LANARK COUNTY

ASSET MANAGEMENT PLAN

2022

Table of Contents

Figures

Tables

Appendix

Acronyms and Abbreviations

°C	degrees Celsius
a.m.	ante meridiem
AADT	average annual daily traffic
ACR	aluminum copper radiators
ALOS	Asset Level of Service
AM	Asset Management
AMP	Asset Management Plan
AODA	Accessibility for Ontarians with Disabilities Act
BCI	Bridge Condition Index
Bldg	Building
C	climate change factor
CAO	Chief Administrative Officer
CCTV	closed-circuit television
CLOS	Community Level of Service
Corp	Corporation
County	Lanark County
CSA	Canadian Standards Association
CSP	Corrugated Steel Pipe
DPSS	Dillon Predictive Scenario Software
e.g.	exempli gratia (for example)
EMC	electromagnetic compatibility
ES	Executive Summary
etc.	etcetera (and so forth)
FCM	Federation of Canadian Municipalities
HCB	High Class Bituminous
HDPE	high density polyethylene
i.e.	id est (that is)
ID	identification

IT	Information Technology
km	kilometre
KPI	key performance indicator
LCB	Low Class Bituminous
LED	light-emitting diode
LOS	Level of Service
Ltd.	Limited
m	metre
M	million
m2	square metre
Maint	maintenance
Max	maximum
Min	minimum
MOE	Ministry of the Environment
MTO	Ontario Ministry of Transportation
N	North
N/A	Not Applicable
No.	number
O & M	Operations and Maintenance
O. Reg.	Ontario Regulation
OSIM	Ontario Structure Inspection Manual
p.m.	post meridiem
PCI	Pavement Condition Index
PVC	polyvinyl chloride
Qty	quantity
Recons	reconstruction
Rehab	rehabilitation
St	street
sq.	square
UPS	Uninterrupted Power Supply

Executive Summary

Lanark County has updated its 2016 Asset Management Plan (AMP) in alignment with the County's Strategic Asset Management Policy and the new regulation guiding municipalities in the development of asset management plans (O. Reg. 588/17 and as amended by O. Reg. 193/21).

Overview of the AMP

The Introduction (Section 1.0) presents an overview of key concepts of asset management such as the State of Local Infrastructure, Levels of Service, Risk Assessment and Lifecycle Activities, concluding with a section on Growth and a Roadmap with Next Steps.

The core assets included in the AMP are:

- Roads (Section 2.0);
- Bridges and Structural Culverts (Section 3.0); and
- Stormwater (Section 4.0).

The non-core assets included in the AMP are:

- Buildings & Facilities (Section 5.0);
- Traffic Lights (Section 6.0);
- Fleet (Section 7.0);
- Emergency Services (Section 8.0);
- Social Housing (Section 9.0); and
- IT Infrastructure (Section 10.0).

The financing strategy is presented in Section 11.0.

Policy Alignment

This asset management plan was developed in alignment with the County's Strategic Asset Management Policy (Report # FIN-11-2019).

The purpose of the policy is to establish consistent standards and guidelines for management of the County's assets applying sound technical, social and economic principles that consider present and future needs of users, and the service expected

from the assets. This means leveraging the lowest lifecycle cost of ownership with regard to the service levels that best meet the needs of the community while being cognizant of the risk of failure that is acceptable.

Within the policy the County states the importance of strategic alignment with other planning documents at the County, namely a Strategic Plan, an Official Plan, an Emergency Response Plan, and an Asset Management Plan.

These plans were designed to meet the legislative requirements and work together to achieve the County's mission of providing innovation and excellence in service delivery. These plans will be reviewed regularly by staff and annual spending requirements in support of the plans' objectives will be incorporated into the budgeting process. All of the County's plans rely to some extent on the physical assets owned by the County and the commitment of staff to ensure their strategic use. This includes the long-term maintenance, repair, and replacement of existing assets along with the acquisition of new assets to meet the evolving needs in the County.

Regulatory Alignment

The 2022 AMP update is aligned with the requirements of **O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure** and as amended by O. Reg. 193/21 which requires all core assets to be covered in the asset management plan with current Level of Service (LOS). Core assets owned by the County include roads, bridges/culverts and stormwater. This update also includes non-core assets such as buildings, fleet and emergency services.

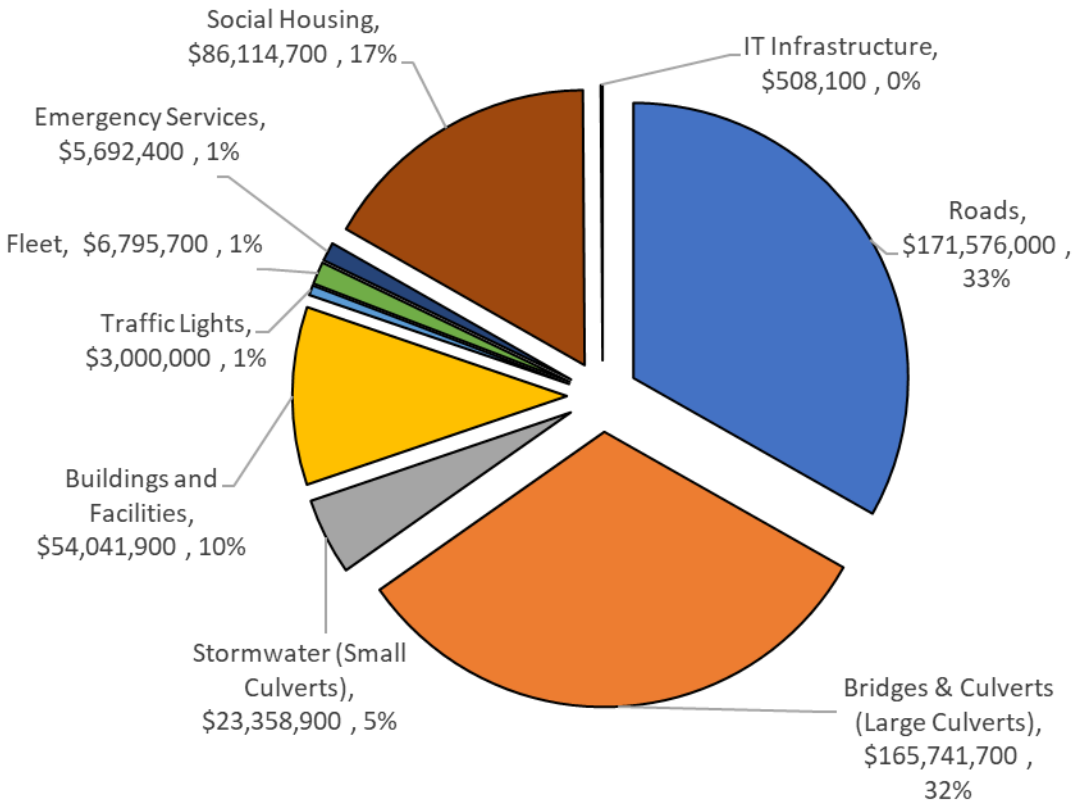
Roadmap with Next Steps

Future updates will need to include green infrastructure assets (i.e. natural assets) owned by the County and further assessment on infrastructure vulnerability to the impacts caused by climate change related to operations, levels of service and lifecycle management.

Current Replacement Value

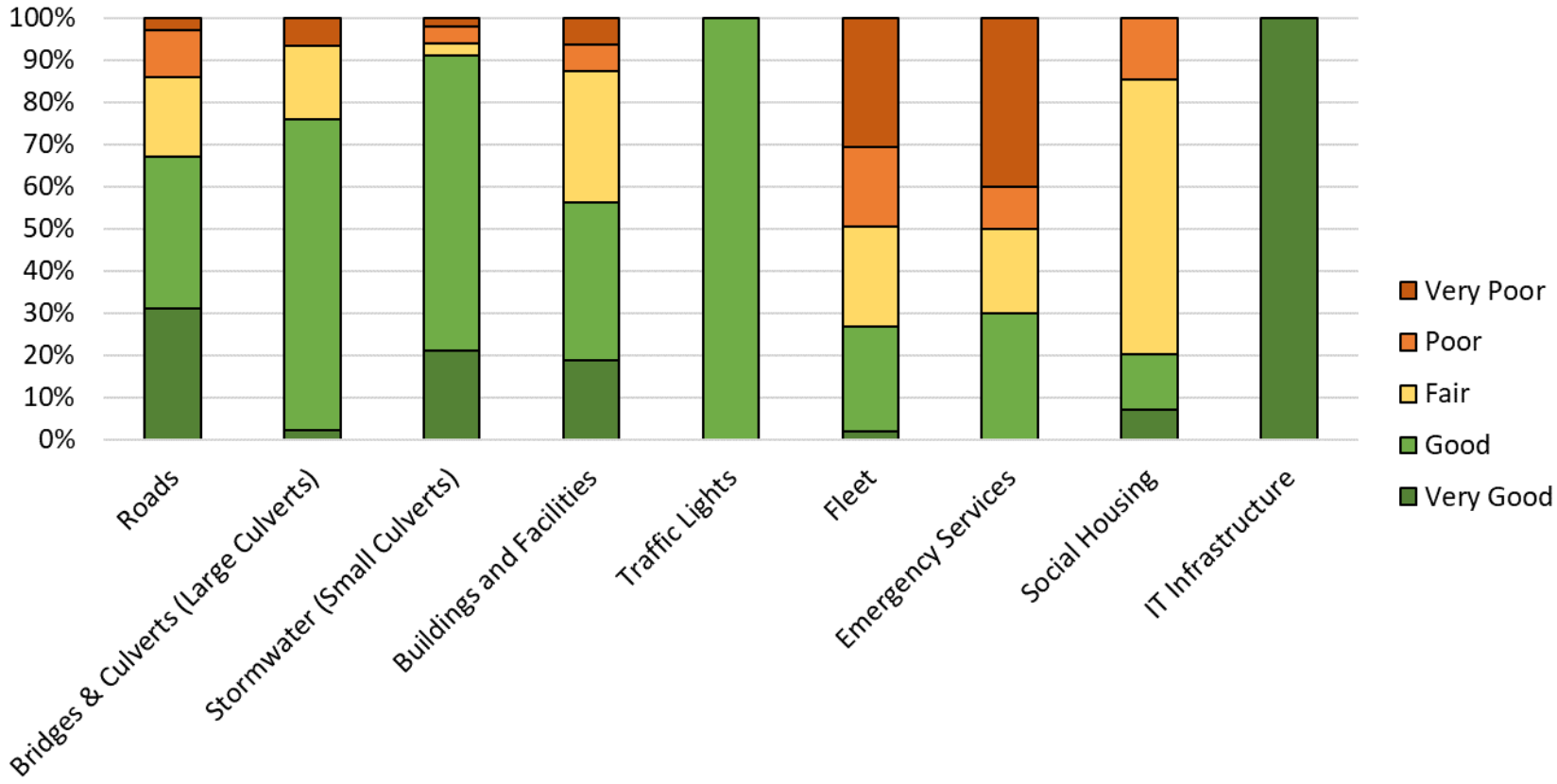
The current replacement cost for all infrastructure assets owned by the County of Lanark is $517 million (in 2022 dollars). The distribution of this replacement cost is shown in **Figure ES- 1**.

Figure ES- 1: Distribution of Replacement Cost



The current condition of each of the asset categories is presented in **Figure ES-2.**

Figure ES- 2: Current Condition of Asset Categories

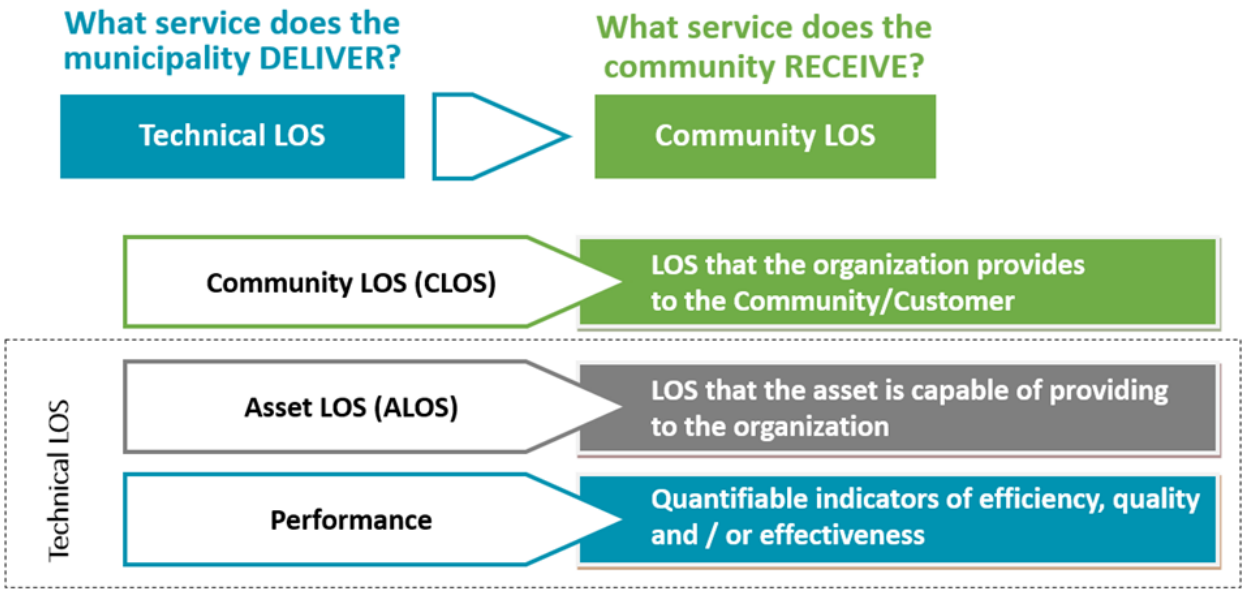


Levels of Service (LOS)

Levels of Service (LOS) are presented in **Figure ES- 3** and defined as follows:

- **Community LOS:** LOS that the organization provides to the community, intended to be customer-focused, providing a qualitative description of scope and quality; and
- **Technical LOS:** LOS that the asset is capable of providing to the County which is further measured by the performance of the asset, providing technical metrics that support the delivery of LOS.

Figure ES- 3: Levels of Service



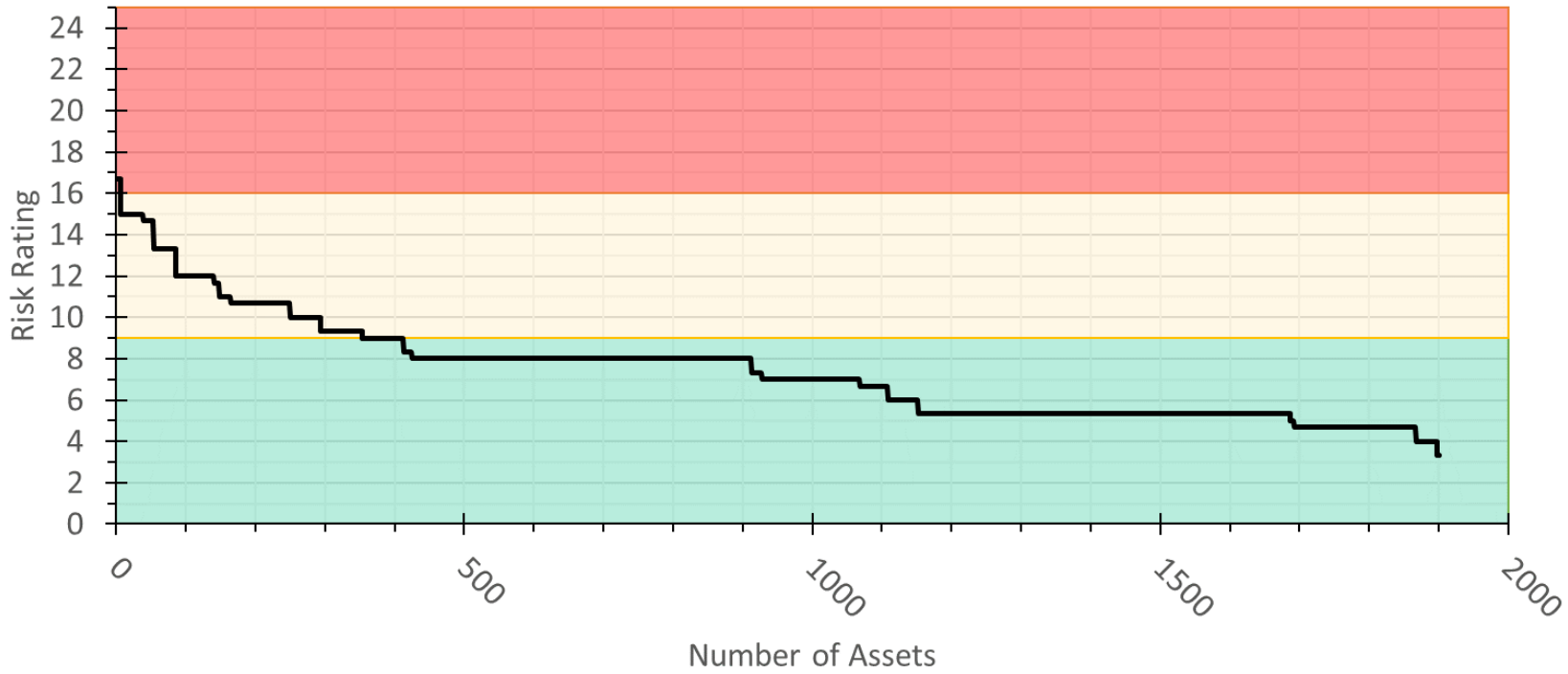
The current and proposed LOS are described in terms of technical metrics and qualitative descriptions for each asset type. These descriptions are prescribed for core assets (including stormwater, roads, and bridges and culverts) within Ontario Regulation (O. Reg.) 588/17.

