Northumberland County

ASSET MANAGEMENT PLAN

Core Assets – Roads, Structures and Storm Sewer

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1.0 EXECUTIVE SUMMARY

1.1 The Purpose of the Plan

This Asset Management Plan (AM Plan) details information about infrastructure assets with actions required to provide an agreed level of service in the most cost-effective manner while outlining associated risks. The plan defines the services to be provided, how the services are provided and what funds are required to provide over the 20 year planning period. The AM Plan links to the County of Northumberland's Long-Term Financial Plan which typically considers a 10-year planning period.

1.2 Asset Description

The County of Northumberland (County) is a thriving, south-eastern Ontario community strategically positioned along Highway 401 to access both Toronto and Kingston within a 1 to 1.5 hour drive. Northumberland County offers a range of living experiences from historic towns to scenic rolling rural areas to spectacular water settings on Rice Lake, the Trent River and Lake Ontario. The County is an upper tier level of municipal government that owns and manages physical assets in numerous service areas which are used to deliver services to over 89, 365 (2021 Census) residents. The County weaves together seven diverse, yet complementary municipalities that manage assets and deliver services to the community. The seven municipalities are:

- Township of Alnwick/Haldimand
- Municipality of Brighton
- Town of Cobourg
- Township of Cramahe
- Township of Hamilton
- Municipality of Port Hope
- Municipality of Trent Hills

This AM Plan has been developed for the County's core infrastructure assets including roads, structures and storm sewers.

The County road network comprises:

- 32 km of paved urban road
- 371 km of paved rural road
- 95 km of surface treated road

The structures network comprises:

- 45 bridges
- 68 culverts
- 20 retaining walls

The storm sewer network comprises:

- 1184 structures
- 32.5 km of pipe

The above infrastructure assets have a replacement value estimated at $887,021,056.

1.3 Levels of Service

The allocation in the planned budget is insufficient to continue providing existing services at current levels for the planning period.

The main service consequences of the Planned Budget are:

- Asset condition deterioration due to lack of operations and/or maintenance activities
- Asset failure, closure or use restrictions implemented
- Increased congestion and/or traffic delays because of upgrades to existing or new infrastructure assets not being completed.

1.4 Future Demand

The factors influencing future demand and the impacts they have on service delivery are created by:

- Increasing Population
- Climate Change
- Economic Development
- Active Transportation
- Changing Technology

These demands will be approached using a combination of managing existing assets, upgrading existing assets and providing new assets to meet demand. Demand management practices may also include a combination of non-asset solutions, insuring against risks and managing failures. The strategies that will be used to manage these demands include:

- On-going implementation of Transportation Master Plan recommendations and completion of additional studies, as required.
- On-going implementation of the Cycling Master Plan recommendations with five (5) cycling routes and current practice is to pave 1.5m shoulders on County Roads up for renewal.
- Researching, piloting, and implementing new methods and materials for maintenance to address changing climate.
- Future design/rehabilitation will take into consideration increasing traffic volumes and population, climate change, economic development, and active transportation.
- Consideration of alternative rehabilitation/construction strategies and construction staging for economic efficiencies.

- Continued inspections to determine condition, capacity, and function.

1.5 Lifecycle Management Plan

1.5.1 What does it Cost?

The forecast lifecycle costs necessary to provide the services covered by this AM Plan includes operation, maintenance, renewal, acquisition, and disposal of assets. Although the AM Plan may be prepared for a range of time periods, it typically informs a Long-Term Financial Planning period of 10 years. Therefore, a summary output from the AM Plan is the forecast of 10 year total outlays, which for the core assets (roads, structures, storm sewers) is estimated as $290,565,324 or $29,056,532 on average per year.

1.6 Financial Summary

1.6.1 What we will do

Estimated available funding for the 10 year period is $198,504,902 or $19,850,490 on average per year as per the Long-Term Financial plan or Planned Budget. This is 68% of the cost to sustain the current level of service at the lowest lifecycle cost.

The infrastructure reality is that only what is funded in the long-term financial plan can be provided. Informed decision making depends on the AM Plan emphasizing the consequences of Planned Budgets on the service levels provided and risks.

The anticipated Planned Budget for core assets leaves a shortfall of $9,206,042 on average per year of the forecast lifecycle costs required to provide services in the AM Plan compared with the Planned Budget currently included in the Long-Term Financial Plan. This is shown in the figure below.

Forecast Lifecycle Costs and Planned Budgets

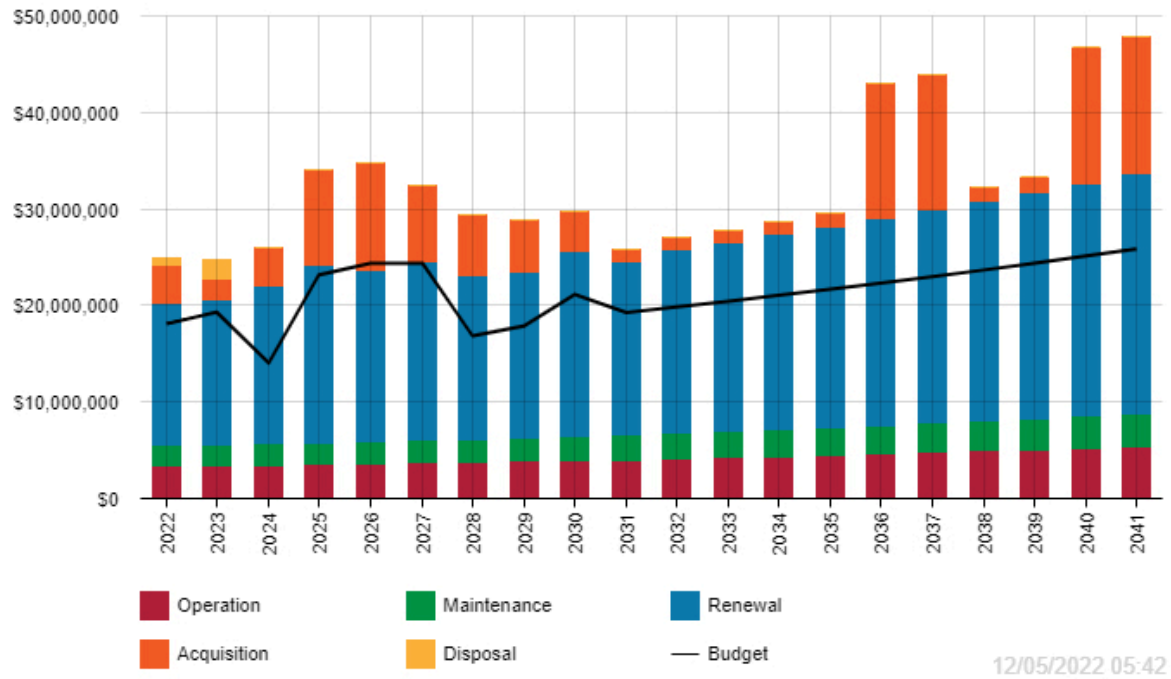


Figure Values are in 2022 dollars.

We plan to provide core asset services for the following:

- Prioritized operation, maintenance, renewal and acquisition of Roads, Structures and Storm Sewer to meet service levels set by the County in annual budgets.
- Replacement of Loomis Bridge in 2022 and subsequent disposal of this asset at the end of 2022
- Replacement of Thompson Bridge in 2023 and subsequent disposal of this asset at the end of 2023
- A new bridge in Campbellford is planned to be constructed between 2025-2027.
- Installation of new storm sewer on various roads in the 10 year capital plan including County Road 18 and County Road 31.
- Various intersection improvements including County Road 18 at Telephone Road and Danforth Road, County Road 2/10/74 in Welcome

1.6.2 What we cannot do

We currently do **not** allocate enough budget to sustain these services at the proposed standard or to provide all new services being sought. Works and services that cannot be provided under present funding levels are:

- Complete 12% of all recommended operations and maintenance activities within the first 10 years, including regular shouldering and granular top up, washing of all structures and all minor repairs identified.
- Complete 37% of renewal works required within the first 10 years to meet lifecycle demands
- Complete all upgrades/new construction of assets to address future growth and/or congestion

1.6.3 Managing the Risks

Our present budget levels are insufficient to continue to manage risks in the medium term.

The main risk consequences are:

- Failure of asset and/or use restrictions (i.e., load restrictions on bridges/culverts, congestion)
- Reduced lifespan due to deteriorating condition
- Flooding
- Increased maintenance and repair resulting from assets not being renewed as required
- Increased liability

We will endeavour to manage these risks within available funding by:

- Continuing to complete inspections and road patrols
- Prioritizing repair, maintenance, upgrades and rehabilitation work to mitigate risks.

- Researching and implementing viable alternative construction strategies and/or staging for economic efficiencies

1.7 Asset Management Planning Practices

Key assumptions made in this AM Plan are identified below.

General Assumptions:

- Asset Register was not used for capital renewal but rather reliance was on technical estimates.
- The last 10 years of projected expenditures maintains the year 10 need or expenditure and applies year over year inflation of 2% in keeping with the Bank of Canada forecast and good financial principles.
- The last 10 years of projected expenditures has an additional 1% increase to accommodate growth considerations.
- Depreciated values assumed based on current replacement costs of assets and percentage currently consumed.
- Assumed function and capacity were the same as condition in the asset register.
- Does not account for works that should be completed but are being deferred due to budget constraints.

Roads Assumptions:

- Last rehabilitation date was used to populate the asset register and generate the age profile due to lack of information regarding construction/reconstruction dates.
- Assumed a 45-year lifecycle and rehabilitation works completed increase the useful life to reconstruction status.
- Road base is included in Current Replacement Costs (CRC).
- Surface Treated road sections with an Annual Average Daily Traffic (AADT) over 1,000 were assigned a CRC in line with 2-Lane Rural Arterial (Class 3/4).
- All former MTO highways were assigned a CRC in line with 2-Lane High Volume Rural Arterial (Class 2).

Structures Assumptions:

- Assumed age of some retaining walls based on age of road.

Storm Sewer Assumptions:

- Condition of storm sewer was assumed based on a combination of age of system and structures and type of material.
- Age of storm sewer assumed based on combination of the age of the road, type of material (i.e. PVC/HDEP > 1990; CSP = mid 1970's) and condition.
- Useful life was assumed to be 60 or 80 based on material type (i.e., PVC vs. CSP)
- Ditches and cross culverts under 3m are not included and will be incorporated in future version(s) of this Plan.

Our systems to manage assets include:

- Cityworks (CW) Asset Management Software
- Geographic Information System (GIS)
- Microsoft Excel Spreadsheets
- Great Plains Fixed Asset Module

Assets requiring renewal are identified from either the asset register or an alternative method.

- The timing of capital renewals based on the asset register is applied by adding the useful life to the year of acquisition or year of last renewal,
- Alternatively, an estimate of renewal lifecycle costs is projected from external condition modelling systems and may be supplemented with, or based on, expert knowledge.

The Alternate Method was used to forecast the renewal lifecycle costs for this AM Plan.

This AM Plan is based on a reliable level of confidence information.

1.8 Monitoring and Improvement Program

The next steps resulting from this AM Plan to improve asset management practices are:

- Further development of asset registers to enhance data set (completeness and accuracy) and incorporation of all data into the County's GIS database and Cityworks software
- Additional lifecycle modelling for roads, structures, and storm sewers using historical data collected through Cityworks to further inform asset condition, performance, reliability, and asset life
- Incorporate additional stakeholder/customer satisfaction data with respect to infrastructure levels of service, risk and financial considerations
- Complete a detailed storm water asset condition assessment
- On-going costing updates as information becomes available from Cityworks (CW)
- Inclusion of additional assets (facilities, fleet, natural assets etc.) in the plan
- Discussion between Public Works and Finance to better understand how assets are valued, tracked and amortized
- Formalized roads and storm sewer renewal ranking criteria weighting
- Review and update Surface Treatment Policy to determine if some roads should be converted to asphalt from surface treatment
- Monitor asset resilience and complete resilience assessment and plan
- Develop a more robust risk management plan
- Review asset condition evaluation process for roads and update accordingly
- Incorporation of recommendations from County's Greenhouse Gas (GHG) Emission Reduction Plan anticipated to be completed in 2022 and any subsequent climate action plans or reports

- Review staff resourcing requirements for on-going asset management plan development and updates and for implementation of plan
- Review and update of the County's Development Charge Study particularly for the Cobourg East Development to reflect current cost estimates for proposed work based on additional design information and accounting for cost escalation
- Review of expenditure thresholds for the capitalization of assets

2.0 INTRODUCTION

2.1 Background

This AM Plan communicates the requirements for the sustainable delivery of services through management of assets, compliance with regulatory requirements, and required funding to provide the appropriate levels of service over the planning period. In summary, asset management involves balancing asset lifecycle costs, performance and risk with a goal of delivering the required performance or level of service at the best possible cost over the life of the asset within an acceptable level of risk.

The AM Plan is to be read in conjunction with the County of Northumberland planning documents including the Asset Management Policy (2019), and the following key planning documents:

- Northumberland County Strategic Plan 2019-2022
- Northumberland County Official Plan
- Northumberland County Transportation Master Plan (2016) and Cycling Master Plan (updated 2014)
- Northumberland County Budget and Long-Term Financial Plan

Since 2009, the revised Public Sector Accounting Board (PSAB) standards have been in place. These standards required that clear definitions of capital be adopted by Municipalities and the County established the acquisition or historic value (PSAB value) for each asset grouping as well as the replacement values in current dollars. The County began developing of a long term 10-year plan as part of the 2012 budget process, which continues to be in place.

In 2014, Northumberland County Council (Council) adopted its first formal AM Plan, in accordance with Funding requirements set out in the Ministry of Infrastructure's *Building Together* standard. Federal Gas Tax funding was modified in 2016 to also include a requirement for municipalities to have a detailed asset management plan. In April 2019, as per O.Reg. 588/17 requirements, Council adopted the Northumberland County Asset Management Policy. The policy outlines the following objectives:

- Provide a consistent framework for implementing asset management throughout the organization
- Provide transparency and accountability and to demonstrate to stakeholders the legitimacy of decision-making processes which combine strategic plans, budgets, service levels and risks.

This AM Plan has been developed for Core Assets as per O.Reg. 588/17 and will be used for development of annual and long term financial planning moving forward. Subsequent AM Plans will be developed for all other County assets in accordance with the requirements and timelines provided in O.Reg. 588/17.

The infrastructure assets covered by this AMP include the core transportation assets being roads, structures and storm sewers. For a detailed summary of the assets covered in this AM Plan refer to Table 5.1.1 in Section 5.

These assets are the foundation of the County's regional road network which plays an integral role in the movement of people, goods and services; creating employment; providing connections to neighbouring communities; and contributing to the social and health needs of the community.

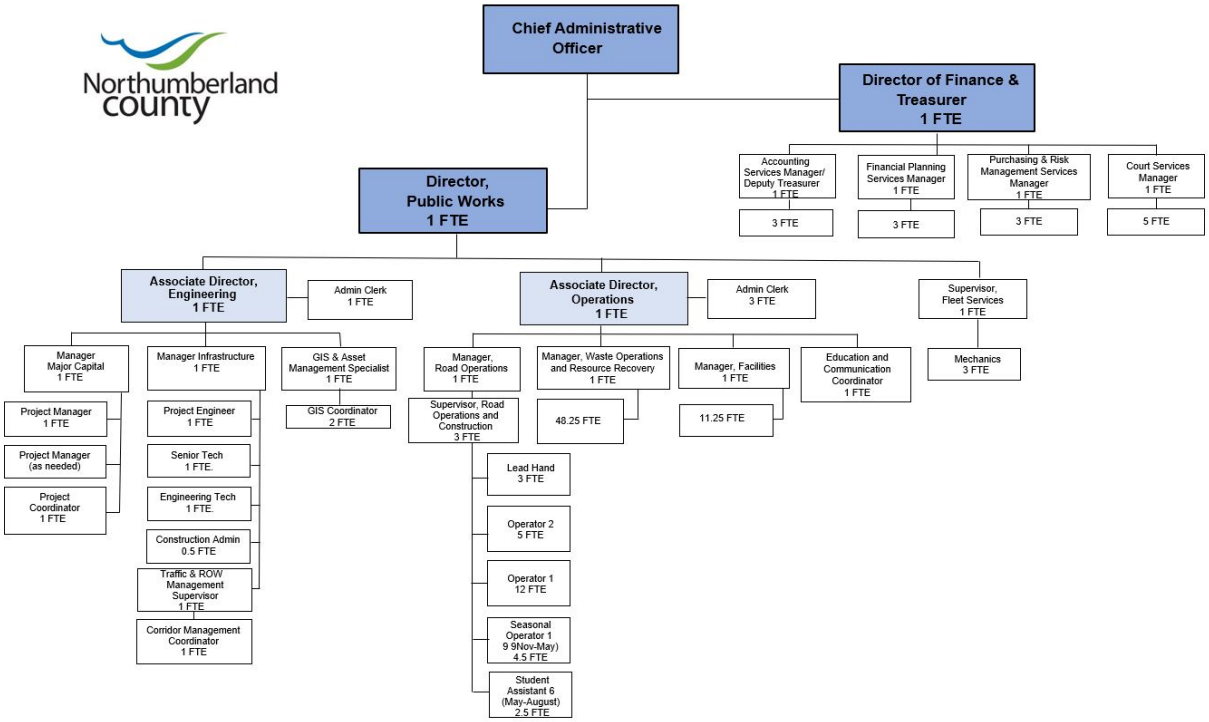
The infrastructure assets included in this plan have a total replacement value of $887,021,056.

Key stakeholders in the preparation and implementation of this AM Plan are shown in Table 2.1.

Table 2.1: Key Stakeholders in the AM Plan

Key Stakeholder	Role in Asset Management Plan
County Council	▪ Represent needs of community/shareholders, ▪ Allocate resources to meet planning objectives in providing services while managing risks, ▪ Ensure organization is financially sustainable.
CAO and Senior Management Team	▪ Endorse the development of asset management plans and provide the resources required to complete this task ▪ Set high level priorities for asset management development and raise the awareness of this function among staff and contractors ▪ Support the implementation of actions resulting from this plan and prepared to make changes for better ways to manage assets and deliver services ▪ Support an asset management driven budget and LTFP
Public Works and Finance	▪ Collection, consolidation, and analysis of the asset register and ensuring asset valuations are accurate based on the available data ▪ Prepare all aspects of the AMP including technical and customer levels of service, planned and future activities, risk management, monitoring and improvement program ▪ Development of supporting policies ▪ Includes GIS and administrative support
External Parties	▪ Provide input through public survey on customer values, levels of service, etc.

Our organizational structure for service delivery of infrastructure assets is detailed below,



2.2 Goals and Objectives of Asset Ownership

Our goal for managing infrastructure assets is to meet the defined level of service (as amended from time to time) in the most cost effective manner for present and future consumers. The key elements of infrastructure asset management are:

- Providing a defined level of service and monitoring performance,
- Managing the impact of growth through demand management and infrastructure investment,
- Taking a lifecycle approach to developing cost-effective management strategies for the long-term that meet the defined level of service,
- Identifying, assessing, and appropriately controlling risks, and
- Linking to a Long-Term Financial Plan which identifies required, affordable forecast costs and how it will be allocated.

Key elements of the planning framework are:

- Levels of service – specifies the services and levels of service to be provided,
- Risk Management – identifies critical infrastructure, potential risk events, and provides mitigation measures to manage risk both proactively and reactively
- Future demand – how this will impact on future service delivery and how this is to be met,
- Lifecycle management – how to manage its existing and future assets to provide defined levels of service,

- Financial summary – what funds are required to provide the defined services,
- Asset management practices – how we manage provision of the services,
- Monitoring – how the plan will be monitored to ensure objectives are met,
- Asset management improvement plan – how we increase asset management maturity.

Other references to the benefits, fundamentals principles and objectives of asset management are:

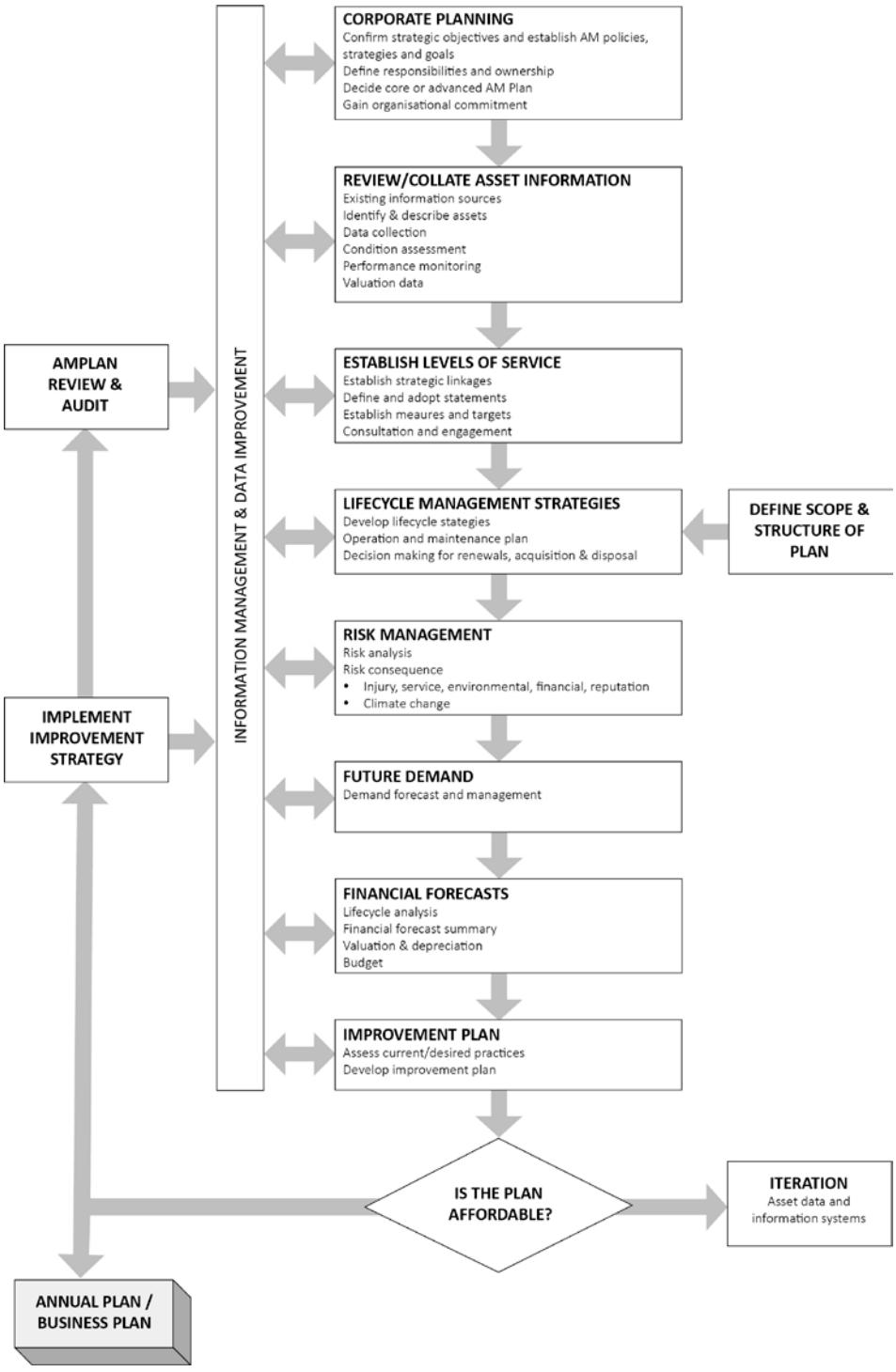
- International Infrastructure Management Manual 2015 [1]
- ISO 55000[2]

A road map for preparing an AM Plan is shown below.

[1] Based on IPWEA 2015 IIMM, Sec 2.1.3, p 2| 13
[2] ISO 55000 Overview, principles and terminology

Road Map for preparing an Asset Management Plan

Source: IPWEA, 2006, IIMM, Fig 1.5.1, p 1.11



3.0 LEVELS OF SERVICE

3.1 Customer Research and Expectations

The County pursued feedback from the public on the current condition of assets, including roads, structures, and storm sewers, along with expectations for future maintenance and renewal through an online survey over a three (3) week period in late 2020. Table 3.1 below illustrates the overall satisfaction levels of respondents for each of the asset categories covered in this plan.

