Northumberland county

ASSET MANAGEMENT PLAN

Road Infrastructure

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Contents

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 road infrastructure assets that provide safety to residents and visitors.

The County road infrastructure assets are comprised of:

- 810 Cross Culverts (less than 3m span)
- 629 Safety Guiderail Segments
- 5390 Signs
- 127 Streetlights and Flashing Beacons
- 18 Signalized Intersections

The above infrastructure assets have a replacement value estimated at $49,933,587.

1.3 Levels of Service

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

The main service consequences resulting from the shortfall of the Planned Budget are:

- Asset condition deterioration due to lack of operations, maintenance and/or renewal activities
- Asset failure creating drainage concerns, traffic delays and negatively impacting additional assets and user experience
- Increased health and safety concerns due to decreased asset function and inability to meet future needs

1.4 Future Demand

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

- Increasing Population
- Climate Change
- Changing Technology
- Active Transportation
- Environmental Awareness

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 following approaches, or a combination thereof, may be used to mitigate the impact of levels of service as a result of future demands:

- On-going implementation of recommendations and completion of additional studies, as required.
- Researching, piloting and implementing new methods and material to address changing climate.
- Future design/replacement works will take into consideration increasing traffic volumes, population, climate change, changing technology and active transportation.
- 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 infrastructure assets is estimated as $18,310,089 or $1,831,009 on average per year.

1.6 Financial Summary

1.6.1 What we will do

Estimated available funding for the 10-year period is $12,144,922 or $1,214,492 on average per year as per the Long-Term Financial plan or Planned Budget. This is 66.33% 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. The Informed decision making depends on the AM Plan emphasising the consequences of Planned Budgets on the service levels provided and risks.

The anticipated Planned Budget for Infrastructure assets leaves a shortfall of $616,517 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 (LTFP). This is shown in the figure below.

Forecast Lifecycle Costs and Planned Budgets

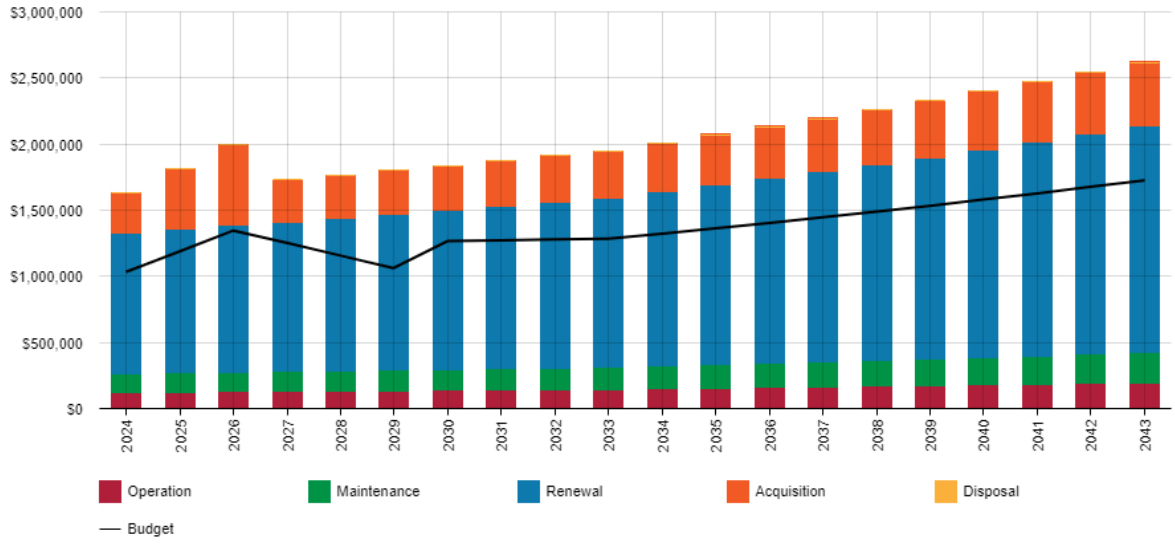


Figure Values are in 2024 dollars.

We plan to provide Infrastructure services for the following:

- Prioritized operation, maintenance, renewal and acquisition of infrastructure assets to meet service levels set by the County in annual budgets.
- Continue to replace cross culverts, traffic signals, signs and guiderails on as needed basis within approved budgets.
- Upgrade or install new cross culverts, traffic signals, streetlight, flashing beacons, signs, and guiderails on as needed basis within approved budgets as per recommendations from various studies, developments and staff expertise.

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 all recommended operations and maintenance activities within the first 10 years, including all necessary repairs
- Complete all of the renewal works required within the first 10 years to meet lifecycle demands
- Complete all upgrades/new to address future service demands

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 assets and/or use restrictions
- Reduced life span due to deteriorating condition
- Increased liabilities
- Increased maintenance and repair resulting from assets not being renewed as required
- Flooding and damage to other assets

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

- Continuing to complete inspections and preventative maintenance
- Prioritizing repair, maintenance, upgrades and replacement to mitigate risks.
- Researching and implementing viable alternative strategies/technology and/or staging for economic efficiencies

1.7 Asset Management Planning Practices

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.
- 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.

Infrastructure Assets Assumptions:

- Assumed age of most cross culverts based on age of road.
- Assumed year acquired for missing streetlight and guiderail data as 2003 which is the average year these assets were acquired.
- Used 2010 for the year the street signs were acquired as this appeared to be the average date.

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 register for each asset category to confirm year acquired, replacement costs etc. and enhance the completeness and accuracy.
- Additional lifecycle modelling using historical data collected through Cityworks to further inform asset condition, performance, reliability and asset life.
- Incorporation of additional public consultation with respect to levels of service, risk and financial considerations.
- Complete detailed condition assessments of cross culverts and guiderail.
- Complete a Roadside Safety Audit to identify potential road safety issues and opportunities for improvements in safety for all users.
- On-going costing updates from Cityworks as information becomes available to better understand work that has been completed.
- Discussion between Public works and Finance to better understand how assets are valued, tracked and amortized.
- Formalized road infrastructure renewal ranking criteria weighting.
- Develop a more robust risk management plan.
- Incorporation of recommendations from the County's Greenhouse Gas (GHG) Emission Reduction Plan anticipated to be finalized in 2024 and any subsequent climate action plans or reports.
- Review of expenditure thresholds for 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. This should include the Asset Management Policy (2019), along with other key planning documents:

- Northumberland County Strategic Plan 2023-2027
- 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 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 all road infrastructure assets as per O.Reg. 588/17 and will be used for development of annual and long-term financial planning moving forward.

The infrastructure assets covered by this AM Plan include cross culverts, safety guiderails, regulatory and warning signs, streetlights, flashing beacons and traffic signals. For a detailed summary of the assets covered in this AM Plan refer to Table 5.1.1 in Section 5.

These assets are crucial to ensuring the movement of people, goods and services and providing a safe transportation network for residents and visitors of the County.

The infrastructure assets included in this plan have a total replacement value of $49,933,587.

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 are 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 programs ▪ Development of supporting policies ▪ Includes GIS and administrative support
External Parties	▪ Provide input through public survey on customer values, levels of service, etc.

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 the required, affordable forecast costs and how they 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:

