200	1200
Depth	Full height of the structure	3.1	1.2
Material	Defined material affects lifecycle and asset purpose	Brick	Concrete-Precast
Surface Elevation	Elevation of the top of the structure	260.14	253.93
Date Constructed	Year of installation	1932	2011
Life Span	Estimated years of useful service	50	50
Construction Cost	Original cost to install asset	\$3999.66	\$4,417.07
Date Lined	Year of full length remediation	N/A	N/A

	Description	Sample	Sample
Liner Life Span	Estimated years of useful service of liner	N/A	N/A
Liner Cost	Original cost to install liner	N/A	N/A

SANITARY DRY CHAMBERS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	SAN-UE-3680-01	SAN-UE-4465-01
Project ID	Notes all projects that are involved with installation/improvements	S2016-2	N/A
Dimensions	Diameter or measurements of chamber	1m x 0.6m	6.25m x 0.6m
Date Constructed	Year of installation	2006	2003
Life Span	Estimated years of useful service	50	50
Construction Cost	Original cost to install asset	\$7,457.50	\$1,558.88

SANITARY EQUALIZATION TANKS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	SAN-EQ-2190-01	SAN-EQ-3080-01
Project ID	Notes all projects that are involved with installation/improvements	N/A	N/A
Dimensions	Diameter or measurements of chamber	7.319m x 3.048m x 3.099m	120m x 2.1m
Date Constructed	Year of installation	1997	1991
Life Span	Estimated years of useful service	50	50
Construction Cost	Original cost to install asset	\$67,429.46	\$222,924.64

SANITARY VALVES

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	SAN-VL-3680-04	SAN-VL-3680-05
Project ID	Notes all projects that are involved with installation/improvements	S2016-2	S2016-2
Diameter	Size of pipe diameter the valve is attached to	100	150
Valve Type	Purpose of valve function	Line Valve	Line Valve
Valve within Chamber	Whether the valve is enclosed in an underground chamber or has an access sleeve	No	No

	Description	Sample	Sample
Date Constructed	Year of installation	2006	2006
Life Span	Estimated years of useful service	30	30
Construction Cost	Original cost to install asset	\$657.50	\$986.25

SANITARY PUMPING STATIONS – ELECTRICAL SYSTEMS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	SAN-CP-1675-01	SAN-CP-2190-01
Project ID	Notes all projects that are involved with installation/improvements	S2015-1	N/A
Specifications	Electrical system configuration	3 Phase - 600 Volts	3 Phase - 220 Volts
Date Constructed	Year of installation	2006	1997
Life Span	Estimated years of useful service	25	25
Construction Cost	Original cost to install asset	\$20,368.57	\$25,000.00

SANITARY PUMPING STATIONS – GENERATORS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	SAN-GN-4465-01	SAN-GN-5060-01
Project ID	Notes all projects that are involved with installation/improvements	N/A	N/A
Specifications	Generator details	40 Kw Diesel	40 Kw Diesel
Date Constructed	Year of installation	2003	1996
Life Span	Estimated years of useful service	25	25
Construction Cost	Original cost to install asset	\$38,179.22	\$40,000.00

SANITARY PUMPING STATIONS – PUMPS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	SAN-PU-3680-02	SAN-PU-4465-01
Project ID	Notes all projects that are involved with installation/improvements	S2016-2	N/A
Specifications	Pump size details	NP 3171 HT Electrical Submersible	CP 3140 HT Electrical Submersible
Date Constructed	Year of installation	2006	2003

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	Description	Sample	Sample
Life Span	Estimated years of useful service	25	25
Construction Cost	Original cost to install asset	\$15,556.17	\$12,120.39

SANITARY PUMPING STATIONS – STRUCTURES

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	SAN-ST-3000-01	SAN-ST-3680-01
Project ID	Notes all projects that are involved with installation/improvements	N/A	S2016-2
Dimensions	Diameter or measurements of the structure	N/A	N/A
Date Constructed	Year of installation	2001	1998
Life Span	Estimated years of useful service	50	50
Construction Cost	Original cost to install asset	\$5,000.00	\$233,763.32