Table 3.1: Customer Satisfaction Survey Levels

Performance Measure	Very Satisfied	Fairly Satisfied	Satisfied	Somewhat satisfied	Not satisfied
Overall condition of road related infrastructure	21.4%	57.1%	4.8%	11.9%	4.8%
Overall condition of structures	28.6%	57.5%	4.8%	7.1%	0%
Overall condition of storm sewers	15.4%	56.4%	23.1%	2.6%	2.6%

The results from the survey have informed the customer values section of the AM Plan. The community satisfaction information is also one of the factors used to develop strategic plans and prioritization and allocation of funds in annual and long-term budgets.

3.2 Strategic and Corporate Goals

This AM Plan is prepared under the direction of the County of Northumberland's vision, mission, goals and objectives.

Our vision is:

To bring together people, partnerships, and possibilities for a strong and vibrant Northumberland County.

Our mission is:

To be a best practices leader of County Government and a collaborative partner with our member municipalities and community partners.

Strategic goals have been set by the County. The relevant goals and objectives and how these are addressed in this AM Plan are summarised in Table 3.2.

Table 3.2: Goals and how these are addressed in this Plan

Goal	Objective	How Goal and Objectives are addressed in the AM Plan
Sustainable Growth	To provide safe and sustainable infrastructure which meets or exceeds the movement of goods and services within the County of Northumberland.	Developing a sustainable renewal program as well as operational and maintenance programs to maintain the current infrastructure assets and address future expansion requirements and the natural environment.
Sustainable Growth	Ensures a fiscally responsible organization through a proactive approach to management of assets	Development of an AM Plan that not only meets legislative requirements but meets corporate objectives and ensures a fiscally responsible organization.
Leadership in Change	Gather feedback from the public on LOS related to our infrastructure and service delivery and educate the public on budget considerations and the consequence of selecting different options/priorities.	Inclusion of further public consultation and education as part of the improvement plan to further inform all aspects of the AM Plan.
Economic Prosperity and Innovation	Ensuring levels of service for transportation assets are in place to ensure movement of goods and services in the County today and in the future	Inclusion of growth forecasts in the AM Plan and ensuring levels of service account for current and future economic development opportunities. Inclusion of further public consultation education as part of the improvement plan to further inform all aspects of the AM Plan.
Thriving and Inclusive Communities	Leadership in public safety to address road safety issues and enhanced regional transit	Developing a sustainable renewal program and upgrade/new program to implement traffic safety and transit initiatives identified through Master Plans and Environmental Assessments.

3.3 Legislative Requirements

There are many legislative requirements relating to the management of assets. Legislative requirements that impact the delivery of the core transportation assets are outlined in Table

3.3.

Table 3.3: Legislative Requirements

Legislation	Requirement
The Municipal Act	Compliance with the Act with respect to ownership and responsibilities of its infrastructure.
The Public Transportation and Highway Improvement Act	Compliance with the Act with respect to ownership and responsibilities of the County owned roadways.
The Highway Traffic Act	Compliance with the Act with respect to ownership and responsibilities of County owned roadways.
Infrastructure for Jobs and Prosperity Act, 2015	To develop a Strategic Asset Management Policy as well as an Asset Management Plan in accordance with the technical requirements set out in O. Reg. 588/17
Ontario Minimum Maintenance Standards O. Reg. 239/02	To meet or exceed all road patrol requirements including repair of potholes, surface defects and winter maintenance as it pertains to the roadway.
Standard for Bridges O. Reg. 104/97	Requirement to inspect the structural integrity, safety and condition of every bridges at least once every second calendar year under the direction of a professional engineer and in accordance with the Ontario Structure Inspection Manual (OSIM).
Development Charges Act	States municipalities may impose development charges through a by-law on land to pay for increased capital costs because of additional needs for services due to development in the area(s) the by-law applies.

3.4 Growth Considerations

The Northumberland County Official Plan (OP) is currently being updated to guide growth and development in Northumberland over the next 30 years. These updates align with Provincial legislation that requires municipalities to review and update their Official Plan every few years.

Current Provincial forecasts indicate that the population for Northumberland County will grow to 122,000 people and 44,000 jobs by the year 2051. Most of this growth is expected to be concentrated in fully serviced urban areas however, there will be some housing growth in the rural areas. As a result, there will be added pressure on existing assets and the potential need for upgrades or expansion. The updated Official Plan will include updated maps and policies related to long-term growth and land needs within Northumberland.

The County has also completed a County-wide Development Charge (DC) Study that recommended new Development Charges and policies for Northumberland as another mechanism to fund growth related infrastructure needs (By-law 2020-36). The Development

Charges applicable to roads, structures and storm sewer have been incorporated into this plan.

Review and update of this AM Plan will be required once the OP update is complete to incorporate any changes with respect to future transportation needs identified as a result of growth and development.

3.5 Customer Values

Service levels are defined in three ways, customer values, customer levels of service and technical levels of service.

Customer Values indicate:

- what aspects of the service is important to the customer,
- whether they see value in what is currently provided and
- the likely trend over time based on the current budget provision

Table 3.5: Customer Values

Service Objective: Provide a safe, functional, and well-maintained arterial road network.

Customer Values	Customer Satisfaction Measure	Current Feedback	Expected Trend Based on Planned Budget
The County will maintain the road surface so as to minimize (within reason) uneven surfaces, rutting and cracking, potholes	Annual # of customer service requests relating to asset quality; AMP Public Input Survey; Road patrol judgement	Average of 21 Cityworks (CW) Service Requests (SR) a year regarding surface condition; 64% of survey respondents rated condition of roads as good or very good.	Remain the same or increase in complaints based on current funding gap and lack of annual increase in funding.
The County will provide a continuous and predictable road network, with minimal disruption for its users.	Annual # of customer service requests relating to road geometry and system disruption; accident data	Average two (2) SR a year relating to road design concerns; Select known intersections that require improvement from TMP.	Remain the same or slight increase in complaints. There will be improvements to some locations as planned construction projects are completed, however, not all identified improvements through the TMP or other studies can be implemented due to the funding gap.
County roads will be continuous and integrated to serve all modes and users	Annual # of customer service requests/complaints requesting roads be improved from a function perspective	Few to no complaints received regarding function of road network.	Receive few or no complaints.
Provide a road network with reasonable traffic flow and movement and minimal congestion	Annual # of customer service requests relating to traffic flow and movement; AMP Public Input Survey	Few CW Service Requests; 78% of survey respondents rated traffic flow and congestion on roads as good or very good.	Expect increased congestion and traffic flow in some areas due to growth and the 407 expansion, resulting in slight increase in complaints and/or decreased level of service satisfaction

Service Objective: Provide safe and reliable structures to meet service needs while connecting the County's communities, residents, and visitors.

Customer Values	Customer Satisfaction Measure	Current Feedback	Expected Trend Based on Planned Budget
Structures are safe and in good condition	Annual # of customer service requests relating to structure condition, including safety concerns; AMP Public Input Survey	Average three (3) SR a year regarding bridge condition or safety concerns; 88% of survey respondents rated the condition of structures to be good or very good.	Increase in the number of complaints relating to bridge condition if funding levels not increased to meet annual maintenance, renewal and repair needs.
Northumberland County structures will provide connectivity of the road network and conveyance of waterways as per legislation	Annual # of customer service requests regarding connectivity or the need for additional structures.	Very few complaints received regarding the connectivity structures provide in the County. Have received project specific concerns for Campbellford bridge, Thompson Bridge and Loomis Bridge.	Improvement with the construction of an additional bridge in Campbellford and planned replacement of two closed structures (Loomis and Thompson).
Few or no bridges with load restrictions in place	Annual # of customer service requests relating to bridges/culverts with load restrictions	Very few complaints are received regarding the current load restrictions in place. One (1) service request relating to closure of Loomis Bridge.	Limited number of complaints anticipated unless new load restrictions are put in place on any structures.
Structures have sufficient lanes of traffic to accommodate traffic flow and congestion	Annual # of customer service requests relating to bridge lane restrictions; AMP Public Input Survey	Trent River Crossing EA identified Campbellford bridge requirement for additional capacity; 83% of survey respondents rated bridge traffic flow and congestion as good to very good.	Improvement with the construction of an additional bridge in Campbellford. May be additional widenings required in future based on growth.

Service Objective: Provide reliable, functional and safe storm sewers to prevent flooding.

Customer Values	Customer Satisfaction Measure	Current Feedback	Expected Trend Based on Planned Budget
Storm sewers are safe and in good condition	Annual # of customer service requests related to storm sewer damage (i.e. catch basin/ditch inlet condition); AMP Public Input Survey	66% of respondents familiar with storm sewers rated them as good to very good.	May increase as storm sewers continue to age and funding is not increased to meet annual requirement.
Storm sewers are inspected and cleaned on a regular schedule to ensure uninterrupted service and proper drainage	Annual # of customer service requests related to storm sewer blockages (i.e. water not draining away properly).	Very few complaints received regarding storm sewer blockages.	May increase as storm sewers continue to age and funding is not increased to meet annual requirement.
Provide storm sewers that protect the environment and community	Annual # of customer service requests that request the need to storm sewers or improved drainage.	Few complaints received requesting the need for additional storm sewers.	May increase as storm sewers continue to age and funding is not increased to meet annual requirement.
Storm sewers are designed to meet capacity during the rain and/or thaw events to reduce the risk of flooding	Annual # of flooding complaints pertaining to storm sewers	Few complaints of flooding in locations that contain storm sewers.	May increase as storm sewers continue to age and funding is not increased to meet annual requirement.

Service Objective: Effectively communicate construction and/or maintenance with the public while considering the environment and sustainability.

Customer Values	Customer Satisfaction Measure	Current Feedback	Expected Trend Based on Planned Budget
The County will keep its customers informed about its activities and respond promptly to inquiries and complaints.	Annual # of service requests related to road closures, construction, and maintenance activities.	On average, 1 road closure inquiry and 10 construction/capital project inquiries a year.	Remain the same.
The County will consider the environmental impacts of asset maintenance, operations, and construction projects	Annual # of service requests related to environmental issues/complaints (i.e. dust, water body contamination, wildlife, roadside spraying etc)	21 SR regarding roadside spraying in 2019/2020; on average 3 SR regarding dust concerns per year.	Anticipate reduced number of complaints based on current review of roadside vegetation program and use of alternative measures for roadside spraying, where feasible
Demonstrate leadership in sustainable asset management and invest in preventative maintenance and rehabilitation when most beneficial.	What we hear from Council, our superiors, public? Comments/concerns during PICs, service requests regarding specific projects, request for memos, request for information/clarification/presentations/etc.	Few inquiries annually regarding budgeting process and roads capital plan.	Remain the same or potential increase with increasing community expectations and as infrastructure continues to age.

3.6 Customer Levels of Service

The Customer Levels of Service are considered in terms of:

Condition How good is the service? What is the condition or quality of the service?

Function Is it suitable for its intended purpose? Is it the right service?

Capacity/Use Is the service over or under used? Do we need more or less of these assets?

Communication Are impacts to the service communicated to the public? Is the public aware of service changes?

Environmental Impacts How is the environment impacted? Do service activities consider this?

Sustainability How is the budget allocated to services? How are works prioritized?

In Tables 3.6.1 - 3.6.3 under each of the service measures types (Condition, Function, Capacity/Use, Communication, Environmental Impacts, Sustainability) there is a summary of the performance measure being used, the current performance, and the expected performance based on the current budget allocation.

These are measures of fact related to the service delivery outcome (e.g. number of occasions when service is not available or proportion of replacement value by condition %'s) to provide a balance in comparison to the customer perception that may be more subjective.

Table 3.6.1: Customer Level of Service Measures - Roads

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Condition	Organizational measure	Descriptions and/or images that illustrate the different levels of road class pavement condition (PCI's), road patrol logs and Cityworks work orders; known problem areas	54% adequate (>85), 26% good (75-84), 15% fair (55-74) and 5% poor (<55); Average PCI is 84	PCIs anticipated to remain about the same or decrease as work is deferred if pace of funding is not significantly increased
	Confidence levels		Medium Professional judgement supported by visual pavement condition index (PCI) surveys	High Professional judgement supported by analysis of data and current funding versus forecasted funding levels
Function	Organizational measure	Description, which may include maps, of the road network in the municipality and its level of connectivity; lane km as proportion of land area	GIS mapping; 498km of roadway under County jurisdiction; Arterial Road network with the main function of moving people, goods, and services through the County	Minor changes anticipated because of potential future upload and download of various road sections based on recommendations from the TMP or other transportation or development related studies.
	Confidence levels		High Supported by extensive road network data in the County's GIS	High Supported by previous studies and reports

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Capacity	Organizational measure	TMP modelling and traffic manuals	Using v/c of 0.7 for congestion, 0.2 % of total vehicle kilometres travelled are in congestion (Based on County's TMP)	3.4% (in 20 years but assuming capital improvements over that time) (Based on County's TMP)
	Confidence levels		Medium Supported by analysis in the County's TMP completed in 2016. Requires update to confirm and/or modify current capacity versus what was predicted for 2022	Medium Supported by analysis in the County's TMP completed in 2016. Requires update to confirm and/or modify current capacity and future capacity beyond 2022 taking into consideration new growth forecasts and development

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Communication	Organizational measure	Notice of Construction, Notice of study commencement	32 road closures, construction notices and any traffic impacts posted on Municipal 511 in 2020; 16 Media Releases/Public notices issued and 91 Social Media posts through Communications Dept in 2020. 44 road closures, construction notices and/or traffic impacts posted on Municipal 511 in 2021; 5 Media Campaigns, 8 Media Releases/Public Notices issued through Communications Dept in 2021.	Anticipate increased public communication with increasing capital works program, studies and EA's. through various means.
	Confidence levels		High Based on data collected through Communications Department for project notification, public consultation, social media, etc. as well as Municipal511 data for construction updates	High Increase in Communications Department Staff for Major Projects; increasing public consultation requirements and expectations for projects and studies

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Environmental Impacts	Organizational measure	Description of the measures in place to minimize the environmental impacts of construction works etc.	Required permits are obtained from local conservation authorities for scheduled work; implementation of dust control, stream protection and erosion control measures; using various paving methodologies such as Cold-in-Place Recycling to reduce waste and re-use existing material	Remain the same or potentially increase.
	Confidence levels		High Implementing required environmental mitigation measures on construction projects through documented permits and regulatory approvals as well as following best management practices for construction	Medium Continue to implement best management construction practices and follow legislative requirements; could be potential future changes based on policy or legislative changes
Sustainability	Organizational measure	Long-term plan, lifecycle models, purchasing protocol	10 year long-term financial plan is in place and updated annually; Development and approval of AMP; Purchasing by-law in place	AMP will be approved, additional AM data will be available through CW for assets and more complex lifecycle modelling will have been completed.

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
	Confidence levels		Medium Based on engineering judgement and compilation, review, and analysis of existing data	Medium Availability of additional data, however, resourcing may be required to complete more complex lifecycle modelling and analysis

Table 3.6.2: Customer Level of Service Measures – Structures

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Condition	Organizational measure	Descriptions and maps that illustrate the different levels of bridge/culvert condition (BCI). Road patrol logs	Approximately 76.7% of the County's structures are in good condition, 14.3% are in fair condition and 9% are in poor condition; Average BCI is 70	Several structures with now and 1-5 year needs for minor or major rehabilitation and several expected to reach the end of their useful life in the near future and therefore this percentage of structures in good condition will decrease as works need to be deferred due to funding gap.
	Confidence levels		Medium Medium Based on OSIM inspections (high level visual inspection) completed by engineering consultants. Condition rating is not always indicative of structure condition and needs.	Medium Without additional funding to address the funding gap in all areas (ops/maintenance/renewal/replacement) structures will continue to deteriorate.

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Function	Organizational measure	Description, which may include maps, of the structures as part of the overall road network.	There are currently two (2) bridges in the County that are closed to all traffic (Thompson and Loomis Bridge). There are two (2) additional single lane structures (Burnley Bridge and Wilson Island Bridge).	Replacement of both structures planned in 2022 and 2023 capital budget. Both Thompson and Loomis Bridge have been determined to remain single lane structures. Further study will need to be completed to determine function capacity of remaining single lane structures
	Confidence levels		High Professional Judgement supported by studies and data	High Funds committed in 2022 for replacement of Loomis Bridge and anticipate funds to be approved in 2023 for replacement of Thompson Bridge.
Capacity	Organizational measure	Descriptions of the traffic that is supported by structures - % of structures with load or land restrictions from OSIM reports or existing traffic studies	45 Bridges and 68 Culverts >3m spread across the County and 20 retaining walls. Many large bridges connect communities over the Trent Severn River (Trent River Bridge, Healey Falls Bridge, Campbellford Bridge).	Additional bridge in Campbellford is planned in 2025, providing additional connectivity for residents/visitors and emergency services in the settlement. Also, County Road 20 grade separation is planned in 2036/2037 and County Road 64 grade separation in 2040/2041.

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
	Confidence levels		High (Professional Judgement supported by various studies and EAs	Medium Medium Significant EA studies required for both Grade Separations requiring resources and agency collaboration. Campbellford Bridge in detailed design for anticipated 2025 construction start date
Communication	Organizational measure	Notice of Construction, Notice of study commencement	32 road closures, construction notices and any traffic impacts posted on Municipal 511 in 2020; 16 Media Releases/Public notices issued and 91 Social Media posts through Communications Dept in 2020. 44 road closures, construction notices and/or traffic impacts posted on Municipal 511 in 2021; 5 Media Campaigns, 8 Media Releases/Public Notices issued through Communications Dept in 2021.	Remain the same or increased public communication through various means.

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
	Confidence levels		High Based on data collected through Communications Department for project notification, public consultation, social media, etc. as well as Municipal511 data for construction updates	High Increase in Communications Department Staff for Major Projects; increasing public consultation requirements and expectations for projects and studies
Environmental Impacts	Organizational measure	Description of the measures in place to minimize the environmental impacts of construction works etc.	Required permits are obtained from local conservation authorities for scheduled work; implementation of dust control, stream protection and erosion control measures implemented; accommodate projects outside the nesting season for birds and turtle fencing before construction.	Remain the same or potentially increase.

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
	Confidence levels		High Implementing required environmental mitigation measures on construction projects through documented permits and regulatory approvals as well as following best management practices for construction	Medium Continue to implement best management construction practices and follow legislative requirements; could be potential future changes based on policy or legislative changes
Sustainability	Organizational measure	Long-term plan, lifecycle models, purchasing protocol	10 year long-term financial plan is in place and updated annually; Development and approval of AMP; Purchasing by-law in place	AMP will be approved, additional AM data will be available through CW for assets and more complex lifecycle modelling will have been completed.
	Confidence levels		Medium Based on engineering judgement and compilation, review, and analysis of existing data	Medium Availability of additional data, however, resourcing may be required to complete more complex lifecycle modelling and analysis

Table 3.6.3: Customer Level of Service Measures – Storm Sewer

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Condition	Organizational measure	CCTV inspections, # of blockages, cleaning schedule	CCTV inspections completed in preparation for future construction projects. Select catch basins are cleaned annually.	Better understanding of storm sewer condition as additional CCTV inspections and condition rating is completed. Not all catch basins cleaned annually.
	Confidence levels		Medium Professional Judgement with some data collection	High Professional Judgement supported by planned additional data collection and analysis
Function	Organizational measure	Description/maps of storm sewer systems in the studies and development proposals	32.5km of storm sewer pipe. Two (2) development proposals that would involve new storm sewer being installed.	Better understanding of storm sewer systems through future detailed storm sewer condition assessments and stormwater management planning through planned development.
	Confidence levels		Low Professional Judgement with minimal data, detailed drawings, or studies/design sheet data	Medium Professional judgement supported by additional storm sewer data collection and analysis

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Capacity	Organizational measure	% of storm sewers resilient to 5 year and 100 year storms; studies and known areas with issues	A few areas with storm sewer that are known to be problem areas	Anticipate some improvement in 1-2 areas as storm sewers are rehabilitated/upgraded in the next 10 years. Collection of additional data for further analysis and assessment of capacity to be completed as there may be other areas requirement improvement that will require additional funding
	Confidence levels		Low Professional Judgement with minimal data, detailed drawings, or studies/design sheet data	Medium Professional judgement supported by additional storm sewer data collection and analysis

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Communication	Organizational measure	Notice of Construction, Notice of study commencement	32 road closures, construction notices and any traffic impacts posted on Municipal 511 in 2020; 16 Media Releases/Public notices issued and 91 Social Media posts through Communications Dept in 2020. 44 road closures, construction notices and/or traffic impacts posted on Municipal 511 in 2021; 5 Media Campaigns, 8 Media Releases/Public Notices issued through Communications Dept in 2021.	Remain the same or increased public communication through various means.
	Confidence levels		High Based on data collected through Communications Department for project notification, public consultation, social media, etc. as well as Municipal511 data for construction updates	High Increase in Communications Department Staff for Major Projects; increasing public consultation requirements and expectations for projects and studies

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Environmental Impacts	Organizational measure	Description of the measures in place to minimize the environmental impacts of construction works etc.	Required permits are obtained from local conservation authorities for scheduled work; implementation of dust control, stream protection and erosion control measures implemented; accommodate projects outside the nesting season for birds and turtle fencing before construction.	Remain the same or potentially increase.
	Confidence levels		High Implementing required environmental mitigation measures on construction projects through documented permits and regulatory approvals as well as following best management practices for construction	Medium Continue to implement best management construction practices and follow legislative requirements; could be potential future changes based on policy or legislative changes

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Sustainability	Organizational measure	Long-term plan, lifecycle models, purchasing protocol	10 year long-term financial plan is in place and updated annually; Development and approval of AMP; Purchasing by-law in place	AMP will be approved, additional AM data will be available through CW for assets and more complex lifecycle modelling will have been completed.
	Confidence levels		Medium Based on engineering judgement and compilation, review, and analysis of existing data	Medium Availability of additional data, however, resourcing may be required to complete more complex lifecycle modelling and analysis

3.7 Technical Levels of Service

Technical Levels of Service – To deliver the customer values, and impact the achieved Customer Levels of Service, are operational or technical measures of performance. These technical measures relate to the activities and allocation of resources to best achieve the desired customer outcomes and demonstrate effective performance.

Technical service measures are linked to the activities and annual budgets covering:

- **Acquisition** – the activities to provide a higher level of service (e.g. widening a road, replacing a sewer with a larger size) or a new service that did not exist previously (e.g. a new bridge).
- **Operation** – the regular activities to provide services (e.g. bridge washing, winter and summer road operations, inspections, etc.)
- **Maintenance** – the activities necessary to retain an asset as near as practicable to an appropriate service condition. Maintenance activities enable an asset to provide service for its planned life (e.g. road patching, shoulder grading, structure repairs).
- **Renewal** – the activities that return the service capability of an asset up to that which it had originally provided (e.g. road resurfacing and pavement reconstruction, sewer replacement and structure rehabilitation or replacement),

Service and asset managers plan, implement and control technical service levels to influence the service outcomes.[3]

[3] IPWEA, 2015, IIMM, p 2|28.

Table 3.6 shows the activities expected to be provided under the current 10 year Planned Budget allocation, and the Forecast activity requirements being recommended in this AM Plan.

Table 3.6.1: Technical Levels of Service- Roads

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
Acquisition	Road widening/addition of lanes	Km/yr based on 10 year plan	0-1km/yr	1-5km/yr
	Intersection improvements	Studies completed (TMP, EAs); design and construction	1 intersection per year or every other year (constructed)	1 intersection per year (constructed)
		Budget* **	***$1,412,750***	***$2,933,600***
Operation	Clean/sweeping	Frequency of sweeping program and debris/roadkill pickup	Currently sweep once a year in the spring; debris/roadkill is picked up as required	Sweep twice a year minimum; continue with debris/roadkill pickup as required.
		Meet MMS Road Patrol requirements	Weekly MMS patrol generally completed in each Patrol Area	Meet weekly MMS patrol in each Patrol Area ensuring sufficient time available to capture all required deficiencies/areas of concerns, etc.
	Winter Operations	Meet MMS Winter Operations requirements	Winter operations meet or exceed MMS in each Patrol Area (varies depending on winter events)	Meet or exceed MMS for winter operations in each Patrol areas (varies depending on winter events)
	Pavement Condition Surveys	Meet best practice for biennial inspections	Conduct biennial pavement condition surveys by in-house staff; Average PCI is 84	Conduct biennial pavement condition surveys through combination of in-house and consultants
		Budget* **	***$3,314,626***	***$3,419,050***
Maintenance	Crack Sealing	Linear meters	70,000m	100,000m

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
	Microsurfacing	Km/yr	10-15km/yr	18-20km/yr (completed at year 10 and 33 of the 45 year lifecycle)
	Cold patching	MMS	Cold patching is currently completed on an as required basis and when resources are available to meet MMS	Continue to complete in order to meet MMS
	Shouldering/ Grading	MMS	Shoulder grading is completed based on priority and complaints	All shoulders are graded and topped with gravel annually
	Asphalt Padding	m/yr	Completed as needed annually based on observed areas of concern and available funding – approximately 300m/yr	Completed as needed annually based on observed areas of concern and available funding– approximately 300m/yr
	Pavement Marking Re-application	Complete annually	Re-apply all pavement markings on County roads annually	Re-apply all pavement markings on County roads annually and consider thermoplastic paint for symbols
		Budget* **	***$1,866,317***	***$2,083,732***
Renewal	Paving	Km/yr	13.5km/yr (average)	18km/yr
	Surface Treatment	Km/yr	10-15km/yr completed	20km/yr
		Budget* **	***$7,775,684***	***$12,984,724***

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
Disposal	Download of road sections	Download CR31, CR33, CR29 East to respective local municipality	Roads have been identified in Transportation Master Plan (TMP) for potential download to local municipalities	Discussions to outline terms and download of all identified road sections to respective local municipality
		Budget* **	***$0***	***TBD - Further discussion required***

Note: * Current activities related to Planned Budget.