Through the AMP development, the County sought to establish current and proposed LOS in accordance with O. Reg. 588/17.

For the non-core assets included within this AMP, the County sought to define and establish current and proposed LOS in line with the intent of O. Reg. 588/17.

As part of this process, the County undertook education and working sessions with internal stakeholders, and provided a survey for public feedback to understand level of service concepts, and gain understanding of public perception of the levels of service.

Risk Profile



Of the approximate 1900 assets tracked within the County's asset management data only six are classified as High risk rating and approximately 350 as Moderate risk rating. These assets are considered high and moderate priorities for the implementation of lifecycle activities and possible replacement. The remaining assets are considered Low risk rating.

Acknowledgements

The consulting team would like to express our appreciation to the staff and Council for their cooperation and input to this update. We acknowledge their commitment and flexibility to contribute to this project despite the challenges brought into daily operations as a result of the global pandemic.

Project Team

- Kevin Wills, Treasurer;
- Megan Beson, Deputy Clerk;
- David Dicaire, Housing Operations Supervisor;
- Kurt Greaves, CAO;
- Emily Hollington, Director of Social Services;
- Christa Lowry, Mayor of Mississippi Mills; and
- Joan Pratt, Business Manager.

About this Report

Dillon Consulting Limited was retained by Lanark County to conduct an update to their Asset Management Plan to meet the requirements of O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure and as amended by O. Reg. 193/21.

Consulting Team

- Darla Campbell, Project Manager;
- Kaelee Oxford, Technical Lead; and
- Joseph Hoekstra, Financial Strategy.

1.0 Introduction

Lanark County (County) is updating its 2016 Asset Management Plan (AMP) in alignment with the County's Strategic Asset Management Policy (Report # FIN-11-2019 – Strategic Asset Management Policy) and **O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure.**

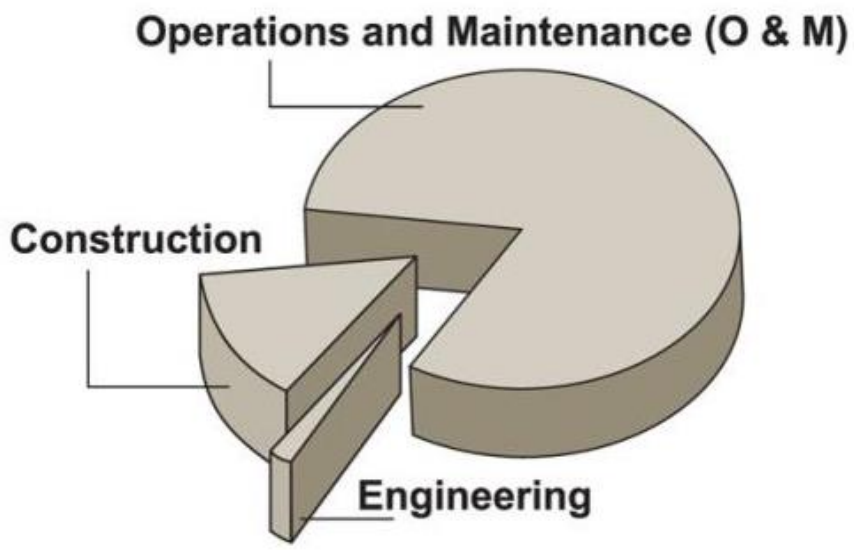
The AMP documents the County's assets and strategies based on known information at the time of writing the report. This plan is prepared in 2022 and is a snapshot of a period of time. Assets will continue to deteriorate and investments will be required to improve the condition and extend the useful life of the infrastructure, to meet the "fit for purpose" measure of the assets in delivery of the services and meeting (or moving towards) the proposed levels of service established by the County.

1.1 Asset Management Overview

Asset management is a process of making the best possible decisions regarding the creation, maintenance, renewal, rehabilitation, disposal, expansion and procurement of infrastructure assets. The objective of asset management is to maximize the benefits of the assets, minimize risk and provide satisfactory levels of service to the public in a sustainable manner. It considers risks related to the lifecycle of the assets and requires a multi-disciplinary team of planning, finance, engineering, technology, maintenance and operations.

Asset management considers the full lifecycle of the infrastructure, not just the initial cost for designing and constructing the asset (20%), but the operations and maintenance each and every year (80%). See **Figure 1-1**.

Figure 1-1: Lifecycle Approach (Infraguide 2005)



The provision of reliable infrastructure is crucial for ensuring that the County can continue to deliver reliable services to its current residents and to accommodate growth in a manner which is environmentally, socially and economically sustainable.

To ensure that the County is able to provide infrastructure that meets the needs of residents now and in the future the County has developed and implemented an asset management plan. The intent of the asset management plan is to identify the technical and financial needs of assets well in advance of a major asset renewal or replacement so that the County is able to plan for these major projects should the timing of the needs coincide.

The structure of the County's Asset Management Plan is based on the essential elements framework described in the Federation of Canadian Municipalities (FCM)'s Infraguide for Managing Infrastructure Assets, which includes seven questions. A summary of the seven questions and the corresponding sections within this report in which it is addressed is shown in **Table 1-1.**

Table 1-1: Seven Essential Questions and Report Sections

Question	Report Section
1. What do you have and where is it?	**State of Local Infrastructure**
2. What is it worth?	**State of Local Infrastructure**
3. What is its condition and expected remaining service life?	**State of Local Infrastructure**
4. What is the level of service expectation, and what needs to be done?	**Levels of Service** **Lifecycle Activities** **Asset Management Strategy**
5. When do you need to do it?	**Asset Management Strategy**
6. How much will it cost and what is the acceptable level of risk(s)?	**Asset Management Strategy** **Risk Assessment**
7. How do you ensure long-term affordability?	**Financing Strategy**

1.2 Overview of the AMP

This introduction includes an overview of key asset management principles: State of Local Infrastructure, Levels of Service, Risk Assessment and Lifecycle Activities. The introduction concludes with a section on Growth and a Roadmap with Next Steps.

The core and non-core assets included in the AMP are presented in **Table 1-2**.

Table 1-2: Core and Non-Core Assets

Core Assets	Non-Core Assets
• Roads (Chapter 2) • Bridges and Culverts (Chapter 3) • Stormwater (Chapter 4)	• Buildings & Facilities (Chapter 5) • Traffic Lights (Chapter 6) • Fleet (Chapter 7) • Emergency Services (Chapter 8) • Social Housing (Chapter 9) • IT Infrastructure (Chapter 10)

Each asset category presents the following topics:

1. State of Local Infrastructure;
2. Condition;
3. Current Levels of Service;
4. Current Performance;
5. Risk Assessment;
6. Lifecycle Activities;
7. Asset Management Strategy; and
8. Proposed Levels of Service.

1.2.1 Policy Alignment

This asset management plan was developed in alignment with the County's Strategic Asset Management Policy (Report # FIN-11-2019).

The purpose of the policy is to establish consistent standards and guidelines for management of the County's assets applying sound technical, social and economic principles that consider present and future needs of users, and the service expected from the assets. This means leveraging the lowest lifecycle cost of ownership with regard to the service levels that best meet the needs of the community while being cognizant of the risk of failure that is acceptable.

Within the policy the County states the importance of strategic alignment with other planning documents at the County, namely a Strategic Plan, an Official Plan, an Emergency Response Plan, and an Asset Management Plan. These plans were designed to meet the legislative requirements and work together to achieve the County's mission of providing innovation and excellence in service delivery. These plans will be reviewed regularly by staff and annual spending requirements in support of the plans' objectives will be incorporated into the budgeting process. All of the County's plans rely to some extent on the physical assets owned by the County and the commitment of staff to ensure their strategic use. This includes the long-term maintenance, repair, and replacement of existing assets along with the acquisition of new assets to meet the evolving needs in the County.

Stakeholder Engagement: As established in the policy, the County recognizes the need for stakeholder engagement as an integral component of a comprehensive asset management approach. The County commits to provide opportunities for residents and other stakeholders serviced by the County to provide input into asset management planning process, and will foster informed dialogue using the best available information.

This was achieved through workshops with staff and a level of service on-line survey.

1.2.2 Regulatory Alignment

The 2022 AMP is an update to the 2016 AMP which requires alignment with the new regulation, **O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure**.

The regulation requires the following four phases of compliance:

1. By July 2019: Municipalities to have a strategic asset management policy;
2. By July 2022: All core assets to be covered in the asset management plan with current Level of Service (LOS). Core assets include water, wastewater, stormwater, roads and bridges/culverts;
3. By July 2024: All assets owned by the municipality to be covered in the AMP. Non-core assets include buildings, fleet and equipment as well as green infrastructure assets; and
4. By July 2025: Municipalities will have approved proposed LOS and the lifecycle management and financial strategy for 10-year period to achieve the proposed LOS.

This AMP meets phase 3 requirements for all asset categories except natural assets.

This AMP sets out proposed (target) levels of service and a financing strategy to meet the proposed levels of service for all core and non-core infrastructure assets. Once approved by Council, will move the County forward to phase 4 compliance.

Future updates will need to include green infrastructure assets (i.e. natural assets) owned by the County and further assessment on infrastructure vulnerability to the impacts of climate change.

Inclusive of all other assets owned by the County, this AMP provides an overview of what is needed to continue to deliver the services required of the community in the future. The asset management plan identifies the required investments to maintain service delivery for the next 10 years. The plan will be updated on an ongoing basis with

the availability of new information, and the regulation requires annual reporting to Council on the progress (and barriers) to implementing the AMP.

1.3 State of Local Infrastructure

Each section on the State of Local Infrastructure sets out the following:

- A summary of the assets in the category;
- The replacement cost of the assets in the category;
- The average age of the assets in the category, determined by assessing the average age of the components of the assets;
- The information available on the condition of the assets in the category; and
- A description of the County's approach to assessing the condition of the assets in the category, based on recognized and generally accepted good engineering practices where appropriate.

1.3.1 Asset Inventory

The inventory includes assets that are owned by the County. The County maintains comprehensive databases of their assets including detailed attributes of the assets. The inventory was compiled prior to initiation of this work, and was provided by the County.

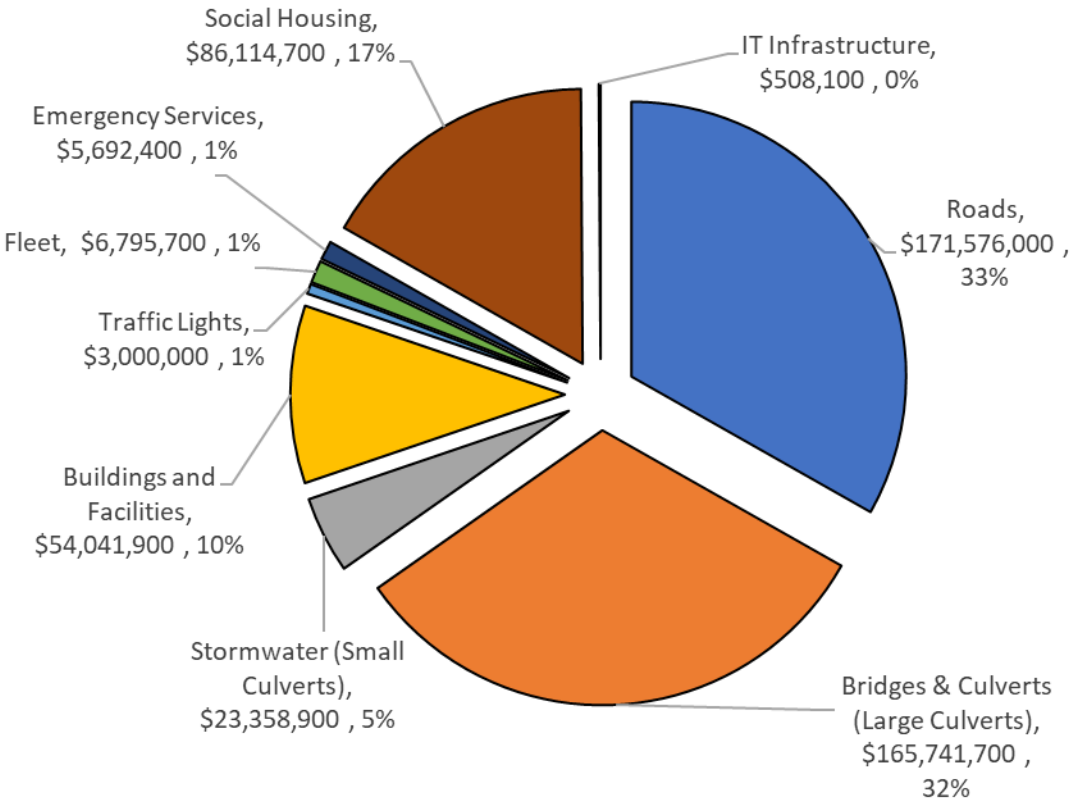
Lanark County owns infrastructure assets that provide services in the following asset categories: Roads; Bridges and Culverts; Stormwater; Buildings and Facilities; Traffic Lights; Fleet; Emergency Services; Social Housing and IT Infrastructure.

The County owned assets included within this Asset Management Plan include core assets (as defined in O. Reg. 588/17) and non-core assets as previously presented in **Table 1-2**.

1.3.2 Asset Replacement Costs

The total replacement cost for the County's infrastructure assets is: $517 million (in 2022 dollars). The distribution of this replacement cost is shown in **Figure 1-2**, with roads, bridges and culverts making up 64% of the replacement costs.

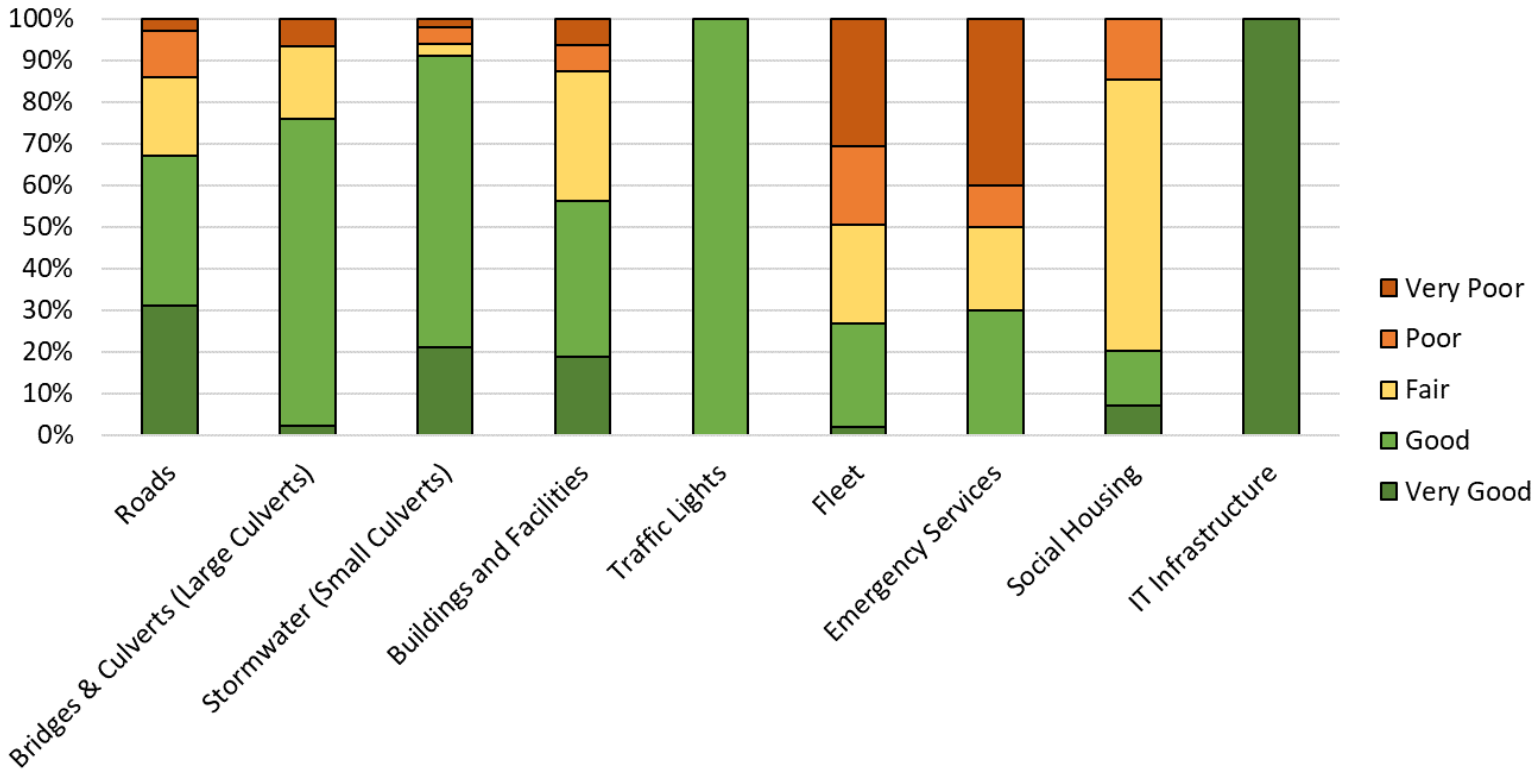
Figure 1-2: Distribution of Replacement Cost



1.3.3 Asset Condition Summary

A summary of the condition for each of the County's infrastructure assets is shown in **Figure 1-3**. On average, 21% of the County's infrastructure assets have a condition rating of Very Good, 35% have a condition rating of Good, 24% have a condition rating of Fair, 8% have a condition rating of Poor, and 11% have a condition rating of Very Poor.