STORMWATER SYSTEMS & CULVERTS

STORM SEWERS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STM-LN-4085-08	STM-LN-4085-09
Project ID	Notes all projects that are involved with installation/improvements	31076	31076
Length	Quantity referenced from design schematic	63.70	81.40
Diameter	Size of sewer pipe diameter	300	375
Depth	Average depth of pipe below grade	1.7	1.7
Material	Defined material affects lifecycle and asset purpose	Ribbed Polyvinyl Chloride (Ultra Rib)	Ribbed Polyvinyl Chloride (Ultra Rib)
Upstream MH ID	Reference ID for asset located at the upstream of the sewer	STM-MH-4085-05	STM-MH-4085-06
Upstream Inverts	Elevation of the sewer at the point of entry	266.88	265.48
Downstream MH ID	Reference ID for asset located at the downstream of the sewer	STM-MH-4085-06	STM-MH-4070-11
Downstream MH Inverts	Elevation of the sewer at the point of exit	265.56	264.26
Date Constructed	Year of installation	2011	2011
Life Span	Estimated years of useful service	80	80
Construction Cost	Original cost to install asset	\$23,110.28	\$32,896.44
Date Lined	Year of full length remediation	N/A	N/A

	Description	Sample	Sample
Liner Life Span	Estimated years of useful service of liner	N/A	N/A
Liner Cost	Original cost to install liner	N/A	N/A

STORM MAINTENANCE CHAMBERS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STM-MH-1715-02	STM-MH-1715-03
Project ID	Notes all projects that are involved with installation/improvements	S2012-1	S2012-1
Diameter	Distance between the chamber walls	1200	1800
Depth	Full height of the structure	3.2	3.7
Material	Defined material affects lifecycle and asset purpose	Concrete-Precast	Concrete-Precast
Surface Elevation	Elevation of the top of the structure	255.40	255.35
Date Constructed	Year of installation	2007	2007
Life Span	Estimated years of useful service	55	55
Construction Cost	Original cost to install asset	\$3,800.00	\$5,300.00

STORM DRY CHAMBERS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STM-UE-1670-01	STM-UE-5050-01
Project ID	Notes all projects that are involved with installation/improvements	S2015-1	S2015-1
Dimensions	Diameter or measurements of chamber	1500mm	1500mm
Date Constructed	Year of installation	2006	2006
Life Span	Estimated years of useful service	50	50
Construction Cost	Original cost to install asset	\$4,927.84	\$4,927.84

CATCHBASINS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STM-CB-1030-05	STM-CB-1030-06
Project ID	Notes all projects that are involved with installation/improvements	31048	31048
Material	Defined material affects lifecycle and asset purpose	Concrete-Precast	Concrete-Precast

	Description	Sample	Sample
Date Constructed	Year of installation	2003	2012
Life Span	Estimated years of useful service	55	55
Construction Cost	Original cost to install asset	\$2,728.79	\$4,465.67

STORM CLEANOUTS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STM-CO-3390-03	STM-CO-3390-04
Project ID	Notes all projects that are involved with installation/improvements	N/A	N/A
Diameter	Distance between the chamber walls	200	200
Depth	Full height of the structure	3.94	2.62
Material	Defined material affects lifecycle and asset purpose	Polyvinyl Chloride	Polyvinyl Chloride
Date Constructed	Year of installation	1992	1992
Life Span	Estimated years of useful service	50	50
Construction Cost	Original cost to install asset	\$379.15	\$543.21

STORM EQUALIZATION TANKS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STM-EQ-1505-02	STM-EQ-2245-01
Project ID	Notes all projects that are involved with installation/improvements	S2016-3	N/A
Dimensions	Diameter or measurements of chamber	83.63m x 1.65m	4.6m x 4.6m x 1.7m
Date Constructed	Year of installation	2012	1994
Life Span	Estimated years of useful service	50	50
Construction Cost	Original cost to install asset	\$84,122.80	\$32,707.73