** Expected performance related to forecast lifecycle costs, engineering estimates, and professional judgement.

*** Average per year based on 10 year planning period, unless otherwise noted.

Table 3.6.2: Technical Levels of Service- Structures

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
Acquisition	New or upgrade	Number of new bridges planned	There is one new bridge planned in the Municipality of Trent Hills within the first 10 year planning period. Construction is to commence in 2025. Two additional grade separations have been identified through other studies.	Planned construction of new Campbellford bridge. County Road 20 grade separation in 2036/2037 and County Road 64 grade separation in year 2040/2041 with an estimated cost of $25,000,000 each.
		Budget* **	***$1,847,500***	***$1,847,500***
Operation	Vegetation removal	Brushing within County ROW for bridge identified.	Completed on an as needed basis and as identified in OSIM inspections. Not all recommended vegetation removal has been completed.	Complete all recommended vegetation removal each year for all structures identified in the OSIM inspection reports.
	Bridge Washing	Washing of all bridges and retaining walls annually	Washing some structures based on priority and available resources	Wash all bridges and retaining walls annually
	OSIMs	Conduct biennial OSIM inspections on all structures	Completed biennially by consultant; Average BCI is 70	Complete biennially by consultant
		Budget* **	***$44,146***	***$118,257***
Maintenance	Minor Repairs	Minor concrete surface repairs completed on all structures at appropriate times within lifecycle	Some minor repair work completed on priority basis or incorporated into larger rehabilitation work	Complete all identified minor repair work within identified lifecycle
		Budget* **	***$21,899***	***$120,447***

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
Renewal	TMP Implementation, EA studies and 10 year capital planning implementation	Minor and Major Rehabilitation and Replacement completed at appropriate times within lifecycle	Average 1 bridge rehabilitation a year	1-2 structure rehabilitations/replacements a year
		Budget*	***$2,898,539***	***$3,193,483***
Disposal	Download of two (2) bridges not within County jurisdiction	Download of Loomis Bridge and Thompson Bridge	Replacement and disposal of Thompson Bridge and Loomis Bridge to the local municipalities.	Replacement and disposal of Loomis Bridge and Thompson Bridge to the local municipalities
	Download of five (5) additional structures not within County jurisdiction	Download of seven (5) bridges not on County Roads to their respective local municipality.	Structures have been identified for potential download to local municipalities.	Discussions to outline terms and download of all identified structures to respective local municipality
		Budget*	***$2,700,000 (Total replacement cost of Loomis Bridge and Thompson Bridge)***	***TBD – Further discussion required***

Note: * Current activities related to Planned Budget.

** Expected performance related to forecast lifecycle costs, engineering estimates and professional judgement.

*** Average per year based on 10 year planning period, unless otherwise noted.

Table 3.6.3: Technical Levels of Service- Storm Sewer

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
Acquisition	New or upgraded storm sewers identified through development proposals and/or EA's or studies	Total number of m/year that is installed or upgraded.	0-50m/year (varies)	0-50m/year depending on growth and development.
		Budget* **	***$154,750***	***$803,625***
Operation	Storm structure inspection and cleaning	Number of catch basins cleaned each year	Storm structures are cleaned annually on priority basis and available budget.	Ensure all storm structures are cleaned annually.
	Storm sewer flushing and CCTV inspection	Number of locations each year.	Select storm sewers are flushed and camera inspection completed in preparation for design/construction or as required.	Maintain practice which will require an increase each year based on need
		Budget* **	***$25,184***	***$136,872***
Maintenance	Storm Structure internal repairs	Number of structures repaired each year	Completed on an as required basis	Maintain current practice being proactive during other road works when possible.
	Storm Frame and Grade/Surface Repairs	Number of structures repaired each year	Complete on as required basis	Maintain current practice being proactive during other road works when possible
	Storm sewer spot repairs	Metres/year	Complete as required/incorporate into planned construction projects	Maintain current practice being proactive during other road works when possible
		Budget* **	***$19,821***	***$125,922***

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
Renewal	Storm sewer replacement	Total number of m/year that is replaced	Replacement completed as part of road rehab projects, as required (0-50m)	Complete replacement as needed during road construction or as identified through additional condition studies.
	Storm structure replacement	Total number of structures replaced each year	Replacement completed as part of road rehab projects, as required	Complete replacement as needed during road construction or as identified through additional condition studies.
		Budget* **	***$219,274***	***$1,019,322***
Disposal	Download of storm sewer to local municipality	Download of 1.2km of storm sewer on CR31 to local municipality.	Storm sewer has been identified for potential download to local municipality.	Discussions to outline terms and download of all identified storm sewer to respective local municipality
		Budget* **	***$0***	***TBD – Further discussion required***

Note: * Current activities related to Planned Budget.

** Expected performance related to forecast lifecycle costs, engineering estimates and professional judgement.

*** Average per year based on 10 year planning period, unless otherwise noted.

It is important to monitor the service levels regularly as circumstances can and do change. Current performance is based on existing resource provision and work efficiencies. It is acknowledged changing circumstances such as technology and customer priorities will change over time.

4.0 FUTURE DEMAND

4.1 Demand Drivers

Drivers affecting demand include things such as population change, regulations, changes in demographics, seasonal factors, vehicle ownership rates, consumer preferences and expectations, technological changes, economic factors, agricultural practices, environmental awareness, etc.

4.2 Demand Forecasts

The present position and projections for demand drivers that may impact future service delivery and use of assets have been identified and documented.

4.3 Demand Impact and Demand Management Plan

The impact of demand drivers that may affect future service delivery and use of assets are shown in Table 4.3.

Demand for new services will be managed through a combination of managing existing assets, upgrading of existing assets and providing new assets to meet demand and demand management. Demand management practices can include non-asset solutions, insuring against risks and managing failures.

Opportunities identified to date for demand management are shown in Table 4.3. Further opportunities will be developed in future revisions of this AM Plan and climate change is addressed in Section 4.5.

Table 4.3: Demand Management Plan

Demand driver	Current position	Projection	Impact on services	Demand Management Plan
Population Change	Current population is 89,365 (Statistics Canada, 2021 Census Data), an increase of 4.4% since 2016.	Increase to 122,000 by 2051 (current Provincial Forecasts)	An increase in the population is expected to increase traffic volumes on the County's transportation infrastructure, particularly in urban areas. There may also be an increased need for urbanization of areas or upgrades to existing assets to meet demands.	Transportation Master Plan, County Road 2 EA and other development proposals identify areas for expansion; continued inspections to determine capacity and function and future design/rehabilitation should consider increased traffic volumes.

Demand driver	Current position	Projection	Impact on services	Demand Management Plan
Economic Development	The majority of businesses are located in the urban areas with the exception of some large-scale agricultural operations in the rural areas; Highway 407 service expansion underway.	Further development in the urban areas, as well as increased/expanded large-scale agricultural operations; access to Highway 407 will be in close proximity to Northumberland County.	Future developments may increase the volume of traffic and size/type of vehicles (i.e. agricultural machinery, grain trucks etc) on the County's road network and associated structures.	Transportation Master Plan included preliminary study; additional studies as required; Continued inspections to determine capacity and function; future design/rehabilitation should consider increase traffic volumes and various vehicle types.
Active Transportation	Northumberland County is marketed as a tourist destination for cyclists and has a Cycling Master Plan with 5 designated cycling routes. The County has been paving 1.5m shoulders since 2010.	Increase in active transportation (i.e. cycling) in Northumberland County.	Increased demand for on and off-road cycling lanes and/or smooth surfaces on county roads and structures.	Pave 1.5m shoulders on County Roads up for renewal; Cycling Master Plan in place with 5 cycling routes; Studies; Future rehab/design consider active transportation and tourism.
Changing Technology	Typically, traditional vehicles with the presence of some electric and/or autonomous vehicles.	More autonomous vehicles and/or electric vehicles travelling on roadways.	May impact future design of roads and structures to accommodate new types of vehicles.	Future design and rehabilitation will consider this changing technology and any necessary safety elements to accommodate the mix of traditional vs. electric vehicles.

4.4 Asset Programs to meet Demand

The new assets required to meet demand may be acquired, donated or constructed. Additional assets are discussed in Section 5.5.

Acquiring new assets will commit the County to ongoing operations, maintenance and renewal costs for the period that the service provided from the assets is required. These future costs are identified and considered in developing forecasts of future operations, maintenance and renewal costs for inclusion in the long-term financial plan (Refer to Section 5).

4.5 Climate Change Adaptation

The impacts of climate change may have a significant impact on the assets we manage and the services they provide. In the context of the Asset Management Planning process climate change can be considered as both a future demand and a risk.

How climate change impacts assets will vary depending on the location and the type of services provided, as will the way in which we respond and manage those impacts.[4]

As a minimum we consider how to manage our existing assets given potential climate change impacts for our region.

Risk and opportunities identified to date are shown in Table 4.5.1

[4] IPWEA Practice Note 12.1 Climate Change Impacts on the Useful Life of Infrastructure

Table 4.5.1 Managing the Impact of Climate Change on Assets and Services

Climate Change Description	Projected Change	Potential Impact on Assets and Services	Management
Increasing temperatures and more frequent temperature fluctuations between hot and cold	Summer temperatures are expected to be hotter with more extreme heat days and winter temperatures are also rising.	Deteriorating asset condition due to increasing temperatures and increasing frequency of rapid temperature fluctuations between hot and cold, road conditions due to snow falling as ice in winter months, and increased number of potholes during winter and spring.	Modify winter maintenance activities to meet conditions including de-icing activities to address warmer and fluctuating temperatures throughout the winter months. Review and implementation of various rehabilitation methods and materials that are more resilient to fluctuating temperatures. Ensuring adequate resources to address potholes and padding.
Heavy Precipitation Days	Increase in the number of heavy precipitation days falling as rain, freezing rain and/or snow.	Heavy precipitation events can create many challenges, including flooding, erosion/washouts, potholes, road closures and/or reduced driving conditions.	Modify operations and maintenance activities to meet needs including catch basin cleaning, culvert steaming/flushing, pothole and shoulder repair and set up detour routes as required. Ensure adequate stormwater management for renewal, upgrade/new and new developments meet stormwater guidelines for all storm events
Intense storms	Increased frequency and intensity of storms resulting in high winds and severe weather.	Damage to assets, road closures due to debris and/or accidents.	Setup detour routes, vegetation management to reduce likelihood of trees damaging assets.

Additionally, the way in which we construct new assets should recognize that there is opportunity to build in resilience to climate change impacts. Building resilience can have the following benefits:

- Assets will withstand the impacts of climate change;
- Services can be sustained; and
- Assets that can endure may potentially lower the lifecycle cost and reduce their carbon footprint

The County is currently finalizing a Greenhouse Gas (GHG) Emissions Reduction Plan which is expected to recommend the development of a Climate Adaptation and Resilience Plan. As a result, strategies for building resilience to climate change will be established through these recommendations and included in future revisions of this Asset Management Plan.

5.0 LIFECYCLE MANAGEMENT PLAN

The lifecycle management plan details how the County plans to manage and operate the assets at the agreed levels of service (Refer to Section 3) while managing life cycle costs.

5.1 Background Data

5.1.1 Physical parameters

The assets covered by this AM Plan are shown in Table 5.1.1.

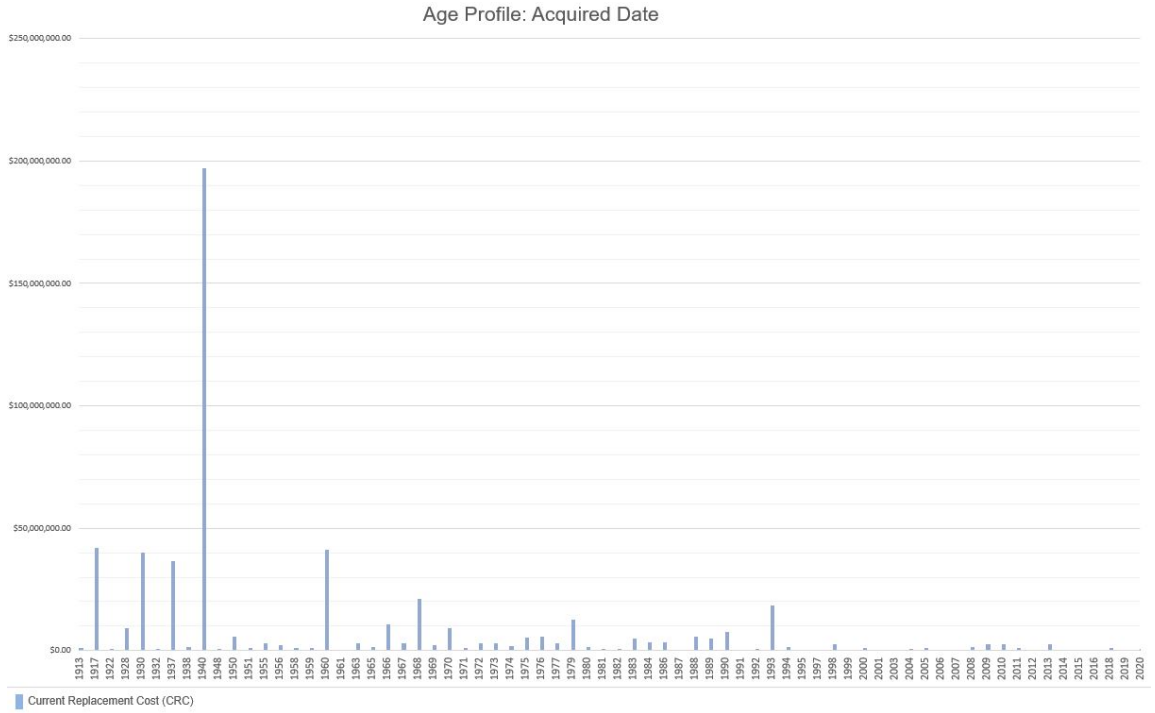
These assets include the core assets including roads, structures (bridges and culverts with a greater than 3 m span and retaining walls), and storm sewer.

The age profile of the assets included in this AM Plan are shown in Figure 5.1.1 and Figure 5.1.2.

Table 5.1.1: Assets covered by this Plan

Asset Category	Dimension	Replacement Value
Road network	32 km paved urban road 371 km paved rural road 95 km surface treated road	$686,268,516
Structures	48 Bridges 68 Culverts 20 Retaining walls	$141,325,060
Storm Sewer	1184 Structures 32.5 km of pipe	$59,427,443
TOTAL		**$887,021,019**

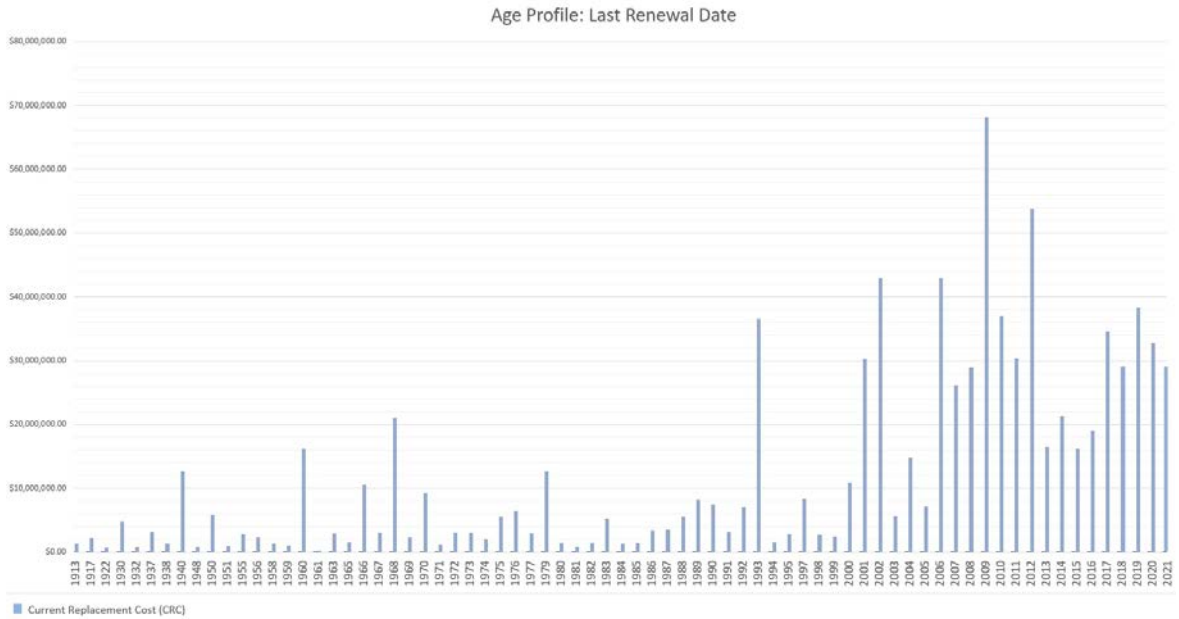
Figure 5.1.1: Asset Age Profile – Acquired Date



All figure values are shown in 2022 dollars.

Figure 5.1.1 above illustrates the date acquired for the core assets covered in this plan. Due to the lack of reliable information available, these dates were assumed for many assets and explains the significant spike in 1940. This would indicate that the majority of assets would have reached the end of their useful life and are in need of replacement. This is not a true representation of the state of assets and, as a result, the last renewal date was determined to be a more accurate portrayal of our asset age in relation to their respective lifecycle model. The revised age profile using the last renewal date is shown in Figure 5.1.2 below.

Figure 5.1.2: Asset Age Profile – Last Renewal Date



All figure values are shown in 2022 dollars.

It is evident through the figure above that there are clear peaks prior to 1970 and again in 1993 for many assets, leading us to believe that they have reached the end of their useful life or will be approaching the end of their useful life in the near future. This will undoubtedly add to the renewal expenditures required. In addition, there are significant peaks from the early 2000's to 2021 indicating past investments in assets that will be requiring renewal or maintenance activities (i.e. pavement preservation, minor repairs) in the coming years.

5.1.2 Asset capacity and performance

Assets are generally provided to meet design standards where these are available. However, there is insufficient resources to address all known deficiencies. Locations where deficiencies in service performance are known are detailed in Table 5.1.2.

Table 5.1.2: Known Service Performance Deficiencies

Location	Service Deficiency
Road Surface renewal – various roads throughout County	Significant budget cuts in the 1990's resulted in decreased expenditures on road resurfacing which led to road deterioration. In recent years, funding has increased to a point where repaving is occurring at a rate of once every 29 years with minimal preservation (i.e., Crack sealing, microsurfacing). Our Level of Service (LOS) target based on a 45-year lifecycle includes resurfacing at approximately year 23 and full reconstruction at year 45.
Road - Maintenance and Operation Activities	Annual maintenance (i.e. pavement preservation) and operational (i.e. sweeping) activities are underfunded and generally dealt with in a reactive manner. Our LOS target based on a 45-year lifecycle includes microsurfacing at approximately year 10 and 33 and crack sealing at approximately year 6, 16, 29 and 39 before full reconstruction at year 45.
Structures – Maintenance and Operation Activities	Annual maintenance (i.e. minor repairs) and operational (i.e. bridge washing and vegetation removal) activities are underfunded and generally dealt with in a reactive manner. All identified minor repair work and vegetation removal from the OSIM inspections should be completed within the lifecycle and all structures should be washed/cleaned annually.
Thompson and Loomis Bridge	Bridges currently closed with planned replacement in 2022 and 2023.
Various Structures throughout the County	Upgrades required to meet geometric standards or increased capacity (i.e., single lane to double) are reviewed at time of renewal, however, not always required to meet current needs or able to be completed based on funding. The annual maintenance and operational activities are generally underfunded and 1-2 structures should be rehabilitated/replaced each year, however current funding generally allows for 1 structure to be completed annually
Storm Sewer – Maintenance and Operations Activities	Annual maintenance (i.e. repairs) and operational (cleaning/flushing) activities are generally underfunded and completed in a reactive manner based on complaints and/or road patrol inspections. A thorough condition assessment should be completed to better understand condition and prioritize maintenance, operational and renewal works more effectively.

The above service deficiencies were identified from road (PCI) and structure (BCI) condition surveys, data analysis, and available historical data.

5.1.3 Asset condition

Road and structure conditions are monitored biennially using industry standard technical inspections. Pavement Condition Index (PCI) surveys, based on a standard developed by the Ontario Good Roads Association (OGRA), are completed by County staff for all County roads providing a rating of the road based on visual defects and the rideability of the road surface. Structure condition is assessed through Ontario Structure Inspection Manual (OSIM) inspections completed by retained consultants, providing an overall Bridge Condition Index (BCI) rating. Storm sewers are not currently monitored in a formal way.

It is important that a consistent approach is used in reporting asset performance enabling effective decision support. A finer grading system may be used at a more specific level, however, for reporting in the AM plan results are translated to a 1 – 5 grading scale for ease of communication. Road condition is measured using a 1 – 5 grading system[5] as detailed in Table 5.1.3.

The BCI is calculated in accordance with the method outlined in the Ontario Structures Inspection Manual (OSIM) and is completed during biennial inspections. The BCI was used to model bridge condition in a 1-3 grading system as detailed in Table 5.1.4. The OSIM inspections are a high level visual inspection completed on the structures and does not always identify the true needs of the structure. Additional investigation and studies are required to better understand the needs through deck condition surveys, detailed conditions surveys, etc.

Table 5.1.3: Condition Grading System for Roads

Condition Grading	Description of Condition	Pavement Condition Index (PCI)
1	**Very Good/Adequate**: free of defects, only planned and/or routine maintenance required	**85-100**
2	**Good/rehabilitation in 6-10 years**: minor defects, increasing maintenance required plus planned maintenance	**75-84**
3	**Fair/rehabilitation in 1-5 years**: defects requiring regular and/or significant maintenance to reinstate service	**61-74**
4	**Poor/Now Rehabilitate**: significant defects, significant renewal/rehabilitation required	**55-60**
5	**Very Poor/Now Reconstruct**: physically unsound and/or beyond rehabilitation, immediate action required	**<55**

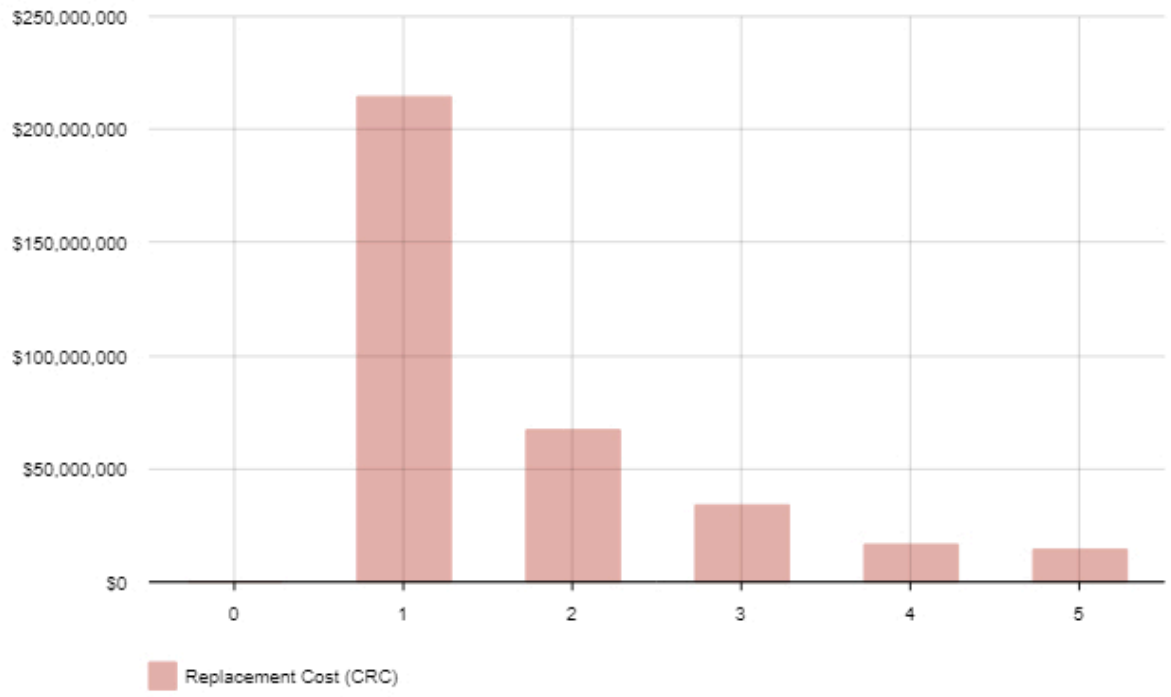
[5] IPWEA, 2015, IIMM, Sec 2.5.4, p 2|80.