Figure 1-3: Summary of Condition of All Infrastructure Assets



1.3.4 Asset Hierarchy

The asset hierarchy defines the tiers of asset componentry. Each type of asset, both complex and linear, can have its assets defined and inventoried at a high level, or with increased component detail. The County currently tracks their assets to a subcomponent level. An example of the componentry within the buildings and facilities is shown in **Table 1-3.** The components of the assets have been defined with their category, assets, components and subcomponents.

Table 1-3: Asset Hierarchy Example

Asset Category	Asset Component	Subcomponent
Roads	Road Base	Shoulders
	Road Surface	Street lights

For this Asset Management Plan (AMP), the analysis will focus on assets at the 'asset component' level for the linear assets, with the expectation that the condition and replacement of the components and subcomponents will be consistent with the linear assets. This is predicated on the assumption that all other elements included in the system are required componentry that will be replaced in conjunction with the linear components, and are expected to have similar lifespans and conditions as the linear components.

Buildings and facilities are considered complex assets. Complex assets are classified as assets which have various components which will be considered within the AMP. The components that will be included in the AMP are described in the buildings and facilities chapter of this report.

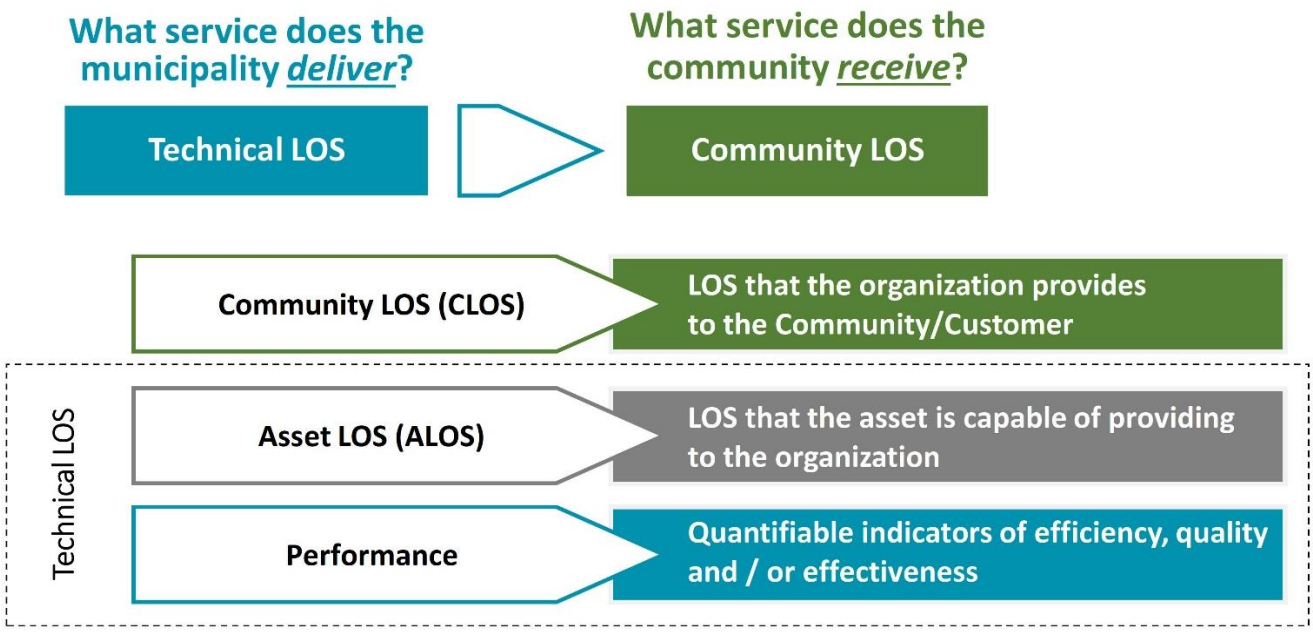
1.4 Levels of Service

The current and proposed levels of service are described in terms of technical metrics and qualitative descriptions for each asset type. These measures are prescribed for core assets (including water, wastewater, stormwater, roads, and bridges and culverts) within O. Reg. 588/17.

Levels of Service (LOS) are presented in **Figure 1-4** and defined as follows:

- **Community LOS**: LOS that the organization provides to the community, intended to be customer-focused, providing a qualitative description of scope and quality; and
- **Technical LOS**: LOS that the asset is capable of providing to the County which is further measured by the performance of the asset, providing technical metrics that support the delivery of LOS.

Figure 1-4: Levels of Service (Community LOS, Technical LOS and Performance)



The Levels of Service (LOS) section provides responses to question 4 of FCM's Infraguide seven questions framework. The current and proposed LOS are described in terms of technical metrics and qualitative descriptions for each asset type. These descriptions are prescribed for core assets (including stormwater, roads, and bridges and culverts) within Ontario Regulation (O. Reg.) 588/17.

Through the AMP development, the County sought to establish current and proposed LOS, in accordance with O. Reg. 588/17 for the core assets, and to define and establish current and proposed LOS for non-core assets in line with the intent of O. Reg. 588/17.

As part of this process, the County undertook education and working sessions with internal stakeholders, and provided a survey for public feedback to understand level of service concepts, and gain understanding of public perception of the levels of service.

1.4.1 LOS Workshop

A workshop was held with staff from the County, representing departments across the organization. The workshop was held on June 18, 2021 through online delivery.

During the LOS of workshop, the concepts of Levels of Service were discussed, including definition of levels of service, impacts of changes to levels of service, and barriers to delivering the service.

The workshop included discussion regarding current Levels of Service at the County, conducting individual group discussions to identify important parameters for defining service delivery, and local issues and efficiencies for delivery.

1.4.2 LOS Community Survey

The County undertook a community survey to receive feedback and information regarding Levels of Service in the community.

The purpose of the community survey was to engage with members of the public about levels of service related to asset management in the County, related to service delivery associated with the asset categories included within this plan. The survey solicited feedback on:

- Overall satisfaction with municipal services;
- Suggestions for service improvements;
- Expectations for levels of municipal services;
- Willingness to pay to maintain or increase services; and
- Service priorities for funding allocation.

The survey was advertised with a notice in a mail out and was available on the County's website from April 19, 2022 to May 5, 2022. The community could request a printed copy of the survey or directly participate with the online survey. The survey was completed by 254 respondents with 94% of them being full time residents within the County. A summary of the survey results was presented in the report, **Asset Management Levels of Service Survey Summary (June 2022)**.

The following are the overall themes and findings that emerged from the survey results:

- **Theme #1**: The community is generally satisfied with the programs and services provided by the Municipality;
- **Theme #2**: The community feels that most of the services listed in the survey do not need improvement at this time;
- **Theme #3**: Overall, majority of residents are willing to pay an increase or slight increase in taxes to maintain the current levels of services;
- **Theme #4**: The services that should be prioritized are County roads and winter control of those County roads and Paramedic Services; and
- **Theme #5**: On a future scenario about addition of lanes, the majority of responses indicated that it was not important, with only 26% being favourable towards importance.

1.4.3 Proposed LOS

The proposed Levels of Service (LOS) is an established target for the County's LOS, set to guide the County in their current and future asset management. Proposed Levels of Service are a requirement for compliance with O. Reg. 588/17. The Proposed LOS established within this report is the target to be achieved in 10 years, the year 2031.

To establish the proposed Levels of Service, the County established the current level of service, and sought input from County staff, the public (through levels of service survey), and Council to understand the preferred levels of service targets.

Through the process, three scenarios were generally considered for proposed levels of service, each a considering a different level of investment to the infrastructure, and the corresponding impact it will have on the level of service being provided. The scenarios considered included the following:

- No change in funding – LOS would decrease over time;
- Increase in funding – LOS would be maintained over time; and,
- Greater increase in funding – LOS would increase over time (increase would vary depending on funding increase).

Direction received from County staff indicated that the current Levels of Service were generally found to be sufficient, and therefore appropriate to maintain as the levels of service targets. However, there were some asset categories that would benefit from an increase in LOS targets. Accordingly, the proposed Levels of Service targets for 2031 have been identified, maintaining the established LOS values from 2022 or slightly improving. Proposed Levels of Service are summarized in **Table 1-4**, with additional description provided for asset categories with increased LOS in the sections that follow.

Table 1-4: Proposed Levels of Service for 2031

Asset Service	LOS Parameter	LOS Measure	2022 LOS Delivered	Proposed LOS for 2031
Paved Roads	Quality	Average pavement condition index (PCI)	72	72
Paved Roads	Quality	Percentage of roads rated as 'Good' or better	65%	75%
Bridges and Structural Culverts	Quality	Average bridge condition index (BCI)	73.1 (bridges) 70 (structural culverts)	73 (bridges) 70 (structural culverts)
Bridges and Structural Culverts	Quality	Percentage of bridges and structural culverts rated as 'Good' or better	78% (bridges) 59% (structural culverts)	78% or better (bridges) 59% or better (structural culverts)

Asset Service	LOS Parameter	LOS Measure	2022 LOS Delivered	Proposed LOS for 2031
Stormwater	Quality	Average condition index value: Percentage of culverts rated as 'Good' or better	80%	80%
Buildings and Facilities	Quality	Average condition of facilities	Good	Good
Buildings and Facilities	Quality	Average condition of Lanark Lodge	Fair	Good
Traffic Lights	Quality	Average condition: of traffic lights as 'Good' or better	100%	100%
Fleet	Quality	Assets replaced at end of useful life	6 assets (10%) past their useful life	0 assets past their useful life
Emergency Services	Reliability	Fleet assets replaced at end of useful life	0 assets past their useful life	0 assets past their useful life
Emergency Services	Reliability	Average condition of emergency services equipment as 'Good' or better	43%	43%
Social Housing	Quality	Average condition of housing assets rated 'Fair' or better;	88%	100%;
Social Housing	Quality	Average condition of parking lots to be 'Fair' or better	44%	85%
IT Infrastructure	Reliability	Assets replaced at end of useful life	0 assets past their useful life	0 assets past their useful life

1.4.4 Areas of Consideration for Proposed LOS Increase

Multiple areas of service delivery have been identified for consideration of increased proposed LOS, supported by the results of the community LOS survey, and priorities of Council and administration. The proposed LOS would target a slight change for the following asset categories:

- Roads, improving the percentage of assets in 'good' condition or better;
- Buildings and facilities: improving the average condition of the Lanark Lodge to 'good', adjusting the average condition of other assets to 'good' from 'very good'; and
- Fleet, improving the percentage of assets past their service life (however allowing for some flexibility as some assets can still perform well past their service life).

The proposed LOS would target a greater increase for the following asset category:

- Social Housing and parking lots, improving the percentage of assets in 'fair' condition or better.

Additional information related to these changes are in the asset categories respective sections below.

1.5 Performance Measures

The performance measures included in the AMP are intended to be indicators that the County can use to understand the assets and to guide decision making in asset management. The performance indicators are based on previous targets and tracking measures used by the County, or typical indicators for the asset type.

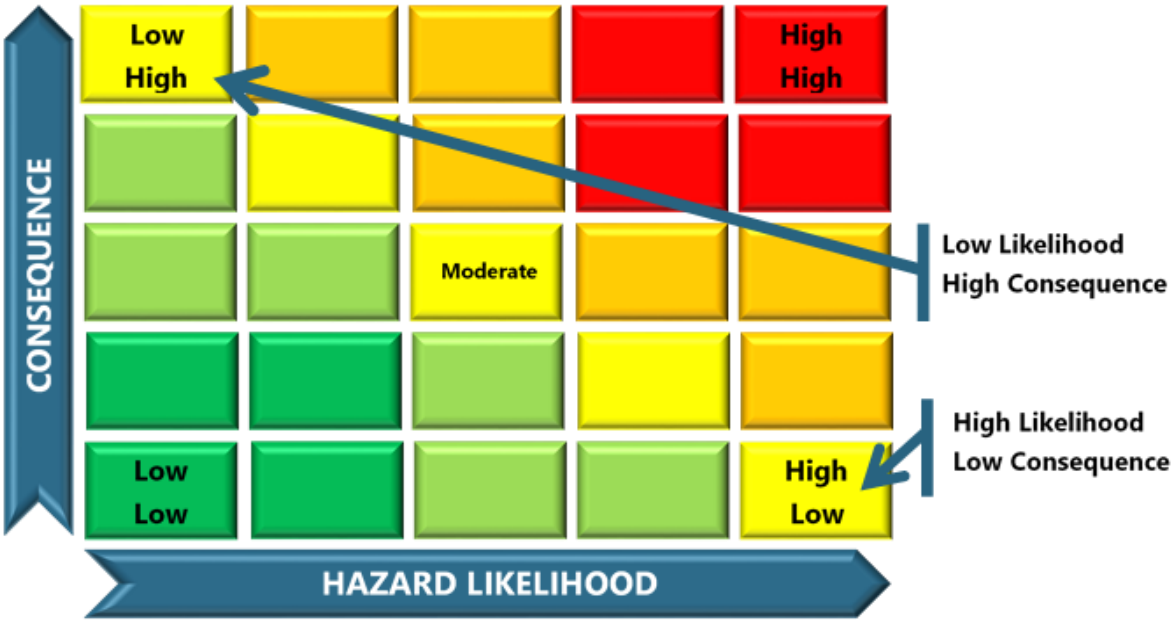
The performance measures are not prescribed by O. Reg. 588/17, therefore the County has flexibility in selecting and tracking measures that are reflective of information available, or how the performance is locally defined. The selection of performance measures within this AMP include current measures, potential measures for consideration. The County can review and update the performance measures used in future updates to their asset management plan.

1.6 Risk Assessment

The risk assessment section provides responses to question 6 of FCM's Infraguide seven questions framework. In determining the lifecycle activities for each asset category and identifying the priority activities, the risks associated with the options are to be considered. The risk rating for each asset generates a risk profile for the entire asset category.

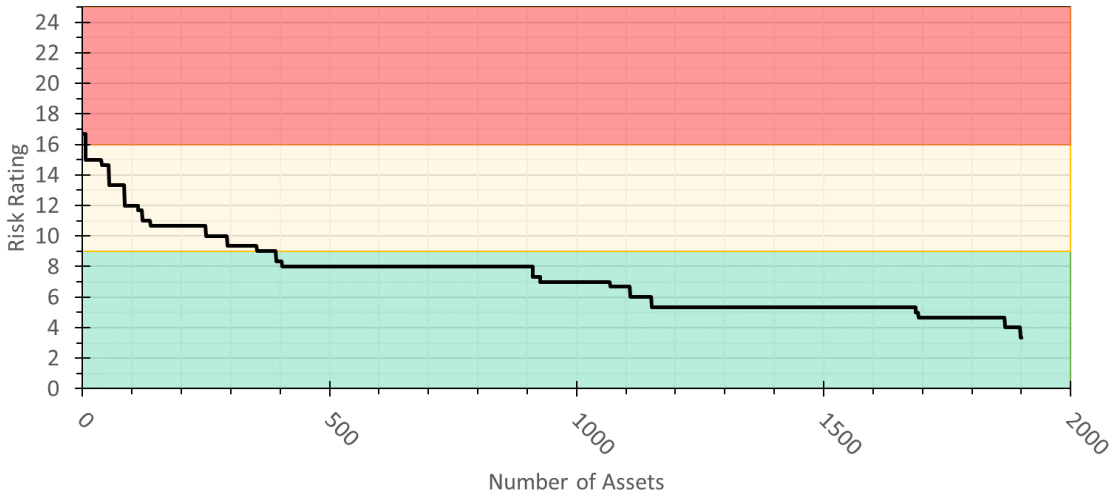
The assets with the highest risk rating identify the priorities for the County. As part of assessing risk, consider the factors that increase the likelihood of a hazard occurring (or non-delivery of service) and the consequence. **Figure 1-5** presents a risk "heat map" plotting likelihood and consequence.