STORM VALVES

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STM-VL-1670-01	STM-VL-2740-01
Project ID	Notes all projects that are involved with installation/improvements	S2015-1	S2015-2
Diameter	Size of pipe diameter the valve is attached	300	450

	Description	Sample	Sample
	to		
Valve Type	Purpose of valve function	Drain Valve	Drain Valve
Valve within Chamber	Whether the valve is enclosed in an underground chamber or has an access sleeve	Yes	Yes
Date Constructed	Year of installation	2006	2012
Life Span	Estimated years of useful service	30	30
Construction Cost	Original cost to install asset	\$2,130.92	\$8,739.29

STORM WATER MANAGEMENT PONDS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STM-PN-5060-01	STM-PN-5070-01
Project ID	Notes all projects that are involved with installation/improvements	N/A	N/A
Facility ID	Reference ID to other projects	NC11	NW1
Legal Land Parcel	Parcel of land the pond can be found on	PLAN 65M2873 PT BLK 26 & PLAN 65M3573 BLOCK 274	PLAN 65M2781 PT LOT 78; 65R20120 PART 59
Area (m2)	Quantity retrieved from GIS	16751.6	3781.8
Facility Type	Typical pond functionality	Wet Pond	Wet Pond
Date Constructed	Year of installation	1999	2006
Construction Cost	Original cost to install asset	\$1,072,101.86	\$166,403.60

BRIDGES & CULVERTS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STM-CV-1045-02	STM-CV-1155-01
Project ID	Notes all projects that are involved with installation/improvements	N/A	N/A
Type	Defined by whether there is fill on the structure or not	Culvert	Bridge
Material	Defined material affects lifecycle and asset purpose	Steel	Concrete Cast-In-Place
Dimensions	Record measurements of the various dimensions of the culvert	40.8m x 4.72m x 3.07m	32m x 19m x 5.5m
Date Constructed	Year of installation	1983	1991
Life Span	Estimated years of useful service	40	60
Construction Cost	Original cost to install asset	\$87,722.95	\$1,250,000.00

CONTINUOUS DEFLECTIVE SEPARATION & OIL-GRIT SEPARATOR UNITS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STM-OG-1035-01	STM-OG-1035-02
Project ID	Notes all projects that are involved with installation/improvements	31048-2013	31048-2013
Make	Defines filter function/configuration	Continuous Deflective Separation	Continuous Deflective Separation
Model	Specific model numbers set by manufacturer	5654-10	3030-8
Date Constructed	Year of installation	2013	2013
Life Span	Estimated years of useful service	30	30
Construction Cost	Original cost to install asset	\$114,920.37	\$51,454.67

HEADWALLS

	Description	Sample	Sample
ID	Unique identifier - not to be recycled	STM-OF-3110-02	STM-OF-3110-03
Project ID	Notes all projects that are involved with installation/improvements	N/A	31104-2013
Outflow Diameter	Diameter of sewer pipe(s) that outfall at the headwall	525	1050
Date Constructed	Year of installation	2006	2013
Life Span	Estimated years of useful service	55	55
Construction Cost	Original cost to install asset	\$4,258.56	\$10,026.75