Table 5.1.4: Condition Grading System for Structures

Condition Grading	Description of Condition	Bridge Condition Index (BCI)
1	**Good**: minor maintenance required	**70-100**
2	**Fair**: maintenance/rehabilitation usually required within 1-5 years	**60-69**
3	**Poor:** significant maintenance required within next year	**<60**

The condition profile of our assets is shown in Figures 5.1.3 and 5.1.4.

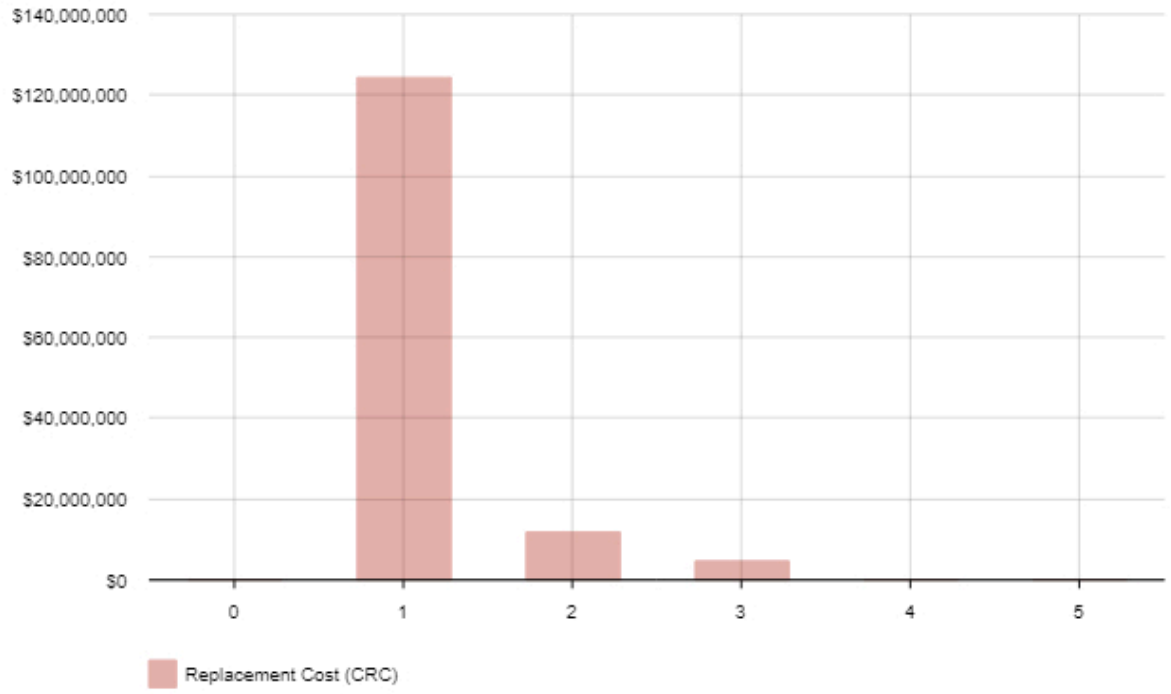
Figure 5.1.3: Asset Condition Profile - Roads



All figure values are shown in 2022 dollars.

The desirable target for system adequacy is 70% and it is presently at 54% which is a decrease from the 2018 adequacy of 63%. However, this percentage reflects a shift in some of the adequate roads to fair (rehabilitate in 6-10 year) roads and aligns with the increase in pavement preservation to target road in the 6-10 year range and increase the life expectancy. There has also been a substantial reduction in 'Now rehabilitate' roads from 17% in 2014 to 5% in 2020 as these road sections have been priority in the capital plan over the past 5 years, which reduces high maintenance and operations costs and puts this category close to what should be targeted to reduce maintenance costs while still achieving full life expectancy.

Figure 5.1.4: Asset Condition Profile - Structures



All figure values are shown in 2022 dollars.

There are 45 major structures, 64 culverts with a span greater than 3.0 meters, and 20 retaining walls. Generally, the expected lifespan of a structure can range from 50 to 75 years. The age of the County's bridges range from 12 to 99 years old (built between 1922 and 2010), with 92% of the bridges aged 35 years or older as of 2021. There is a significant need to ensure the integrity of these structures due to the continued aging of the infrastructure and the growing number of structures that require repairs.

The OSIMs provide a very high level visual inspection and calculated condition rating (BCI) that does not always reflect the actual needs of the structures. Despite 76% of the structures being classified in 'Good' condition, there are 10 major rehabilitation and 13 replacements identified in the 10-year plan based on the 2020 OSIM inspections. The majority of all other structures are also identified for some form of repair or maintenance and, at the very least, require ongoing preventative care through bridge washing and inspections.

The condition of our storm sewer assets has not been formally assessed and a thorough condition assessment will be carried out in the future to determine current condition, renewal and/or replacement requirements.

5.2 Operations and Maintenance Plan

Operations include regular activities to provide services. Examples of typical operational activities include bridge washing, street sweeping, and asset inspection.

Maintenance includes all actions necessary for retaining an asset as near as practicable to an appropriate service condition including regular ongoing day-to-day work necessary to keep

assets operating. Examples of typical maintenance activities include storm sewer repairs, asphalt patching, crack sealing and microsurfacing.

The trend in maintenance budgets are shown in Table 5.2.1.

Table 5.2.1: Maintenance Budget Trends

Year	Maintenance Budget $
2021	$1,808,897
2022	$1,627,776
2023	$1,396,931

Maintenance budget levels are considered to be inadequate to meet current and projected service levels and the decreasing trend can be attributed to the need for funds from pavement preservation to be allocated to various other capital projects. Where maintenance budget allocations are such that they will result in a lesser level of service, the service consequences and service risks have been identified and are highlighted in this AM Plan and service risks considered in the Infrastructure Risk Management Plan.

Assessment and priority of reactive maintenance is undertaken by staff using experience and judgement of severity and risks associated in relation to the available budget.

Asset hierarchy

An asset hierarchy provides a framework for structuring data in an information system to assist in collection of data, reporting information and making decisions. The hierarchy includes the asset class and component used for asset planning and financial reporting and service level hierarchy used for service planning and delivery.

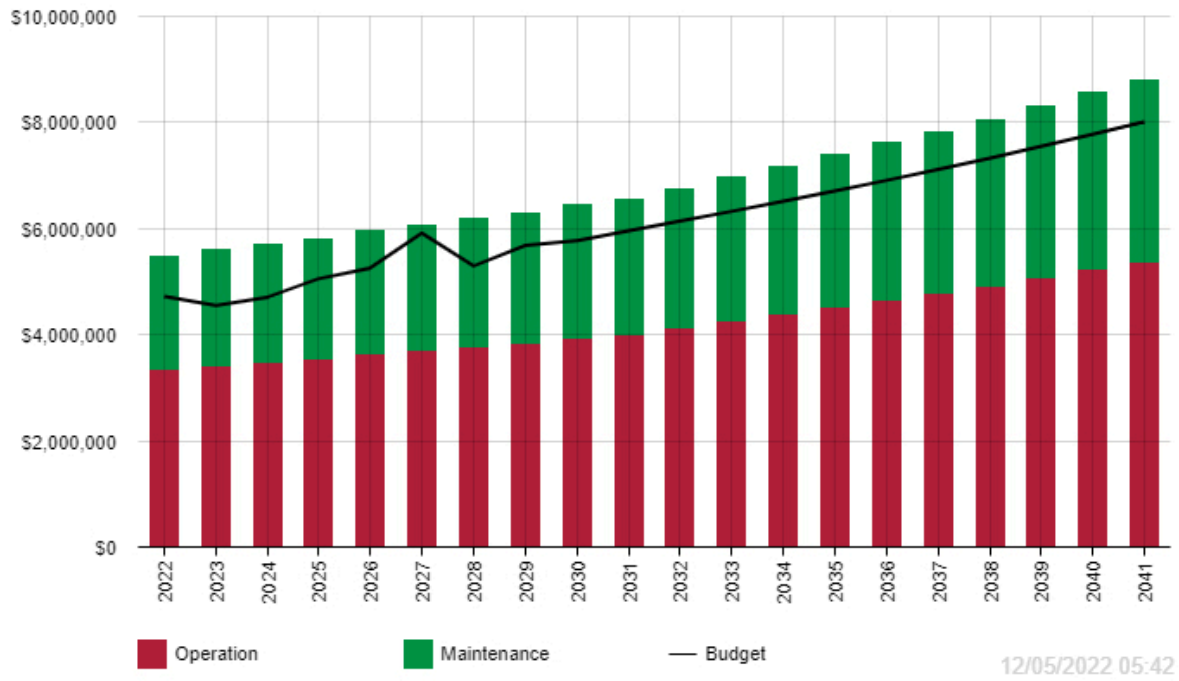
The County does not currently have a formal hierarchy framework in place however, several factors are considered when making decisions related to service planning and delivery of core assets. Information provided from biennial inspections, road class and Emergency Detour Routes (EDR) are key components that are evaluated. Social and political feedback, as well as development pressures, are also taken into consideration.

Additionally, legislative requirements impact the delivery of these core asset groups and outline the responsibility of the County to complete the required maintenance and operations work.

Summary of forecast operations and maintenance costs

Forecast operations and maintenance costs are expected to vary in relation to the total value of the asset stock. If additional assets are acquired, the future operations and maintenance costs are forecasted to increase. If assets are disposed of the forecast operation and maintenance costs are expected to decrease. Figure 5.2 shows the forecast operations and maintenance costs relative to the proposed operations and maintenance Planned Budget.

Figure 5.2: Operations and Maintenance Summary



All figure values are shown in 2022 dollars.

The current and future operations and maintenance forecasts are not within the current annual and forecasted budgets. The County operates and maintains the County Road network to ensure compliance with O.Reg. 239/02 Minimum Maintenance Standards (MMS) and completes biennial road and bridge inspections. The operational and maintenance activities are prioritized based on the criticality of the asset and balancing the legislative requirements and user needs and expectations. It is critical to meet the required operational and maintenance needs to extend service lives and to reduce lifecycle costs.

It is clear from the above figure that the planned budget does not meet all operations and maintenance requirements, with a shortfall of $712,286 on average per year over the period 2022-2031. As a result, some works will need to be deferred. Deferred maintenance refers to identified maintenance activities that are unable to be completed due to a lack available funding. The risk associated with deferring works is addressed in Section 6.0 of this plan.

5.3 Renewal Plan

Renewal is major capital work which does not significantly alter the original service provided by the asset, but restores, rehabilitates, replaces, or renews an existing asset to its original service potential. Work over and above restoring an asset to original service potential is considered to be an acquisition resulting in additional future operations and maintenance costs.

Assets requiring renewal are identified from one of two approaches in the Lifecycle Model.

- The first method uses Asset Register data to project the renewal costs (current replacement cost) and renewal timing (acquisition year plus updated useful life to determine the renewal year), or
- The second method uses an alternative approach to estimate the timing and cost of forecast renewal work (i.e. condition modelling system, staff judgement, average network renewals, or other).

The typical useful lives of assets used to develop projected asset renewal forecasts are shown in Table 5.3. Asset useful lives were last reviewed through the development of this plan.

Table 5.3: Useful Lives of Assets

	Asset (Sub)Category	Useful life
Roads	Asphalt	45 Years
	Surface Treated	20 Years
Structures	Bridges	75 Years
	Culverts over 3m	50 Years
	Retaining Walls	25 Years
Storm Sewer	Structure	60 or 80 Years (dependent on material)
	Pipe	60 or 80 Years (dependent on material)

The estimates for renewals in this AM Plan were based on the Alternate Method.

5.3.1 Renewal ranking criteria

Asset renewal is typically undertaken to either:

- Ensure the reliability of the existing infrastructure to deliver the service it was constructed to facilitate (e.g. replacing a bridge that has a 5 t load limit), or
- To ensure the infrastructure is of sufficient quality to meet the service requirements (e.g. condition of a road).[6]

It is possible to prioritize renewals by identifying assets or asset groups that:

- Have a high consequence of failure,
- Have high use and subsequent impact on users would be significant,
- Have higher than expected operational or maintenance costs, and

[6] IPWEA, 2015, IIMM, Sec 3.4.4, p 3|91.

- Have potential to reduce life cycle costs by replacement with a modern equivalent asset that would provide the equivalent service.[7]

Currently, the County does not have a formal ranking criteria to determine priority of identified renewal and replacement proposals for **roads** assets. However, information provided from the biennial Pavement Condition Index (PCI) inspections, emergency detour routes (EDR), average annual daily traffic counts, motor vehicle collision data, consultant recommendations, studies and staff knowledge are used to determine renewal and replacement schedules.

Similarly, due to the limited extent of **storm sewer** assets under County jurisdiction, there is no formal ranking criteria to determine renewal and replacement schedules. Storm sewer infrastructure is identified and examined through the road rehabilitation and design process to identify renewal needs.

A formal ranking criteria for **structures** has recently been implemented to account for various non-structural considerations to assist in prioritizing recommended renewal and replacement works. Bridge Sufficiency Index (BSI) values are assigned to all structures and are subtracted from the Bridge Condition Index (BCI) to give an adjusted BCI/Priority number during the bi-annual inspections. BSI factors and their assigned values are detailed in Table 5.3.1 below.

Table 5.3.1: Renewal and Replacement Priority Ranking Criteria for Structures

Criteria	Scoring Range	BSI Value
AADT	0-999	0
	1000-1999	1
	2000-2999	2
	3000-5999	3
	≥6000	4
Replacement Value (current geometry) ($000)	0-500	0
	500-1000	1
	1000-2000	1.5
	≥2000	2
Rehabilitation Cost (% of Replacement)	0-25%	0
	25-50%	1
	≥50%	2
Structure Load Posted	No	0

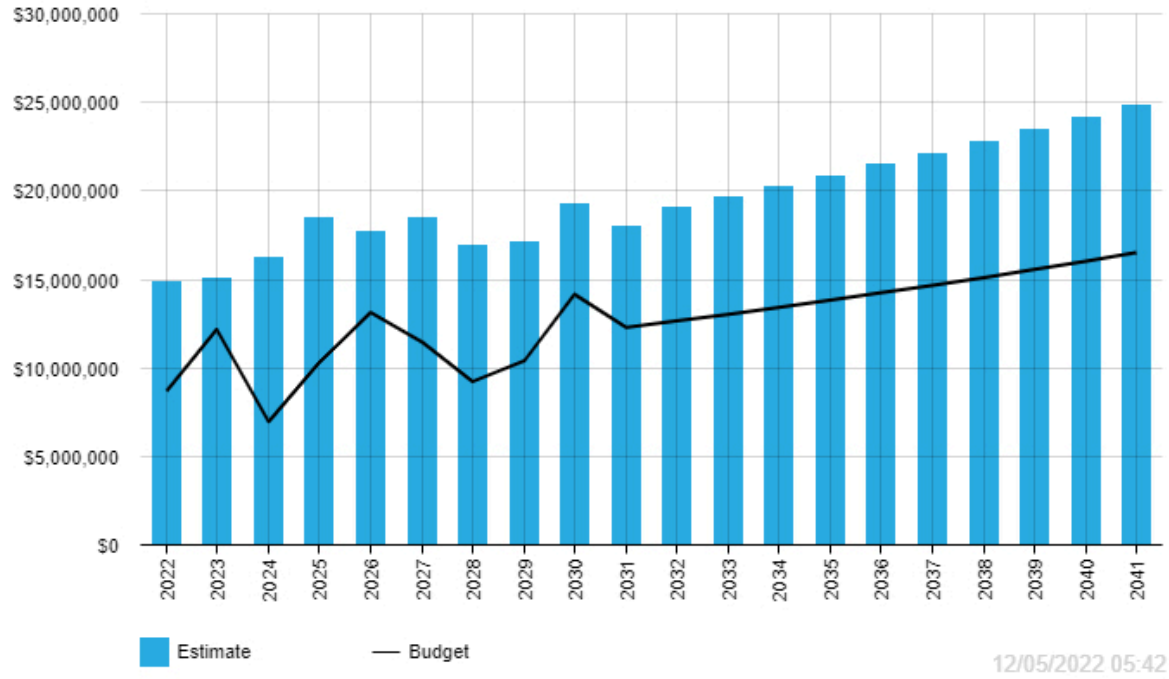
[7] Based on IPWEA, 2015, IIMM, Sec 3.4.5, p 3|97.

Criteria	Scoring Range	BSI Value
	Yes	1
Availability of Viable Detour	Viable Detour	0
	No Viable Detour	1
Structure on Emergency Detour Route (EDR)	Not on EDR	0
	On EDR	1
Utility Disruption Possible	Disruption not Possible	0
	Disruption Possible	1
Availability of Structural Redundancy	Redundancy Available	0
	No Redundancy Available	1
Original Construction Date	<50 years	0
	50-75 years	0.5
	>75 years or unknown	1

5.4 Summary of future renewal costs

Forecast renewal costs are projected to increase over time if the asset stock increases. The forecast costs associated with renewals are shown relative to the proposed renewal budget in Figure 5.4.1. A detailed summary of the forecast renewal costs is shown in Appendix C.

Figure 5.4.1: Forecast Renewal Costs



All figure values are shown in 2022 dollars.

The figure above demonstrates that the County's planned asset renewal investment strategies will not sustain the current levels of service and the forecasted renewal needs. Although there are some large renewal projects planned in 2023 (Thompson Bridge Replacement, Welcome intersection and storm sewer, numerous road rehabilitations), 2026 (CR28 rehabilitation, two culvert replacements) and 2030 (Warkworth Mill Bridge rehabilitation, CR30 and CR20 rehabilitation), overall, there is an average shortfall of $6,324,032 a year over the first 10-year period. The risks associated with deferring assets identified for renewal but not scheduled in the capital works program are addressed in Section 6.0 of this plan.

5.5 Acquisition Plan

Acquisition reflects are new assets that did not previously exist or works which will upgrade or improve an existing asset beyond its existing capacity. They may result from growth, demand, social or environmental needs. Assets may also be donated to the County.

5.5.1 Selection criteria

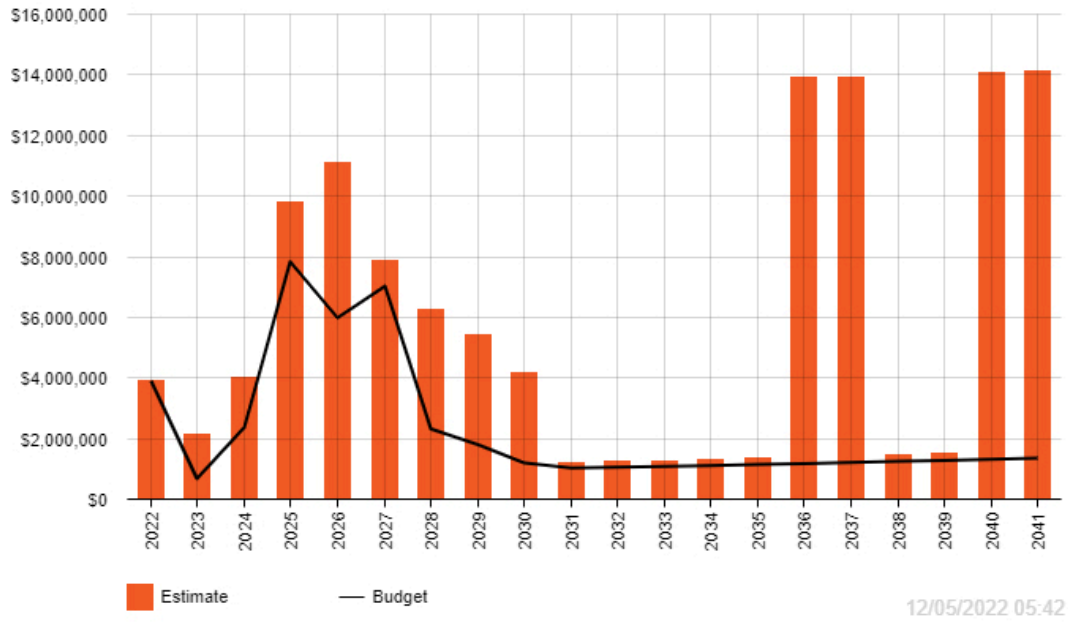
Proposed acquisition of new assets, and upgrade of existing assets, are identified from various sources such as community requests, proposals identified by strategic plans, Environmental Studies (EA's) or partnerships with others. Potential upgrade and new works should be reviewed to verify that they are essential to the County's needs. Proposed upgrade and new work analysis should also include the development of a preliminary renewal estimate to ensure that the services are sustainable over the longer term. Verified proposals can then be ranked by priority and available funds and scheduled in future works programs.

It is important to note that the County currently has a Countywide Development Charges by-law in place. These development charges assist in providing the infrastructure required by future development in the County through the establishment of a viable capital funding source to meet the County's financial requirements.

Summary of future asset acquisition costs

Forecast acquisition asset costs are summarized in Figure 5.5.1 and shown relative to the proposed acquisition budget. The forecast acquisition capital works program is shown in Appendix A.

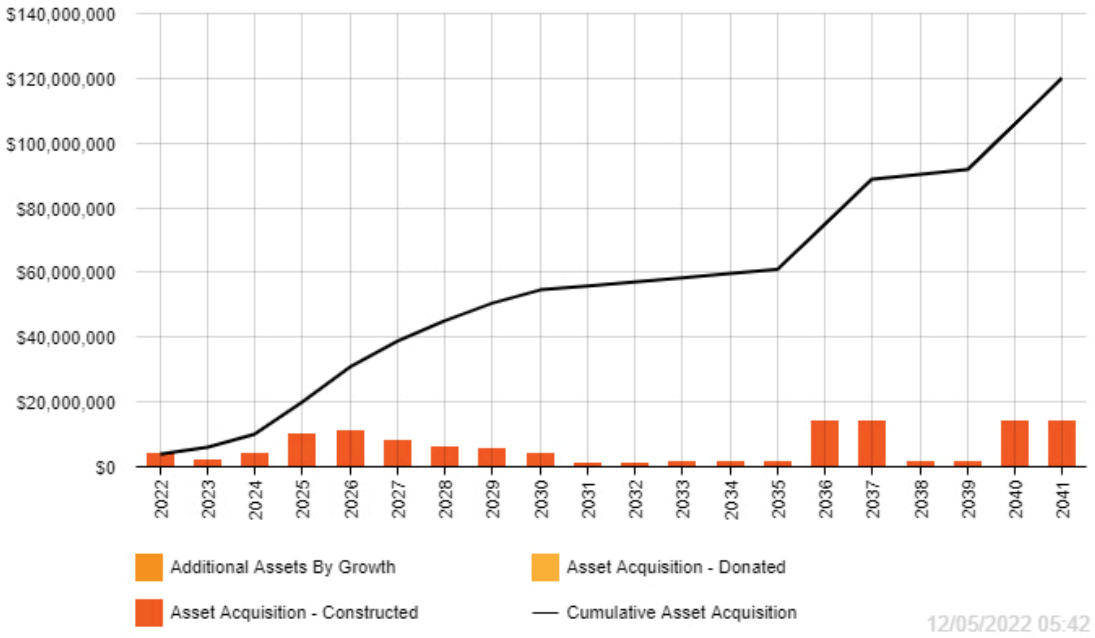
Figure 5.5.1: Acquisition (Constructed) Summary



All figure values are shown in 2022 dollars.

When an Entity commits to new assets, they must be prepared to fund future operations, maintenance, and renewal costs. They must also account for future depreciation when reviewing long term sustainability. When reviewing the long-term impacts of asset acquisition, it is useful to consider the cumulative value of the acquired assets being taken on by the Entity. The cumulative value of all acquisition work, including assets that are constructed and contributed shown in Figure 5.5.2.