Figure 1-5: Risk Heat Map



A priority rating has been developed based on the calculated risk rating and displayed in **Figure 1-6**. High risk ratings are shown in the red zone (risk rating 17 to 25), Moderate risk ratings are shown in the orange zone (risk ratings of 10 to 16) and Low risk ratings are in the green and yellow zone (risk ratings of 1 to 9).

Figure 1-6: Risk Profile for all Assets



The approach and methodology to risk assessment is presented in following sections. A risk profile for each asset category is presented in the corresponding sections for each asset category.

1.6.1 Risk Methodology and Approach

Risk assessment will be conducted for each of the asset categories within the AMP. The risk ratings for the assets follow the below risk methodology.

Risk is the likelihood and magnitude of a negative scenario (hazard) occurring that limits the ability of the asset to deliver the service. Risk is the consideration of asset failure and the consequence of the failure.

Risk = Likelihood x Consequence

Consequence considers the severity of the impact, vulnerability of the asset and exposure to the negative scenario.

Applying the methodology of a score of 1 to 5 for the hazard and the consequence, the maximum risk rating is 25 (high).

1.6.2 Calculation of Likelihood

The factors that contribute to the likelihood of failure include:

- A – Condition of the asset;
- B – Performance (reliability); and
- C – Vulnerability to climate change.

See **Table 1-5** for description of these factors.

Table 1-5: Likelihood Factors

Factors	Low (1)	Moderate (3)	High (5)
A – Condition	Very Good (1)	Good (2); Fair (3)	Poor (4); Very Poor (5)
B – Performance	Always Reliable	Usually Reliable	Not Reliable
C – Climate Change	No or limited impact, quick recovery or mitigation in place	Limited impact with slower recovery; mitigation plan not in place	Moderate or high impact; no or limited mitigation plan

By separating condition and performance as two separate factors, there is an opportunity to consider assets in poor condition that may still be performing well, as well as good condition assets that are not performing well. The climate change factor brings into consideration assets that are vulnerable to climate change scenarios such as intense rainfall, increased temperatures, extreme weather and drought. The climate change rating includes any mitigation activities in the scoring which reduces the risk and lowers the score.

Therefore, the likelihood of failure is (A + B + C)/3 (i.e., the average of the factors, assuming they are equally weighted).

1.6.3 Calculation of Consequence

In calculating consequence, the question to consider is: What increases the impact of non-delivery (or failure of the asset)?

There are two factors that contribute to the consequence which are:

- D – Impact or severity; and
- E – Importance of the asset in delivering service.

Both impact and importance contribute to the consequence and will be multiplied by likelihood. The two ratings will be added together for the consequence maximum score of 5 (D+E). See **Table 1-6** for description of consequence factors.

Table 1-6: Consequence Factors

Factors	Low	Moderate	High
D – Impact	Low or no impact (0)	Moderate impact (1)	High impact (2)
E – Importance of the asset in delivering service	Low importance (1)	Moderate importance (2)	High importance (3)

The impact ratings were established by considering these five possible areas of consequence (as discussed in the Risk Workshop) and determining an overall rating of high, moderate or low by taking an average for the impact of:

- Safety/Injury;
- Financial Loss;
- Reputation with Stakeholders
- Environmental Damage; and
- Loss of Service.

The importance ratings for assets are established in consultation with County staff. The ratings established include assumptions and specific importance values for assets.

1.6.4 Calculation of Risk

The risk calculation for each of the assets is determined as follows:

Risk = Hazard x Consequence

Risk = (A + B + C)/3 x (D + E)

Where A = Condition

B = Performance

C = Climate Change

D = Impact

E = Importance of the asset

1.6.5 Climate Change

In the Risk Workshop, municipal staff considered the following climate change scenarios and identified low, moderate or high vulnerability for assets in each asset category:

- Mean Annual Temperature;
- Number of Hot Days (> 25 °C);
- Heavy Snow Events;
- Heavy Rain Events;
- Extreme Weather Events; and
- Occurrence and Magnitude of Flooding.

This information was used to inform the assignment of climate change factor (C) in the risk rating calculation for each asset component.

1.6.6 Risk Workshop

A workshop was held with staff from the County to greater understand asset risk and relevance to the County. The workshop was attended by staff representing departments across the organization. The workshop was held on July 6, 2021 through online delivery.

During the Risk of workshop, the concept of Risk was discussed relative to County assets. Discussion included review of risk calculation, components of risk, and discussion through specific risk scenarios and examples to understand assessment methodologies.

During the workshop the County provided input on specific risk factors associated with their infrastructure, and some high-level assessment of risk scenarios. Discussions held at the workshop were used to further develop the risk assessment for each asset category.

1.6.7 Limitation and Assumptions – Risk Assessment

Several key limitations and assumptions were made as part of the risk assessment process, which are summarized below:

- Field condition assessment data was used as available to determine state of infrastructure and risk. In the absence of field condition assessment data, asset age and estimated useful life was used to approximate physical condition; and

- Performance of individual assets was assumed as “Always Reliable” unless otherwise indicated by municipal staff, reviewed reports or provided asset data.

1.7 Lifecycle Activities

The lifecycle activities section provides responses to question 4 of FCM’s Infraguide seven questions framework. Lifecycle activities are defined in O. Reg. 588/17 as “activities undertaken with respect to a municipal infrastructure asset over its service life”, and refers to potential activities that can be implemented by the County during the useful life of an asset. The activities are separated by category, including constructing, maintaining, renewing, operating and decommissioning for each asset category.

The lifecycle activities are typical, and include recommendations for timing of implementation and other best practices for implementation. The activities are used in the asset management strategy.

1.8 Asset Management Strategy

The asset management strategy section provides responses to questions 4, 5 and 6 of FCM’s Infraguide seven questions framework. The asset management strategy for the County assets will employ the lifecycle activities to maximize the useful life and economy of each asset.

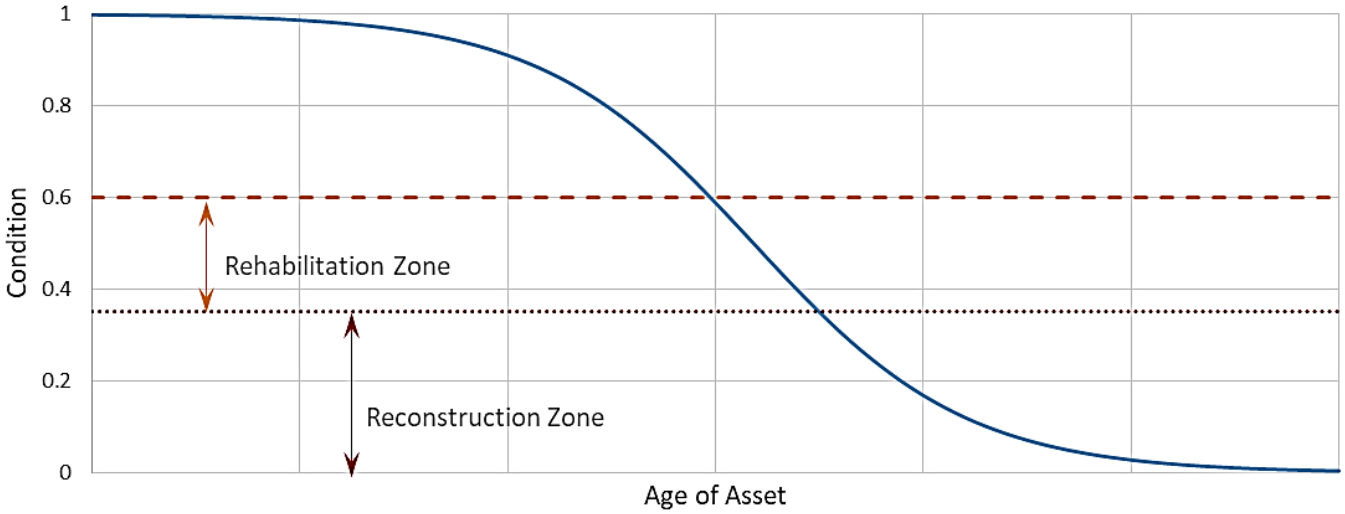
The primary indicator used in the development of a lifecycle strategy is the condition of each asset; however, the strategy should also consider other factors, such as:

- Importance of the asset;
- Asset risk score;
- Condition of adjacent sections;
- Replacement requirements for adjacent infrastructure (linear);
- Expansion requirements; and
- Maintenance frequency and type.

As development continues to occur at the County and the assets continue to deteriorate, these factors will continue to change, and each have an impact on the lifecycle of an asset. Consideration of these factors should be given when devising capital project outlooks and budgeting, and updating of the asset management plan.

The assets will deteriorate on a non-linear basis, and the various lifecycle activities can be implemented at varying stages within an asset's deterioration. **Figure 1-7** provides a visualization of the theoretical deterioration curve for an asset, and the opportunity windows to conduct lifecycle activities within the expected useful life of an asset.

Figure 1-7: Theoretical Deterioration of Assets and Lifecycle Activity Opportunities



Implementation of maintenance activities throughout the lifecycle and rehabilitation works within an appropriate timeframe can assist in optimising the lifespan of an asset.

In reference to **Figure 1-7**, it is expected that maintenance and operating activities will occur through the full lifecycle of the asset. Renewal works are most appropriately employed within the rehabilitation zone, and reconstruction and decommissioning will most likely occur within the reconstruction zone.

On an ongoing basis, each of the factors listed above should be reviewed and established to assist in asset management planning and decision making.

The strategy section for each asset category considers the lifecycle activities and best practices to develop a high-level strategy that can be used as a guide by the County in asset management planning and decision making. The strategy will use current County practices and suggest best practices to try to optimize the lifecycle of each of the County's assets, and therefore asset spending.

Analysis of the assets and development of projections are included as part of the strategy section. Analysis considers current replacement cost information, the attributes of the assets, and budgetary information from the County to analyze the strategy and affordability. The methodologies used for linear and vertical asset analyses are described in the following sections.

1.8.1 Linear Assets

Dillon Predictive Scenario Software Tool

For the preparation of a replacement and rehabilitation profile, the Dillon Predictive Scenario Software (DPSS) was used. This tool is a Microsoft Access application that relies on an overall assessment of the infrastructure condition to produce investment scripts based on degradation curves, which are adjusted to the County's particular operations and thresholds of acceptability.

The DPSS tool assesses the condition, and puts the Asset Manager in control of the lifecycle of assets. It also allows for planning as to where, when, how and how much to invest in the renewal and replacement of infrastructures for the coming year, or for the next 5, 10, 20 or 50 years. The tool incorporates known asset information, deterioration data, and unit costs for rehabilitation of assets provided by the County, to assess the network.

Limitations of the Program

The DPSS program operates within the bounds of assumptions and limitations in data inputs. The current operational limitations of the program that are relevant to this AMP include:

- The program cannot link adjacent asset segments. If an asset is broken into multiple adjacent components (such as a road from intersection to intersection), the program will view each inventory item as a single asset, and cannot connect projections for adjacent sections;
- The program cannot compute concurrent projections with multiple types of assets. Each instance of the program projects works for one asset category only; and
- The prioritization of works in the outputs of the program are based on the condition of the asset.

1.8.2 Vertical Assets

The development of scenarios and capital expenditure projections for the vertical assets varied by asset type, due to the existing processes and the types of assets. A description of the process taken for each asset is described within their respective sections; however, scenario development generally considered the following:

- Where available, existing reporting on assets was used to generate a prioritization of works. The County has multiple reports wherein detailed condition assessment was undertaken of assets, and subsequent recommendations made for maintenance and reconstruction works according to findings of the assessment. The projected works in this AMP were assumed to be consistent with recommendations in existing reports. (Reports considered here include Ontario Structure Inspection Manuals (OSIMs), Building Condition Reports); and
- Where prior information was not available, condition was assumed based on lifespan and age. Projection of works were estimated according to the expected lifespan of an asset. Due to the complexity of vertical assets, detailed assessment of maintenance and reconstruction works of the componentry was not undertaken. As such, individual component replacement costs and maintenance costs have not been projected as part of this AMP.

1.8.3 Other Factors to Consider for Scenarios and Capital Projections

For understanding and application of the scenarios and capital projections within this AMP, the County must also consider the following:

- The scenarios and capital projections conducted as part of this AMP were completed by asset category individually. As such, the results do not reflect efficiencies in completing works on adjacent infrastructure simultaneously; and
- The scenarios and capital projections conducted as part of this AMP were completed by asset segment individually. As such, the results do not reflect efficiencies in completing works on consecutive asset segments simultaneously.

1.9 Growth

Population and household data for the growth projections outlined here were obtained from the Sustainable Communities Official Plan adopted in 2012 and amended in 2013.

The 2021 Census, the latest Census available, showed the County's population as 75,760. The County's official plan adopts a moderate growth scenario that targets a population of 70,434 by the year 2031. **Table 1-7** outlines the expected growth in the County. Note that the projections were developed before the 2011 census data was available.

Table 1-7: Population Growth Rates for Lanark County (2006 to 2031)

Location	Base Year (2006)	Share of Growth	2011	2016	2021	2026	2031
Beckwith	6,387	11.9%	6,757	7,127	7,497	7,867	8,245
Carleton Place	9,453	20.5%	9,964	10,476	10,987	11,498	12,010
Drummond North Elmsley	7,118	13.4%	7,570	8,021	8,473	8,924	9,376
Lanark Highlands	5,180	7.6%	5,509	5,839	6,168	6,497	6,827
Mississippi Mills	11,734	24.4%	12,421	13,107	13,794	14,480	15,167
Montague	3,595	3.9%	3,680	3,766	3,851	3,937	4,022
Perth	5,907	8.2%	6,079	6,251	6,423	6,595	6,767
Tay Valley	5,634	10.1%	6,111	6,589	7,066	7,543	8,020
Lanark County	55,008	100%	58,092	61,175	64,259	67,343	70,434

The projected population to 2031 is based on the following assumptions, taken from the Official Plan:

- Current trends with respect to population distribution will continue;
- Over 70% of development takes place in designated settlement areas; and
- Projections and growth rate represent a target and will not limit development.

The County's Development Charges Background Study (developed in 2021 by Watson & Associates Economists Ltd.) discusses future development in the County including a growth forecast. This study estimated that the County will have a permanent population of 87,520 by early 2032, and 98,854 by mid-2038. Assumptions and processes for the projections are contained within that report.

Each growth-related assumption and its impact on the lifecycle of the assets has been shown in **Table 1-8.**

Table 1-8: Growth Impact and Assumptions by Category

Asset Category	Growth Impact Assumptions	How Assumptions Relate to Lifecycle of the Assets
Roads	• Increased traffic in the County, particularly in identified settlement areas	• Potential increase in road maintenance costs, capital expenditures (new roads)
Bridges and Culverts	• Increased usage of bridge crossings by vehicles in the area	• Potential traffic volume delays and mitigation required • Load considerations and regularly scheduled maintenance checks
Buildings & Facilities	• Increased facility usage • Changing service demands from aging population	• Increase in capital expenditure for facility development in response to population growth • Increase in operating costs for facility services and maintenance
Fleet	• Increase in service demands requiring increased operating capacity • Changing service demands from aging population	• Increased capital costs for purchase of additional assets to meet service needs • Increased operational costs in fleet maintenance and operational consumables

Asset Category	Growth Impact Assumptions	How Assumptions Relate to Lifecycle of the Assets
Equipment	• Increased development will occur as a result of growth	• Due to increased development, increased equipment needs would be required to supply new facilities etc.

1.10 Roadmap with Next Steps

1.10.1 Regulatory Compliance

Annual Report to Council: As required by O. Reg. 588/17, municipalities will report to their Councils at least once per year on the current progress of asset management in the County and any barriers to aligning operations with the AMP.

Full Update of AMP: A full update of the AMP will be required within 5 years, i.e. by 2027.

Enhancements to the AMP: The inclusion of green infrastructure assets (i.e. green assets) owned by the County and assessment of vulnerabilities caused by climate change on the performance of infrastructure.

1.10.2 Recommendations in AMP 2022

Condition Assessments

Prior to the next update of the AMP, conduct condition assessments of buildings and facilities as well as updates for the roads and bridges to be able to report whether the County is on target to meet the proposed LOS or whether the lifecycle strategy and associated investment strategy require adjustment.

- Condition of the road network can be completed on scheduled basis wherein the entirety of the network is reviewed in annual portions over a defined duration (for example, 20% of the network each year);
- Establish a program for regular condition inspections (by professional service providers) to identify the required capital investments for buildings and facilities; and
- The inspection of storm sewer assets can be undertaken through a condition assessment program, recommended to be visual inspection through CCTV or zoom

camera means. A typical practice is to undertake assessment of 1/5 to 1/3 of the assets annually, such that each pipe gets reviewed on a 3- to 5-year basis.

Performance Data

Expand the collection of performance data to be able to track and report whether the County is on target to meet the proposed LOS.