Asset Management Plan 2018

APPENDIX 3 - DETAILED 10-YEAR FINANCIAL FORECAST FOR INFRASTRUCTURE ASSETS

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
REVENUE											
Line of Credit	-	-	-	-	-	-	-	-	-	-	-
Special Purpose Reserves	1,702,135	300,100	842,530	623,550	374,150	222,620	149,670	49,710	48,000	48,000	48,000
Repair & Replacement Reserve	10,965,426	3,868,100	11,156,300	8,064,964	2,741,041	2,994,008	7,337,944	6,167,827	4,012,834	3,339,784	-
Growth & New Reserves	271,780	515,800	4,571,045	673,341	152,210	1,188,000	75,255	104,990	58,000	48,000	73,000
Studies & Other	448,334	880,000	151,200	194,200	32,100	403,267	262,000	182,200	300,000	243,900	-
Water / Sewer / Storm Reserves	5,318,385	4,510,000	7,402,851	5,471,613	3,458,600	4,714,422	3,734,312	3,624,463	2,706,265	5,016,073	1,043,300
Development Changes	12,155,831	11,636,250	31,155,955	1,237,099	1,878,840	3,968,280	1,809,625	6,847,910	-	-	-
Grants	2,472,306	15,751,046	2,795,612	2,795,612	2,795,612	2,795,612	2,795,612	2,795,612	2,795,612	2,795,612	2,795,612
External Funding	7,044,500	-	-	-	-	-	-	-	-	-	-
Other Revenue	1,100,000	21,600,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	40,000	-
Operating Revenues	5,511,500	5,769,600	6,033,500	6,184,900	6,335,900	6,391,800	6,447,400	6,503,400	6,559,000	6,624,600	6,692,500
	46,990,197	64,830,850	64,209,017	25,345,319	17,868,453	22,778,009	22,711,818	26,376,112	16,579,711	18,155,969	10,652,412

Asset Management Plan 2018

CAPITAL COSTS											
Storm Water Management	3,746,315	1,410,000	3,008,058	3,127,816	2,335,000	2,831,956	1,548,281	1,183,432	1,327,767	1,779,285	800,000
Wastewater Management	520,457	150,000	1,826,056	157,100	160,600	163,800	167,400	171,000	174,700	178,500	-
Water Management Facilities	1,018,280	3,000,000	2,568,737	2,186,697	963,000	1,682,300	2,018,631	2,270,031	1,203,798	3,058,288	243,300
Fleet & Equipment	16,419,735	46,311,110	41,605,200	5,018,700	2,122,400	1,773,800	2,623,600	3,371,000	1,972,900	500,000	-
Roads	2,512,278	3,143,000	1,914,509	1,281,785	914,175	589,613	384,855	881,625	332,965	319,454	501,808
Land, Parkland, Land Improvements	9,888,332	2,835,300	11,792,780	,094,521	3,294,278	5,634,241	8,344,751	10,801,924	4,327,481	7,274,746	-
Cultural Services	8,507,300	3,438,100	5,384,900	4,257,000	1,601,000	3,134,500	844,600	911,400	271,100	96,000	431,000
Non-Infrastructure Solutions	115,000	125,000	135,000	100,000	110,000	100,000	115,000	100,000	110,000	40,000	25,000
	605,000	980,000	251,200	294,200	32,100	476,000	519,200	182,200	300,000	243,900	-
	43,332,697	61,392,510	68,486,440	22,517,819	11,532,553	16,386,210	16,566,318	19,872,712	10,020,711	13,490,173	2,001,108
OPERATING COSTS - MAINTENANCE											
Storm Water Management	319,200	319,200	319,700	320,300	321,300	322,300	323,300	324,300	325,300	326,300	327,300
Wastewater Management	319,400	319,400	320,100	320,600	334,100	335,200	336,200	337,300	338,300	339,400	340,400
Water Management Facilities	1,040,000	1,040,000	1,044,300	1,061,600	1,068,300	1,075,000	1,081,600	1,088,300	1,095,000	1,101,700	1,108,400
Fleet & Equipment	1,093,700	1,095,700	1,329,900	1,425,400	1,503,300	1,513,900	1,524,400	1,535,000	1,545,500	1,556,100	1,566,600
Roads	585,300	707,900	707,900	714,800	722,000	728,400	734,800	741,300	747,700	754,100	760,500
Land, Parkland, Land Improvements	1,538,100	1,746,000	1,765,400	1,787,700	1,810,800	1,832,100	1,853,500	1,874,800	1,896,100	1,917,500	1,941,000
	615,800	541,400	546,200	554,500	576,100	584,900	593,600	602,400	611,100	629,500	648,300
	5,511,500	5,769,600	6,033,500	6,184,900	6,335,900	6,391,800	6,447,400	6,503,400	6,559,000	6,624,600	6,692,500
CASH SURPLUS (DEFICIT*)	(1,854,000)	(2,331,260)	(10,310,923)	(3,357,400)	-	-	(301,900)	-	-	(1,958,804)	-
TOTAL DEFICIT*	(20,114,327)										

*A projected cash flow deficit in any given fiscal year represents a requirement for additional internal and/or external funding.