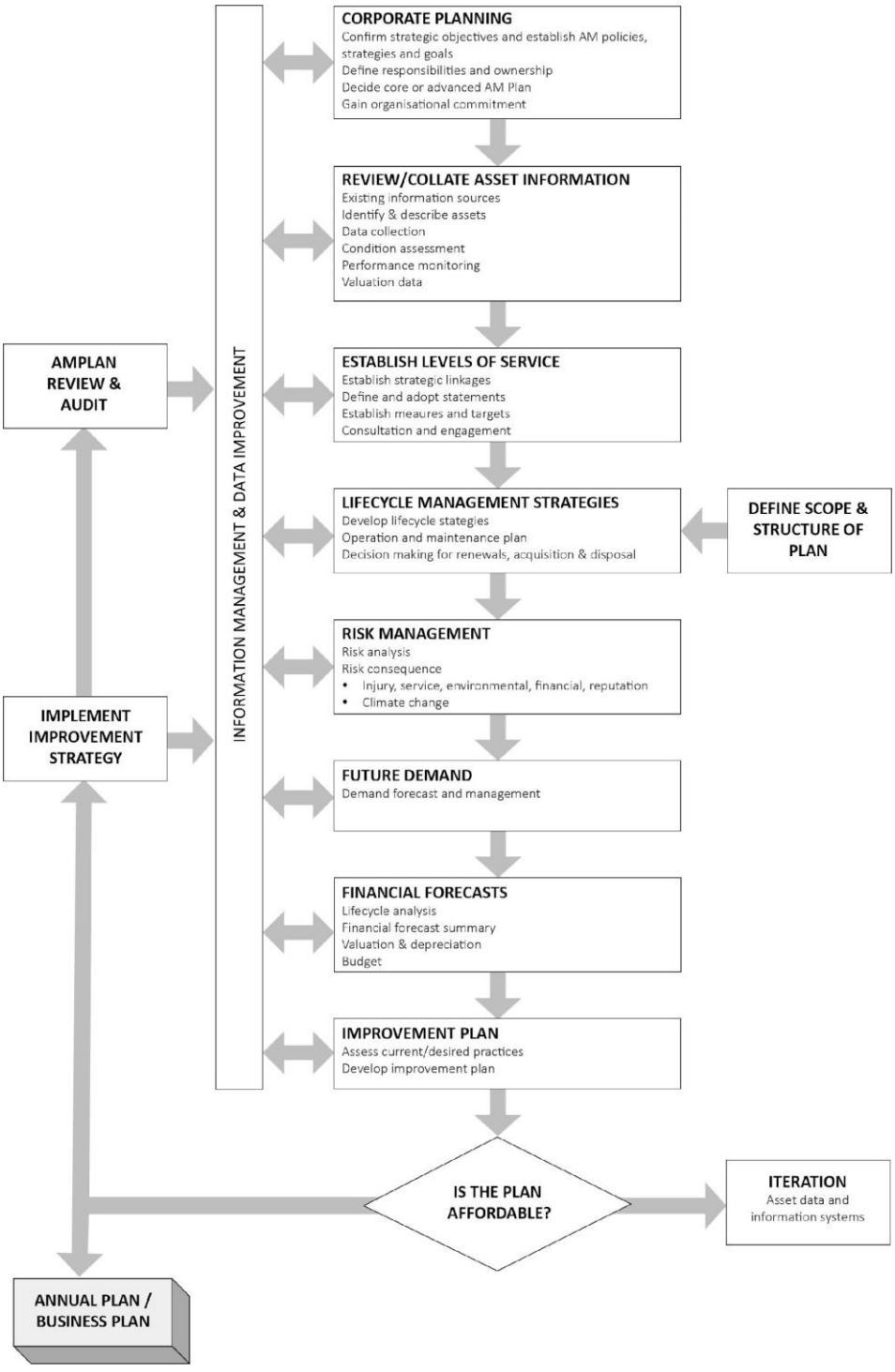
- International Infrastructure Management Manual 2015 [1]
- ISO 55000[2]

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, capacity and function of assets, including various road infrastructure assets, along with expectations for future maintenance and renewal through an online survey over a three (3) week period in late 2023. Table 3.1 below illustrates the overall response.

Table 3.1: Customer Satisfaction Survey Levels

Performance Measure	Infrastructure Asset	Satisfaction Level				
		Very Satisfied	Fairly Satisfied	Neutral	Somewhat satisfied	Not satisfied
Overall Condition	Cross Culverts	11%	50%	25%	11%	3%
	Traffic Lights and Signage	14%	47%	27%	9%	3%
	Streetlights	13%	36%	33%	13%	5%
	Safety Devices (guiderails)	14%	47%	31%	6%	2%
Overall Function	Cross Culverts	12%	43%	28%	13%	4%
	Traffic Lights	16%	44%	27%	11%	2%
	Streetlights	11%	37%	33%	14%	5%
	Safety Devices (guiderails)	14%	43%	33%	7%	3%
Overall Capacity	Cross Culverts	14%	44%	25%	14%	3%
	Traffic Lights and Signage	13%	47%	26%	10%	4%
	Streetlights	14%	38%	30%	13%	5%
	Safety Devices (guiderails)	15%	45%	31%	6%	3%

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:

Northumberland is recognized as a vibrant and connected twenty-first century county. We embrace innovation, respect our natural environment, celebrate diversity and care for one another. Together, we are shaping an inclusive, prosperous, and thriving community for all.

Our mission is:

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

Five strategic pillars have been set by the county. The relevant pillars and objectives and how these are addressed in this AM Plan are summarized 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
Propel Sustainable Growth	To provide safe and sustainable assets which meet or exceeds LOS and supports 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 assets and address future expansion and service requirements and the natural environment.
Innovate for Service Excellence	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.
Foster a Thriving Community	Evaluate needs/opportunities for new infrastructure.	Continue to improve understanding of infrastructure assets through satisfaction surveys.
Champion a Vibrant Future	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.

3.3 Legislative Requirements

There are many legislative requirements relating to the management of assets. Legislative requirements that impact the delivery of the road infrastructure services 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, safety devices as it pertains to the roadway.
Development Charges Act, 1997	Compliance with the Act with respect to development charges in Northumberland County.
Ontario Provincial Standard Specifications (OPSS)	Sets the standard for implementation of new infrastructure and the repair of existing infrastructure.

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 population and employment forecasts indicate that 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).

Review and update of this AM Plan will be required once the OP update is complete to incorporate any changes with respect to future facility 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 provisions

Table 3.4: Customer Values

Service Objective: Provide safe, functional and well-maintained road infrastructure.			
Customer Values	**Customer Satisfaction Measure**	**Current Feedback**	**Expected Trend Based on Planned Budget**
The County will maintain road infrastructure to minimize physical deficiencies and protect the safety of users.	Annual # of customer service requests relating to infrastructure condition; AMP Public Input Survey	Average of 39 annual Cityworks (CW) Service Requests (SR) a year regarding road infrastructure condition; 57% of survey respondents rated the condition of road infrastructure included in this plan as good or very good.	Remain the same or increase in complaints based on current funding gap and requirement for condition assessments to be completed to better understand future priority works (i.e. cross culverts that are failing and need to be replaced).
Road infrastructure will provide reliable services with minimal disruptions for users	Annual # of customer service requests relating to service disruption and function; AM Public Input Survey	Average of 36 annual Cityworks SR relating to infrastructure function and service disruptions; 55% of survey respondents are satisfied or very satisfied with the function of road infrastructure included in this plan and an additional 30% are neutral.	Remain the same or slight increase in complaints. There will be improvements to some areas as planned construction projects are completed, however not all identified improvements can be implemented due to funding gap.
The County will provide road infrastructure that meet service needs of all users	Annual # of customer service requests regarding improving the capacity of road infrastructure; AM Public Input Survey	Average of 23 annual Cityworks SR relating to infrastructure capacity; 80% of survey respondents are neutral, satisfied or very satisfied with the capacity of road infrastructure included in this plan.	Remain the same or slight increase in complaints as growth occurs resulting in increased congestion and traffic volumes and funding doesn't keep pace.

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 customer service requests relating to infrastructure projects; AMP Public Input Survey	Few to no inquiries/complaints annually regarding activities on road infrastructure covered in this plan; 41% of respondents satisfied or very satisfied with communication.	Remain the same or improve as the communication team continues to use various means (social media, radio, press releases) to inform the public/users and Communications Master Plan is completed.
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, environmental sustainability etc.)	Few to no complaints regarding environmental impacts due to changes in roadside vegetation program.	Remain the same.
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 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?

In Table 3.5 under each of the service measure types (Condition, Function, Capacity/Use, Communication, Environmental Impacts) 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 3.5: Customer Level of Service Measures

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 infrastructure condition.	Approximately 4% of the County's infrastructure assets are in very good condition, 94% are in good condition, and 2% are in fair condition. *NOTE: Cross culverts and guiderails need to be assessed for current condition and are thus not included in this condition assessment.	Several assets do not have an up-to-date condition score and have reached or are nearing the end of their useful life. Therefore, the percentage of infrastructure assets in good condition will decrease as works need to be deferred due to funding gaps.
	Confidence levels		Medium Professional judgement supported by data sampling.	Medium Structures will continue to deteriorate without additional funding.
Function	Organizational Measure	Description/maps of infrastructure asset development proposals	Cable guiderail being replaced with steel beam guiderail. Replacement of battery backup and upgrades to traffic signals, as budget allows.	Continue to replace infrastructure assets based on need as resources become available.

	Confidence levels		High Professional Judgement supported by extensive data.	Medium Professional judgement supported by data sampling.
Capacity	Organizational Measure	Customer Satisfaction Survey	Over 80% of respondents said they are neutral, satisfied or very satisfied with the capacity of streetlights, traffic signals, signage and safety device infrastructure assets.	As the population continues to grow the infrastructure assets are expected to increase in use which will cause an increase in operation and maintenance costs.
	Confidence levels		Medium Professional judgement supported by customer satisfaction survey.	Medium Medium Professional judgement supported by analysis of data and forecasted funding.
Communication	Organizational Measure	Notice of Construction, Notice of study commencement	3 media posts regarding cross culvert replacement, 1 media post regarding installation of flashing signals	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.	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; using various methodologies 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.
	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, sealing an unsealed road, replacing a pipeline with a larger size) or a new service that did not exist previously (e.g. new traffic signals).
- **Operation** – the regular activities to provide services (e.g. inspections, guiderail grass cutting, 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, unsealed road grading, building and 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, pipeline replacement and building component replacement),

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

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: Technical Levels of Service

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
TECHNICAL LEVELS OF SERVICE				
Acquisition	Streetlights LED conversion	Total number of LED streetlights	All existing streetlights have now been converted to LED	Any new streetlights installed should be LED
	Installation of additional required signs	Total number installed each year	As required	As required
	Installation of new traffic signals or upgrades (APS, Battery Backup, Overhead Detection)	Total number installed each year	0-1/year	2-4/year
	Installation of new guiderail or extension	Total number in meters per year	75m/year	150m/year