- Traffic counts over bridges to assess usage;
- The percentage of the municipal stormwater management system resilient to a 5-year storm is currently unknown. It is recommended that further studies be completed in the future in order to report the LOS metric;
- % of the community with stormwater quality and quantity control. Recommended that future analysis be completed in order to track this performance measure;
- Inspection frequency of stormwater assets and catch basins. Recommended to track in future; and
- Fleet performance: maintenance expense per utilization ($/km or hour). Not currently tracked, but it is recommended that the County should track this performance measure in the future to compare amongst similar vehicles or established standards and identify vehicles which may be costing considerable operating $ for low utilization.

1.10.3 Operationalizing Asset Management

In operationalizing asset management practices within the County, and preparing for the update in 5 years, there are specific steps that can assist with implementation. These steps are presented in the following categories that align with the **Federation of Canadian Municipalities (FCM) Asset Management Readiness Scale**: Policy and Governance, People and Leadership, Data and Information, Planning and Decision-Making and Contribution to Asset Management Practice.

Policy and Governance

- Manage assets and services in accordance with your AMP policy and organizational objectives;
- Develop a roadmap that details the actions for implementing your AM strategy over the next 3 to 5 years; and

- Use performance measures to monitor AM progress outcomes and benefits.

People and Leadership

- Establish a cross-functional AM Team (or AM Steering Committee) that guides the planning and implementation of your AM program;
- Develop a mandate for the AM Team, which is outlined in a terms of reference and a roadmap;
- Establish lines of accountability for the AMP to be accountable to senior management and Council; and
- Council demonstrates buy-in and support for AM and allocated resources (funding or staff time) to further develop the AM program.

Data and Information

- Update data according to cycles defined in your AM strategy and AM plan;
- Evaluate the lifecycle investment requirements associated with most assets;
- Conduct condition assessment on assets for the next update in the AMP (e.g. roads, bridges, buildings, parks, etc.);
- Now that you have defined proposed LOS targets, communicate the results of LOS measurement program to staff and Council regularly;
- Continually improve how you collect data on LOS performance; and
- Continue to evaluate the trade-offs between investment and the LOS we deliver and use this to optimize financial plans.

Planning and Decision-Making

- Employ a consistent structure asset planning approach for each of your service areas;
- Set priorities using criteria that are fully aligned with your organizational goals and objectives;
- Keep AM plans up to date through normal business (e.g. update condition information and performance information). Integrate your AM plan across services;
- Prepare annual needs-based capital and operating business that are based on an annual assessment of risks and current needs;
- Develop a 5-year capital plan and update it annually; and
- Develop a long-term financial plan (10-year) annually and understand the risks associated with investment gaps.

Contribution to Asset Management Practice

- Provide all staff with basic AM awareness training;
- Provide some staff with advance AM training specific to their roles and responsibilities;
- Provide Council with AM training. Demonstrate that staff and Council are able to communicate the value of AM;
- Develop a culture of knowledge sharing internally, supported by official initiatives;
- Collect and maintain AM knowledge resources;
- Communicate the benefits of AM internally to staff and Council;
- Provide opportunity for staff to contribute to knowledge sharing with others, through membership in one or more AM organizations; and
- Share basic information on our assets, the services we provide and future needs with the public.

2.0 Roads

2.1 State of Local Infrastructure

The County owns and maintains road assets. The County is responsible for 561 km of road, or 1,125 lane-kilometres. A summary of roads by type can be seen in **Table 2-1**.

Table 2-1: Current State Summary of Roads

Road Asset Type	Total Length (km)	Total Replacement Cost (2022)	Average Age of Latest Improvement (2022, by length)	Asset Age as a Proportion of Expected Useful Life (30 years)
High Class Bituminous (HCB)	412	$108,015,960	12.8	43%
Low Class Bituminous (LCB)	128	$32,599,200	7.4	25%
HCB/LCB	21	$5,428,950	9.6	32%
Total	**561**	**$146,044,110**	**11.5**	**38%**

All roads owned and maintained by the County are paved, either with HCB or LCB. The roads are all two-lane roads, with the exception of County Road 29.

In addition to the linear road assets, the road network includes ancillary assets that facilitate usage and adequate service delivery of the roads. These assets include:

- Sidewalks on bridges/ paved boulevards;
- Curb and gutter;
- Signalized pedestrian intersections;
- Streetlight poles;
- Streetlight fixtures;
- Guide rails; and
- Signs.

2.1.1 Replacement Cost

The replacement cost for the assets is representative of the cost in current dollars that would be required for full replacement of the current inventory of assets. The estimated current replacement cost for roads is $172 million.

This cost was determined using unit costs provided by the County, for which the County maintains detailed records per rehabilitation type. The County's unit costs are updated as new data is available, and inflated at an annual rate of 2% to estimate future road works costs. The costs are available by works type, and further refined to vary across road widths. For this estimate, roads with widths up to 9.5 metres (m) used a unit price of $300,000/km, and roads of 10.4 m in width or greater used a unit price of $320,000/km.

2.1.2 Average Age

The average age (11.5 years) as shown above is determined by length of the assets, and shows the time elapsed since the most recent road improvement.

The County does not have complete records of construction year for each of the road assets. For those with construction year available, the range is from 1960 to 2015, noting that 36 segments had no date available.

2.1.3 Expected Useful Life

The County expects a useful life for roads of 30 years, counted from the last rehabilitation. All road segments have either a year of construction or improvement year (marking the last rehabilitation). The average remaining useful life for County roads is 19.8 years, including 2 road segments that are older than their expected useful life.

As a proportion of the expected useful life, all road types (HCB, HCB/LCB and LCB) are at 70% of their expected useful life or greater.

2.2 Condition – Roads

The County has a road condition assessment program where the roads are assessed on an annual basis. All roads in the County are paved surfaces, and evaluated using a Pavement Condition Index (PCI), rated from 0 (low) to 100 (high). A summary of the PCI scores, condition categories and description of the condition are in **Table 2-2**.

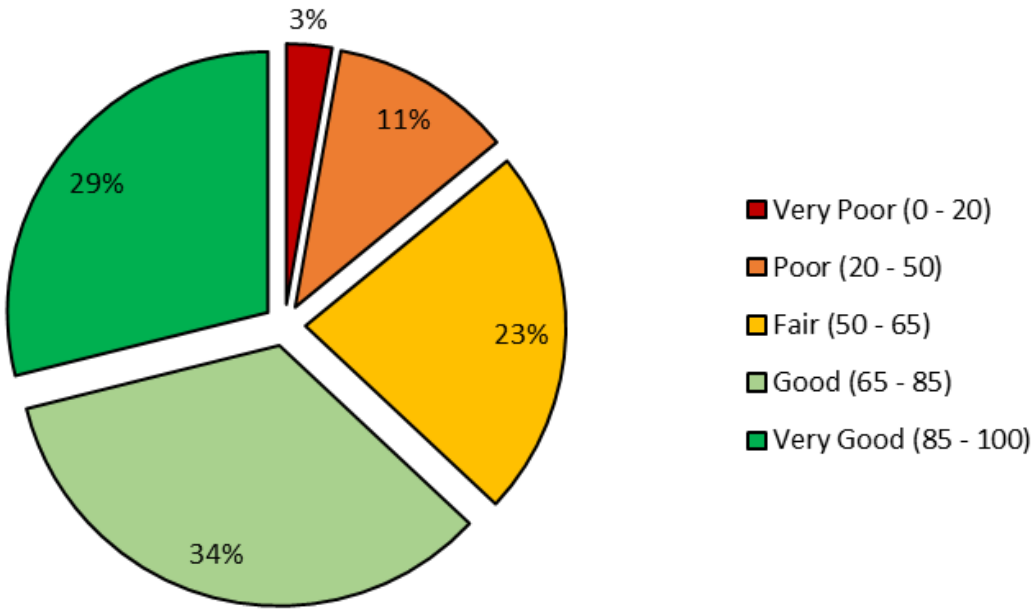
Table 2-2: Road Condition Descriptors and PCIs

PCI Score (Low)	PCI Score (High)	Condition Description	Description
85	100	Very Good	Sound pavement with few defects perceived by drivers.
65	84	Good	Slight rutting and/or cracking and/or roughness that is noticeable to drivers.
50	64	Fair	Multiple cracks are apparent and/or rutting may pull at the wheel and/or roughness necessitates drivers to make minor steering corrections.
20	49	Poor	Significant cracks may cause potholes and/or rutting pulls at the vehicles and/or roughness is uncomfortable to occupants. Drivers may need to correct steering to avoid road defects.
0	19	Very Poor*	Road failed.

Note that in previous versions of the AMP, the County has rated all roads within a PCI range of 0 to 49 as Poor and has not considered a Very Poor category. For consistency with other asset categories, for this report we have added the Very Poor category which separates those assets that are under a PCI score of 20.

An overview of condition ratings amongst all roads assets is shown in **Figure 2-1.**

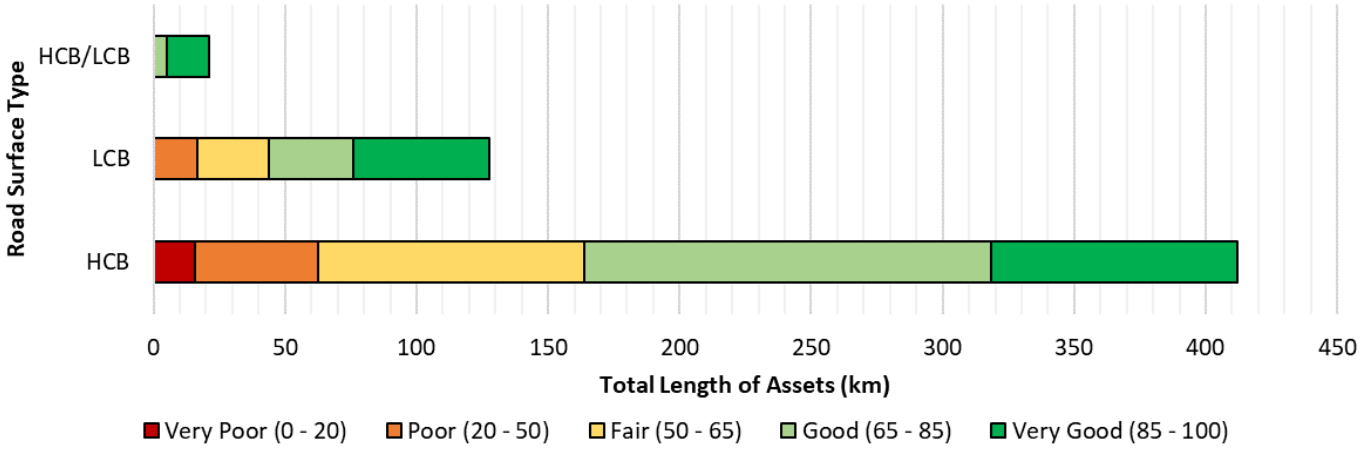
Figure 2-1: Overview of Road Condition Ratings



The majority of the County's road assets are in Good to Very Good condition, with a total of just over 561 km of road, or 63% by length. Only 16 km (3% by length) are within the Very Poor condition category.

Figure 2-2 shows the distribution of Road Condition by PCI and length for three different road surface types (HCB/LCB, LCB and HCB).

Figure 2-2: Road Condition Rating by Total Length and Surface Type



The County maintains records of the PCI ratings from past annual inspections. The results of the 2018 to 2021 assessments are summarized in **Table 2-3**.

Table 2-3: Road PCI Ratings from 2018-2021

Road Rating	2021 Length (km)	2021 Percentage	2019 Length (km)	2019 Percentage	2018 Length (km)	2018 Percentage
Very Good	162	29%	142	25%	134	24%
Good	192	34%	244	43%	218	37%
Fair	128	23%	81	14%	134	18%
Poor	63	11%	86	15%	104	18%
Very Poor	16	3%	8	1%	12	2%

The percentage of roads in Very Good condition has increased since 2018; however, the percentage in Very Poor has also increased. Note that although the Very Poor category has increased, only a small total length of road (16 km) falls in this category. The majority of roads (63%) are in the Good to Very Good condition.

2.3 Current Levels of Service – Roads

- Road assets are considered a core asset under O. Reg. 588/17, and; therefore, have pre-defined levels of service statements, per Table 4 of the regulation. The County's primary indicator for levels of service for roads is the condition, including the following target set within the 2018 Asset Management Plan: 75% of County Roads rated as Very Good and Good.

As of 2021 inspections, only 65% of the network were rated Good or better, which is a gap of 10% from the target.

The O. Reg. 588/17 Level of Service Community and Technical parameters are summarized in **Table 2-4** and **Table 2-5**.

Table 2-4: Community LOS for Roads

LOS Parameter	Community Levels of Service (Qualitative Description)	Response
Scope	Description, which may include maps, of the road network in the Municipality and its level of connectivity.	County Roads serve local and through traffic. Locations of County Roads are shown in **Figure A-1** in **Appendix A**.
Quality	Description or images that illustrate the different levels of road class pavement condition.	Ratings are conducted internally by the County. The rating is assumed to follow Ontario Ministry of Transportation (MTO) manual guidance.

Table 2-5: Technical LOS for Roads

LOS Parameter	Technical Levels of Service (Quantitative Description)	Response
Scope	Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the Municipality.	Land area: 3,035 square kilometers Arterial • Rural: 76.8 lane km (0.03 lane km/sq km) • Urban: 17.3 lane km (0.01 lane km/sq km) Collector • Rural: 968.5 lane km 0.32 lane km/sq km • Rural/Urban: 39.2 lane km 0.01 lane km/sq km • Urban: 62.1 lane km 0.02 lane km/sq km
Quality	For paved roads in the Municipality, the average pavement condition index value.	Average PCI (by length): • 2021: 71.6 • 2019: 71.3
Quality	For unpaved roads in the Municipality, the average surface condition (e.g., excellent, good, fair or poor).	No unpaved roads in the County.

2.4 Current Performance – Roads

The current metric for performance used by the County is that 63% of road assets have a condition rating of Good or Very Good.

Additional indicators can be used to provide a fuller picture of asset performance. A summary of indicators of performance for the past two calendar years is shown in **Table 2-6**.

Table 2-6: Performance for Road Assets

Performance Indicator	County Performance Data 2020 to 2021
Roads with load restrictions	In 2021, all County roads were implemented with reduced load restrictions (5 tonnes per axle), with the exception of 11 roads/road segments. Governed by By-Law 2011-30, 'A Bylaw to Amend By-Law 99-07 Restrict the Weight of Vehicles on County Roads during Reduced-Load Periods
Percentage of roads in Good or Very Good condition	65% (not rated in 2020)
Customer complaints	0

2.5 Risk Assessment – Roads

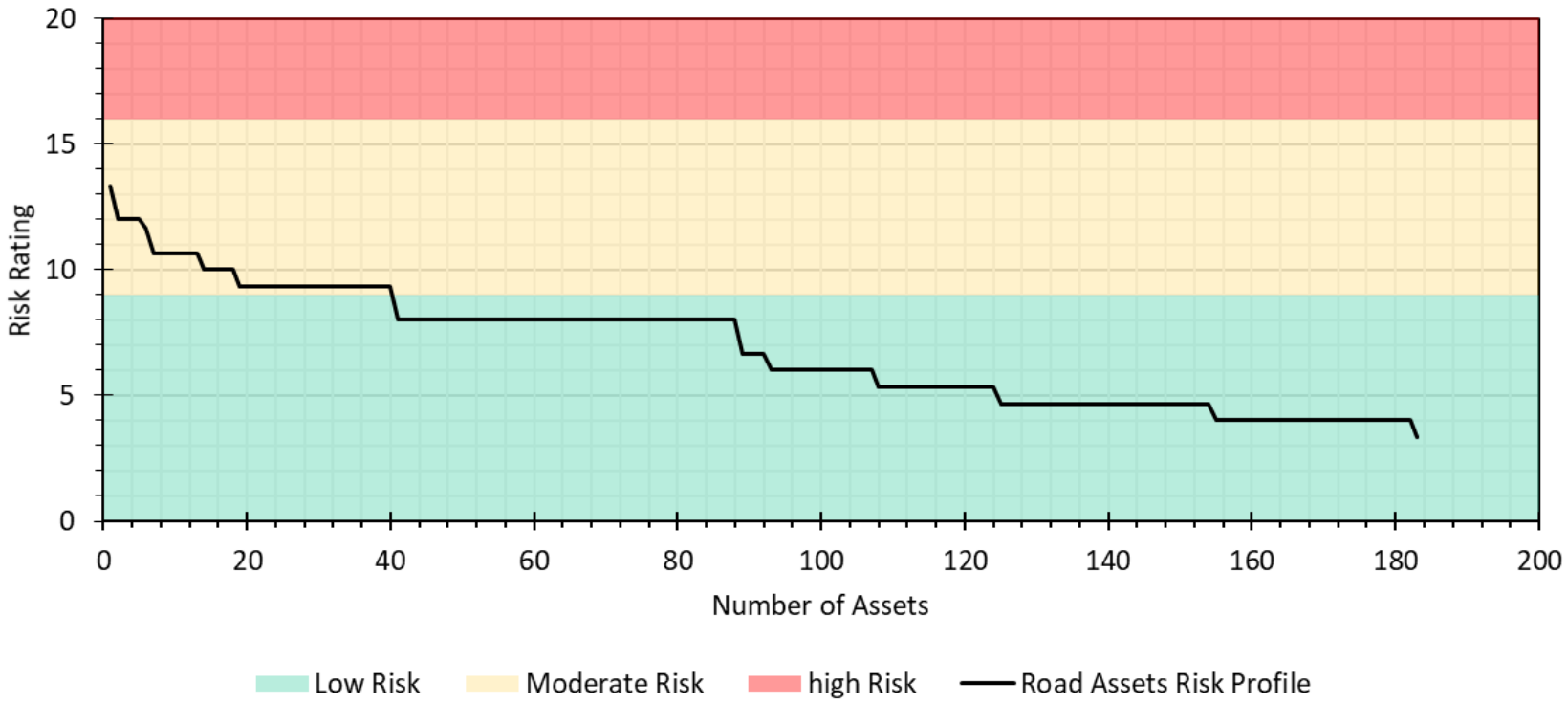
The risk assessment for roads assets will be conducted using the following assumptions and criteria:

- Condition: Determined based on Pavement Condition Index (PCI) from latest inspection;
- Performance: Provided by the County;
- Climate Change: Assumed a value of 3 – assets are vulnerable to climate change impacts, but response and mitigation plan is in place (detours, internal and external response requirements to issues);

- Impact: High impact (value of 2) for Highway Classes 1, 2 & 3; and Moderate impact (value of 1) for all other roads; and
- Importance: Low importance (value of 1) for Highway Class 5 Local Roads; Moderate importance (value of 2) for Highway Class 3 and all with Paved Shoulders; and High importance (value of 3) for Highway Classes 1 & 2, McNeely Avenue, and County Road 511.