Ten Year Capital Investment Plan
2018 Budget and 10 Year Outlook (2019 – 2028)

Asset Management Plan **2018**

APPENDIX 5 - ASSET MANAGEMENT RELATED SOFTWARE

WORKPLACE ASSET MANAGEMENT SYSTEM (WAMS): MAXIMO

Goal: The intent of developing a new Workplace Asset Management System (WAMS) for the Town was to assist in the planning, management and administrative functions that are essential for the successful maintenance and management of the Town's assets. The WAMS is intended to be used by multiple Town departments and will serve as an operational and management tool for managing work orders. The selected tool for the WAMS is Maximo, an enterprise asset management software solution by IBM.

Implementation Date: Maximo was implemented in May 2013. Maximo v7.6 upgrade in 2018

Status: Maximo is used for work and maintenance management and is integrated with GIS. Staff have the ability to create and close work orders and can tie them to Town assets as applicable. Mobile devices allow users to connect to Maximo in the field in real time. Following the Maximo version 7.6 upgrade, Staff will be working with the Water/Wastewater Division to review the current processes for work order creation, assignment and completion. This review will yield configuration changes (screen modifications, workflows, automation) and other enhancements. There is also an opportunity to create an integration with Microsoft Dynamics as the Customer Relationship Management (CRM) application.

GEOGRAPHIC INFORMATION SYSTEM: ESRI ARCGIS

Goal: Capture all infrastructure data sets digitally.

Implementation Date: ESRI ArcGIS was first utilized in the Planning and Development Services (PDS) Department in 2002. In 2008, the Engineering and Capital Delivery Division began to track the asset data spatially. These data sets include: water (e.g. valves, water mains), wastewater (e.g. pipes, manholes), storm (e.g. pipes, manholes, stormwater management ponds) and streets (e.g. lighting, signs). The Long Range and Strategic Planning Division maintain all other GIS data sets outside of Engineering and Capital Delivery.

Status: Staff digitize the asset data using the editing tools available in ArcGIS. Design drawings may be used to draw the preliminary spatial locations of the asset features however; the as-constructed drawings are used to QA/QC the data and populate the attribute data. In the case of new subdivisions, the asset data is reviewed and updates on a street-by-street basis at the time of assumption. In the case of capital projects that result in rehabilitation and/or reconstruction of assets, the GIS data is updated once the as-built drawings have been received and confirmed by Staff. ArcGIS map services are used to create the infrastructure web map that can be used internally by Staff to show asset locations. When users click on an asset, a list of attributes are displayed in the table and there are hyperlinks that will open the design drawings and any CCTV video files as applicable.

ArcGIS Collector is a GPS integrated cloud based solution that enables Operations Staff to inspect and collect spatial features in the field. GIS Staff publish the maps to an ArcGIS Online account where Operators can then access the maps and data in real-time. The data collected by the Operators is appended to existing enterprise GIS data sets to improve data quality and accuracy. The inspection data can be used for further reports and analysis

e.g. budgeting for repairs. Inspection requirements are configured as a series of drop-down menu items that allow Staff to quickly document deficiencies and/or mark features as operating within expected parameters.

Sidewalk and Boulevard third party inspection and maintenance management custom software system is a new tool that has been deployed in the Roads Operations Division for the purposed of gaining critical insight to the condition of our current sidewalk and boulevard inventory , with the new Provincial Minimum Maintenance Standards coming into effect in 2018. The corporation must be more diligent in inspecting, prioritizing and repairing sidewalks on a regularly scheduled cycle and implementing a consistent and properly funded level of maintenance and repair on an annual basis.