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

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
	of new guiderail			
		Budget	***$42,000***	***$300,000***
Operation	Sign inspection	Frequency of sign inspections per year.	Signs inspected annually.	Continue this trend.
	Hazard tree removal	Total number of hazardous trees removed annually.	Completed on an as needed basis as identified through inspections. Not all has been completed.	Complete all recommended removal each year.
	Guiderail grass cutting	Frequency of grass cutting	Once annually	Twice annually
	Cross culvert cleaning/flushing	Frequency of culvert cleaning/flushing	On an as needed basis, reactive to complaints or issues	Implement cross culvert inspection and cleaning for preventive maintenance
	Traffic Signal inspections	Frequency of inspections	Twice annually	Remain the same
		Budget	***$66,000***	***$123,000***
Maintenance	Traffic Signal repairs	Number of traffic signals repaired annually	On an as needed basis and reactive to complaints/issues.	Remain the same.
	Streetlight repairs	Number of streetlights repaired annually	On an as needed basis and reactive to complaints/issues	Remain the same
	Cross culvert maintenance	Blockages per year	Repair areas that need the most maintenance first; reactive to complaints and issues.	Repair all areas that require significant ongoing/recurring maintenance.
	Guiderail maintenance	Number per year	On an as needed/complaint basis due to condition or damage	Repair all guiderails that have identified deficiencies through regular inspections

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
		Budget	***$117,700***	***$140,700***
Renewal	Signage replacement	Total number of signs replaced annually	Replace all regulatory and warning signs that fail inspections (77 in 2024); reactive basis due to damage, theft	Replace all regulatory and warning signs that fail inspections and all that are identified as being damaged or stolen
	Guiderail replacement	Average length (m) per year	1,475m/year	All guiderails with deficiencies/damage, in addition to those that are existing cable and need to be replaced with steel beam
	Traffic Signal battery replacement	Number of battery backup units replaced per year	1-4/year; on as needed basis and within budget constraints	Complete all identified replacements through regular inspections (13 required in 2024)
	Cross culvert replacement	Number per year	2-5/year	5-10
	Streetlight replacement	Number per year	0-2/year; on as needed basis	Remain the same.
		Budget	***$808,400***	***$1,067,400***
Disposal				
		Budget	***$0***	***$0***

Note: * Current activities related to Planned Budget.

** Expected performance related to forecast lifecycle costs.

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 the intensity and frequency of infrastructure use and community needs.	Transportation Master Plan and other studies; continued inspections to determine condition, capacity and function.
Active Transportation	Northumberland County is marketed as a tourist destination for cyclists and has a Cycling Master Plan with 5	Increase in active transportation in Northumberland County.	Increased demand for appropriate signage, audible pedestrian signals (APS) at signalized intersections.	Cycling master plan in place with 5 cycling routes; Future signage/signalization upgrades to consider active transportation and tourism.

Demand driver	Current position	Projection	Impact on services	Demand Management Plan
	designated cycling routes.			
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 or materials used for the assets covered in this plan (i.e. signage, traffic signals, guiderails etc.).	Future maintenance, operations and rehabilitation work will consider this changing technology and any necessary safety elements to accommodate the mix of traditional vs. electric/autonomous vehicles.
Environmental Awareness	The current impacts of climate changes are at the forefront for many individuals.	Increase in environmentally conscious behaviour by residents, staff and Council; GHG Reduction Plan to be finalized in 2024.	Increased operations, maintenance, renewal and replacement costs.	Future maintenance, operations and rehabilitation work will consider environmental factors; GHG Reduction Strategy

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 5.4.

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.

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

Risk and opportunities identified to date are shown in Table 4.5.1

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

Climate Impact 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 increase frequency of rapid temperature fluctuations between hot and cold; fading of signage due to sun. Freeze/thaw conditions are increased in the winter months which has negative impact on road surfaces.	Modify maintenance activities and schedules to meet conditions. Review and implementation of various materials that are more resilient to fluctuating temperatures. Increase inspection frequency.
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 and blockages of cross culverts, deterioration of assets.	Modify operations and maintenance activities to meet needs.
Intense storms	Increased frequency and intensity of storms resulting in high winds and severe weather.	Damage to assets due to debris and/or accidents.	Modify operations and maintenance activities to meet needs, vegetation management to reduce likelihood of trees damaging assets; supplies on hand for repairs.

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.

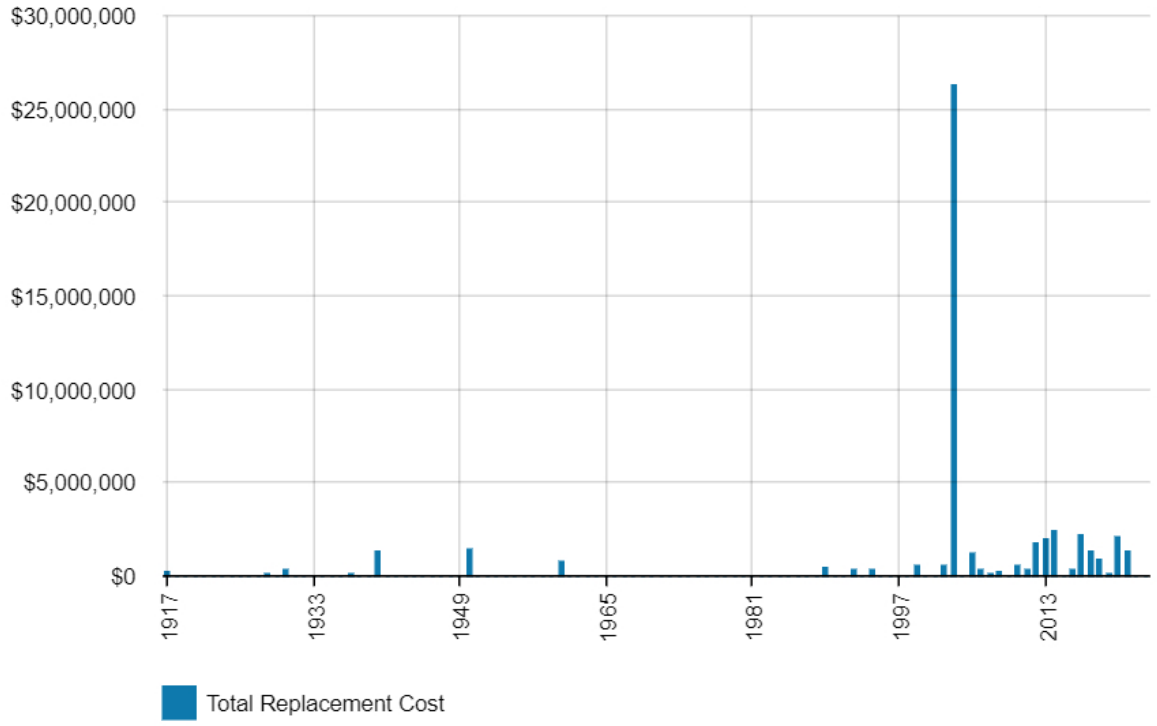
These assets include road infrastructure assets including cross culverts, safety guiderails, signs, streetlights and flashing beacons and traffic signals.

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

Table 5.1.1: Assets covered by this Plan

Asset Category	Dimension	Replacement Value
Cross Culverts	3 Steel Segments 3 PE Segments 61 CONP Segments 743 CSP Segments	$4,378,657
Safety Guiderails	369 Cable Guiderail Segments 260 Steelbeam Guiderail Segments	$38,436,629
Signs	Regulatory: 99 EPG 100 Engineer 2230 High Int. Warning: 67 EPG 21 Engineer 2873 High Int.	$463,801
Streetlights and Flashing Beacons	116 Streetlights 21 Flashing Beacons	$1,254,500
Traffic Signals	18 Signalized Intersections	$5,400,000
TOTAL		**$49,933,587**

Figure 5.1.1: Asset Age Profile – Acquired Date



All figure values are shown in 2024 dollars.

Figure 5.1.1 above illustrates the date acquired for the infrastructure assets covered in this plan. It is evident through the figure above that there are peaks in 1940, 1950 and 1960, which is due to the cross culvert assets. Cross culverts have a useful life between 50-75 years leading us to believe that these assets have reached the end of their useful life. This will undoubtedly add to the renewal expenditures required. In addition, there are significant peaks in the mid 2000's indicating past investments in assets that will be requiring renewal or maintenance activities 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
Traffic Signals – 13 of 18 locations	Uninterrupted Power Supply (UPS) battery backup at 13 traffic signalized intersections are not functioning. This impacts service delivery and safety during a power outage event if the batteries cannot keep the signals functioning properly.

Location	Service Deficiency
Cross Culverts - various locations	Several cross culverts have reached the end of useful life and are in poor condition which can cause sinkholes in the roadway, sediment erosion and blockages.
Traffic Signals	Full LED upgrades required at two signalized intersections to provide improved illumination for users, in addition to the need for audible pedestrian signals (APS) and overhead detection at many others.
Street Signs	77 regulatory and warning signs failed the yearly inspection in 2024 and therefore need to be renewed to meet legislative standards.
Guiderails	There is over 48,500m of cable guiderail that should be replaced with steel beam or high-tension guiderails as recommended by provincial standards. The approximate total cost to complete this is over $9.8M.