Using the assumptions and parameters listed above, a risk assessment was conducted. The distribution of risk ratings for road assets is shown in **Figure 2-3**.

Figure 2-3: Risk Profile for Road Assets



There are 40 assets that fall in the moderate risk range, representing 26% of the roads network by length. The remainder of the assets are within the low risk range.

2.6 Lifecycle Activities – Roads

The following section describes the lifecycle activities that can be implemented within the asset management strategy for road assets. The primary lifecycle activities include construction, maintenance, renewal/rehabilitation, and decommissioning/disposal. The lifecycle activities presented below are consistent with best practices for road asset management and maintenance. The County has an inventory of lifecycle activities for road surfaces that they utilize:

- Micro-surfacing, (double or single lift);
- Warm-mix Overlay (1 or 2 lifts);
- Hot-mix Overlay (1 or 2 lifts);
- Double Surface Treatment Overlay;
- Single Surface Treatment Overlay;
- Pulverize, Restoration & Add Gravel, Double Surface Treatment;
- Pulverize, Restoration & Add Gravel, Warm-mix (1 or 2 Lifts);
- Pulverize, Restoration & Add Gravel, Hot-mix (1 or 2 Lifts);
- Crack Sealing;
- Micro-surfacing, Fibremat, Warm-mix Overlay;
- Micro-surfacing, Warm-mix Overlay; and
- Cold-in-place Recycled Asphalt.

2.6.1 Construction

The initial lifecycle activity of a road asset is its construction. The road asset should be constructed to adhere to applicable requirements, codes, and design guidelines. Construction of new road assets is recommended to be in line with recommendations as part of growth, master plan, or other municipal strategies. Design of the road asset should consider the level of service expected to be provided by that particular road asset, such as the anticipated speed or volume of traffic. Varying factors in construction include: the road classification, surface type, and location.

Construction can also be the replacement of deteriorated assets. At the end of the useful life of an asset, it can be replaced for continuation of service provision. At the time of replacement, design should be undertaken to ensure design requirements are met, and adequate capacity is provided for current and future projections.

2.6.2 Maintenance Activities

Maintenance activities are undertaken on the assets throughout their useful life to maintain their operating condition and performance. There are a variety of maintenance activities available to undertake on road assets, including:

- Ditch improvements (grubbing/clearing);
- Crack sealing;
- Microsurfacing;
- Hot mix patching;
- Single surface treatment; and
- Double surface treatment.

Maintenance activities can include the full road surface, or can be used to address localized repairs on the road surface.

The selection of the maintenance activity is dependent on a variety of factors, including road surface type (material, urban/rural classification), condition (surface and road base), road works history, and importance, among others.

2.6.3 Renewal/Rehabilitation

Renewal or rehabilitation of the road assets can be undertaken when maintenance works are no longer sufficient to address road surface deficiencies. These replace significant parts of the road but provide large improvements to condition and lifespan. The typical lifecycle activities can include resurfacing, reconstruction (full depth), paving of gravel roads, or returning paved roads to gravel. The County's typical lifecycle activities for renewal and rehabilitation include:

- Micro-surfacing, (double or single lift);
- Warm-mix Overlay (1 or 2 lifts);
- Hot-mix Overlay (1 or 2 lifts);
- Double Surface Treatment Overlay;
- Single Surface Treatment Overlay;
- Pulverize, Restoration & Add Gravel, Double Surface Treatment;
- Pulverize, Restoration & Add Gravel, Warm-mix (1 or 2 Lifts);
- Pulverize, Restoration & Add Gravel, Hot-mix (1 or 2 Lifts);
- Micro-surfacing, Fibremat, Warm-mix Overlay (with or without fibremat); and

- Cold-in-place Recycled Asphalt.

The selection of the activity for implementation will require consideration of the same factors listed for maintenance works.

2.6.4 Operating

Operating activities for the road assets include those activities that do not directly deal with the physical state of the road, but work to extend the assets useful life. The operating activities can include non-infrastructure solutions (such as policies, limiting truck traffic, planning reports), and monitoring/inspection of the assets. Inspection of the road assets can be completed by County staff on an as-needed basis, or on a broader portion of the network conducted by a third party. The inspection program can include a combination of the effort types to suit the needs of the County.

2.6.5 Decommissioning

Decommissioning activities of the road assets includes removal of the road from service. A road may be removed by disposal of the asset components, or establishment of a barricade to prevent continued usage of the asset. Disposal activities should be conducted such that health and safety protocols are being followed, and spent materials are disposed of at an appropriate or approved facility.

2.7 Asset Management Strategy

The County's asset management strategy is the set of planned actions that will enable the assets to provide the proposed levels of service in a sustainable way, while managing risk and lifecycle cost (through preventative action).

The County's strategy is informed by research conducted by the Ontario Good Roads Association, which concluded that it is cost effective for a municipal government to invest in a pavement preservation strategy. The road assets will deteriorate on a non-linear basis, and the lifecycle activities can be implemented at varying stages within an asset's deterioration. Accordingly, the County has developed an overall strategy that considers the lifecycle year of the assets and the associated planned maintenance activity. **Table 2-7** shows a summary of the typical progression through the lifecycle activities for a County road. Further discussion is provided following the table.

Table 2-7: Summary of Road Strategy

Planned Lifecycle Activity	Year Performed After Road Segment Rehabilitation
Crack Sealing	Performed in years 3 or 4 after a rehabilitation and again between years 6 and 8
Micro-Surfacing	Performed in years 10 to 12
Resurfacing	Performed in year 20
Rehabilitation	Depending on road condition a full rehabilitation is planned in 30 years

Application of the strategy will vary according to a variety of factors, including the following:

- **Actual condition and deterioration of the road asset.** Factors can impact the actual deterioration rate of an asset from the theoretical such as improper construction, weather, and usage of the road asset;
- **Works required on adjacent infrastructure**. Where adjacent linear infrastructure requires replacement (buried infrastructure such as stormwater pipes or other utilities), road works may be undertaken in advance of the typical schedule as part of rehabilitation works; and
- **Works required on adjacent asset segments.** Where adjacent segment(s) of road requires implementation of a lifecycle activity, there may be cost efficiencies in conducting the activities on multiple segments, even if it occurs ahead of the typical timeframe.

The age of the asset is the primary indicator of roads asset management strategy for the County. The County maintains up to date records of the road assets, which tracks the latest date of construction and implementation of lifecycle activity such that the asset can be tracked through its lifecycle and maintenance activities completed.

The age of the asset can be an indicator of probable condition; however, actual condition information from roads assessments can be valuable in proceeding through the strategy and identifying appropriate lifecycle activities.

An asset condition assessment program for roads can assess the assets on a regularly scheduled basis wherein the entirety of the network is reviewed in portions over a specified timeframe (for example 1/5 of the network in a 5-year timeframe), or all assets to be done in one assessment year, with assessment recurring every few years. The County currently undertakes assessment annually on the entirety of the road network, assessing the condition as PCI on a scale of 0 to 100, where 100 represents a road in perfect condition. The assessment is conducted by County staff.

A variety of methods can be implemented for undertaking condition assessment of roads, including visual inspection, and usage of technological systems such as street scan technology. The assessment can be conducted in-house by County staff or through acquisition of a third-party assessment. The current inspection program includes visual inspection of the assets by staff.

In addition to the condition, prioritization and selection of a road asset for implementation of lifecycle activities can consider the following:

- Importance of the asset;
- Asset risk score;
- Condition of adjacent sections;
- Replacement requirements for adjacent infrastructure (watermain, storm or roadworks); and
- Upstream dependency and expansion requirements.

Maintenance works should be undertaken throughout the lifecycle of an asset. Selection of the appropriate maintenance activity will depend on the type of deterioration being experienced on the asset, and the condition of the asset. Some activities, such as crack sealing, are best utilized on a road segment that is generally in good condition. As the road segment continues to deteriorate, maintenance activities may become a less preferred option as it may become insufficient to address deficiencies. Maintenance activities can be undertaken on a road segment multiple times prior to the asset requiring rehabilitation activities, depending on the nature and extents of the maintenance works. The County undertakes regular minor maintenance activities to extend the useful life of the road assets.

Rehabilitation activities should be undertaken on an asset when it has deteriorated past the point where maintenance activities could address condition issues. Selection of the appropriate rehabilitation activity will depend on the road surface material, stage in lifecycle, and severity and type of deterioration. Due to the current road surface types in the County, conducting a road overlay will require shaving of the existing surface. During these works, the County must retain the current grade of road due to the urban cross-section used on the road infrastructure.

At the point where a road asset has deteriorated such that maintenance and rehabilitation options will be inadequate to address condition issues, the road can be a candidate for reconstruction. The depth of reconstruction (either surface or full depth including road base) will need to be identified. This distinction is made through a variety of factors, primarily the age of the asset and the history of lifecycle activities. A road candidate for rehabilitation will typically have progressed through the lifecycle activities as suggested in the above table. Reconstruction works will result in a road segment being at a very good condition rating.

The County has an established set of parameters that are utilized when reconstructing a road segment. The road works will consider requirements specific to road classification (class of highway). The width of the road asset (including pavement and shoulders) is determined based on the average traffic values, as summarized in **Table 2-8.**

Table 2-8: Road Surface Widths for Reconstruction

AADT Min	AADT Max	Total Pavement Width (m)	Min Granular Shoulder Width (m)	Total Platform Width (m)	Lane Width (m)	Resulting Paved Shoulder Width (m)
0	999	8	0.25	8.5	3.25	0.75
1,000	2,999	9.5	0.5	10.5	3.3	1.45
3,000	4,999	10.4	0.8	12	3.5	1.7
5,000	over	12	0.8	13.6	3.75	2.25

The County also maintains an up-to-date estimate of the costs of the lifecycle activities, tracking estimated unit costs for each of the treatments listed above and inflating it by 2% each year.

Reconstruction and rehabilitation works offers the County an opportunity to integrate other improvements into the road works. This may include active transportation facilities, upgrade of drainage, street lighting, and changes to the road cross-section to accommodate growth demands.

2.7.1 Scenario Analysis

To understand the needs of the roads network and overall system condition within a 10-year outlook, replacement and relining activities were reviewed under varying budget scenarios. The budget scenarios analyzed include:

1. Unlimited budget – To determine backlog of works;
2. No Budget – To understand the changes in average network condition with no investment;
3. 2015 AMP Funding Level – To understand impact of current recommended allocation; and
4. Maintain Current PCI – Determining the target budget to maintain the current average condition across the network

The assets were analyzed using reconstruction activities only. Discussion below presents the results as they are analyzed individually and combined.

Analysis Results

Multi-year projection scenarios were run using the budgets noted above. In the analysis, reconstruction activities are recommended when a road has a condition rating of between 0 and 0.35. Reconstruction of a segment will return the segment to a condition index of 1.

A summary of the analyses is found in **Table 2-9**.

Table 2-9: Roads Analysis Budget Scenario Results

#	Budget Scenarios	Annual Value	Average Annual Investment (2022-2031)	Total Investment (2022-2031)	Average Condition Index (at 2031)
1	Unlimited	Unlimited	$8,623,460	$86,234,600	0.72
2	No Budget	$0	$0	$0	0.35
3	2015 AMP	$7,165,950	$7,056,400	$70,564,000	0.63
4	Maintain PCI	$9,500,000	$8,498,880	$84,988,800	0.71

The annual value of the budget scenarios are maximum investment value per year.

The selection of an investment level for the roadway strategy should consider the current and intended level of service, affordability, effectiveness of the scenario, and backlog of works.

Scenario 1 assumes an unlimited budget available for reconstruction of the roadway assets. In the first year of the scenario, $11 million (M) in reconstruction works were identified, indicating that there is a backlog of repairs required to improve the condition of the assets. The backlog includes any assets that are currently at a condition rating of 0.35 or less. Given the typical annual investment recommended within the 2015 AMP (ranging from over $5 M to over $7 M), the backlog is noted to be higher than average investment but is not indicative of a significant amount of works outstanding.

Scenario 2 models the impact of no spending on road reconstruction during the 10-year timeframe. The average condition rating deteriorates to 0.35, which is well below the current level of service and best practice recommendations for average network condition.

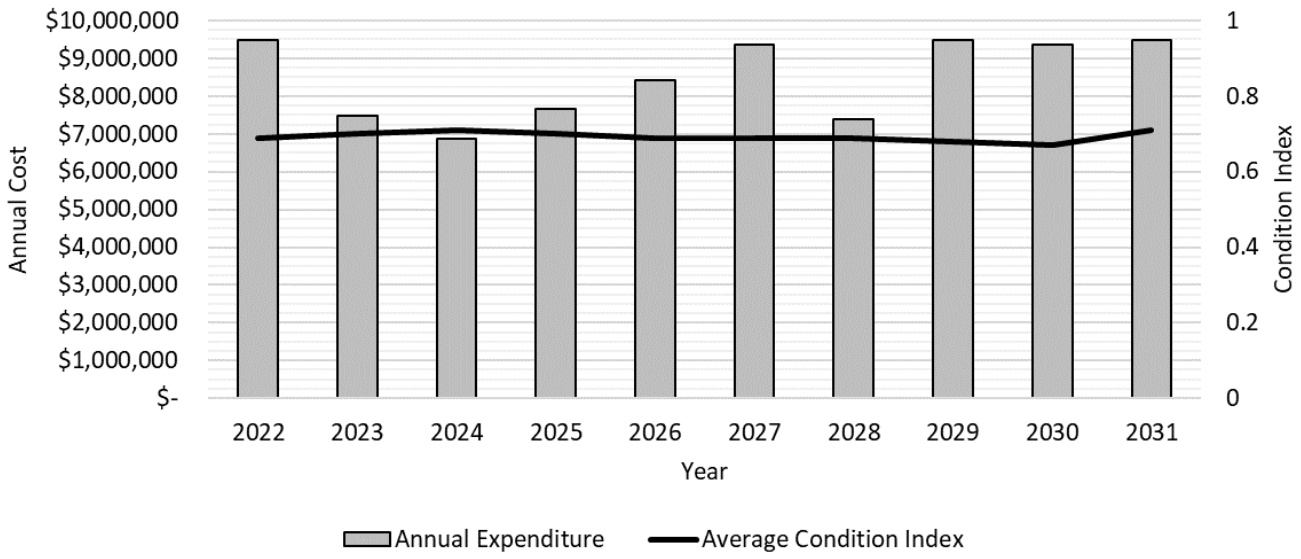
Scenario 3 analyzes the average recommended investment value from years 2021-2025 as suggested in the County's 2015 AMP. Most years of the scenario maximized expenditure within the annual value, with slight decreases in spending in year 2025

(spending approximately $7.6 M). Through the term of the scenario the overall total expenditure is just over $70 M.

Throughout the scenario, the average condition index is decreases, to a value of 0.63 in year 2031.This value is less than the current level of service being provided by the County, but still represents an acceptable condition range based on best practices.

Scenario 4 analyzes the recommended investment level to maintain the current PCI over the 10-year timeframe. The scenario required a maximum annual expenditure of $9.5M, and achieved a 0.71 at the end of the timeframe (and remaining within a range of 0.68-0.71 each year). The average expenditure across the 10-year timeframe is $8.5M, however five of the scenario years maximize the $9.5M expenditure, and one drops below $7M (2024). The annual expenditure under the Scenario 4 budget value and its resulting impact on the average condition of the assets is shown in **Figure 2-4**

Figure 2-4: Annual Expenditure and Condition Index for Roads - Scenario 3 (2015 Funding Value)



The scenarios discussed above are projected using condition as the primary factor for prioritization, and provide information of how the overall condition of the assets will respond at varying levels of investment over the time period. When conducting capital planning and annual capital expenditures, additional factors beyond those in the model must be considered by the County, as previously described. Further, the scenarios above

are focused on reconstruction of the assets. The County can optimize the scenarios above through continued implementation of other lifecycle activities to extend the useful life and maintain the assets in desired condition and performance.