REFERENCE INFORMATION MANAGEMENT: DRAWINGS DATABASE

Goal: Digital repository of all construction and as-built infrastructure drawings.

Implementation Date: 2009

Status: The Engineering and Capital Delivery Division maintain a Microsoft Access Database that catalogues all drawing sets. Staff scan the drawings as PDF and/or TIF images. The images are geo-referenced and imported into ArcGIS for asset digitization purposes. New drawings are added based on development and reconstruction projects. As of 2015, facility drawings are also scanned and added to the database. Where applicable, the reference drawings are linked to the GIS assets.

AUTOMATED VEHICLE LOCATION (AVL): WEBTECH WIRELESS

Goal: GPS monitoring of roads and water fleet vehicles with an emphasis on supporting sidewalk and snow plow truck routes during the winter maintenance season.

Implementation Date: Winter Season 2012/13

Status: The Town has the ability to track road and water fleet vehicles in real-time or select historical data based on user-defined requirements. Users can query all vehicles or specific ones, run reports (winter event summary, stop history salt distribution) and utilize breadcrumbs to playback route progress. A public facing website was developed for the 2014/15 winter season. The “Where’s My Plow” website allows residents and Staff to see what roads have been plowed and when they were completed. New for the 2017/18 winter season was the addition of GPS units in the sidewalk vehicles. Website users are able to toggle between the plow trucks and sidewalk tractors. Objective to GPS enable all parks vehicles in 2018/19.

CONDITION ASSESSMENT TOOLS

Goal: Review/assign asset condition rating based on field observations

Implementation Date: Roads – InfraPave Pavement Condition Index (PCI), 2002, 2005, 2010 (historic)
Roads – IMS Pavement Condition Data Collection 2015, Stantec RoadMatrix software, Pavement Quality Index (PQI) 2016
Sanitary & Storm – CCTV, digital records initiated in 2008 and ongoing
Roads & Sidewalk – RoutePatrol Manager, 2013-2016; options being assessed

Status:

Roads – InfraPave is software developed by Aecom (formerly EarthTech) that is used to assess the condition of pavement distresses on accordance with the Canadian Public Works Association’s Pavement Condition Index (PCI) rating. The PCI is a 0 to 100-scale measurement to describe pavement condition. Inspections began in 2002 and have been reinspected on a 3-5 year cycle (2005, 2010).

Roads – Road Matrix is software developed by Stantec that is used to assess the condition of pavement distresses. This software was purchased in 2015 to replace the outdated InfraPave system. The Town is undergoing a data collection exercise wherein the vendor (IMS) used their vehicles to inspect the Town’s road network, identifying, classifying and measuring individual pavement distresses. Right-of-Way (ROW) images were also collected. The raw data collected in 2015 was imported into Road Matrix. This software and its built-in decision support tools were configured to analyse the data to generate new PQI ratings. The PQI ratings and the analysis tools help to guide and/or support the Town’s 10 Year Road Reconstruction Plans.

Sanitary & Storm – CCTV video inspections for sanitary pipes, maintenance holes, storm pipes and maintenance holes is being collected annually. Data is being stored on a network computer and is used to assess underground infrastructure. The CCTV video files are being linked to the applicable GIS asset feature(s). Through the use of the infrastructure web map, Staff can now click on an asset and open the video for review as needed.

Roads & Sidewalk – Route Patrol Manager (RPM) is GPS integrated road/sidewalk patrolling and maintenance management software from R. J. Burnside. RPM was used from 2013-2016 wherein Staff identified deficiencies with Town related assets such as roads, sidewalks and light poles. It also captures road conditions, air and pavement temperature. RPM tracks deficiencies and conditions from the time they are added in the field to the time they are completed. RPM also provides detailed reports and maps showing when roads were patrolled and the exact time the deficiencies were identified and repaired. This functionality ensures compliance with the Town’s level of service and the guidelines set out in the provincial minimum maintenance standards (O. Reg. 239/02). The Town is currently reviewing other options to assess road and/or sidewalk conditions.