The above service deficiencies were identified from inspections, condition surveys, data analysis, staff expertise and available historical data.

5.1.3 Asset condition

Condition is currently monitored through inspections completed by staff and consultants. Condition is measured using a 1 – 5 grading system[5] as detailed in Table 5.1.3. 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.

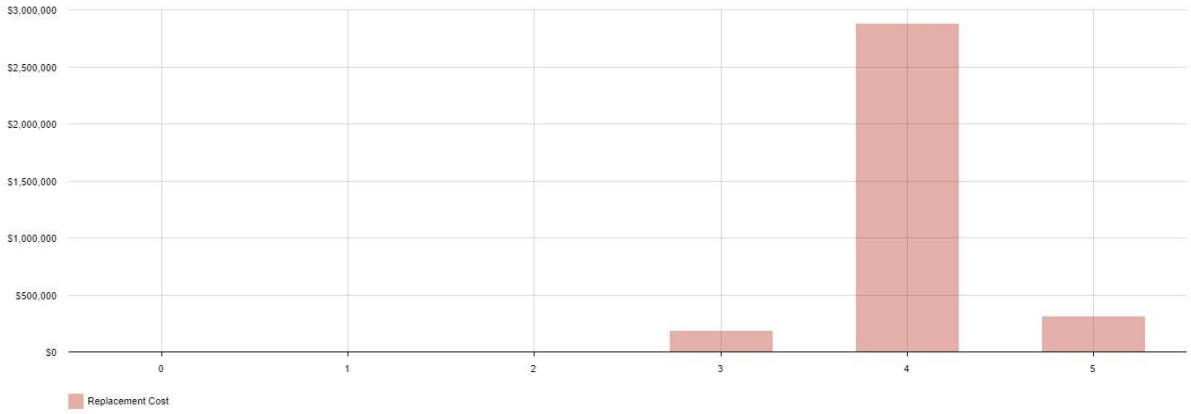
Table 5.1.3: Condition Grading System

Condition Grading	Description of Condition
5	**Very Good**: free of defects, only planned and/or routine maintenance required
4	**Good**: minor defects, increasing maintenance required plus planned maintenance
3	**Fair**: defects requiring regular and/or significant maintenance to reinstate service
2	**Poor**: significant defects, higher order cost intervention likely
1	**Very Poor**: physically unsound and/or beyond rehabilitation, immediate action required

The condition profile of our assets is shown in Figure 5.1.3.

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

Figure 5.1.3: Asset Condition Profile



All figure values are shown in 2024 dollars.

There are 116 streetlights, 18 traffic signals, 2961 warning signs and 2429 regulatory street signs. Overall, 2% of assets have a condition of fair indicating the likelihood of maintenance and renewal activities in the near future. Most of these assets (94%) are listed in good condition and will require ongoing operation and maintenance work prior to replacement. Finally, 4% of assessed assets are in very good condition meaning they have recently been replaced and will require maintenance activities to prolong their useful life.

The condition of our cross culverts and safety guiderails have not been formally assessed and therefore are not included in the condition profile above. 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 guiderail grass cutting, asset inspection, and utility costs.

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 pipe repairs, asphalt patching, and equipment repairs.

The trend in maintenance budgets are shown in Table 5.2.1.

Table 5.2.1: Maintenance Budget Trends

Year	Maintenance Budget $
2023	$82,100
2024	$117,700
2025	$119,300

Maintenance budget levels are considered to be inadequate to meet projected service levels, which may be less than or equal to current service levels. 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.

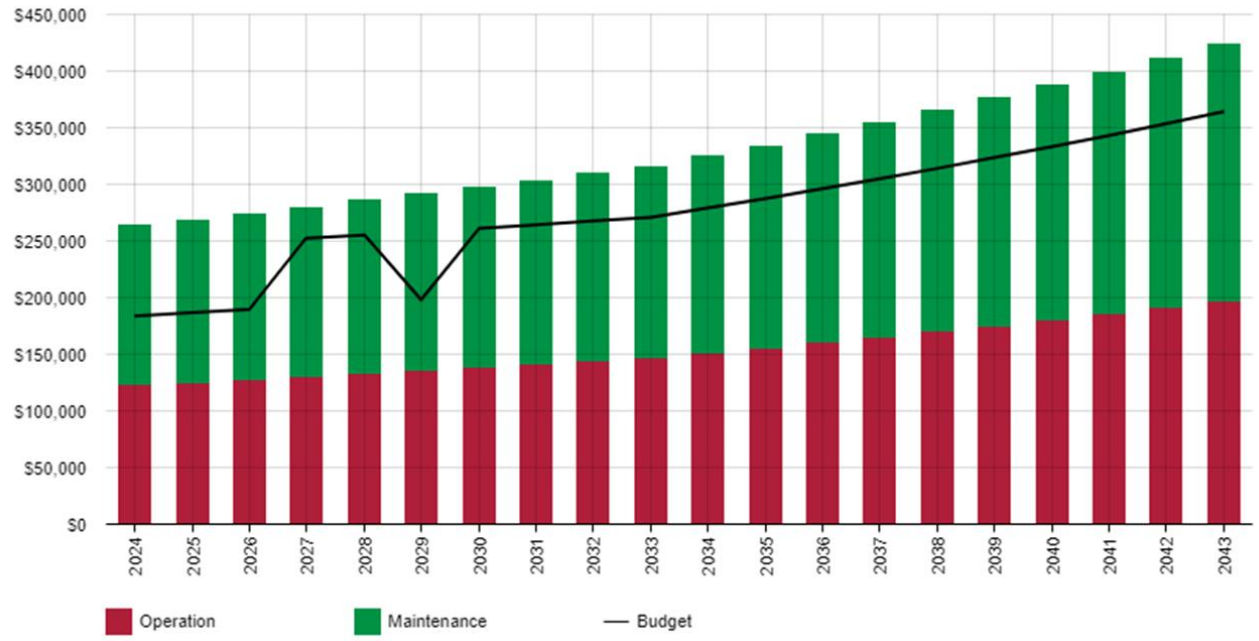
The County does not currently have a formal hierarchy framework in place however, several factors are considered when making decisions related to service planning and delivery of infrastructure assets. Information provided from inspections, studies, planned capital projects, development pressures, and any damage that occurs are key components that are evaluated.

Additionally, legislative requirements impact the delivery of these infrastructure 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 forecast 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 2024 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 annual sign and traffic signal 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 $55,723 on average per year over the period 2024-2033. 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 of 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 Category	Asset Type	Useful life
Cross Culverts	CONP	75 years
	CSP	50 years
Safety Guiderails	Cable	15 years
	Steelbeam	30 years
Signs	EGP	7 years
	Engineer	7 years
	High Int.	7 years
Streetlights and Flashing Beacons	Streetlights	15 years
	Flashing Beacons	8 years
Traffic Signals	Traffic Signals	12 years
	Pedestrian Signals	12 years

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 batteries on traffic signals), or
- To ensure the infrastructure is of sufficient quality to meet the service requirements (e.g. condition of a safety guiderail).[6]

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

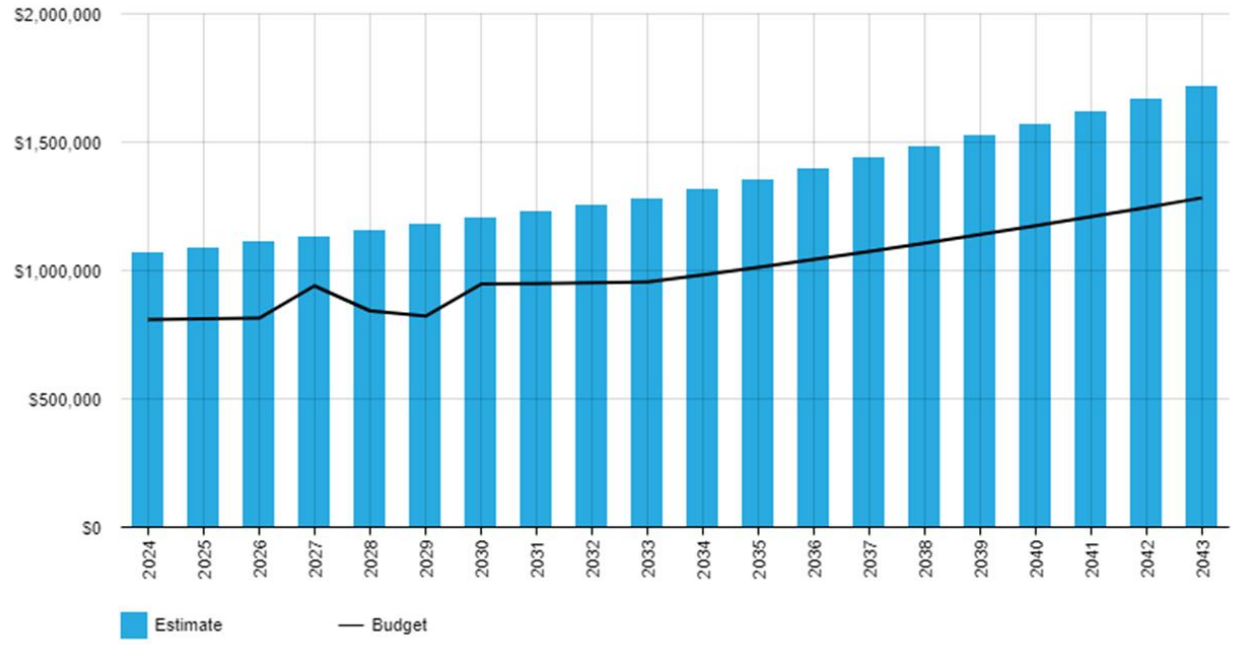
[6] IPWEA, 2015, IIMM, Sec 3.4.4, p 3|91.
[7] Based on IPWEA, 2015, IIMM, Sec 3.4.5, p 3|97.