2.8 Proposed LOS Increase for Roads

In previous versions of the AMP, the County identified a target LOS as 75% of County Roads are rated as 'Very Good' & 'Good', with a goal to achieve the target by 2025. While the current LOS is lesser than the target, the County intends to retain the LOS target, supported through priorities of local Council and administration, and through data collected during the Community Level of Service Survey (as discussed in Section 1.4.2).

The proposed LOS definition for roads also includes the average pavement condition index value, as set out by O. Reg. 588/17. The target for this is to maintain the current index. The two LOS definitions can work in tandem to allow the County multiple ways to show and understand the condition of their road assets. The date for achieving the proposed LOS target will be adjusted from 2025 to 2031 (the planning period of this asset management plan).

3.0 Bridges & Structural Culverts

3.1 State of Local Infrastructure

The County's bridge network consists of 43 bridges managed by the County, and two boundary bridges for which the County shares management. The County handles 50% of the costs for the boundary bridges. Locations of the County bridges are shown in in **Figure A-1** in **Appendix A**.

The County's 45 bridges have a total deck area of 17,079 square metres (m^2). A summary of bridge details by bridge type can be seen in **Table 3-1**.

Table 3-1: Current State Summary of Bridge Assets

Bridge Type	Total Count	Total Deck Area (m^2)	Total Replacement Cost	Average Asset Age (2022) (years)	Average Remaining Life (years)
Cast in Place[1]	16	2,291	$28,219,680	51	54
Precast	16	10,548	$76,516,020	44	52
Steel	12	3,626	$33,164,260	68	41
Stone	1	614	$1,811,740	121	45
TOTAL	**45**	**17,079**	**$139,711,700**	**71**	**48**

Currently the county of Lanark owns 39 structural culverts which have a diameter in excess of 3 meters. The total length of these is 985 m. A summary of the 39 culverts, by culvert type, can be seen in **Table 3-2**.

[1] Note that two of these bridges are the boundary bridges.

Table 3-2: Current State Summary of Structural Culverts

Culvert Type (>3 m)	Total Count	Total Replacement Cost (2022)	Average Asset Age (2022) (years)	Average Remaining Life (years)
Open Footing	13	$7,629,000	54	28
Pipe Arch	4	$1,088,000	41	16
Pipe Horizontal Ellipse	7	$3,392,000	53	8
Box Culvert	12	$8,805,000	39	56
Arch	1	$4,945,000	72	38
CSP	2	$171,000	33	N/A
TOTAL	**39**	**$26,030,000**	**48**	**29**

3.1.1 Replacement Cost

The replacement costs for bridge assets were estimated as part of the OSIM reporting conducted by Keystone Bridge management Group in 2019. The estimation was done based on replacement in kind, and were estimated in dollars current to the report. To estimate current prices, the costs within the OSIMs were inflated by a rate of 3% per year since the inspection, with these values being shown in **Table 3-2**.

Note that no replacement costs were provided for the two shared boundary, cast-in-place bridges.

The replacement costs were estimated as part of structural culvert inspection that occurred in 2020 (by Keystone Bridge Management Corp), and are noted to be estimated based on replacement in kind. To reflect 2022 values, the replacement costs within the 2020 reports were inflated annually by 3%.

Note that Lunney Culvert was assessed as part of the Boundary Bridges assessment, which did not provide estimations of replacement value. Therefore, this Corrugated Steel Pipe (CSP) structure does not currently have an estimated replacement cost, the provision for which should be considered within the next assessment of the structure.

3.1.2 Average Age

The average age of the bridge structures is 55 years, with the oldest being 120 years old (Asset ID 020021, constructed in 1901), and the newest being 7 years old (Asset ID 511116, constructed in 2015).

The average age of the structural culverts is 48 years. The oldest asset is a 90-year-old concrete box culvert (Asset ID 029135, constructed in 1932), and the newest is a 5-year-old concrete box culvert (Asset ID 043148, constructed in 2017).

The year of construction was not available for eight of the 39 culvert structures, these structures therefore being omitted from the average age determination. This includes the following structures:

- 012248 (Pipe Horizontal Ellipse) – Mill Street Culvert;
- 016477 (Box) – Wolfe Grove Creek;
- 029062 (Open Footing) – County Road #29;
- 029255 (Open Footing) – Glen Creek Box;
- 043100 (Open Footing) – Rosedale Creek;
- 043237 (Open Footing) – Tay Tributary;
- 043293 (Open Footing) – Road Con Box; and
- 511252 (Open Footing) – Hopetown Box Culvert.

3.1.3 Expected Useful Life

The County currently tracks a general expected useful life value associated with each bridge, which is used to estimate the year of replacement of the asset. The expected useful life values are similar yet inconsistent across the asset types. A summary of the range and most common expected useful lives are shown in **Table 3-3**.

Table 3-3: Expected Useful Life Summary for Bridges

Bridge Type	Range	Most Common
Cast in Place	90 to 140	100
Precast	80 to 110	90
Steel	65 to 167	115
Stone	150+ years	166

The expected remaining useful service life for the bridges was estimated as part of the inspections that took place in 2019. The values were estimated based on the bridge condition, expected works, history, etc. The estimations were reduced by 3 years to estimate them current to 2022.

The remaining useful life ranges from 3 years remaining (Bridge 3, Dixon Bridge, Althorpe Road), to 83 years (Bridge 34, Mississippi River Bridge).

Note that no inspection information was provided for the two cast-in-place boundary bridges therefore the remaining useful life is unknown.

The expected remaining useful service life for the structural culverts was estimated as part of the inspections that took place in 2020 (or earlier). The values were estimated based on the bridge condition, expected works, history, etc. The estimations were reduced by the number of years lapsed since the inspection to estimate them current to 2022.

The remaining useful life ranges from 0 years remaining (Site ID 12, Mill Street Culvert), to 89 years (Bridge 26, The Swale Culvert).

3.2 Condition – Bridges & Structural Culverts

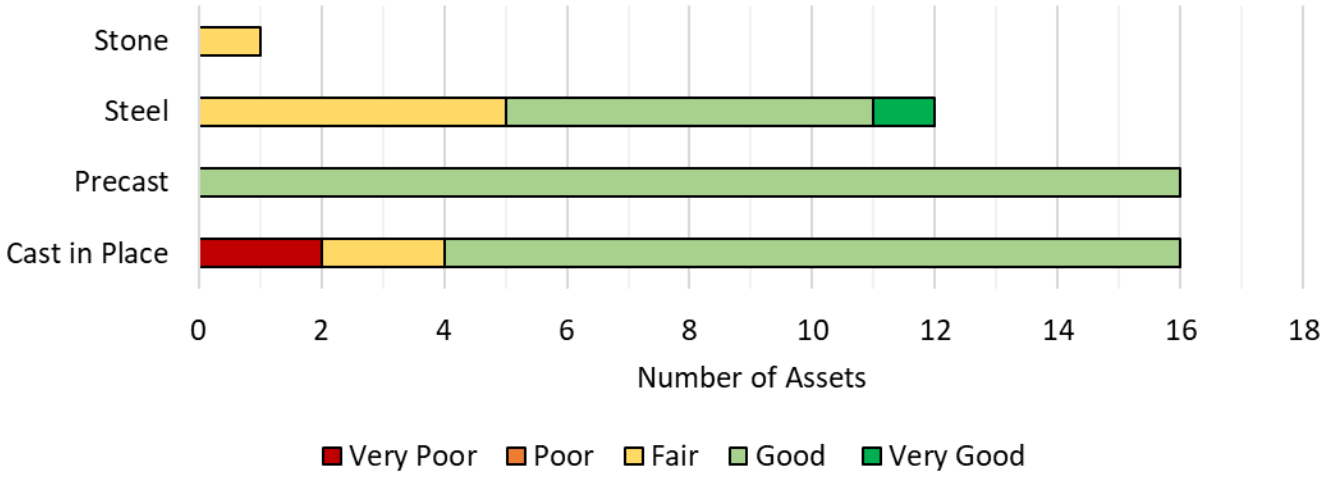
Condition for bridges were measured using Bridge Condition Index (MTO calculation) as part of the OSIM inspections completed in 2021. The BCI ratings are given on a scale of 0 to 100. For consistency with condition descriptions for other asset categories, the Bridge Condition Index (BCI) score ranges are summarized in **Table 3-4** with their corresponding text condition description.

Table 3-4: Bridge Condition Ratings from BCI Ratings

Condition	BCI Score Range
Very Good	86 to 100
Good	71 to 85
Fair	56 to 70
Poor	41 to 55
Very Poor	0 to 40

The condition ratings by bridge type (using the 2021 BCIs from inspection) can be seen in **Figure 3-1**. Note that BCI ratings were not assigned for Boundary bridges, for which the condition was estimated as a percentage of the useful life used.

Figure 3-1: Condition Ratings for Bridge Assets



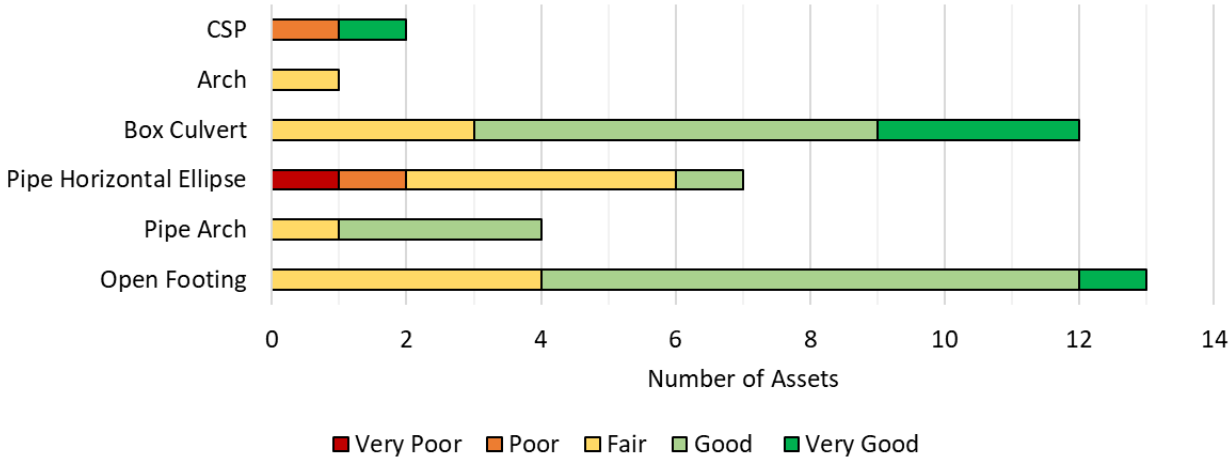
The majority of bridges are within the ‘‘Good’ condition range, with 76%, 18% fair, 2% very good, and 4% very poor. No bridges are currently in the ‘Poor’ range.

The County had previously estimated the condition of the structures based on the ten-year projected structural rehabilitation costs for each asset, as a percentage of the total replacement cost of the asset.

Condition for culverts >3 m diameter were assessed and reported using a BCI as part of culvert inspections from 2020 and 2018. The BCI ratings are given on a scale of 0 to 100. The BCI score ranges and corresponding text condition descriptions for structural culverts are consistent with bridges, as described in **Table 3-4.**

The condition ratings by culvert type (using the 2018 and 2020 BCIs from inspection) can be seen in **Figure 3-2**. Note that a BCI rating was not assigned for Lunney Culvert (Site ID 39), therefore its condition was assessed based on its age and the deterioration rate of the culvert of the same construction type at Site ID 38.

Figure 3-2: Condition Ratings for Structural Culvert Assets



The majority of culverts are within the 'Good' condition range, with 46%, with a further 33% within the 'Fair' condition range. Within the remaining 21%, there are 13% in 'Very Good', 5% in 'Poor', and 3% in 'Very Poor' (including only one asset).

The County had previously estimated the condition of the structures based on the ten-year projected structural rehabilitation costs for each asset, as a percentage of the total replacement cost of the asset.

3.3 Current Levels of Service – Bridges & Structural Culverts

Bridge and structural culvert assets are considered a core asset under O. Reg. 588/17, and therefore have pre-defined levels of service statements, per Table 5 of the regulation. Note that the LOS statements are provided for Bridges and Structural Culverts as a combined asset category, therefore the information below incorporates bridge asset data, as well as structural culverts (greater than 3 m diameter). The County's primary indicator for levels of service for Bridges is the condition, including the following targets set within the 2016 Asset Management Plan: 87% of County Bridges rated as 'Good'.

The County intends to continue to track the quantity of bridges within each condition category in conjunction with tracking the overall BCI of the structures.

The O. Reg. 588/17 level of service Community and Technical parameters are summarized in **Table 3-5** and **Table 3-6**.

Table 3-5: Community LOS for Bridges and Structural Culverts

LOS Parameter	Community Levels of Service (qualitative descriptions)	Response
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	• Heavy transport vehicles • Motor vehicles • Emergency vehicles • Agricultural vehicles and equipment • Pedestrians Locations of County bridges are shown in **Figure A-1** in **Appendix A**.
Quality	1. Description or images of the condition of bridges and how this would affect use of the bridges. 2. Description or images of the condition of culverts and how this would affect use of the structural culverts.	The condition of bridges and culverts are evaluated routinely according to the OSIM requirements. For full descriptions and samples images of bridge and culvert condition classifications refer to the OSIM 2008 and associated field guide. Bridges and structural culverts in good condition typically operate as designed and would not receive any additional restrictions or limitations beyond those designed. Bridges and structural culverts in fair to poor condition may receive load restrictions or be subject to closure as deterioration affects asset capacity to safely and reliably deliver the designed level of service. For photos illustrating the condition of bridge components in each category refer to OSIM 2008 and the associated field guide.

Table 3-6: Technical LOS for Bridges and Structural Culverts

LOS Parameter	Technical levels of service (technical metrics)	Response
Scope	Percentage of bridges in the municipality with loading or dimensional restrictions.	Load postings currently in place 2 bridges, or 4.4%. Bridges include: • Bridge 40 (Andrewsville Bridge) • Bridge 41 (Blakeney Bridge)
Quality	1. For bridges in the municipality, the average bridge condition index value. 2. For structural culverts in the municipality, the average bridge condition index value.	1. Average BCI Bridges: 73.1 (2021) 2. Average BCI Culverts: 70.8 (2020)

3.4 Current Performance – Bridges & Structural Culverts

The current metric for performance used by the County, is that 87% of bridge assets have a condition rating of 'Good'. Additional indicators can be used to provide a fuller picture of asset performance. A summary of indicators of performance for the past two calendar years is shown in **Table 3-7**.

Table 3-7: Performance for Bridges

Performance Indicator	County Performance Data 2021	County Performance Data 2020
Traffic counts over bridges to assess usage	AADT captured bi-annually	AADT captured bi-annually
Number of bridge failures/road closures	0	0
Number of structures with load restrictions	1 height restriction 1 length restriction 3 weight restriction	2
Percentage of bridges in good or very good condition (OSIM report results)	BCI 2021: <40: 4% 41-55: 0% 56-70: 18% 71-85: 76% 86-100: 2%	BCI 2019: <40: 4% 41-55: 0% 56-70: 13% 71-85: 78% 86-100: 4%

The current metric for performance used by the County, is that 87% of culvert assets have a condition rating of 'Good'. Additional indicators can be used to provide a fuller picture of asset performance. A summary of indicators of performance for the past two calendar years is shown in **Table 3-8**.