Figure 5.5.2: Acquisition Summary



All figure values are shown in 2022 dollars.

Expenditure on new assets and services in the capital works program will be accommodated in the long-term financial plan, but only to the extent that there is available funding.

Planned acquisition over the 20 year planning horizon as depicted in Figure 5.5.2 includes the new bridge in Campbellford between 2025 and 2027, a new grade separation on County Road 20 (Brook Road) in 2036-2037 and a new grade separation on County Road 64 in 2040-2041. The new structures will address existing capacity and safety issues identified through previous studies. In addition to the capital costs for construction, this will add three new structures to the County's assets that will require on-going maintenance, operations and renewal activities and costs going forward.

5.6 Disposal Plan

Disposal includes any activity associated with the disposal of a decommissioned asset including sale, demolition or relocation. Assets identified for possible decommissioning and disposal are shown in Table 5.6. A summary of the disposal costs and estimated reductions in annual operations and maintenance of disposing of the assets are also outlined in Table 5.6. Any costs or revenue gained from asset disposals is included in the long-term financial plan.

Table 5.6: Assets Identified for Disposal

Asset	Reason for Disposal	Timing	Disposal Costs	Operations & Maintenance Annual Savings	Capital Expenditure Savings in next 10 years
Various roads (CR33, CR31, CR29 east)	Identified in TMP for potential transfer to member municipalities	2022 and beyond (as determined by Council)	TBD	$106,000	$735,000 (CR 31) $900,000 (CR 33)

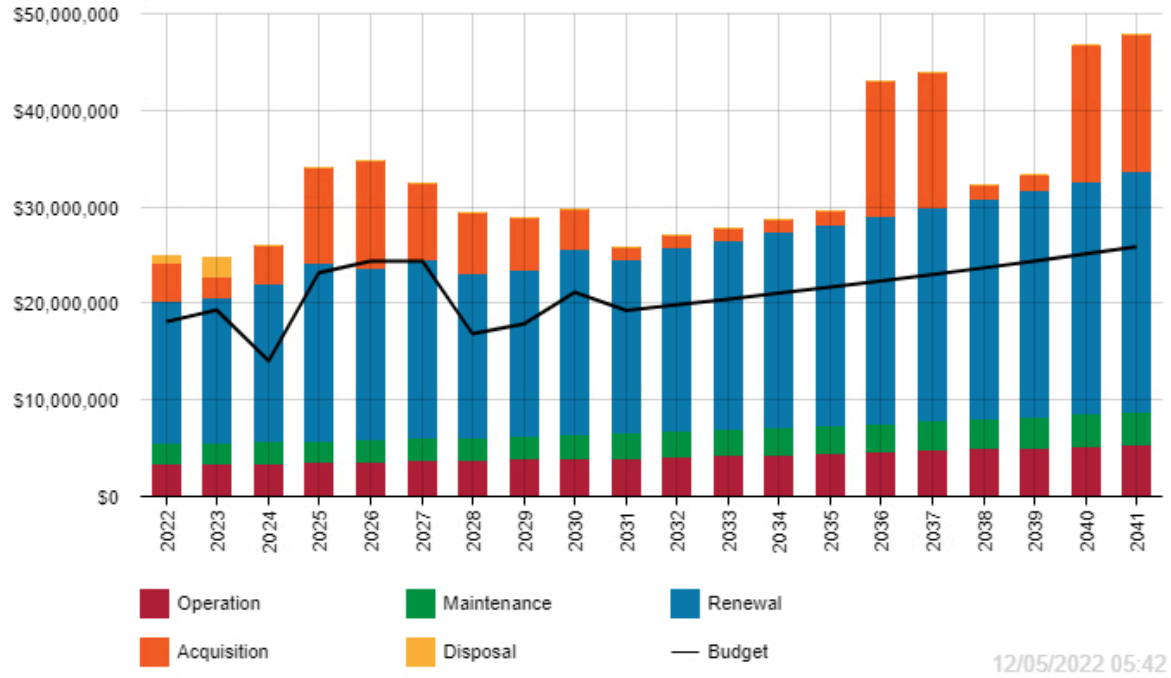
Asset	Reason for Disposal	Timing	Disposal Costs	Operations & Maintenance Annual Savings	Capital Expenditure Savings in next 10 years
Loomis Bridge and Thompson Bridge,	Structures not located on the County Road network and identified to be transferred to Municipality of Brighton and Municipality of Trent Hills through Council resolution 2021-11-17-789	2022 for Loomis Bridge and 2023 for Thompson Bridge	Approximately $800,000 for replacement of Loomis Bridge in 2022 prior to transfer and $1.9M for Thompson Bridge replacement before transfer in 2023	$2,000	$0
5 other Structures not on a County Road (Lakeport Bridge, Keogan Bridge, Wilson Island Bridge, Squires Creek Bridge, Allan Mills Bridge)	Structures not located on the County Road network	2022 and beyond (as determined by Council)	TBD	$5,000	$0
County Road 31 Storm Sewer	Road section with storm sewer identified in TMP for potential transfer to member municipality	2022 and beyond (as determined by Council)	TBD	$7,400	$651,986

5.7 Summary of asset forecast costs

The financial projections from this asset plan are shown in Figure 5.7.1. These projections include forecast costs for acquisition, operation, maintenance, renewal, and disposal. These forecast costs are shown relative to the proposed budget.

The bars in the graphs represent the forecast costs needed to minimize the life cycle costs associated with the service provision. The proposed budget line indicates the estimate of available funding. The gap between the forecast work and the proposed budget is the basis of the discussion on achieving balance between costs, levels of service and risk to achieve the best value outcome.

Figure 5.7.1: Lifecycle Summary



All figure values are shown in 2022 dollars.

The figure above illustrates that the County does not have sufficient funds in the budget, represented by the black line, to meet the forecasted needs over the planning period. Over the first 10 year planning period, there is a shortfall of $9,206,042 on average per year of the forecast lifecycle costs required to provide services in the AM Plan compared with the planned budget. The aging assets and addition of new assets acquired (i.e. Campbellford Bridge, two new grade separations) will further exacerbate this shortfall if maintenance, operations and renewal budgets are not adjusted to account for this. As a result, maintenance, operations, and renewal activities will continue to be deferred moving forward.

6.0 RISK MANAGEMENT PLANNING

The purpose of infrastructure risk management is to document the findings and recommendations resulting from the periodic identification, assessment and treatment of risks associated with providing services from infrastructure, using the fundamentals of International Standard ISO 31000:2018 Risk management – Principles and guidelines.

Risk Management is defined in ISO 31000:2018 as: 'coordinated activities to direct and control with regard to risk'[8].

An assessment of risks associated with service delivery will identify risks that will result in loss or reduction in service, personal injury, environmental impacts, a 'financial shock', reputational impacts, or other consequences. The risk assessment process identifies credible risks, the likelihood of the risk event occurring, and the consequences should the event occur. The risk assessment should also include the development of a risk rating, evaluation of the risks and development of a risk treatment plan for those risks that are deemed to be non-acceptable.

6.1 Critical Assets

Critical assets are defined as those which have a high consequence of failure causing significant loss or reduction of service. Critical assets have been identified and along with their typical failure mode, and the impact on service delivery, are summarized in Table 6.1. Failure modes may include physical failure, collapse or essential service interruption.

Table 6.1 Critical Assets

Critical Asset(s)	Failure Mode	Impact
Roads designated as 401 Emergency Detour Routes (EDR)	Closure or damage due to vehicle accident/fire, flooding or other natural disaster and/or poor condition.	The 401 runs through Northumberland County and is prone to closures, primarily in the winter months. Therefore, designated County roads provide an emergency detour route for vehicles during closures. A closure/damage to one of these County Roads would cause significant travel issues and congestion in nearby villages for vehicles being forced off the 401.
Class 2 Roads (CR18 from Cobourg to CR74; CR20 from CR18 to Division St)	Closure or damage due to vehicle accident/fire, flooding or other natural disaster and/or poor condition.	Negative impact on transportation of people/goods/services within and through the County.

[8] ISO 31000:2009, p 2

Critical Asset(s)	Failure Mode	Impact
Former MTO Highways (CR28, CR2, CR45, CR30)	Closure or damage due to vehicle accident/fire, flooding or other natural disaster and/or poor condition.	Negative impact on transportation of people/goods/services within and through the County.
County Road 9	Closure or damage due to vehicle accident/fire, flooding or other natural disaster and/or poor condition.	County Road 9 is a direct link to Highway 407 and acts as an east/west connection across the northern portion of Northumberland County. A closure of damage would have a negative impact on the transportation of people/goods/services within and through the County.
Any structures over the Trent River (Campbellford Bridge, Hastings Bridge, Trent River Bridge)	Bridge failure/collapse; closure due to poor condition	Several communities in Northumberland County are divided by the Trent Severn Waterway and are currently serviced by a structure. In the event of a closure or failure/collapse, there are limited detour routes ranging from 20-40 minutes available for residents, visitors, and emergency services. Many of these are also high tourist destinations during summer months and connect Northumberland County to Peterborough County and 'cottage country'.
Any structures over CNR/CPR Railway (CNR/CPR Bridge and CPR Bridge)	Bridge failure/collapse; closure due to poor condition	These structures are along highly travelled routes, providing direct connection for residents and goods between the Town of Cobourg and the Municipality of Port Hope and Township of Hamilton. In addition, the potential impacts of a bridge failure/collapse at these locations would have significant cost implications for CNR or CPR to close these high volume route(s).

Critical Asset(s)	Failure Mode	Impact
Any structures on designated EDR or Class 2 Roads (52 total)	Failure/collapse; closure due to poor condition	These structures are along highly travelled roads and a closure would directly affect the transportation of goods, services and residents of the County, inflicting detours and causing congestion.
Retaining walls within close proximity to a Class 2 or EDR Road (Baltimore Retaining Wall, CR45 Retaining Wall, CR20 Retaining Walls)	Collapse due to poor condition	A collapse of these retaining walls could result in significant damage to our County roads and/or road closures limiting travel in the County.
Storm sewers in urban areas (i.e. Baltimore, Brighton, Campbellford, Castleton, Cobourg, Colborne, Grafton, Warkworth)	Failure causing flooding and/or sinkholes due to poor condition or natural disaster	Significant property damage to surrounding properties; subsequent road closures possible.

By identifying critical assets and failure modes an organization can ensure that investigative activities, condition inspection programs, maintenance and capital expenditure plans are targeted at critical assets.

6.2 Risk Assessment

The risk management process used is shown in Figure 6.2 below.

It is an analysis and problem-solving technique designed to provide a logical process for the selection of treatment plans and management actions to protect the community against unacceptable risks.

The process is based on the fundamentals of International Standard ISO 31000:2018.

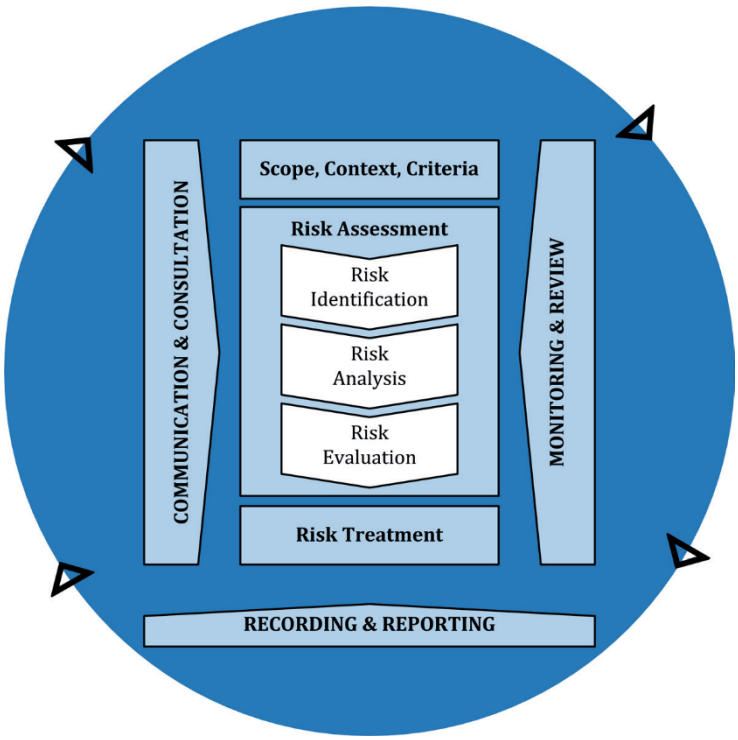


Fig 6.2 Risk Management Process – Abridged
Source: ISO 31000:2018, Figure 1, p9

The risk assessment process identifies credible risks, the likelihood of the risk event occurring, the consequences should the event occur, development of a risk rating, evaluation of the risk and development of a risk treatment plan for non-acceptable risks.

An assessment of risks associated with service delivery will identify risks that will result in loss or reduction in service, personal injury, environmental impacts, a 'financial shock', reputational impacts, or other consequences.

Critical risks are those assessed with 'Very High' (requiring immediate corrective action) and 'High' (requiring corrective action) risk ratings identified in the Infrastructure Risk Management Plan. The residual risk and treatment costs of implementing the selected treatment plan is shown in Table 6.2. It is essential that these critical risks and costs are reported to management and County Council.

Table 6.2: Risks and Treatment Plans

Service or Asset at Risk	What can Happen	Risk Rating (VH, H)	Current Risk Treatment Plan	Current Residual Risk	Preferred Risk Treatment Plan	Residual Risk *	Treatment Costs
Roads	Severe Flooding	VH	Reactive ditching and shouldering activities driven by complaints, road and storm sewer design for rehab projects in 10-year plan, some problem areas identified	M	Regular ditching and shouldering as defined in a program, road and storm sewer design and rehabilitation, identification of all problem areas	L	Staff and equipment time and/or contracted services
Roads	Road Closure	VH	Road patrols completed; detour routes determined on as needed basis	M	Plan for road closures or rerouting traffic, road patrols completed	M	Staff and equipment time
Roads	Poor condition, difficult travel and/or road closure due to premature failure of existing road	M	Reactive maintenance activities driven by complaints and/or what is prioritized in the 10-year plan	M	Proper maintenance and capital program that addresses all required works to meet service levels	L	Staff and equipment time; contracted services; capital paving budget

Service or Asset at Risk	What can Happen	Risk Rating (VH, H)	Current Risk Treatment Plan	Current Residual Risk	Preferred Risk Treatment Plan	Residual Risk *	Treatment Costs
Roads	Congestion	M	Few lane upgrades, road widening, and intersection improvements completed within 10-year plan, streetlight upgrades and timing changes, traffic impact studies as result of development	M	All lane upgrades, road widening, and intersection improvements completed, additional traffic impact studies completed, streetlight upgrades and timing changes	L	Capital budget costs for consultant and contracted services
Structure	Failure/ Collapse	H	Some repairs, maintenance and renewals as identified in OSIM inspections completed	M	Complete all priority repairs, maintenance and renewal as identified in OSIM inspections	L	Capital budget costs for consultant and contracted services
Structure	Load restrictions	H	Some repairs, maintenance and renewals as identified in OSIM inspections completed	M	Complete all priority repairs, maintenance and renewal as identified in OSIM inspections	L	Capital budget costs for consultant and contracted services

Service or Asset at Risk	What can Happen	Risk Rating (VH, H)	Current Risk Treatment Plan	Current Residual Risk	Preferred Risk Treatment Plan	Residual Risk *	Treatment Costs
Structure	Drivers veer off roadway	H	As structure is rehabilitated or replaced, new and appropriate guiderails are installed. High priority guiderail needs also identified and replaced as needed.	L	New and appropriate guiderails are installed on those structures identified through OSIM inspections	L	Capital budget costs for consultant and contracted services
Storm Sewer	Sinkhole	H	Reactive repairs completed as identified through road patrols and complaints, repairs/replacement addressed through road construction projects	M	Road patrol, condition assessment and repairs/replacement clearly identified and completed	L	Operational and Capital budget costs for consultant and contracted services
Storm Sewer	Severe Flooding	H	Reactive maintenance as identified through road patrols and complaints, rehabilitation and upgrades through road construction projects, annual catch basin cleaning	M	Prioritize maintenance, rehabilitation and upgrades based on condition assessment, complete catch basin cleaning/flushing	L	Contractor and/or consultant costs; staff and equipment time

Note * The residual risk is the risk remaining after the selected risk treatment plan is implemented.

6.3 Infrastructure Resilience Approach

The resilience of our critical infrastructure is vital to the ongoing provision of services to customers. To adapt to changing conditions we need to understand our capacity to 'withstand a given level of stress or demand', and to respond to possible disruptions to ensure continuity of service.

Resilience is built on aspects such as response and recovery planning, financial capacity, climate change risk assessment and crisis leadership.

We do not currently formally measure our resilience in service delivery. This will be included in future iterations of the AM Plan as further plans are developed.

6.4 Service and Risk Trade-Offs

The decisions made in adopting this AM Plan are based on the objective to achieve the optimum benefits from the available resources.

6.4.1 What we cannot do

There are some operations and maintenance activities and capital projects that are unable to be undertaken within the next 10 years. These include:

- Complete 12% of all recommended operations and maintenance activities within the first 10 years, including regular shouldering and granular top up, washing of all structures and all minor repairs identified.
- Complete 37% of renewal works required within the first 10 years to meet lifecycle demands
- Complete all upgrades/new to address future growth and/or congestion

6.4.2 Service trade-off

If there is forecast work (operations, maintenance, renewal, acquisition or disposal) that cannot be undertaken due to available resources, then this will result in service consequences for users. These service consequences include:

- Deterioration of assets and reduced life span
- Increased congestion where expansion cannot occur
- Failure of assets and use restrictions put in place (i.e. potholes, load restrictions, etc.)
- Flooding
- Decreased LOS

6.4.3 Risk trade-off

The operations and maintenance activities and capital projects that cannot be undertaken may sustain or create risk consequences. These risk consequences include:

- Deterioration of assets to point of rehab instead of regular maintenance and repair
- Potential loss of service and decreased life span of assets due to deterioration
- Public disappointment

- Potential increase in claims resulting from property damage (i.e. vehicle or land)
- Increased lifecycle costs for not completing timely repairs, maintenance, and rehabilitation

These actions and expenditures are considered and included in the forecast costs, and where developed, the Risk Management Plan.

7.0 FINANCIAL SUMMARY

This section contains the financial requirements resulting from the information presented in the previous sections of this AM Plan. The financial projections will be improved as the discussion on desired levels of service and asset performance matures.

7.1 Financial Sustainability and Projections

7.1.1 Sustainability of service delivery

There are two key indicators of sustainable service delivery that are considered in the AM Plan for this service area. The two indicators are the:

- asset renewal funding ratio (proposed renewal budget for the next 10 years / forecast renewal costs for next 10 years), and
- medium term proposed budget/forecast costs (over 10 years of the planning period).

Asset Renewal Funding Ratio

Asset Renewal Funding Ratio[9] 63.23%

The Asset Renewal Funding Ratio is an important indicator and illustrates that over the next 10 years we expect to have 63.23% of the funds required for the optimal renewal of assets.

The forecast renewal work along with the proposed renewal budget, and the cumulative shortfall, is illustrated in Appendix C.

Medium term – 10 year financial planning period

This AM Plan identifies the forecast operations, maintenance and renewal costs required to provide an agreed level of service to the community over a 10 year period. This provides input into 10 year financial and funding plans aimed at providing the required services in a sustainable manner.

This forecast work can be compared to the proposed budget over the first 10 years of the planning period to identify any funding shortfall.

The forecast operations, maintenance and renewal costs over the 10 year planning period is $23,201,808 on average per year.

The proposed (budget) operations, maintenance and renewal funding is $16,165,490 on average per year giving a 10 year funding shortfall of $7,036,318 per year. This indicates that 70% of the forecast costs needed to provide the services documented in this AM Plan are accommodated in the proposed budget. Note, these calculations exclude acquired assets.

Providing sustainable services from infrastructure requires the management of service levels, risks, forecast outlays and financing to achieve a financial indicator of approximately 1.0 for the first years of the AM Plan and ideally over the 10 year life of the Long-Term Financial Plan.

[9] AIFMM, 2015, Version 1.0, Financial Sustainability Indicator 3, Sec 2.6, p 9.

7.1.2 Forecast Costs (outlays) for the long-term financial plan

Table 7.1.3 shows the forecast costs (outlays) required for consideration in the 10 year long-term financial plan.

Providing services in a financially sustainable manner requires a balance between the forecast outlays required to deliver the agreed service levels with the planned budget allocations in the long-term financial plan.

A gap between the forecast outlays and the amounts allocated in the financial plan indicates further work is required on reviewing service levels in the AM Plan (including possibly revising the long-term financial plan).

We will manage the 'gap' by developing this AM Plan to provide guidance on future service levels and resources required to provide these services in consultation with the community.

Forecast costs are shown in 2022 dollar values.

Table 7.1.2: Forecast Costs (Outlays) for the Long-Term Financial Plan

Year	Acquisition	Operation	Maintenance	Renewal	Disposal
2022	$3,905,000	$3,355,500	$2,128,000	$14,846,827	$800,000
2023	$2,138,875	$3,422,610	$2,170,560	$15,092,669	$1,900,000
2024	$4,016,875	$3,491,062	$2,213,971	$16,269,284	$0
2025	$9,797,533	$3,560,884	$2,258,251	$18,436,242	$0
2026	$11,103,683	$3,632,101	$2,303,416	$17,646,190	$0
2027	$7,880,083	$3,704,743	$2,349,484	$18,464,414	$0
2028	$6,230,000	$3,778,838	$2,396,473	$16,904,500	$0
2029	$5,409,200	$3,854,415	$2,444,403	$17,097,354	$0
2030	$4,166,000	$3,931,503	$2,493,291	$19,227,722	$0
2031	$1,200,000	$4,010,133	$2,543,157	$17,990,078	$0
Total	**$55,847,249**	**$36,741,789**	**$23,301,006**	**$171,975,280**	**$2,700,000**

7.2 Funding Strategy

The proposed funding for assets is outlined in the County's budget and Long-Term financial plan. The financial strategy of the County determines how funding will be provided, whereas the AM Plan communicates how and when this will be spent, along with the service and risk consequences of various service alternatives.

7.2.1 Budget Overview and Background

The 2022 County budget process began on June 1st of 2021 after staff received direction from the Finance and Audit Committee, and subsequently Council, to target a base levy increase of 1.5% for the 2022 budget year. Within the long-term financial planning model for the years 2023-2031 Council approved utilization of an annual base levy rate increase of 2.7%. Further, that the annual dedicated infrastructure levy be calculated annually at 1.0% of the prior year's levy. The approval for a target levy increase typically derived from

economic indicators provided Finance staff the direction to commence drafting budgets with all departments based on a known expectation from Council. Initiating the budgetary cycle in June facilitates enough time for December budget Council deliberations with sufficient opportunities for review and discussion among staff, management and Council as well as providing for public consultation. The timing allows for early tendering of projects and purchases and ideally provides more advantageous pricing. This also allows for projects to move forward with funding in place and demonstrates ongoing improvements in the budget process and long-term planning.

The 2022 draft budget and long-term financial plan is aligned with the County's Strategic Plan 2019 - 2023, approved June 19, 2019. The existing strategic plan identifies four strategic priorities:

1. Economic Prosperity and Innovation
2. Sustainable Growth
3. Thriving and Inclusive Communities
4. Leadership in Change

The 2022 draft budget proposed an overall levy increase of 5.1%. After growth, the increase to the existing property owner would have been 3.4% and further after the annual hospital grant (0.4%) and dedicated infrastructure investment (0.9%), the annual base levy increase would have been 2.1%. The 2022 budget target for the base levy increase was set by Council at 1.5%. The dedicated infrastructure investment is comprised of the dedicated infrastructure levy and the annual increase to the transportation construction program. At 0.9% this is a very modest increase for infrastructure investment in light of the County's infrastructure deficit and current inflation within the construction industries. Growth in the draft 2022 budget was estimated at 1.70%.

The Canadian inflation rate on a year-over-year basis hit 6.7% as reported by Statistics Canada for the month of March 2022. This is significantly higher than the inflation target of 2.0% as set by the Bank of Canada (BOC) in monetary policy. Consumer prices are rising at their fastest rate since 1991. These increases in inflation are being driven by sustained housing prices, substantial supply chain constraints, and geopolitical conflicts that have lifted prices for energy and agricultural markets.