Currently, the County does not have a formal ranking criteria to determine priority of identified renewal and replacement for the infrastructure assets included in this plan. However, information provided from inspections, studies, planned capital projects, development pressures, damage that occurs, legislative requirements and staff knowledge are used to determine renewal and replacement schedules.

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 2024 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. However, there are some renewal projects planned in 2024 (streetlight replacements, LED bulbs in traffic signals and UPS battery backup), as well as ongoing renewal of cross culverts and safety guiderails. Overall, there is an average shortfall of $284,503 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 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

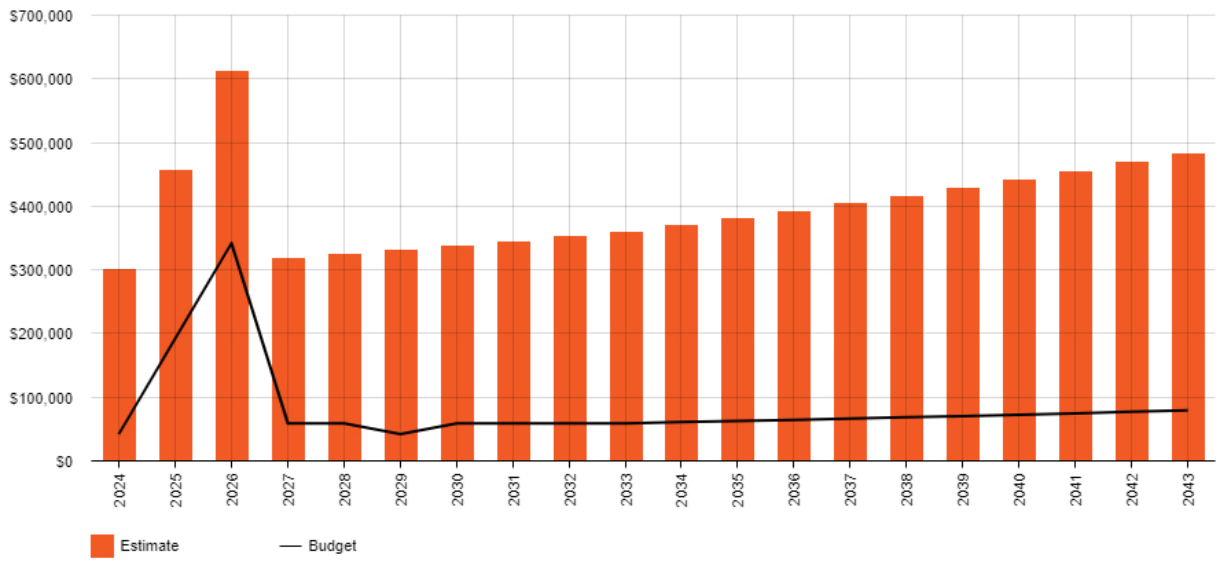
Proposed acquisition of new assets, and upgrade of existing assets, are identified from various sources such as community requests, proposals identified by strategic plans, Environmental Studies (EA's) or partnerships with others. Potential upgrade and new works should be reviewed to verify that they 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 as funds become available, implementation of proposals can be 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 are shown relative to the proposed acquisition budget. The forecast acquisition capital works program is shown in Appendix A.

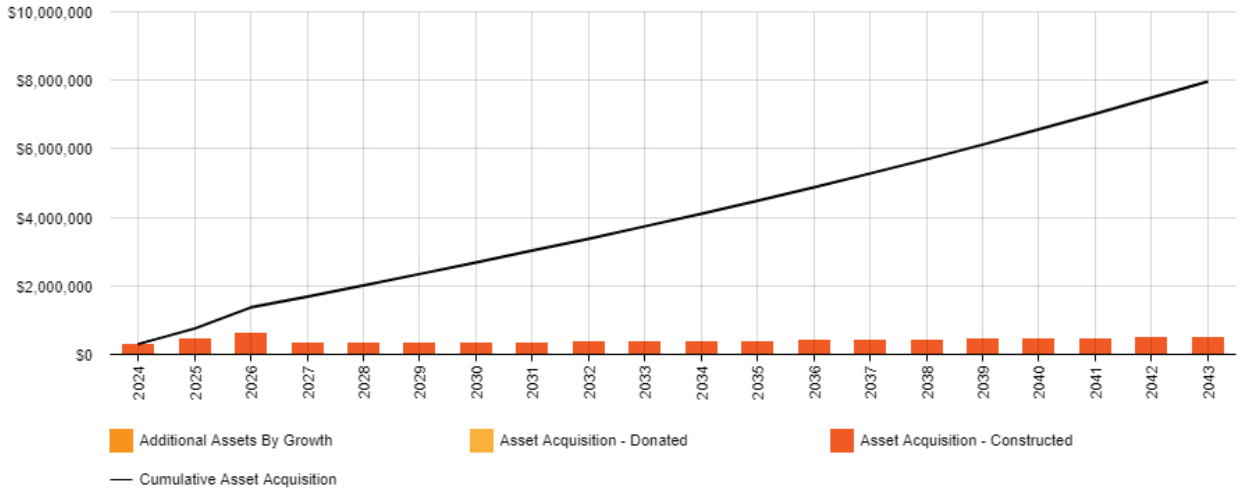
Figure 5.5.1: Acquisition (Constructed) Summary



All figure values are shown in 2024 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 is shown in Figure 5.5.2.

Figure 5.5.2: Acquisition Summary



All figure values are shown 2024 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 period as depicted in Figure 5.5.2 includes new traffic control signals at two locations, streetlights and/or flashing beacons which are all needed to keep up with the future growth of the County and service demands. Specifically, new traffic signals are planned to be installed at County Rd 20 (Elgin Street) and D'Arcy Street in 2025 through a cost sharing agreement with the Town of Cobourg. As well, in 2026 new traffic signals will be installed at on County Rd 20 (Elgin Street) at the intersection with Brook Road. Additional signage, new guiderails or extensions on existing guiderails are also needed in areas throughout the County and are thus included.

It is important to note that the Transportation Master Plan identified three (3) additional rural intersections that may require signalization in the future. If it is determined through further investigations that signalization is warranted, the acquisition and ongoing operations, maintenance and renewal costs would be additional to what is shown in this plan.

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

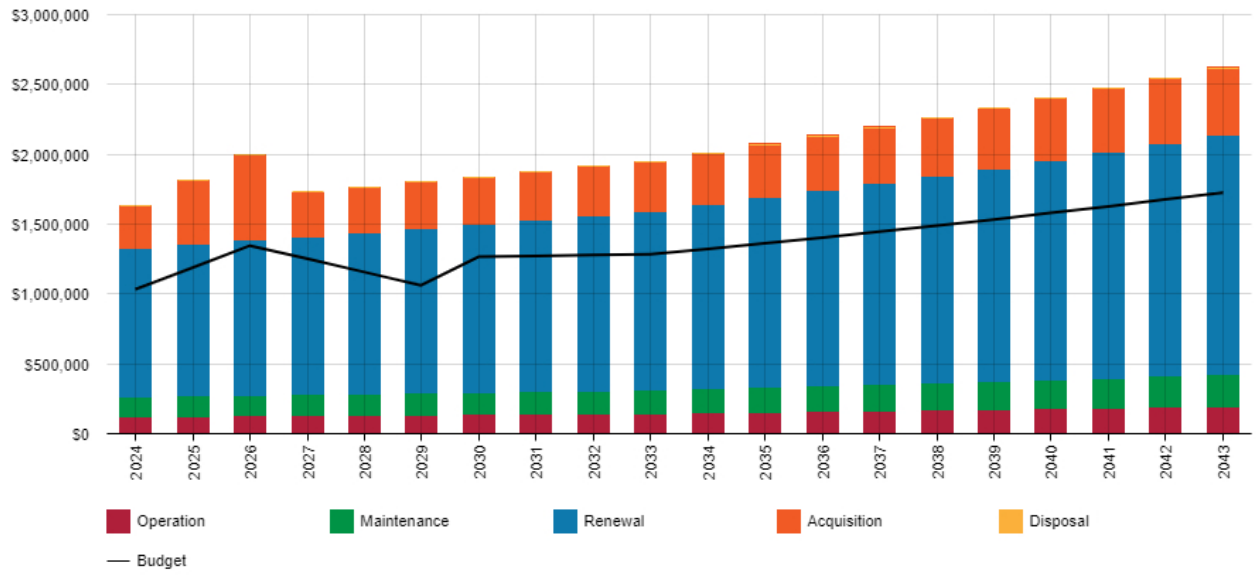
Asset	Reason for Disposal	Timing	Disposal Costs	Operations & Maintenance Annual Savings
N/A	N/A	N/A	N/A	N/A

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 graph represent the forecast costs needed to minimise 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 2024 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 $616,517 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 along with increasing maintenance costs will further exacerbate this shortfall if maintenance and operations

budgets are not adjusted to account for this. As a result, some 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[9] 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 summarised 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
Traffic Signals	Failure due to power outage, accident or natural disaster	Negative impact on transportation of people, goods and services within urban areas and safety concerns due to traffic volumes.
Signs (Regulatory and Warning)	Reduced visibility due to poor condition (fading, reduced reflectivity) or missing due to accident or theft	Signage provides necessary and crucial information to drivers about laws, potential hazards and navigation while traveling through the County and the failure of these in any form would increase risk and liability for the County by not meeting MMS.