Trimble GPS Unit – The Trimble GPS Unit provides field workers with a reliable tool to collect, verify, maintain and locate various Town owned assets with high precision and accuracy. A GPS Unit can be used to collect GIS asset data such as Sanitary Pipes, Hydrants, Sidewalks, etc. in real time situations. It also gives you the ability to locate buried or snow covered assets. In addition to the spatial component, users also have the ability to add/update attribute information for the asset collected. This improves the accuracy and reliability of data in various Town applications.

MOBILE DEVICES

Goal: Use mobile devices for field inspections and work orders

Implementation Date: Panasonic ToughPad tablets 2015

Status: Through a reliable and secure virtual private network (VPN) connection, Staff can use the ToughPad tablets to create and complete Maximo Work Orders in real-time while out in the field. Staff can also connect to the network to retrieve drawings, CCTV videos, and other documents. New for 2018 is a pilot project to use the ArcGIS Collector application on the tablets for inspecting curbs, catch basins and maintenance holes.

HYDRAULIC MODELLING: INFOWATER AND INFOWORKS ICM

Water Hydraulic Modelling: InfoWater

Goal: Create a hydraulic model to analyze the Town's water system. The model will utilize physical network information from GIS (pipes, nodes, valves) engineering drawings, and manufacturer specifications in conjunction with network demands (pumping records/stations, treatment records, population). The model can be used to support decisions on master planning, pumping station sizing, infrastructure rehabilitation, system expansion and improvements.

Implementation Date: 2017/2018

Status: InfoWater is the selected software to build the water hydraulic model. The vendor reviewed data from a variety of sources (GIS, SCADA, master plans, official plans, rain data, water quality etc.) to create a model that can be used to run scenarios for existing operational activities and future capacity planning. Town Staff will receive training in 2018 for InfoWater and the Aurora Water Model

Wastewater Hydraulic Modelling: InfoWorks ICM

Goal: Create a hydraulic model to analyze the Town's wastewater system. The model will utilize physical network information from GIS (pipes, nodes, valves) engineering drawings, and manufacturer specifications in conjunction with network demands (pumping records/stations, treatment records, population). The model can be used to support decisions on master planning, pumping station sizing, infrastructure rehabilitation, system expansion and improvements.

Implementation Date: 2017/2018

Status: InfoWorks ICM is the selected software to build the wastewater hydraulic model. The vendor reviewed data from a variety of sources (GIS, SCADA, master plans, official plans, rain data, pump data etc.) to create a model that can be used to run scenarios for existing operational activities and future capacity planning. Town Staff will receive training in 2018 for InfoWorks ICM and the Aurora Wastewater Model.

FUTURE PROJECTS

Water Hydraulic Modelling: Water Model Update

Goal: Building off the water model created in 2017, Staff will use InfoWater to update the network information and run new scenarios. The model can be used to support decisions on master planning, pumping station sizing, infrastructure rehabilitation, system expansion and improvements.

Implementation Date: Target 2021

Status: Future capital project

Wastewater Hydraulic Modelling: Wastewater Model Update

Goal: Building off the wastewater model created in 2017, Staff will use InfoWorks ICM to update the network information and run new scenarios. The model can be used to support decisions on master planning, pumping station sizing, infrastructure rehabilitation, system expansion and improvements.

Implementation Date: Target 2021

Status: Future capital project

Road and Sidewalk Inspection Application: Investigate and implement inspection application software

Goal: Building off the specifications from the Route Patrol Manager (RPM) application, the Town will be investigating other solutions to meet the weekly/annual road and sidewalk patrol requirements to ensure compliance with the Provincial minimum maintenance standards guidelines (O. Reg. 239/02).

Implementation Date: Target 2018/2019

Status: Future operations project