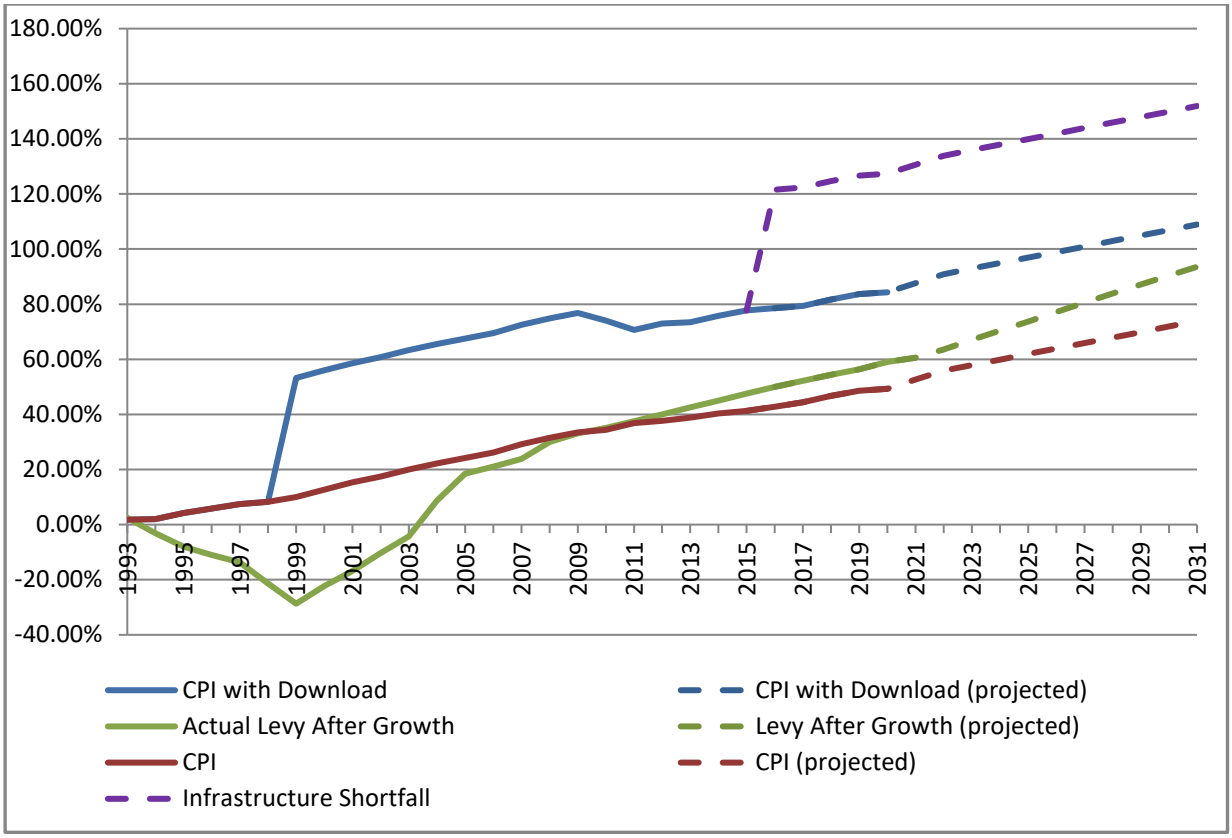
However, many of the goods and services purchased by the County move independently of the general rate of inflation as determined by a consumer basket of goods; therefore, CPI is not necessarily indicative of inflationary pressures experienced by the County. Expenditures such as construction and insurance for the County are impacted by other factors not typical of household consumers and far exceed the headline CPI index. The annual Non-residential Building Construction Index at the 4th quarter 2021 was 15.3% and 17.2% for Toronto and Ottawa, respectively. This represents a more indicative measure of costs related to County infrastructure construction projects. These increases far exceed the County's dedicated annual increase to infrastructure investment within the draft 2022 budget and the long-term plan. Impacts from price escalations related to construction type activities are being realized by the County currently with several recent tender awards coming in overbudget; therefore, requiring additional financing to initiate the works. These price escalations represent a

significant risk to the County with several major construction projects contemplated in the near term and within the long term financial plan.

As mentioned, many of the County's expenditures move independently of inflation as measured by the headline CPI. Additionally, the County has not fully re-established sustainable budgets for all departments such as transportation, waste and social housing. The ongoing trend of heightened inflationary pressures within the economy for construction type activities, as evidenced by the Non-residential Construction Price Index, will make it increasingly difficult to continue to limit tax levy increases without impacting capital intensive programs or seeing the infrastructure deficit worsen.

The chart below has been included in budget presentations over the past several years. It continues to be relevant as it provides a clear picture of the actual changes in the County levy compared to inflation and program changes. The green line shows the major decrease in the County levy through the 1990's when budgets were slashed across all departments. However, program responsibilities such as County Roads stayed the same so by 2000 the County's programs were all seriously underfunded. From 1998-2001, a range of former Provincial and Federal programs, such as Social Housing, several roads and EMS, were downloaded to the County with significant financial costs. From 2000-2005, the levy increases were steep as Council struggled to meet its responsibilities to fund and operate all of the former and new downloaded services. The red line represents the Consumer Price Index (CPI) and shows how, theoretically, the County levy should have been increased to sustain its original program responsibilities only. The blue line is a theoretical line showing how the levy should have been increased from 1993 to today to handle both the original and downloaded program responsibilities. The purple dashed line reflects the additional investment in capital (for all County asset categories) that was recommended in the County's 2014 Asset Management Plan. While this chart shows significant financial challenges in the past, the County is much more financially stable as we have made up much of the ground previously lost.

Levy vs Consumer Price



We have continued to project stable increases over the next several years. However, as we continue on the path of financial rebuilding, annual levy increases need to begin to address the perpetual shortfall in infrastructure funding particularly in light of increased inflationary pressures for construction type activities which will erode financial capacity in future years with not keeping pace.

The Federal Gas Tax is the primary source of infrastructure funding available to the County and included a one-time doubling up of funds in 2019 and again in 2021. Ongoing Federal Gas Tax funding is an important part of the County Construction funding strategy. Any changes to this program would have a significant impact on the County's core asset renewal capabilities.

The Province introduced formula based OCIF funding in 2015 and announced under their Fall 2021 Economic Statement that the OCIF formula-based funding model has now been redesigned. The announcement indicated the funding will be enhanced, effectively doubling the funding envelope over 5 years across the Province. Application based funding programs are sporadic and require competition with other municipalities. The County was unsuccessful in 2019 on a joint application under an intake of the Investing in Canada Infrastructure Program (ICIP) with member municipalities for proposed works on County Road 2 towards creation of a new 401 EDR. In an environment where almost all municipalities are in need of infrastructure investments, the competition is fierce to chase relatively small pots of funding. Therefore, the level of annual increases is being reconsidered for future budgets as we develop plans to reach sustainable funding levels for both operating and capital budgets.

The 2022 draft budget (**cash basis**) is as follows:

	2020 (M$) Budget	2021 (M$) Budget	2022 (M$) Draft
Revenue			
Levy	58.7	60.3	63.4
Grants & Subsidies	40.6	42.6	47.4
Other Revenue	18.3	20.2	20.5
Total Revenue	117.7	123.1	131.2
Borrowing			
Debenture/Construction Financing	8.8	60.3	44.7
Internal Borrowing	0	0	0
Total Borrowing	8.8	60.3	44.7
Total Revenue & Borrowing	126.5	183.4	175.9
Expenditures			
Operating	102.2	104.5	107.5
Capital	30.0	75.3	65.3
Debt Principal Repayment	1.5	1.7	1.7
Total Expenditure	133.7	181.5	174.5
Reserves			
Transfer to Reserve	6.7	6.8	6.9
Transfer from Reserve*	(13.9)	(4.9)	(5.5)
Net Change in Reserves	(7.2)	1.9	1.4
Total Expenditures & Reserves	126.5	183.4	175.9

* inclusive of prior year carryover items

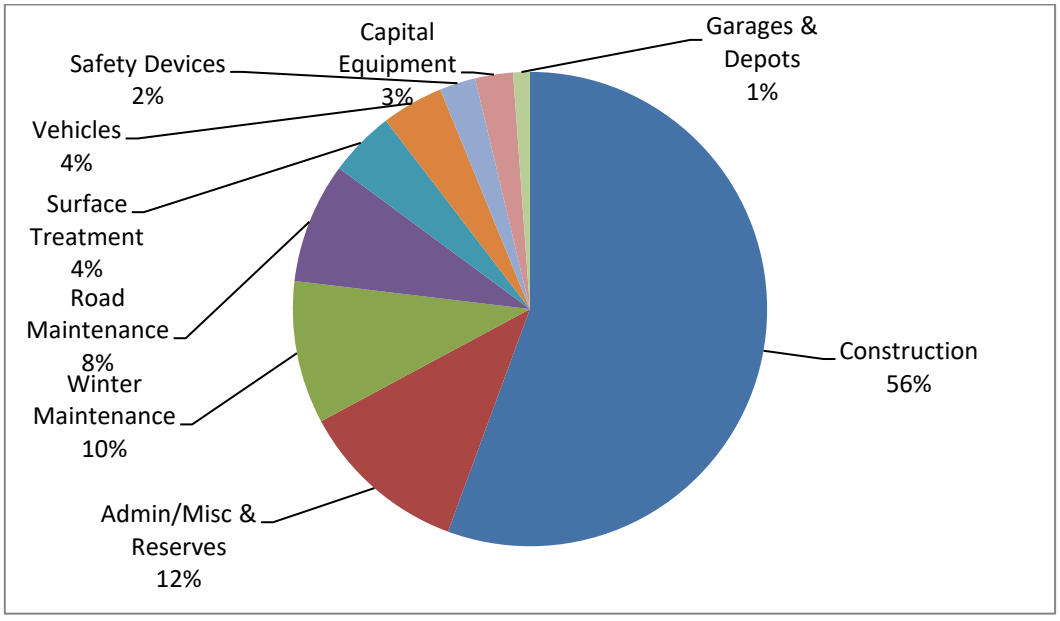
The 2022 draft budget (**accrual basis**) is as follows:

	2020 (M$) Budget	2021 (M$) Budget	2022 (M$) Draft
Cash Budget	126.5	183.4	175.9
Less:			
Debt Principal Repayment	1.5	1.7	1.7
Capital	30.0	75.3	65.3
Internal Borrowing	0	0	0
Debenture/Construction Financing	8.8	60.3	44.7
	(40.3)	(137.3)	(111.7)
Add:			
Amortization	8.8	9.1	9.4

Future Employee Benefits Liability	0.2	0.3	0.4
Landfill Post Closure Liability	0.6	0.6	0.6
	9.6	10.0	10.4
Accrual Based Budget	96.0	56.1	74.6

The County's core assets are managed by the Public Works department. The Transportation portion of the Public Works department draft budget is $27.5M. This includes road maintenance for winter and summer, surface treatment and construction activities. The department is primarily funded by the levy but also receives Federal Gas Tax funding and Ontario Infrastructure Funding (OCIF), as mentioned above. The 2022 draft budget currently has OCIF formula-based funding budgeted at its 2021 amount of $750K. Upon allocation notice to the County for 2022, this will provide some additional funds within the Transportation Department towards infrastructure needs. Further top up funds for Federal Gas Tax Funding in 2021 will allow for the advancement of some projects within the capital program over the next several years and are ultimately anticipated to then be utilized towards financing for the Trent Hills Bridge given likely price escalations to previously estimated costing. The department also receives full cost recovery for providing surface treatment services to the member municipalities.

Public Works (Transportation) Expenditures



The Transportation section of the Public Works draft 2022 budget includes two Issue Papers related to re-occurring annual requests. The first is related to the established priority to ramp-up the Roads and Bridges construction program budget. There is also an Issue Paper to replace equipment which is at the end of life as had previously been identified in the ten-year plan. As was the case in 2021, the 2022 capital maintenance program for

transportation facilities that had previously been allotted in the ten-year plan have been redirected into Transportation reserves towards the financing of a possible consolidated operations facility with the possibility of also housing some County departments. The long-term plan has a placeholder for the facility in 2026 for future consideration with a feasibility study to be completed utilizing Provincial Modernization Funding.

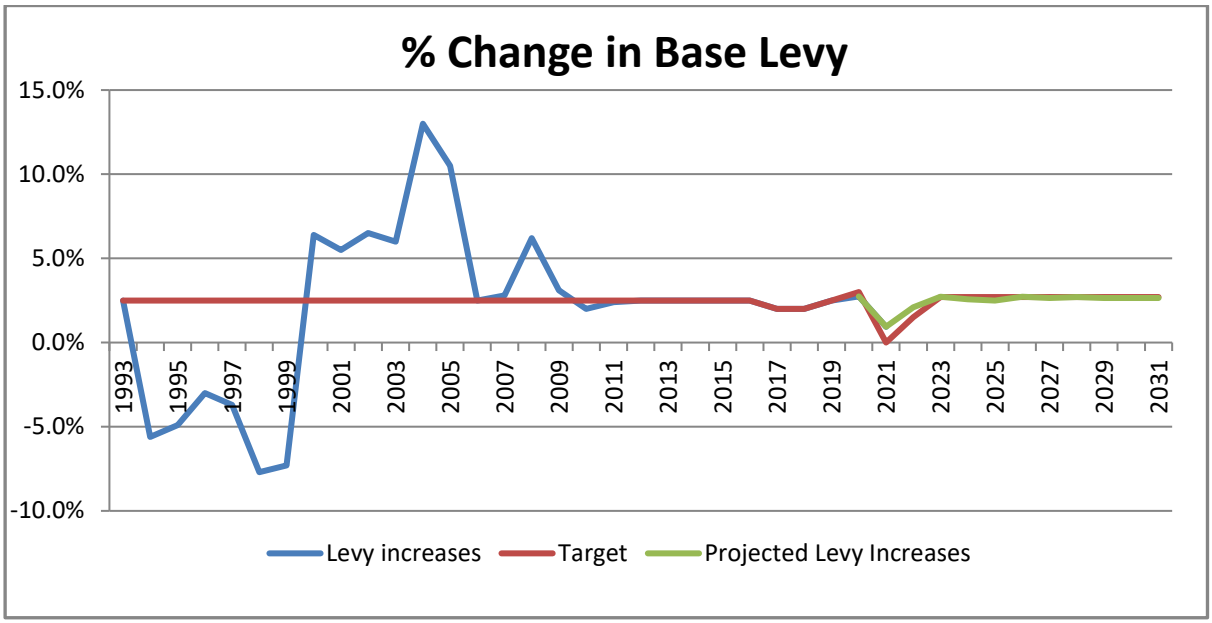
In addition to the Issue Papers, the consolidated budget identified building the bridge reserve as a priority. Approximately $13.8M will be spent on major capital projects towards overall improving the County's 503km road system in 2022 through the transportation construction program.

7.2.2 Long Term Financial Planning Framework

In recognition of the many competing priorities and budget pressures, the County developed a long-term financial plan in 2012. Since then, County staff have prepared the ten-year financial planning model, that is aligned with the County's strategic plan, and accordance with methodologies derived under the adopted Long-Term Financial Planning Framework (LTFPF).

The County has adopted a financial strategy within this framework that is focused on long term needs and challenges, as opposed to focusing solely on the current budget year levy impact. In order to ensure consistent and modest levy increases over time, this framework adopts a philosophy of establishing a targeted annual increase within the current year budget and the nine-year forecast.

In prior years the County experienced significant volatility in annual levy decreases/increases. Since adopting the LTFPF, the County has realized stable annual levy increases and this approach carries forward within the long-term financial model as displayed below:



* Prior to 2020, the Base Levy excluded the Dedicated Infrastructure Levy; however, included the annual increase for the Transportation Construction Program. Effective 2021, calculation methodology changed whereby the base levy also excludes the annual increase for the Transportation Construction Program now treated as Dedicated Infrastructure Investments. The 2020 target was set by Council as inclusive of the Base Levy and Dedicated Infrastructure Investments. 2021 Target represents Council request for feasibility review of a 0.0% increase. Hospital grants are excluded from base levy.

This chart helps to display how each year is interlinked and how decisions focusing on the short term can impact on future years. In the '90's the County experienced levy rate reductions and then in subsequent years implemented significant increases trying to rebuild operating and capital budgets particularly in light of Provincial downloads. In conjunction with this, reserves were depleted as a means for financing routine capital items and in some instances, projects were completed and recorded as unfinanced capital within the Financial Statements. Working capital was minimal and the operating line of credit was frequently utilized to maintain cash flow requirements.

Prudent long-term focused planning under the existing framework allows for improved financial positioning by building upon reserves. Minimization of debt servicing costs is achieved with the issuing of debt for only larger, non-routine capital projects or projects where debt is available at exceptionally low rates that allow project funds to be stretched further. Striving towards a more sustainable financial model, escalation of annual capital budgets is a key priority.

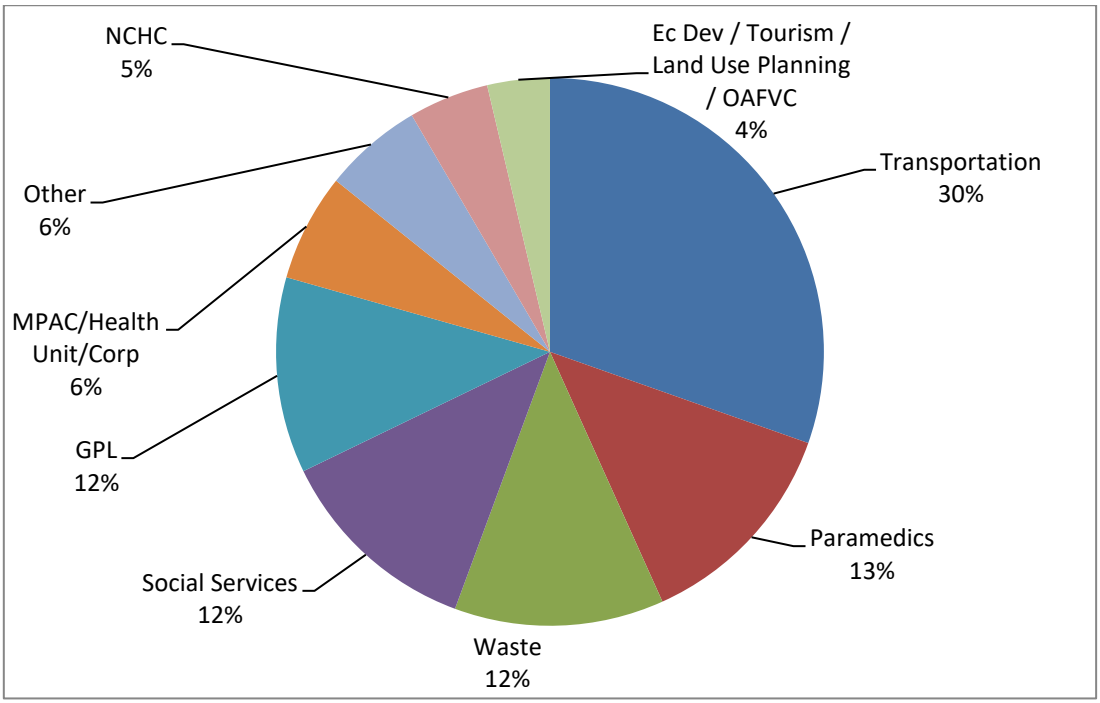
The County continues to work towards addressing the infrastructure deficit. Much of the infrastructure the County owns was downloaded from the Province in the form of roads, bridges and social housing. In many instances, this infrastructure is nearing the end of useful life and is inefficient and costly to operate and maintain. In 2016, the County introduced a dedicated infrastructure levy. Even with the implementation of this special purpose levy, infrastructure spending is only marginally gaining ground relative to the need that relates to the desired level of service. Adoption of a County-wide D.C. has increased financial capacity towards advancing expansion related infrastructure projects within the Transportation Department given the significant funding gap identified in this area.

7.2.3 Levy

Each County department is funded through multiple sources. The proposed $63.4M levy is split across the County operating departments as outlined in the graph below. Approximately 30% of the levy is directed to the Transportation department as the Federal Gas Tax is the only other significant source of revenue for roads maintenance and construction projects. Paramedics require 13% of the levy to fund the County's portion of operating costs as well as capital. The Waste division receives about 12% of the levy. Waste has multiple other sources of revenue such as bag tags, tipping fees and the sale of recycled materials. About 12% of the levy goes to the Community and Social Services department with the NCHC garnering a further 5%. The GPL is allocated 12% of the levy and continues to contribute to reserves towards the future redevelopment of the facility. The GPL receives a

Provincial subsidy and accommodation revenue from residents in addition to the levy. The levy requirements for these departments remain fairly consistent with previous years. A further 6% of the levy funds the County's required payments to the Health Unit and MPAC. The balance of the levy funds various smaller departments including Economic Development, Tourism, Natural and Cultural Heritage, Land Use Planning and Emergency Planning and Health and Safety. The relative departmental levy allocations for 2022 are generally consistent with the prior year.

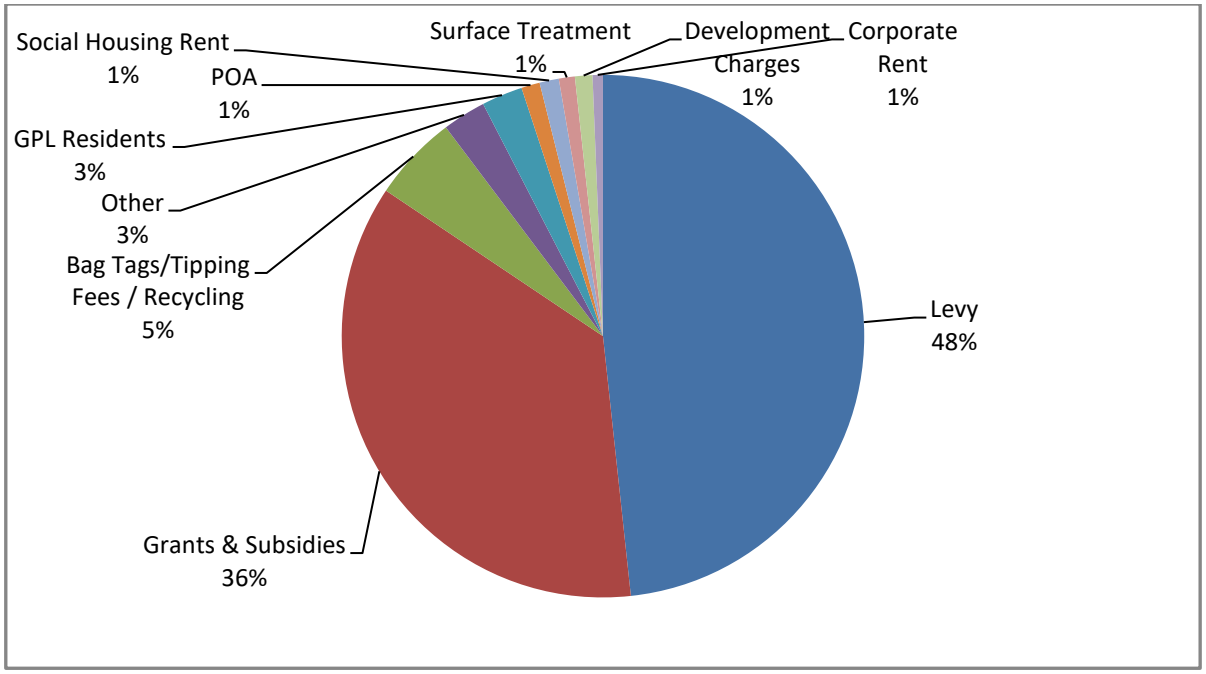
2022 Levy by Department



7.2.4 **Revenue**

The County funds its programs, services and infrastructure through a number of sources. The largest single source of revenue is property taxes or the tax levy at 48%. An additional 36% of County operations are funded by grants and subsidies from the Provincial and Federal governments. Several departments generate significant revenue for their programs through rents, sale of recycled materials, accommodation fees for long term care, fees such as bag tags and tipping fees, and Provincial Offences fines. The 2022 draft budget represents the second year with D.C.'s representing 1% of revenues within the year. The D.C. revenue in the year primarily reduces debt requirements for previously identified projects and increases financing within the Transportation Department towards addressing the infrastructure deficit gap for expansion related projects. The relative proportion of revenue sources is fairly consistent with previous years.