[8] ISO 31000:2009, p 2

[9] REPLACE with Reference to the Corporate or Infrastructure Risk Management Plan as the footnote

Critical Asset(s)	Failure Mode	Impact
Safety Guiderails	Failure due to accident, fire, flooding or other natural disaster	Guiderails act as a physical barrier to help minimize accident severity and injuries by guiding out-of-control vehicles to safer locations. Failure of these assets negatively impacts road safety and increases risk and liability for the County by not meeting MMS.

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.

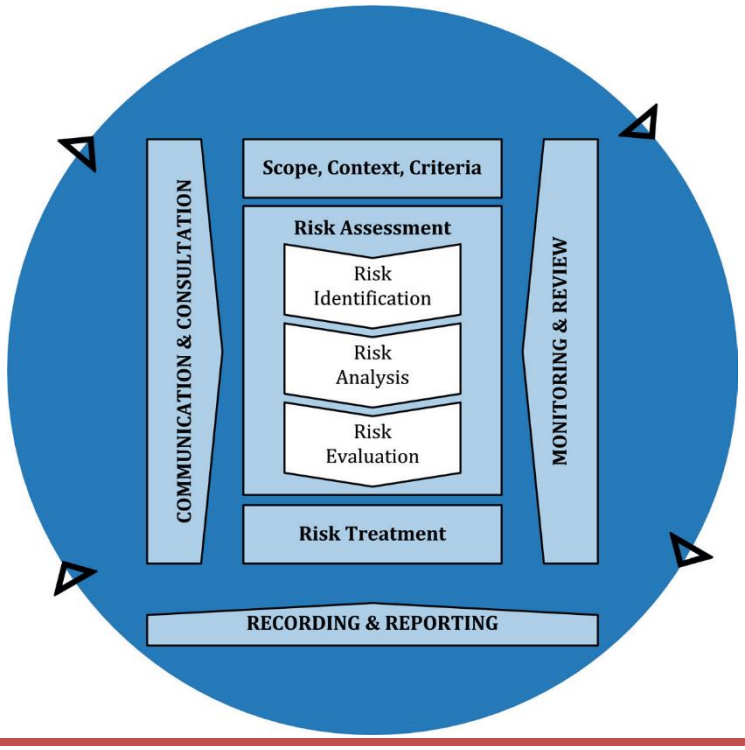
6.2 Risk Assessment

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[10] 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
Cross Culvert	Severe Flooding caused by culverts blocked by debris/sediment build up	H	Reactive maintenance as identified through road patrols, inspections, and complaints. Rehabilitation and upgrades through construction projects.	M	Prioritize maintenance and inspections on identified deteriorating assets. Rehabilitation and upgrades based on condition assessment.	M	Staff and equipment time, material costs, operation costs for consultant/contracted services to complete condition assessment.

[10] REPLACE with Reference to the Corporate or Infrastructure Risk Management Plan as the footnote

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
Cross Culvert	Failure/Collapse causing sinkholes in roadway	H	Reactive maintenance as identified through road patrols, inspections, and complaints. Rehabilitation and upgrades through construction projects.	M	Complete inspections and prioritize maintenance on identified deteriorating assets. Rehabilitation and upgrades based on condition assessment.	M	Staff and equipment time, material costs, operation costs for consultant/contracted services to complete condition assessment.
Guide rails	Drivers veer off roadway	H	Guiderail is rehabilitated or replaced with new during road rehabilitation or on as needed basis due to damage.	M	New and appropriate guiderails are installed where identified through inspections. Existing cable guiderails are replaced with steel beam.	L	Contracted services, capital budget costs for consultants if necessary for new guiderails.
Traffic Signals	Intense Storms cause power outage	H	13 traffic signals have UPS battery backup, however they failed inspections and require replacement. Three do not have battery backup.	M	Complete all UPS battery back-up renewals as needed and ensure all traffic signals have functioning battery backup.	L	Renewal costs for replacement backup batteries or installation of new UPS battery backup.

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
Street signs	Vandalism /Theft, Damage, Poor condition	M	Annual street sign inspections determine what signs need to be replaced or fixed.	M	Complete all priority repairs, maintenance and renewal as identified in inspections.	L	Staff time, maintenance and material costs.

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 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 all recommended operations and maintenance activities within the first 10 years, including all necessary repairs
- Complete all of renewal works required within the first 10 years to meet lifecycle demands
- Complete all upgrades/new to address future service demands

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
- Decreased LOS
- Failure of assets and use restrictions put in place
- Health and Safety risks for the residents and visitors

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 liabilities due to decrease in LOS
- 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 / proposed renewal outlays for the next 10 years shown in the AM Plan), and
- Lifecycle Funding Ratio / proposed lifecycle budget (for the next 10 years / proposed lifecycle outlays for the next 10-years shown in the AM Plan).

Asset Renewal Funding Ratio

Asset Renewal Funding Ratio[11] 75.66%

The Asset Renewal Funding Ratio is an important indicator and illustrates that over the next 10 years we expect to have 75.66% of the funds required for the optimal renewal of assets.

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

Lifecycle Funding Ratio – 10 year financial planning period

This AM Plan identifies the forecast operations, maintenance and renewal costs required to provide an agreed, and affordable 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 $1,457,517 on average per year.

The proposed (budget) operations, maintenance and renewal funding is $1,117,292 on average per year giving a 10 year funding shortfall of $340,225 per year. This indicates that 76.66% 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.

[11] 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 7.1.2 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 and/or financial projections in the long-term financial plan.

We will manage any '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 2024 dollar values.

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

Year	Acquisition	Operation	Maintenance	Renewal	Disposal	Total
2024	$300,000	$123,000	$140,700	$1,067,400	$0	$1,631,100
2025	$456,000	$125,460	$143,514	$1,088,748	$0	$1,813,722
2026	$612,120	$127,969	$146,384	$1,110,523	$0	$1,996,996
2027	$318,362	$130,529	$149,312	$1,132,733	$0	$1,730,936
2028	$324,730	$133,139	$152,298	$1,155,388	$0	$1,765,555
2029	$331,224	$135,802	$155,344	$1,178,496	$0	$1,800,866
2030	$337,849	$138,518	$158,451	$1,202,066	$0	$1,836,884
2031	$344,606	$141,288	$161,620	$1,226,107	$0	$1,873,621
2032	$351,498	$144,114	$164,852	$1,250,629	$0	$1,911,093
2033	$358,528	$146,996	$168,150	$1,275,642	$0	$1,949,316
Total	**$3,734,917**	**$1,346,815**	**$1,540,625**	**$11,687,732**	**$0**	**$18,310,089**

7.2 Funding Strategy

The proposed funding for assets is outlined in the Entity's budget and Long-Term financial plan.

The financial strategy of the entity 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

Northumberland County adopted its first multi-year budget for the years 2024 to 2026. The multi-year budget will allow staff and council to focus on longer term planning. The 2024 - 2026 budget and long-term financial plan is aligned with the County's Strategic Plan 2023 - 2027. The existing strategic plan identifies four strategic priorities:

1. Innovate for Service Excellence
2. Ignite Economic Opportunity
3. Foster a Thriving Community
4. Propel Sustainable Growth
5. Champion a Vibrant Future

The property tax levy increase approved by council for the 2024 budget year is 8.57%. After growth, the increase to the existing property owner is 6.57%. This increase includes a 1% increase for the dedicated infrastructure levy and another 1% increase for a new dedicated social housing levy. Growth in the 2024 - 2026 budget was estimated at 2.0%.

Inflation has been a significant issue for the county operating and capital budgets. Inflation rose sharply in 2021 and 2022 and has remained somewhat elevated since then. Consumer prices rose during this time at their fastest rate since 1991. These increases in inflation are being driven by sustained housing prices, substantial supply chain constraints, and geopolitical conflicts. The Consumer Price Index measure of inflation has only recently dropped to 2.9% (12 month change) in March of 2024.

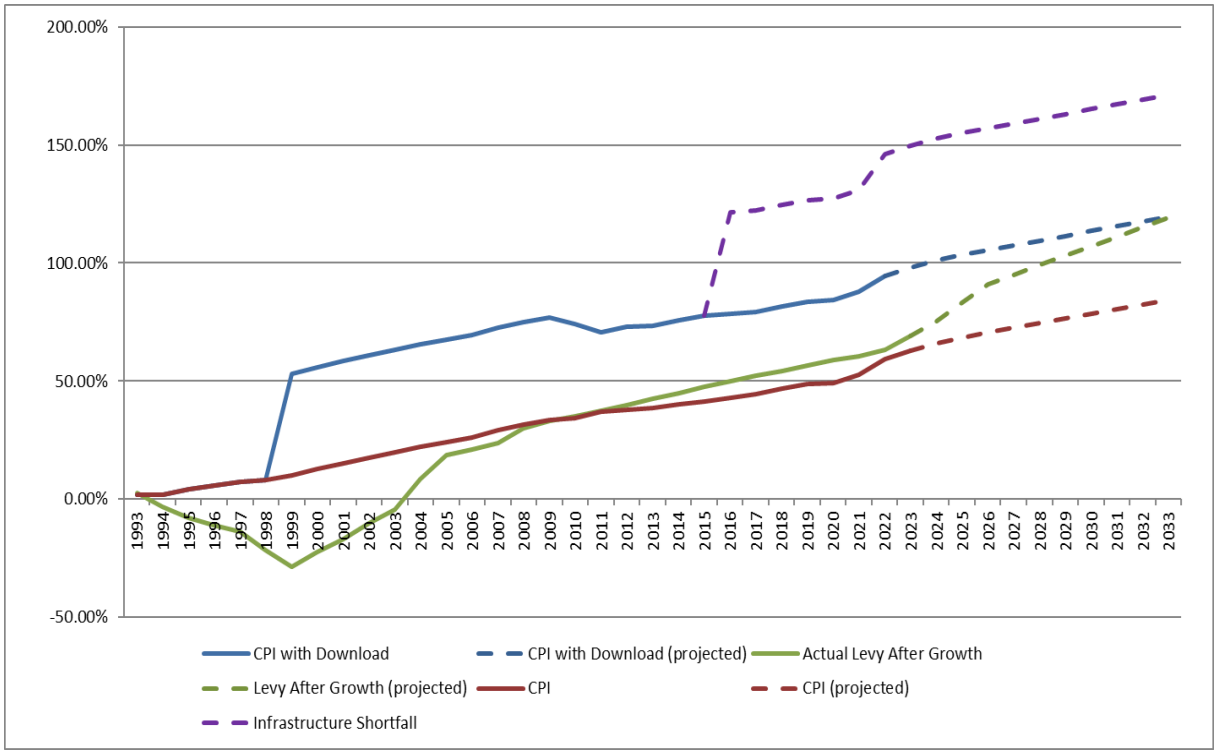
However, many of the goods and services purchased by the County move independently of the general rate of inflation as determined by a consumer basket of goods; therefore, CPI is not necessarily indicative of inflationary pressures experienced by the County. Expenditures such as construction and insurance 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 2023 was 5.5% for the Greater Toronto Area. This represents a more indicative measure of costs related to County infrastructure construction projects. These increases exceed the County's dedicated annual increase to infrastructure investment within the 2024 - 2025 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 underway and others 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, programs responsibilities such as County Roads stayed the same and therefore by the year 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 and 2022 Asset Management Plans. While this chart shows significant financial challenges in the past, currently 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 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 and will not maintain the required pace.

The Federal Gas Tax is the primary source of infrastructure funding available to the County. 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 the formula based Ontario Community Infrastructure Fund (OCIF) program in 2014 for small, rural and northern communities to use on core infrastructure assets. In 2024 the province will distribute a total of $400M in OCIF funding to eligible municipalities based on the current replacement value of their core assets.

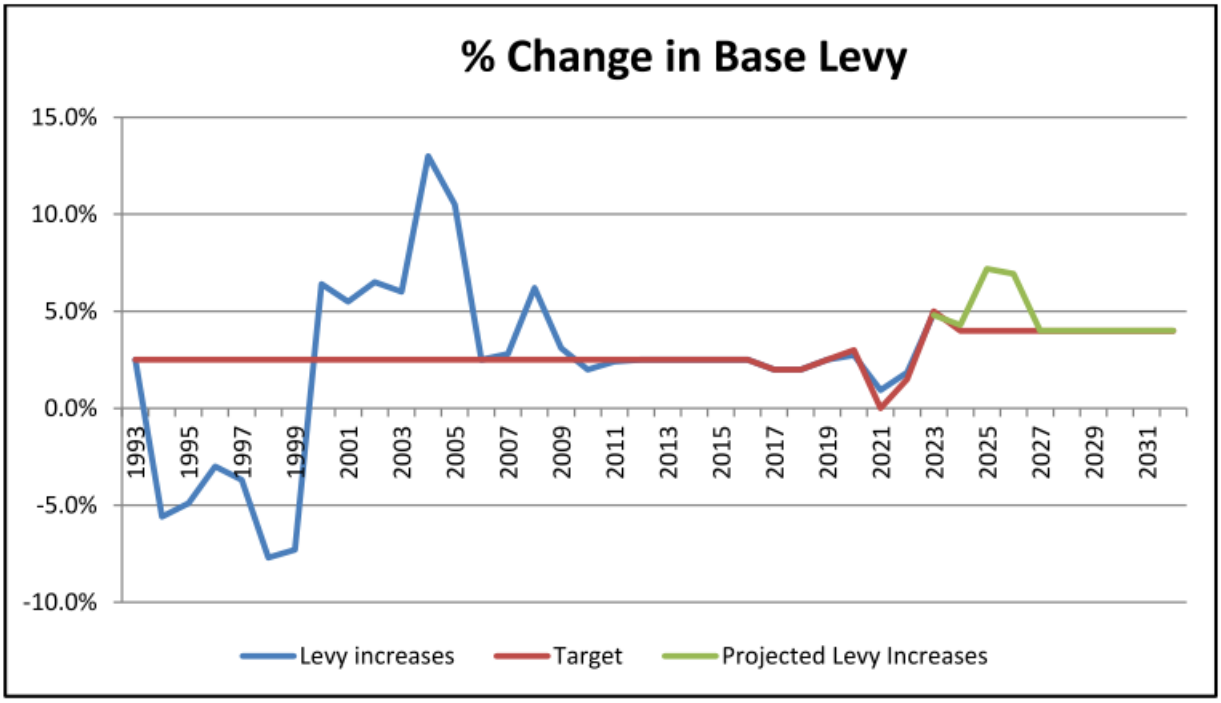
Application based funding programs are sporadic and require competition with other municipalities. In an environment where almost all municipalities are in need of infrastructure investments, the competition is fierce to chase relatively small pots of funding. Therefore, the level of annual increases is being reconsidered for future budgets as we develop plans to reach sustainable funding levels for both operating and capital budgets.

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.

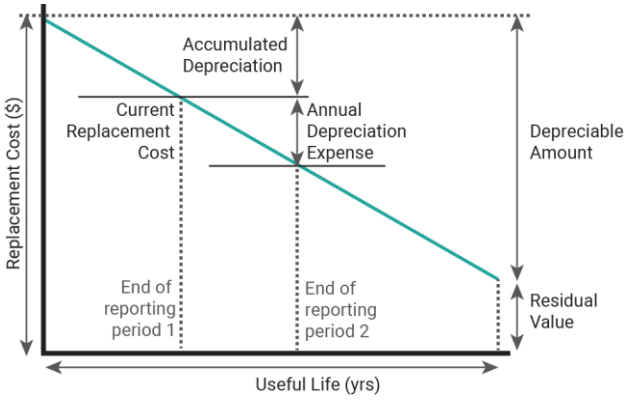
The County continues to work towards addressing the infrastructure deficit. Much of the infrastructure the County owns was downloaded from the Province in the form of roads, bridges and social housing. In many instances, this infrastructure is nearing the end of useful life and is inefficient and costly 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.

For a detailed review of the budget background and its components please refer to the Financial section of the Northumberland County Core Infrastructure Asset Management Plan.

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 estimates.



Replacement Cost (Gross)	$48,933,587
Depreciable Amount	$46,933,587
Current Replacement Cost[12]	$10,468,188
Annual Depreciation Expense	$2,662,763

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.
- 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.

Infrastructure Assets Assumptions:

- Assumed age of most cross culverts based on age of road.
- Assumed year acquired for missing streetlight and guiderail data as 2003 which is the average year these assets were acquired.

[12] Also reported as Written Down Value, Carrying Amount or Net Book Value in some jurisdictions.

- Used 2010 for the year the street signs were acquired as this appeared to be the average date.

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[13] 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 the reliability of data used in this AM Plan is shown in Table 7.5.2.