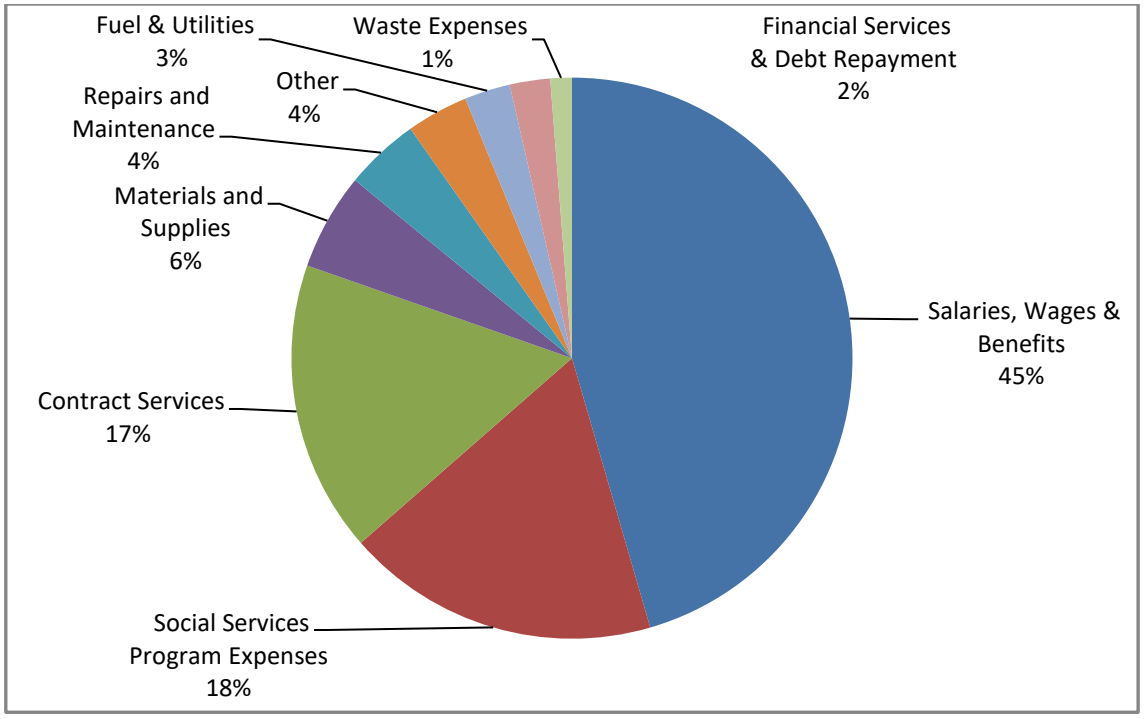
2022 Revenue Sources



7.2.5 Operating and Capital Expenditures

In 2022, approximately 45% of operating expenditures will be spent on staffing costs due to the fact that many services provided by the County are labour intensive such as long-term care and paramedics. Salaries and benefits relative portion of expenditures remains fairly consistent year over year. About 18% of the County's operating budget is spent on Social Services programs although a significant portion of these costs are flow-through dollars and are funded directly by the Province. The County spends 17% of their operating costs on contract/external services which include all forms of contract services including waste collection, engineering, auditing, legal, repairs and maintenance and a number of other specialized services. External services also include annual fees to the Municipal Property Assessment Corporation (MPAC) and the Health Unit, as well as Fire Dispatch services, Court Security and the County's contribution towards the Eastern Ontario Regional Network (EORN) mobile broadband project. External transfers include the new annual hospital grants amounting to $250,000. Materials and supplies account for 6% of operating expenditures and consist of medical supplies, raw food for the long-term care home, sand and salt for roads, maintenance materials, office supplies and many other goods required for County operations. The balance of operating expenditures includes repairs and maintenance, fuel, utilities, waste expenses (primarily leachate management) and debt servicing.

2022 Operating Expenditures

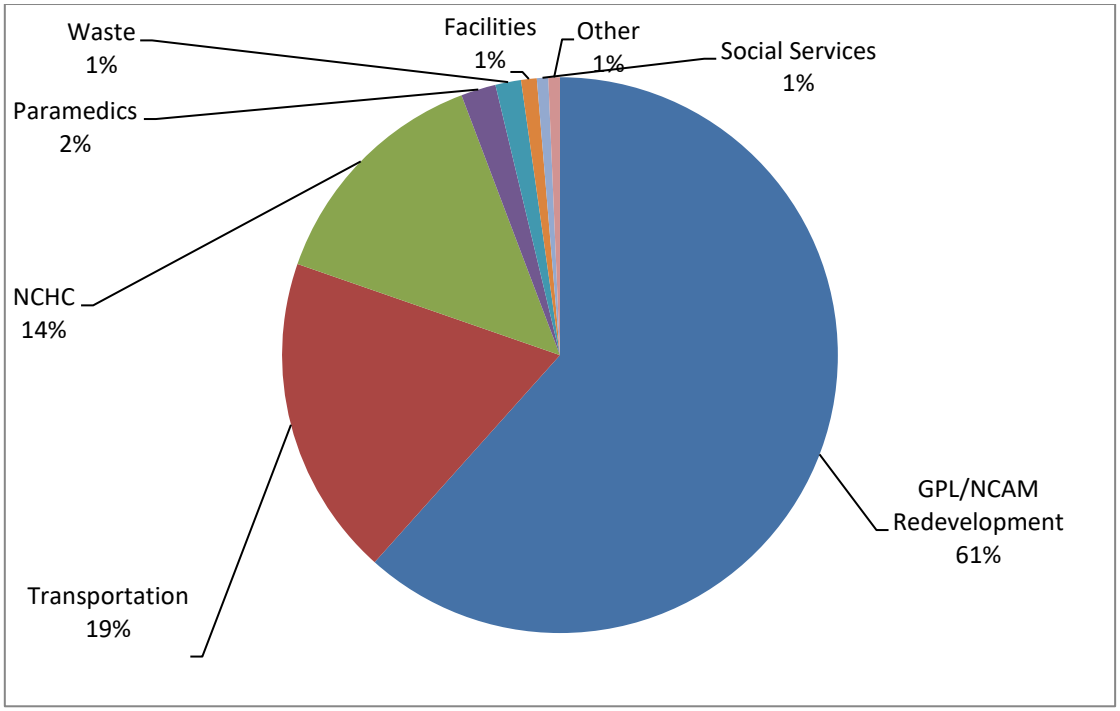


The majority of the capital expenditures will be directed to the GPL/NCAM Redevelopment project at 61% with construction continuing for the multi-year project. The next largest proportion of capital expenditures occurs within the Transportation department at 19%. This department manages the vast majority of the County's infrastructure. The NCHC and the Facilities Department also manages a significant portion of the County assets. In 2021 the NCHC is anticipated to start works related to the Elgin Park Redevelopment project with much of the construction occurring in 2022 representing approximately 14%. Most 2022 expenditures for Facilities are for repairs and maintenance; however, the draft budget does contemplate $400,000 for the design and implementation of a humidity control system to meet stipulated humidity levels as outlined in a lease the County has with the Province for the provincial courts at 860 William Street. Paramedics includes a placeholder for capital needs to facilitate an expanded paramedicine program contingent on provincial funding. The balance of the capital budget will be spent primarily in Waste, Planning, Natural Heritage, and Information Technology Management.

Key capital projects & purchases in 2022 include:

- Continuation of the GPL/NCAM Redevelopment project
- Continuation of the Elgin Park Redevelopment project
- Commencement of the Ontario Street Development project
- Roads and bridge work
- Paramedics capital needs contingent on provincial paramedicine funding
- Residual waste environmental assessment
- Equipment replacement in Transportation, Waste & Paramedics (snowplows, trucks, ambulances)
- Social Housing and corporate building upgrades and equipment replacement

2022 Capital Expenditures



Since 2009, the revised Public Sector Accounting Board (PSAB) standards have been in place. These standards required that clear definitions of capital be adopted by municipalities. Capital is generally defined as new, replacement or betterment projects or purchases greater than $5,000 with a useful life of more than one year. Where high value purchases are made to improve or expand upon an existing asset, it is measured against specific criteria to determine whether it will be recorded as a capital or operating expenditure. Examples of the criteria include extending the useful life of the asset and the value of the improvements relative to the total value of that asset.

7.2.6 Reserves

Reserves are an important tool for long term planning. As part of the long-term planning process, reserves are being set aside to pay for future capital projects and unexpected operating expenses such as extreme weather events. As infrastructure needs are becoming better defined through AM Planning activities and various departmental master planning processes, it is becoming more apparent that the County will not have near enough funds set aside for future infrastructure needs. The dedicated infrastructure levy assists with building reserves in an effort to be better financially prepared for impending capital needs.

The County's reserve position has improved slightly through 2018/19. Once again, the County has exceeded the Provincial average when looking at reserve contributions as a percentage of operating expenses. The portion of departmental budgets allocated to reserves has increased but planned reserve contributions need to be further enhanced in future budgets. Reserves allotted specifically for the GPL/NCAM Redevelopment, the consolidated operations facility, the Trent River Bridge and various social housing development projects will significantly reduce the County reserve position once these funds are utilized to finance these large extraordinary capital projects The Ministry of Municipal Affairs and Housing (MMAH) with its latest published Financial Indicators assigned a risk

rating of low based on the County's level of reserves in 2019. While this metric is important, it should be noted that MMAH uses all reserves for its evaluation. In 2019, this included approximately $4.7M in reserve contributions for 2018 project carryovers which were only established as temporary reserves. Even after adjusting for the temporary reserves, the County has made significant progress in building reserves.

Total Reserves and Discretionary Reserve Funds as a % of Operating Expenses (latest published data MMAH)

	County	Average
2007	6.1%	23.9%
2008	10.0%	28.1%
2009	12.9%	30.7%
2010	24.8%	30.7%
2011	27.3%	32.9%
2012	31.2%	37.1%
2013	39.2%	33.2%
2014	41.5%	33.3%
2015	46.3%	34.5%
2016	54.0%	35.9%
2017	50.7%	37.8%
2018	53.4%	39.4%
2019	54.0%	43.5%

The County's reserves as a percentage of operating expenses have increased substantially between 2007 and 2019. There was a reduction in the County's reserve position in 2017 primarily as a result of utilizing corporate reserves to pay off maturing debt in the amount of $5.8M.

At the end of 2021, the County's reserve balance is expected to be approximately $62.5M. The reserve position at the end of the year is inflated as a result of using construction financing towards financing the GPL/NCAM Redevelopment costs prior to the dedicated reserve for this project. Favourable construction financing has been secured through Infrastructure Ontario such that it is advantageous to keep reserve funds invested in the County's High Interest Savings Accounts to realize a favourable interest rate spread. There has been a conscious effort across all departments to identify needs and increase reserve contributions. However, the ongoing operational needs will continue to prevent reserve contributions from accelerating as quickly as required. The development of an AM Plan and long-term financial plan identifies future capital needs and provides a plan for ongoing reserve contributions and withdrawals for major capital projects. Given the number of major projects coming up in the next 10-20 years, and an expanded bridge program for replacement of interjurisdictional bridges the County's reserves will need to continue to grow.

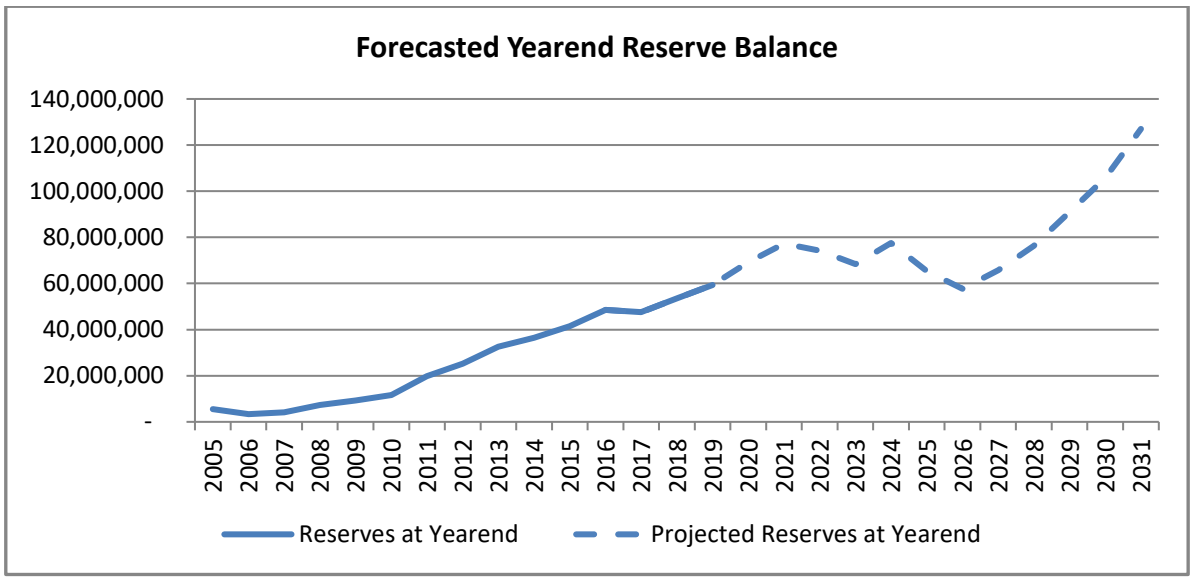
There will be significant utilization of reserves for major capital projects moving forward to 2026 as dedicated reserve funds are sourced for the GPL/NCAM Redevelopment, the Elgin

Park Redevelopment, the Trent River Bridge and towards placeholders contemplated for expansion of affordable housing, residual waste needs and remediation and a possible consolidated works yard. The County reserves in the long-term plan are anticipated to be depleted to a low of approximately $57.7M by 2026 or approximately 49% of the 2026 estimated operating budget versus the most recent comparator average from MMAH at 43.5%. Further to this, the County will be acquiring debt financing in the years leading up to 2026 towards these extraordinary large projects. The ability to provide reserve financing limits the amount of debt that otherwise would be required. Reserves were utilized towards providing rate stabilization for the first time in 2021; specifically, towards 'smoothing' the impact of the new curbside collections contract over 2021/22. There are future years as well within the long-term model with this being contemplated when new extraordinary costs come on-line such as the GPL debt servicing costs versus commencement of construction per diem funding from the Ministry of Long-term Care. Reserves will grow in the years following 2026 which will be critical for financing needs into the extended future and limiting debt, particularly post GPL/NCAM Redevelopment, as debt levels and servicing costs will be approaching levels that are at upper threshold of what most municipalities set as a limit.

Under the new County Reserve Policy that was approved by Council in 2021, a new reserve has been established towards funding the Landfill Closure and Post-closure Liability as identified within the County audited Financial Statements. This liability is significant at $28.8M and represents estimated future costs for closure of the Brighton landfill as the County's only operating landfill as well as costs for closed landfill remediations, monitoring and leachate collection and maintenance of control systems. Previously, this liability was unfunded and disclosed as such within the audited Financial Statements. An annual contribution to this reserve is contemplated within the long term plan commencing in 2023. This will be dependent in future years on economics conditions and actual annual levy increases.

The AM Plan illustrates that despite efforts to save for future projects, the County will still fall far short of the funds needed for infrastructure over the next several decades. The data presented above is helpful to illustrate our progress. However, benchmarking against other upper tier municipalities should be done with caution. Each municipality provides a different range of programs and services and operate different infrastructure. The trends are useful, but it is not an 'apples to apples' comparison. It is widely understood that no municipality is contributing to reserves at an adequate level.

The shortfall in reserves will require future tax increases and the assumption of more debt in the near term as infrastructure needs become more critical.



There will be approximately $5.1M placed in reserves at the end of 2021 as identified to date to carryover funds for projects into 2022 and future years that were incomplete at yearend (primarily roads, waste, and several smaller projects). Estimated yearend reserve balances are detailed in the chart below.

Estimated Year End Reserve Balances

Reserve	2021 (est)	2022 Additions	2022 Reductions	2022 (est)
General / Rate Stabilization Reserves	18,551,974	1,707,473	1,170,408	19,089,039
Social Housing Reserve	13,338,570	410,315	1,347,286	12,401,599
Transportation Capital Reserve	13,589,078	697,203	2,442,000	11,844,281
GPL Rebuild Reserve	7,955,715	1,565,566	-	9,521,281
WSIB Reserve	5,335,603	-	-	5,335,603
Waste Services Capital Reserve	4,980,002	1,100,000	1,798,730	4,281,273
Landfill Closure/Post-closure Liability Reserve	3,568,095	-	-	3,568,095
Facilities Capital Reserve	2,391,960	50,000	329,000	2,112,960
Paramedics Capital Reserve	1,379,670	917,000	808,056	1,488,614
Transportation Operating Reserve	1,364,082	-	-	1,364,082
IT Reserve	785,072	160,000	268,000	677,072
Social Services Reserve	1,125,169	32,000	555,500	601,669
Human Resources Reserve	412,877	-	53,952	358,925
Land Use Planning	449,099	53,904	156,459	346,544
Forest Reserve	358,672	59,416	116,017	302,071
Emergency Planning Reserve	369,518	5,000	110,000	264,518
Ec Dev and Tourism Operating Reserve	348,329	-	125,651	222,678
Insurance Claims Reserve	241,386	-	40,000	201,386
Paramedics Operating Reserve	116,600	-	-	116,600
GPL Capital Reserve	80,458	-	-	80,458
GPL Donations Reserve	34,868	-	-	34,868
Communications Reserve	25,000	-	-	25,000
Other Operating Reserves	6,038	-	-	6,038
Corporate Service Reserves	434,000	100,000	530,000	4,000
	77,241,834	**6,857,877**	**9,851,058**	**74,248,653**

7.2.7 Debt

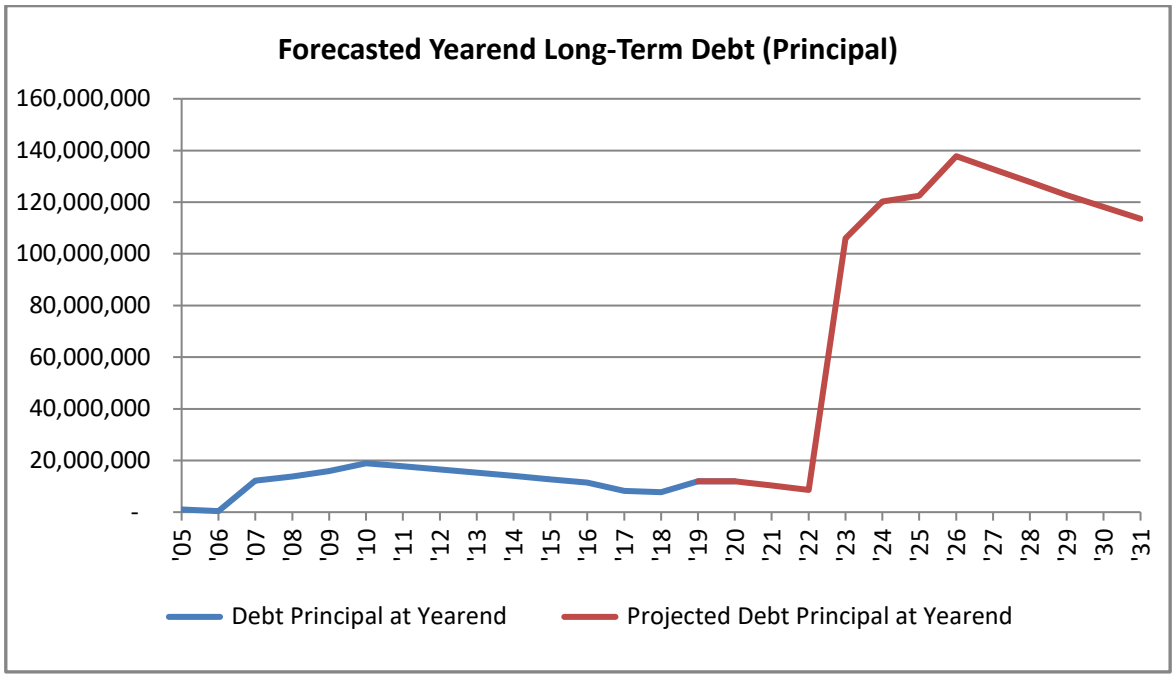
The County's outstanding debt continues to be at a manageable level. It is below the annual repayment limit set by MMAH. The County, as a public body, is able to acquire debt through Infrastructure Ontario with rates that are generally preferable to what can be garnered through private financing sources. The County is sourcing construction financing through Infrastructure Ontario currently towards works for the GPL/NCAM Redevelopment. Also, construction financing for the Elgin Park Redevelopment will be sourced. Preferential rates were being realized with the low rate interest environment indicative of the BOC setting its trend setting overnight rate at it's lower bound during the pandemic.

Although there are no capital works anticipated in 2022 to be financed by long-term debentures, the County will continue to acquire and incur interest costs from construction financing for the GPL/NCAM Redevelopment and Elgin Park Redevelopment projects with the final long-term borrowings to be issued upon completion of the works. Municipalities are only permitted to assume debt for capital projects. The long-term debt level projected for 2022 is $8.6M which is approximately $96 per capita, excluding short-term construction financing.

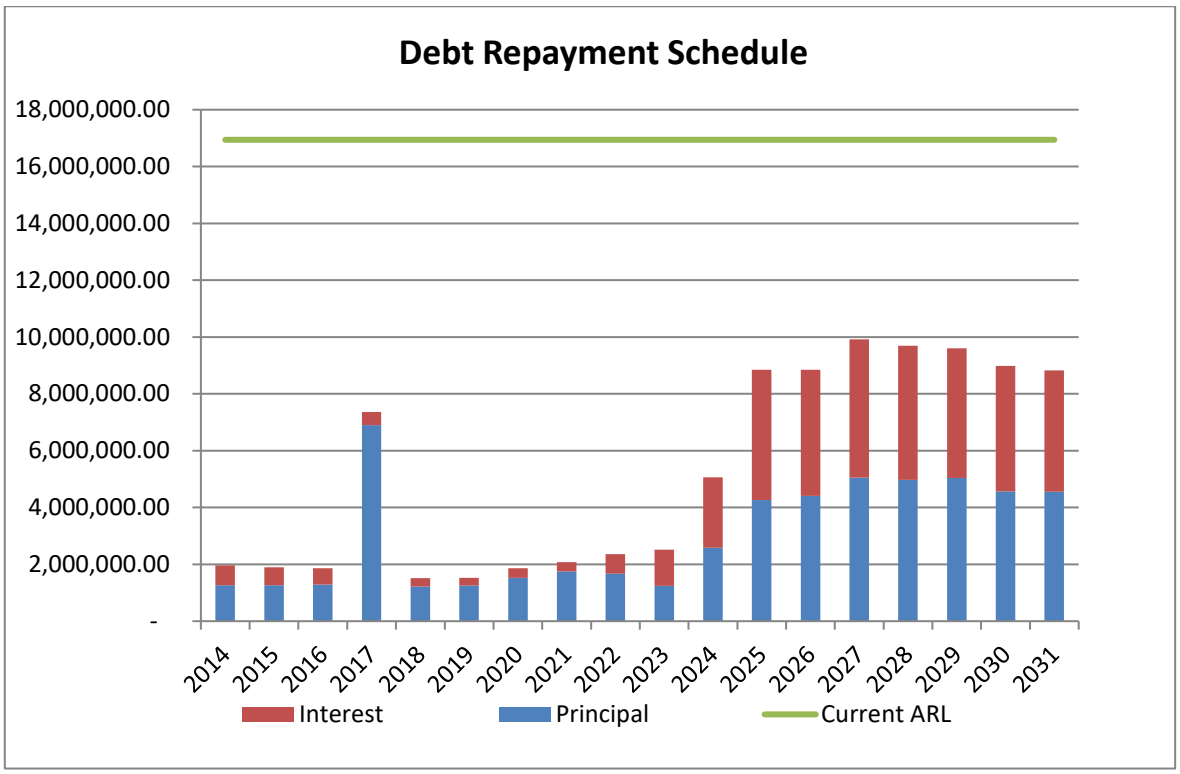
As the longer-term financial needs are considered, the County will need to take on additional debt in the medium and long term. Progress has been made to build reserves for future projects. However, adequate reserves will not be accumulated prior to beginning these critical projects. Major projects that have been identified for partial financing by debt will be the GPL/NCAM Redevelopment, the Elgin Park Redevelopment, Ontario Street Housing Development, a placeholder for a new Paramedic base in Brighton, a possible consolidated operations facility and various housing projects to redevelop and construct purpose-built housing in the form of new affordable and market rental units. As more detailed project plans are developed and cost estimates are refined, the specific financing tools will be reevaluated. A portion of these projects will be funded by reserves, but it is unlikely sufficient reserves can be set aside in time for these projects. Further, the first County-wide D.C. implemented in 2020 will provide financing towards reducing debt requirements. A business case analysis will be completed to determine if it is a more prudent business decision to forego the return on invested funds or pay interest on debt. Given the anticipated growth in reserves within the long-term plan there will likely be a greater proportion of reserves utilized for financing identified projects versus what is currently contemplated in the model; thereby, lowering the amount of debt. Other sources of financing such as Federal or Provincial funding may advance the timing of projects if opportunities become available. The County currently has the financial capacity to utilize reserves in order to optimize any funding opportunities with the advancement of projects ultimately minimizing debt levels. The exceptionally low cost of debt available to the low risk municipal sector further accentuated by the current historically low interest rate environment presents an attractive business case. In some instances, it may be more prudent for the County to leave reserve investments in place and assume additional debt at today's extremely low interest rates.