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 and staff discussion and knowledge

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

Data	Confidence Assessment	Comment
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, in addition to staff judgement/knowledge.
Operation forecast	Medium	Operation forecasts were determined using staff judgement/knowledge and current costs.
Maintenance forecast	Medium	Maintenance forecasts were determined through a variety of sources including needs identified, past expenditures and staff judgement/knowledge.
Renewal forecast - Asset values	Medium	Asset values were determined using the Current Replacement Costs (CRC) assigned through technical estimates or approximate price per sq ft where estimates unavailable.
- Asset useful lives	Medium	Useful lives were determined using industry standards and staff judgement/knowledge.
- Condition modelling	Low	Condition modelling is unavailable for cross culverts and safety devices and was determined through visual inspections and staff judgement/knowledge for all other assets covered in this plan.
Disposal forecast	Medium	Information on the disposal of assets is based on previous studies and investigations.

The estimated confidence level for the 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[14]

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.

8.1.2 Asset management data sources

Road 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 recognise 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.

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 and GIS 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	Guiderail condition assessment to determine current condition, renewal and replacement requirements.	Engineering Department Staff; Consultants	Staff time; funding	1-5 years
5	Cross culvert condition assessments to determine current condition, renewal and replacement requirements.	Engineering Department Staff; Consultants	Staff time; funding	1-5 years

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

Task	Task	Responsibility	Resources Required	Timeline
6	Complete Roadside Safety Audit to identify potential road safety issues and opportunities for improvements in safety for all road users.	Engineering Department Staff and/or Consultants	Staff time; funding	1-5 years
7	Further implementation and on-going use of Cityworks to better understand operational, maintenance and capital work that has been completed and the associated costs	Road Operations, Engineering and GIS Staff	Staff time	On-going
8	Discussions between Public Works, GIS/AM and Finance staff to better understand how assets are valued, tracked and amortized.	Public Works, GIS/AM and Finance Departments	Staff time	1-2 years
9	Formalized road infrastructure renewal ranking criteria weighting	Engineering Staff	Staff time	1-5 years
10	Develop a more robust risk management plan	All Departments	Staff time	1-5 years
11	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
12	Review of expenditure thresholds for capitalization of assets	Finance, Engineering, and GIS/AM 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 annually 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 Organisational target (this target is often 90 – 100%).

9.0 REFERENCES

- IPWEA, 2006, 'International Infrastructure Management Manual', Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/IIMM
- IPWEA, 2015, 3rd edn., 'International Infrastructure Management Manual', Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/IIMM
- IPWEA, 2008, 'NAMS.PLUS Asset Management', Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/namsplus.
- IPWEA, 2015, 2nd edn., 'Australian Infrastructure Financial Management Manual', Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/AIFMM.
- IPWEA, 2020 'International Infrastructure Financial Management Manual', Institute of Public Works Engineering Australasia, Sydney
- IPWEA, 2018, Practice Note 12.1, 'Climate Change Impacts on the Useful Life of Assets', Institute of Public Works Engineering Australasia, Sydney
- IPWEA, 2012, Practice Note 6 Long-Term Financial Planning, Institute of Public Works Engineering Australasia, Sydney, https://www.ipwea.org/publications/ipweabookshop/practicenotes/pn6
- IPWEA, 2014, Practice Note 8 – Levels of Service & Community Engagement, Institute of Public Works Engineering Australasia, Sydney, https://www.ipwea.org/publications/ipweabookshop/practicenotes/pn8
- ISO, 2014, ISO 55000:2014, Overview, principles and terminology
- ISO, 2018, ISO 31000:2018, Risk management – Guidelines
- Northumberland County Strategic Plan 2023-2027
- 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

A.2 – Acquisition Project Summary

The project titles included in the lifecycle forecast are included here.

Asset	Year	Acquisition Project	Forecast
Signs	2024	New ATV signs	$20,000
		Install warning signs	$30,000
Guiderails	2024	Additional guiderails or guiderail extensions	$50,000
Traffic Signals	2025	Additional cost for new traffic control signals	$150,000
	2026		$300,000
	2024-2033		$200,000 annually

A.3 – Acquisition Forecast Summary

Table A3 - Acquisition Forecast Summary

Year	Constructed	Donated	Growth
2024	$300,000	$0	$0
2025	$456,000	$0	$0
2026	$612,120	$0	$0
2027	$318,362	$0	$0
2028	$324,730	$0	$0
2029	$331,224	$0	$0
2030	$337,849	$0	$0
2031	$344,606	$0	$0
2032	$351,498	$0	$0
2033	$358,528	$0	$0
2034	$369,284	$0	$0
2035	$380,362	$0	$0

Year	Constructed	Donated	Growth
2036	$391,773	$0	$0
2037	$403,526	$0	$0
2038	$415,632	$0	$0
2039	$428,101	$0	$0
2040	$440,944	$0	$0
2041	$454,172	$0	$0
2042	$467,797	$0	$0
2043	$481,831	$0	$0

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
2024	$123,000	$140,700	$263,700
2025	$125,460	$143,514	$268,974
2026	$127,969	$146,384	$274,353
2027	$130,529	$149,312	$279,841
2028	$133,139	$152,298	$285,437
2029	$135,802	$155,344	$291,146
2030	$138,518	$158,451	$296,969
2031	$141,288	$161,620	$302,908
2032	$144,114	$164,852	$308,966
2033	$146,996	$168,150	$315,146
2034	$151,406	$173,194	$324,600
2035	$155,948	$178,390	$334,338
2036	$160,627	$183,742	$344,369
2037	$165,446	$189,254	$354,700
2038	$170,409	$194,931	$365,340
2039	$175,521	$200,779	$376,300
2040	$180,787	$206,803	$387,590
2041	$186,211	$213,007	$399,218
2042	$191,797	$219,397	$411,194
2043	$197,551	$225,979	$423,530

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

- All forecasted costs based on technical estimates

C.2 – Renewal Project Summary

The project titles included in the lifecycle forecast are included here.

Asset	Year	Forecast
Cross Culverts	2024	$150,000
Sign Materials	2024	$80,000
Traffic Signals	2024	$52,000
Guiderails	2024	$775,000

C.3 – Renewal Forecast Summary

Table C3 - Renewal Forecast Summary

Year	Renewal Forecast	Renewal Budget
2024	$1,067,400	$808,400
2025	$1,088,748	$811,700
2026	$1,110,523	$814,600
2027	$1,132,733	$940,000
2028	$1,155,388	$842,400
2029	$1,178,496	$821,800
2030	$1,202,066	$947,200
2031	$1,226,107	$949,600
2032	$1,250,629	$952,200
2033	$1,275,642	$954,800
2034	$1,313,911	$983,444
2035	$1,353,328	$1,012,947
2036	$1,393,928	$1,043,336

Year	Renewal Forecast	Renewal Budget
2037	$1,435,746	$1,074,636
2038	$1,478,819	$1,106,875
2039	$1,523,183	$1,140,081
2040	$1,568,879	$1,174,284
2041	$1,615,945	$1,209,512
2042	$1,664,423	$1,245,797
2043	$1,714,356	$1,283,171

Appendix D Disposal Summary

D.1 – Disposal Forecast Assumptions and Source

Describe the assumptions and include relevant information relating to the Disposal Forecast.

D.2 – Disposal Project Summary

The project titles included in the lifecycle forecast are included here.

D.3 – Disposal Forecast Summary

Table D3 – Disposal Activity Summary

Year	Disposal Forecast	Disposal Budget
N/A	N/A	N/A

Appendix E Budget Summary by Lifecycle Activity

Assumptions relating to the budget include:

- The Long-Term Financial plan, and proposed budget documents 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 E1 – Budget Summary by Lifecycle Activity

Year	Acquisition	Operation	Maintenance	Renewal	Disposal	Total
2024	$42,000	$66,000	$117,700	$808,400	$0	$1,034,100
2025	$192,000	$67,400	$119,300	$811,700	$0	$1,190,400
2026	$342,000	$69,099	$120,600	$814,600	$0	$1,346,299
2027	$59,000	$70,737	$181,700	$940,000	$0	$1,251,437
2028	$59,000	$72,414	$182,900	$842,400	$0	$1,156,714
2029	$42,000	$74,131	$124,100	$821,800	$0	$1,062,031
2030	$59,000	$75,890	$185,300	$947,200	$0	$1,267,390
2031	$59,000	$77,691	$186,700	$949,600	$0	$1,272,991
2032	$59,000	$79,535	$188,100	$952,200	$0	$1,278,835
2033	$59,000	$81,425	$189,500	$954,800	$0	$1,284,725
2034	$60,770	$83,868	$195,185	$983,444	$0	$1,323,267
2035	$62,593	$86,384	$201,041	$1,012,947	$0	$1,362,965
2036	$64,471	$88,975	$207,072	$1,043,336	$0	$1,403,854
2037	$66,405	$91,645	$213,284	$1,074,636	$0	$1,445,969
2038	$68,397	$94,394	$219,682	$1,106,875	$0	$1,489,348
2039	$70,449	$97,226	$226,273	$1,140,081	$0	$1,534,029
2040	$72,563	$100,142	$233,061	$1,174,284	$0	$1,580,050
2041	$74,739	$103,147	$240,053	$1,209,512	$0	$1,627,451
2042	$76,982	$106,241	$247,255	$1,245,797	$0	$1,676,275
2043	$79,291	$109,428	$254,672	$1,283,171	$0	$1,726,563