The chart below shows the current debt being paid down and the addition of new debt based on the estimated costs for the projects as noted above. The GPL Redevelopment project commenced in 2019. Construction financing will be sourced prior to utilizing the reserve funds dedicated for this project in order to take advantage of a favourable interest

rate spread between the rate earned by holding the reserve funds in the County's HISA accounts versus the exceptionally low construction financing rates secured through Infrastructure Ontario. The final long-term debenture is anticipated to be issued in 2023 upon project completion. Similarly, construction financing will be sourced for the Elgin Park Redevelopment with a debenture or mortgage being issued upon project completion as well as a portion of the project receiving Provincial funding and possibility of CMHC Co-investment funding with a funding application review pending. Further projects in the long-term model contemplating debt financing include the Ontario Street Housing Development project, a new Emergency Services Base in Brighton, and a consolidated operations facility in 2026. Placeholders for further housing developments in the years 2025 and 2027 are assumed to be financed by a combination of funding from upper levels of government, debt and reserves within the long-term plan.



The debt repayment schedule below also shows that the amount of budget dollars required to service the debt will remain relatively flat until about 2024 when financing costs for long-term debt related to various extra-ordinary large construction projects start to come on-line as mentioned above. The County's annual debt repayment remains well below the maximum permitted per our Annual Repayment Limit (ARL) established by the Province. The 2021 limit is $16.9M according to calculations under the Financial Information Return as submitted to MMAH. The County continues to have debt room within the ARL; however, is encroaching on limits that are typically set by municipalities within a debt policy that the County will pursue drafting in the new year. Historically, the focus was on only assuming debt for high value capital projects that will provide taxpayer benefit well into the future. As mentioned above, the very unusual economic circumstances of today with historically low interest rates have prompted a reevaluation of this strategy. These financial circumstances present potential opportunities to strategically advance infrastructure projects and see tax dollars stretched further by using cost effective debt tools.



MMAH provides two sustainability metrics to identify concerns with a municipality's ability to continue to pay for servicing long term debt commitments. The County's position had improved in 2018 for both metrics below assessing Net Financial Assets or Net Debt as a % of Own Source Revenues and Debt Servicing Cost as a % of Total Operating Revenue.

Net Financial Assets or Net Debt as a % of Own Source Revenues
(latest published data MMAH)

	County	Average
2014	-5.0%	16.8%
2015	2.7%	18.7%
2016	12.2%	21.6%
2017	20.4%	25.8%
2018	23.3%	29.2%
2019	21.2%	36.3%

Data only available from 2014

The recent debt has been at relatively low interest rates which are not reflected in the metrics. These low rates have helped keep the cost to service debt at a minimum. The higher than normal measure in 2017 for Debt Servicing Cost as a % of Total Operating Revenue below can be attributed to paying off the maturing debt on the County Headquarters in 2017 from this one-time debt payout. Eliminating the extraordinary one-time payout of the County Headquarters in 2017 the County remains aligned with the provincial averages for debt servicing costs.

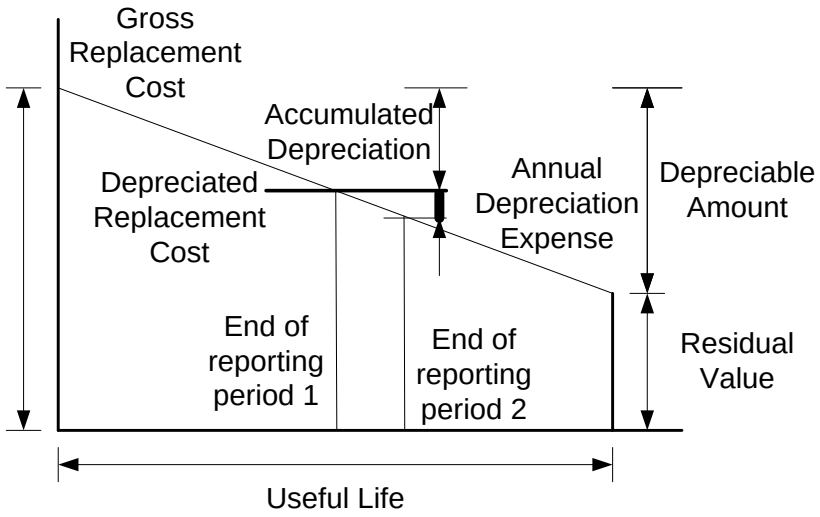
Debt Servicing Cost as a % of Total Operating Revenue
(latest published data MMAH)

	County	Average
2007	0.7%	2.1%
2008	1.7%	2.3%
2009	1.8%	2.4%
2010	2.1%	1.9%
2011	2.3%	2.1%
2012	2.2%	2.1%
2013	2.2%	2.0%
2014	2.1%	1.9%
2015	1.9%	1.7%
2016	1.8%	1.8%
2017	6.9%	2.0%
2018	1.3%	1.9%
2019	1.3%	1.6%

7.3 Valuation Forecasts

7.3.1 Asset valuations

The best available estimate of the value of assets included in this AM Plan are shown below. The assets are valued at current replacement costs derived from engineering estimates.



Replacement Cost (Current)	$887,021,056
Depreciable Amount	$824,857,072
Depreciated Replacement Cost[10]	$535,153,824
Depreciation	$19,186,440

[10] Also reported as Written Down Value, Carrying or Net Book Value.

7.3.2 Valuation forecast

Asset values are forecast to increase as additional assets are added into service.

Additional assets will generally add to the operations and maintenance needs in the longer term. Additional assets will also require additional costs due to future renewals. Any additional assets will also add to future depreciation forecasts.

7.4 Key Assumptions Made in Financial Forecasts

In compiling this AM Plan, it was necessary to make some assumptions. This section details the key assumptions made in the development of this AM plan and should provide readers with an understanding of the level of confidence in the data behind the financial forecasts.

Key assumptions made in this AM Plan are:

General Assumptions:

- Asset Register was not used for capital renewal but rather reliance was on technical estimates.
- The last 10 years of projected expenditures maintains the year 10 need or expenditure and applies year over year inflation of 2% in keeping with the Bank of Canada forecast and good financial principles.
- Depreciated values assumed based on current replacement costs of assets and percentage currently consumed.
- Assumed function and capacity were the same as condition in the asset register.
- Does not account for works that should be completed but are being deferred due to budget constraints.

Roads Assumptions:

- Last rehabilitation date was used to populate the asset register and generate the age profile due to lack of information regarding construction/reconstruction dates.
- Assumed a 45 year lifecycle and rehabilitation works completed increase the useful life to reconstruction status.
- Road base is included in Current Replacement Costs (CRC).
- Surface Treated road sections with an Annual Average Daily Traffic (AADT) over 1,000 were assigned a CRC in line with 2-Lane Rural Arterial (Class 3/4).
- All former MTO highways were assigned a CRC in line with 2-Lane High Volume Rural Arterial (Class 2).

Structures Assumptions:

- Assumed age of some retaining walls based on age of road.

Storm Sewer Assumptions:

- Condition of storm sewer was assumed based on a combination of age of system and structures and type of material.

- Age of storm sewer assumed based on combination of the age of the road, type of material (i.e. PVC/HDEP > 1990; CSP = mid 1970's) and condition.
- Useful life was assumed to be 60 or 80 based on material type
- Ditches and cross culverts under 3m are not included and will be incorporated in future version(s) of this Plan.

7.5 Forecast Reliability and Confidence

The forecast costs, proposed budgets, and valuation projections in this AM Plan are based on the best available data. For effective asset and financial management, it is critical that the information is current and accurate. Data confidence is classified on a A - E level scale[11] in accordance with Table 7.5.1.

Table 7.5.1: Data Confidence Grading System

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

The estimated confidence level for and reliability of data used in this AM Plan is shown in Table 7.5.2.

[11] IPWEA, 2015, IIMM, Table 2.4.6, p 2|71.

Table 7.5.2: Data Confidence Assessment for Data used in AM Plan

Data	Confidence Assessment	Comment
Demand drivers	Medium	Demand drivers have been identified through various studies (Official Plan, Transportation Master Plan) and staff discussion and knowledge.
Growth projections	Medium	Growth projections were obtained from Statistics Canada, in correlation with the County's Official Plan update which will help guide growth and development in Northumberland over the next 30 years.
Acquisition forecast	Medium	Acquisition forecasts were determined through previous studies, investigations, and development proposals, in addition to staff judgement/knowledge.
Operation forecast	Medium	Operation forecasts were determined using a variety of sources including legislated requirements (Minimum Maintenance Standards (MMS) and biennial inspections), costs tracked in Cityworks (CW) and staff judgement/knowledge.
Maintenance forecast	Medium	Maintenance forecasts were determined through a variety of sources including needs identified in condition inspections (PCI and BCI), costs tracked in Cityworks (CW) and staff judgement/knowledge.
Renewal forecast - Asset values	Medium	Asset values were determined using the Current Replacement Costs (CRC) assigned through BCI inspections, technical estimates and industry standards, and staff knowledge.
- Asset useful lives	Medium	Useful lives were determined using industry standards and staff judgement/knowledge.
- Condition modelling	Medium	Condition modelling was determined through biannual inspections, industry standards and staff judgement/knowledge.
Disposal forecast	Medium	Information on the disposal of assets is based on previous studies and investigations. Estimates for the replacement of Loomis Bridge and Thompson Bridge are based on recent technical estimates.

The estimated confidence level for and reliability of data used in this AM Plan is considered to be Medium.

8.0 PLAN IMPROVEMENT AND MONITORING

8.1 Status of Asset Management Practices[12]

8.1.1 Accounting and financial data sources

The County's asset register was not used for the purposes of this plan due to a lack of confidence in the information contained in the register. The County currently tracks the historical acquired costs of assets, as well as any costs associated with major rehabilitation, maintenance, operation work and amortization costs. For the purposes of this Asset Management Plan, the budget data was obtained from the 10-year capital plan and the County's Finance department (approved annual budget and the long term financial plan). Current replacement costs were derived from technical engineering estimates provided in studies or reports completed by external consultants and internal staff (i.e. OSIM reports, Storm Sewer Inventory, Master Plans etc.).

8.1.2 Asset management data sources

Infrastructure assets, including those in this plan, are stored in the County's Geographic Information System (GIS) and rehabilitation, maintenance and operations works are tracked against each asset using Cityworks.

8.2 Improvement Plan

It is important that an entity recognize areas of their AM Plan and planning process that require future improvements to ensure effective asset management and informed decision making. The improvement plan generated from this AM Plan is shown in Table 8.2.

[12] ISO 55000 Refers to this as the Asset Management System

Table 8.2: Improvement Plan

Task	Task	Responsibility	Resources Required	Timeline
1	Further development of asset register for each asset category to confirm year acquired, replacement costs etc.	Engineering and GIS Department Staff	Staff time	On-going
2	Additional lifecycle modelling for each asset category using Cityworks data and improved asset register.	Engineering Department Staff; Consultants	Staff time; Funding for development of lifecycle models	On-going
3	Further public consultation on LOS/risk and financial considerations	All Departments	Staff time	1-5 years
4	Storm water system asset condition assessment to determine current condition, renewal and/or replacement requirements etc.	Engineering Department Staff; Consultants	Funding; Staff time	1-5 years
5	Further implementation and ongoing use of Cityworks to better understand operational, maintenance and capital work that has been completed and associated costs.	Road Operations and Engineering Staff	Staff time	On-going
6	Inclusion of additional assets (facilities, fleet, natural assets etc.) in the plan.	All Departments with assets	Staff time	1-3 years
7	Discussions between Public Works Department and Finance Departments to better understand how assets are valued, tracked and amortized.	Public Works and Finance Departments	Staff time	1-2 years
8	Formalized roads and storm sewer renewal ranking criteria weighting	Engineering Staff	Staff time	1-5 years
9	Review and update of Surface Treatment Policy to determine if some roads should be converted to asphalt from surface treatment.	Engineering and Road Operations Staff	Staff time	1-3 years
10	Monitor asset resilience and complete a resilience assessment and plan	Engineering, Road Operations and GIS/AM staff	Staff time	1-2 years
11	Develop a more robust risk management plan	All Departments	Staff time	1-5 years

Task	Task	Responsibility	Resources Required	Timeline
12	Review asset condition evaluation process for roads and update accordingly	Engineering Staff	Staff time	1-2 years
13	Incorporation of recommendations from County's GHG Emissions Reduction Plan and any subsequent climate action plans or reports	GIS/AM Staff	Staff time	1-2 years
14	Review staff resourcing requirement for on-going asset management plan development, updates and implementation of the plan	Public Works Director, Finance Director, and GIS/AM Staff	Staff time	1-2 years
15	Discussions between Public Works and Finance Department to develop a better understanding of how Development Charges should be captured in future revisions of this plan and to ensure Development Charge study is updated with revised estimates and incorporated back into AMP	Public Works and Finance Staff	Staff time	1-2 years
16	Review of expenditure thresholds for capitalization of assets	Finance and Public Works Staff	Staff time	1-2 years

8.3 Monitoring and Review Procedures

This AM Plan will be reviewed during the annual budget planning process and revised to show any material changes in service levels, risks, forecast costs and proposed budgets as a result of budget decisions.

The AM Plan will be reviewed and updated periodically to ensure it represents the current service level, asset values, forecast operations, maintenance, renewals, acquisition and asset disposal costs and planned budgets. These forecast costs and proposed budget are incorporated into the Long-Term Financial Plan or will be incorporated into the Long-Term Financial Plan once completed.

8.4 Performance Measures

The effectiveness of this AM Plan can be measured in the following ways:

- The degree to which the required forecast costs identified in this AM Plan are incorporated into the long-term financial plan,
- The degree to which the 1-5 year detailed works programs, budgets, business plans and corporate structures consider the 'global' works program trends provided by the AM Plan,
- The degree to which the existing and projected service levels and service consequences, risks and residual risks are incorporated into the Strategic Planning documents and associated plans,
- The Asset Renewal Funding Ratio achieving the Organizational target (this target is often 90 – 100%).

9.0 REFERENCES

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- ISO, 2014, ISO 55000:2014, Overview, principles and terminology
- ISO, 2018, ISO 31000:2018, Risk management – Guidelines
- 'Northumberland County Strategic Plan 2019 – 2022',
- 'Annual Public Works Capital Plan and Budget'

10.0 APPENDICES

Appendix A Acquisition Forecast

A.1 – Acquisition Forecast Assumptions and Source

Assumptions relating to the acquisition forecast include:

- The last 10 years of projected expenditures maintains the year 10 need or expenditure and applies year over year inflation of 2% in keeping with the Bank of Canada forecast and good financial principles
- The last 10 years of projected expenditures has an additional 1% increase to accommodate growth considerations
- Campbellford bridge construction estimate is dated and is expected to be significantly more given the current period of high inflation
- Road and storm sewer forecasts based on previous studies and/or development proposals and the identified needs as a result
- High level estimate of $25,000,000/each used for County Road 20 grade separation and County Road 64 grade separation to be built in last 10-year period

A.2 – Acquisition Project Summary

Significant acquisition projects included in this AM Plan are identified here.

Asset	Year	Acquisition Project	Forecast
Roads	2022-2031	County Road 2 EA	$7,155,000
	2023-2026	Elgin Street Widening	$2,900,000
	2026-2030	Brook Road (CR 20) Widening	$7,410,000
	2023-2031	Intersection Improvements	$10,650,000
Structures	2025-2027	Campbellford Bridge	$5,533,333/year for total of $16,600,000
	2036-2037	County Road 20 Grade Separation	$12,500,000/year for total of $25,000,000
	2040-2041	County Road 64 Grade Separation	$12,500,000/year for total of $25,000,000
Storm Sewer	2023	County Road 2 EA	$528,750
	2023-2026	Elgin Street Widening	$1,207,500
	2026-2030	Brook Road (CR 20) Widening	$2,025,000
	2023-2031	Expansion	$4,275,000

A.3 – Acquisition Forecast Summary

Table A3 - Acquisition Forecast Summary

Year	Constructed
2022	$3,905,000
2023	$2,138,875
2024	$4,016,875
2025	$9,797,533
2026	$11,103,683
2027	$7,880,083
2028	$6,230,000
2029	$5,409,200
2030	$4,166,000
2031	$1,200,000
2032	$1,236,000
2033	$1,273,080
2034	$1,311,273
2035	$1,350,611
2036	$13,891,129
2037	$13,932,862
2038	$1,475,849
2039	$1,520,124
2040	$14,065,728
2041	$14,112,700

Appendix B Operation and Maintenance Forecast

B.1 – Operation and Maintenance Forecast Assumptions and Source

Assumptions relating to the operation and maintenance forecast include:

- The last 10 years of projected expenditures maintains the year 10 need or expenditure and applies year over year inflation of 2% in keeping with the Bank of Canada forecast and good financial principles
- The last 10 years of projected expenditures has an additional 1% increase to accommodate growth considerations
- Forecasted costs based on technical estimates and expenditures entered in Cityworks

B.2 – Operation and Maintenance Forecast Summary

Table B2 – Operation and Maintenance Forecast Summary

Year	Operation Forecast	Maintenance Forecast	Total Forecast
2022	$3,355,500	$2,128,000	$5,483,500
2023	$3,422,610	$2,170,560	$5,593,170
2024	$3,491,062	$2,213,971	$5,705,033
2025	$3,560,884	$2,258,251	$5,819,134
2026	$3,632,101	$2,303,416	$5,935,517
2027	$3,704,743	$2,349,484	$6,054,227
2028	$3,778,838	$2,396,473	$6,175,311
2029	$3,854,415	$2,444,403	$6,298,818
2030	$3,931,503	$2,493,291	$6,424,794
2031	$4,010,133	$2,543,157	$6,553,290
2032	$4,130,436	$2,619,452	$6,749,888
2033	$4,254,351	$2,698,035	$6,952,386
2034	$4,381,981	$2,778,976	$7,160,957
2035	$4,513,441	$2,862,346	$7,375,786
2036	$4,648,844	$2,948,216	$7,597,060
2037	$4,788,309	$3,036,663	$7,824,971
2038	$4,931,958	$3,127,762	$8,059,720
2039	$5,079,918	$3,221,595	$8,301,513
2040	$5,232,314	$3,318,243	$8,550,557
2041	$5,389,285	$3,417,791	$8,807,075

Appendix C Renewal Forecast Summary

C.1 – Renewal Forecast Assumptions and Source

Assumptions relating to the renewal forecast include:

- The last 10 years of projected expenditures maintains the year 10 need or expenditure and applies year over year inflation of 2% in keeping with the Bank of Canada forecast and good financial principles
- The last 10 years of projected expenditures has an additional 1% increase to accommodate growth considerations
- Assumed 45-year lifecycle for roads with resurfacing at year 23 and full reconstruction at year 45
- Assumed 75-year lifecycle for structures with minor rehabilitation at year 25, major rehabilitation at year 50 and replacement at 75
- Assumed 70-year lifecycle for storm sewer
- First 10 years for structures assumes 50% of the replacement cost needs and the last 10 years is based on 100% lifecycle costs plus 10% to address previously deferred works.
- All forecasted costs based on technical estimates

C.2 – Renewal Forecast Summary

Table C3 - Renewal Forecast Summary

Year	Renewal Forecast	Renewal Budget
2022	$14,846,827	$8,687,292
2023	$15,092,669	$12,166,731
2024	$16,269,284	$6,963,596
2025	$18,436,242	$10,273,849
2026	$17,646,190	$13,121,820
2027	$18,464,414	$11,446,438
2028	$16,904,500	$9,221,539
2029	$17,097,354	$10,406,493
2030	$19,227,722	$14,166,042
2031	$17,990,078	$12,281,164
2032	$19,059,396	$12,649,600
2033	$19,631,178	$13,029,087
2034	$20,220,114	$13,419,960
2035	$20,826,718	$13,822,559
2036	$21,451,518	$14,237,235
2037	$22,095,064	$14,664,353
2038	$22,757,916	$15,104,284
2039	$23,440,654	$15,557,412
2040	$24,143,874	$16,024,135
2041	$24,868,188	$16,504,858

Appendix D Disposal Summary

D.1 – Disposal Forecast Assumptions and Source

There are currently two structures approved for download to the local municipalities the asset has been replaced. The forecast cost for replacement of these structures is based on high level technical estimates.

D.2 – Disposal Project Summary

Planned disposals are included here.

Year	Disposal
2022	Loomis Bridge replacement and download to local municipality.
2023	Thompson Bridge replacement and download to local municipality.

It is important to note that there are several other roads, structures and storm sewer that have been identified for disposal but have not yet approved.

Year	Disposal
TBD	Various roads (CR33, CR31, CR29 East)
TBD	5 other structures not on a County Road (Lakeport Bridge, Keogan Bridge, Wilson Island Bridge, Squires Creek Bridge, Allan Mills Bridge)
TBD	County Road 31 storm sewer

D.3 – Disposal Forecast Summary

Table D3 – Disposal Activity Summary

Year	Disposal Forecast	Disposal Budget
2022	$800,000	$800,000
2023	$1,900,000	$1,900,000
2024	$0	$0
2025	$0	$0
2026	$0	$0
2027	$0	$0
2028	$0	$0
2029	$0	$0
2030	$0	$0
2031	$0	$0
2032	$0	$0
2033	$0	$0
2034	$0	$0
2035	$0	$0
2036	$0	$0
2037	$0	$0
2038	$0	$0
2039	$0	$0
2040	$0	$0
2041	$0	$0

Appendix E Budget Summary by Lifecycle Activity

Assumptions relating to the budget include:

- The Long-Term Financial plan, 10-year capital plan and costs inputted in Cityworks were used to determine budget figures
- The last 10 years of projected expenditures maintains the year 10 need or expenditure and applies year over year inflation of 2% in keeping with the Bank of Canada forecast and good financial principles
- The last 10 years of projected expenditures has an additional 1% increase to accommodate growth considerations

Table E.1 – Budget Summary by Lifecycle Activity

Table E1 – Budget Summary by Lifecycle Activity

Year	Acquisition	Operation	Maintenance	Renewal	Disposal	Total
2022	$3,905,000	$3,355,500	$2,128,000	$14,846,827	$800,000	$18,113,838
2023	$2,138,875	$3,422,610	$2,170,560	$15,092,669	$1,900,000	$19,298,934
2024	$4,016,875	$3,491,062	$2,213,971	$16,269,284	$0	$14,042,962
2025	$9,797,533	$3,560,884	$2,258,251	$18,436,242	$0	$23,160,228
2026	$11,103,683	$3,632,101	$2,303,416	$17,646,190	$0	$24,359,942
2027	$7,880,083	$3,704,743	$2,349,484	$18,464,414	$0	$24,394,856
2028	$6,230,000	$3,778,838	$2,396,474	$16,904,500	$0	$16,840,300
2029	$5,409,200	$3,854,415	$2,444,403	$17,097,354	$0	$17,890,478
2030	$4,166,000	$3,931,503	$2,493,291	$19,227,722	$0	$21,136,912
2031	$1,200,000	$4,010,133	$2,543,157	$17,990,078	$0	$19,266,452
2032	$1,236,000	$4,130,436	$2,619,452	$19,059,396	$0	$19,842,444
2033	$1,273,080	$4,254,351	$2,698,035	$19,631,178	$0	$20,435,678
2034	$1,311,273	$4,381,981	$2,778,976	$20,220,114	$0	$21,046,668
2035	$1,350,611	$4,513,441	$2,862,346	$20,826,718	$0	$21,675,946
2036	$13,891,129	$4,648,844	$2,948,216	$21,451,518	$0	$22,324,058
2037	$13,932,862	$4,788,309	$3,036,663	$22,095,064	$0	$22,991,572
2038	$1,475,849	$4,931,958	$3,127,762	$22,757,916	$0	$23,679,066
2039	$1,520,124	$5,079,918	$3,221,595	$23,440,654	$0	$24,387,140
2040	$14,065,728	$5,232,314	$3,318,243	$24,143,874	$0	$25,116,412
2041	$14,112,700	$5,389,285	$3,417,791	$24,868,188	$0	$25,867,514