Table 3-8: Performance for Structural Culverts

Performance Indicator	County Performance Data 2020 to 2021
Traffic counts over culverts to assess usage	Traffic counts are monitored as part of road performance. AADT range for structures is from 300 to 12,000.
Number of culvert failures/road closures	1 (2020, 2021)
Number of structures with load restrictions	See list in **Table 3-7**
Percentage of culverts in good or very good condition	16%

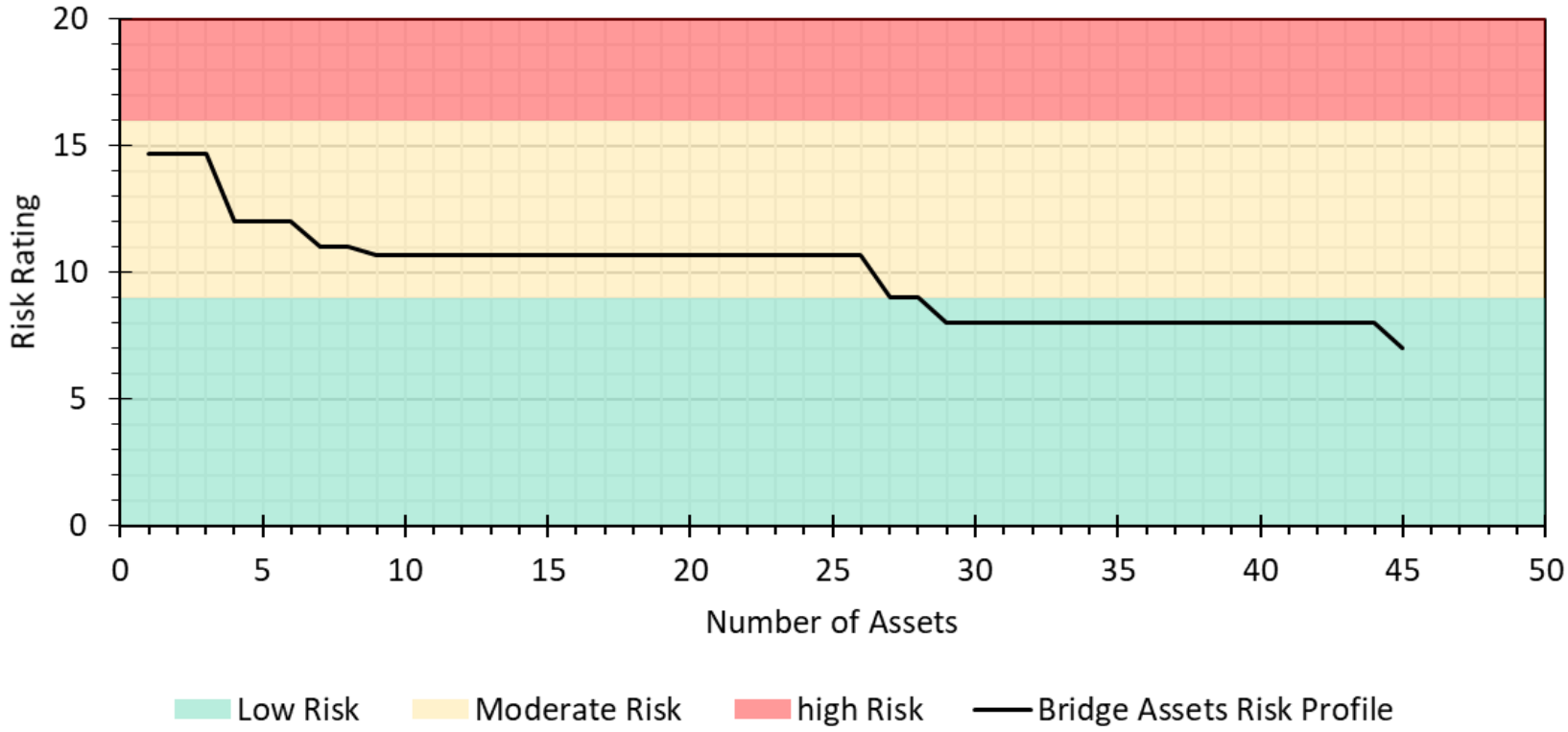
3.5 Risk Assessment – Bridges & Structural Culverts

The risk assessment for bridge assets will be conducted according to the following assumptions and criteria:

- **Condition:** Determined based on Bridge Condition Index (BCI) from latest inspection;
- **Performance:** Assessed by the County (reliability rating);
- **Climate Change:** Assumed a value of 5 – assets highly vulnerable to flood risks from climate change;
- **Impact:** Assumed based on detour route lengths. Detour routes longer than 10 km were given an impact value of 2, while shorter detours were given impact values of 1; and
- **Importance:** Assumed based on Highway Class of the road passing over the structure as follows:
    - Low importance (value of 1) for Highway Classes 4 & 5;
    - Moderate importance (value of 2) for Highway Class 3;
    - High importance (value of 3) for Highway Classes 1 & 2; and
    - If no associated road segment was given, the asset was assumed to have Moderate importance (value of 2).

Using the assumptions and parameters listed above, a risk assessment was conducted. The distribution of risk ratings for bridge assets is shown in **Figure 3-3**.

Figure 3-3: Risk Profile for Bridge Assets



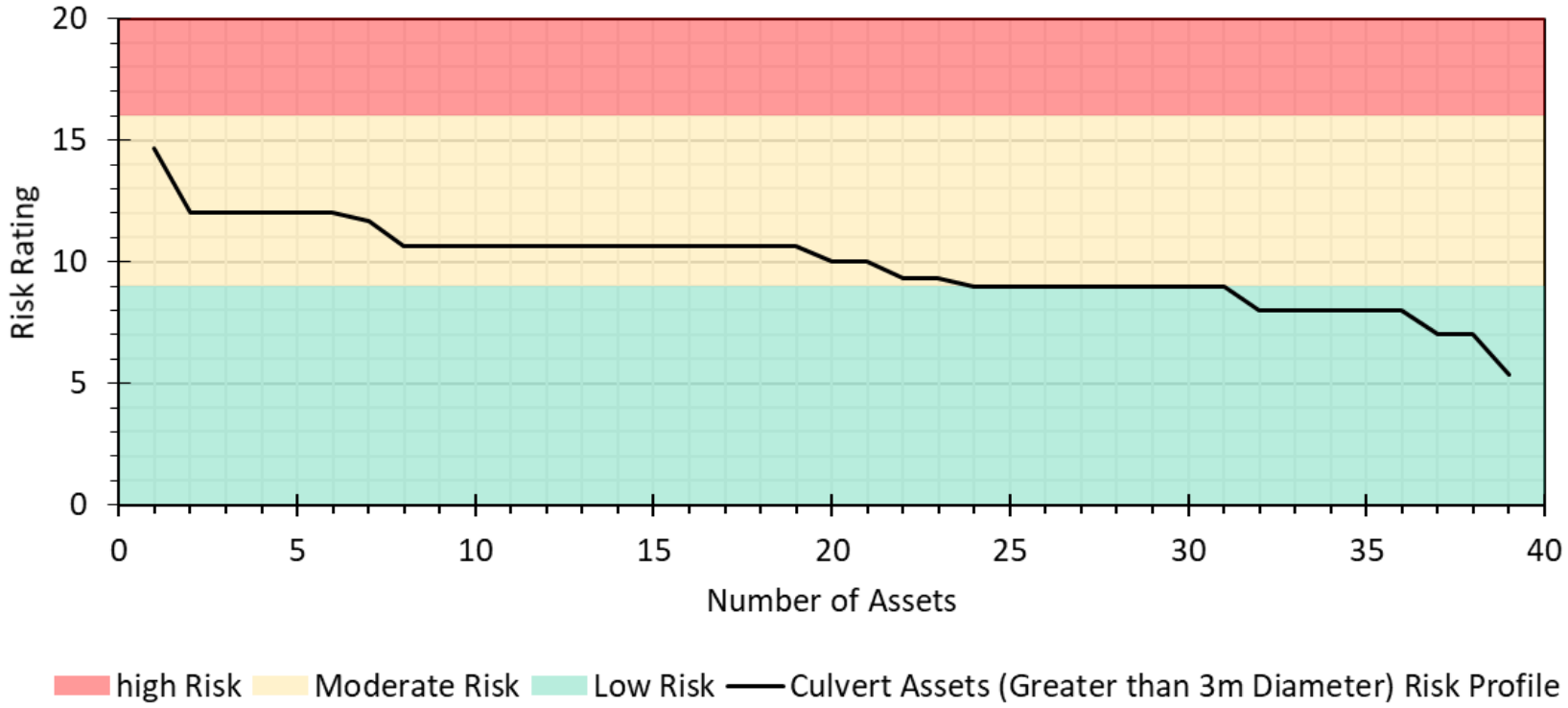
All of the bridge assets were within the low to moderate range, with values from 7 to 14.7. In the moderate range were 26 assets, while 19 were within the low risk range.

The risk assessment for large culvert assets (greater than 3 m diameter) will be conducted according to the following assumptions and criteria:

- **Condition:** Determined based on BCI from latest inspection;
- **Performance:** Assessed by the County;
- **Climate Change:** Assumed a value of 5 – assets highly vulnerable to flood risks from climate change;
- **Impact:** Assumed based on Average Annual Daily Traffic (AADT) as follows:
    - High impact (value of 2) for AADT at or greater than 2,000; and
    - Moderate impact (value of 1) for AADT less than 2,000;
- **Importance**: Assumed based on Highway Class of the road passing over the structure:
    - Low importance (value of 1) for Highway Classes 4 & 5;
    - Moderate importance (value of 2) for Highway Class 3;
    - High importance (value of 3) for Highway Classes 1 & 2; and
    - If no associated road segment was given, the asset was assumed to have Moderate importance (value of 2).

Using the assumptions and parameters listed above, a risk assessment was conducted. The distribution of risk ratings for large culvert assets is shown in **Figure 3-4**.

Figure 3-4: Risk Rating Profile for Structural Culvert Assets



All of the structural culvert assets were within the low to moderate range, with values from 5.3 to 14.7. In the moderate range were 23 assets, while 16 were within the low risk range.

3.6 Lifecycle Activities – Bridges & Structural Culverts

3.6.1 Lifecycle Activities - Bridges

The following section describes the lifecycle activities that can be implemented within the asset management strategy for roadway bridge assets. Note that, as previously discussed, bridge assets refer to the entirety of the asset which is made up of bridge deck surface and bridge structure. The primary lifecycle activities include construction, inspections, maintenance and repair, replacement, and decommissioning/disposal.

Construction

The start of an asset's lifecycle is its construction. The bridge should be constructed to adhere with the requirements of the O.Reg. 160/02: Standards for Bridges, CSA S6 Canadian Highway Bridge Design Code, and any and all other applicable regional codes and requirements for the bridge and its use. Each bridge should be designed and constructed to provide the services for which it is intended.

Inspections

Under O.Reg. 160/02: Standards for Bridges, the County is required to complete one inspection of all bridges every two years to identify condition and produce a report outlining the recommended work for a 1- to 10-year period. The inspection uses the Ontario Structural Inspection Manual (OSIM) 2008 and is referred to as the OSIM or Bridge Inspection Report. The County should continue the current biennial OSIM Bridge Inspections along the current schedule, with the next inspections scheduled for 2023 (noting that inspection was completed in 2021 but data was not available at time of reporting).

Maintenance and Repairs

Bridge assets are long-lived assets with estimated useful lives between 65 to beyond 165 years. Throughout the lifecycle of these assets the majority of expected needs will be maintenance and repair works.

Routine maintenance works are typically used to prolong the lifespan of assets and include both preventative and reactive activities designed to maintain the asset condition and function. Preventative activities are implemented to provide a predictive response to deterioration or possible performance issues by managing the contributing factors prior to an event occurring. Reactive maintenance is conducted in response to a condition or performance issue and designed to correct the issue before it causes asset deterioration and possible deficiencies. The scale of maintenance activities varies widely and is dependent on a variety of factors including the age, asset utilization, environment, and design. Maintenance should be completed based on recommendations in biennial OSIM reports and industry best practices.

A general summary of bridge and structural culvert maintenance activities include, but are not limited to:

- Cleaning, washing or flushing;
- Railing system maintenance;
- Painting of steel bridge components;
- Bearing maintenance;
- Pest control;
- Deck drainage maintenance;
- Erosion control; and
- Scaling of loose concrete and Aluminum Copper Radiators (ACR) Steel.

Repair works are driven by the identification and treatment of deficiencies to prevent the continued deterioration of the deficiency which may cause a reduction in asset condition, performance and LOS delivered. Timing of repairs varies widely as they may be prescheduled based on estimated deterioration, in response to biennial condition reporting, or on an emergency basis. Repairs to bridges vary widely and can be in relation to structural and deck surface components.

Replacement

Replacement of a structure is based on current age, estimated lifespan and recommendations from condition assessments. Replacement can be used when an asset is nearing or has reach the end of its life, repairs are not technically feasible, estimated future repair costs are greater than replacement cost, or increases to capacity or LOS are required. Replacement activities are typically large in scale and involve the issuance

of a capital project. Timing of replacement activities must consider the impact on adjacent infrastructure, the impact on nearby asset LOS and replacement or maintenance requirements of connected infrastructure.

Disposal

Disposal activities from bridges can include the removal from service of a bridge, through:

- Closure of the bridge from access;
- Change in level of service of the bridge to limit access (e.g., vehicular bridge); and
- Deconstruction of the bridge.

Disposal activities should be implemented when a bridge has reached the end of its useful life, or has degraded to such a state that it can no longer provide the level of service for which it is intended. Removal of a bridge from service without replacement, or decrease in level of service should be undertaken only when it is decided to no longer be required to provide level of service to residents.

Disposal activities should be conducted such that health and safety protocols are being followed, and spent materials are disposed of at appropriate or approved facility.

3.6.2 Lifecycle Activities – Structural Culverts

The following section describes the lifecycle activities that can be implemented within the asset management strategy for structural culvert assets (with diameter greater than 3 m). The primary lifecycle activities include construction, inspections, maintenance and repair, replacement, and decommissioning/disposal.

Construction

The start of an asset's lifecycle is its construction. The structural culvert should be constructed to adhere with the requirements of the O. Reg. 160/02: Standards for Bridges, CSA S6 Canadian Highway Bridge Design Code, and any and all other applicable regional codes and requirements for the culvert and its use. Each culvert should be designed and constructed to provide the services for which it is intended.

Inspections

Under O. Reg. 160/02: Standards for Bridges, the County is required to complete one inspection of all culverts every two years to identify condition and produce a report outlining the recommended work for a 1- to 10-year period. The inspection uses the Ontario Structural Inspection Manual (OSIM) 2008 and is referred to as the OSIM or Bridge Inspection Report. The County should continue the current biennial OSIM Bridge Inspections along the current schedule, with the next inspections scheduled for 2024 (noting that inspection is expected to be completed in 2022).

Maintenance and Repairs

Culverts assets are long-lived assets. Throughout the lifecycle of these assets the majority of expected needs will be maintenance and repair works.

Routine maintenance works are typically used to prolong the lifespan of assets and include both preventative and reactive activities designed to maintain the asset condition and function. Preventative activities are implemented to provide a predictive response to deterioration or possible performance issues by managing the contributing factors prior to an event occurring. Reactive maintenance is conducted in response to a condition or performance issue and designed to correct the issue before it causes asset deterioration and possible deficiencies. The scale of maintenance activities varies widely and is dependent on a variety of factors including the age, asset utilization, environment, and design. Maintenance should be completed based on recommendations in biennial OSIM reports and industry best practices.

A general summary of structural culvert maintenance activities includes, but is not limited to:

- Cleaning, washing or flushing;
- Railing system maintenance;
- Pest control;
- Erosion control; and
- Scaling of loose concrete and ACR Steel.

Repair works are driven by the identification and treatment of deficiencies to prevent the continued deterioration of the deficiency which may cause a reduction in asset condition, performance and LOS delivered. Timing of repairs varies widely as they may be prescheduled based on estimated deterioration, in response to biennial condition reporting, or on an emergency basis. Repairs to culverts vary widely and can be in relation to structural roadway/overburden components.

Replacement

Replacement of a structure is based on current age, estimated lifespan and recommendations from condition assessments. Replacement can be used when an asset is nearing or has reach the end of its life, repairs are not technically feasible, estimated future repair costs are greater than replacement cost, or increases to capacity or LOS are required. Replacement activities are typically large in scale and involve the issuance of a capital project. Timing of replacement activities must consider the impact on adjacent infrastructure, the impact on nearby asset LOS and replacement or maintenance requirements of connected infrastructure.

Disposal

Disposal activities for culverts can include the removal from service of an asset, through:

- Closure of the culvert from access;
- Change in level of service of the culvert to limit access (e.g., vehicular bridge); and
- Deconstruction of the culvert.

Disposal activities should be implemented when a culvert has reached the end of its useful life, or has degraded to such a state that it can no longer provide the level of service for which it is intended. Removal of a culvert from service without replacement, or decrease in level of service should be undertaken only when it is decided to no longer be required to provide level of service to residents.

Disposal activities should be conducted such that health and safety protocols are being followed, and spent materials are disposed of at appropriate or approved facility.

3.7 Asset Management Strategy

3.7.1 Asset Management Strategy – Bridges

The asset management strategy for bridges is based on maintaining the structures in sufficient condition and performance to allow for continued access to crossings and adequate service delivery. The strategy considers the requirements set out by applicable regulations, and builds on those to include the lifecycle activities summarized above.

Under **O. Reg. 160/02: Standards for Bridges**, the County is required to complete one inspection of all bridges every two years to identify condition and produce a report outlining the recommended work for a 1- to 10-year period. The inspection uses the Ontario Structural Inspection Manual (OSIM) 2008 and is referred to as the OSIM report. The most recent condition assessment and study was completed in 2019, with reporting currently being completed for the 2021 assessments.

The County's current strategy for maintaining the bridges includes procurement of OSIM reports at the required frequency, and completion of the maintenance, rehabilitation and reconstruction works according to the recommendations from the OSIM reports.

Inspections and OSIM reports will identify works to be done at each of the bridge structures – each of the inspection types should recommend maintenance works, rehabilitation works, and reconstruction where necessary, as well as prioritization of the works and an estimation of the overall condition of the structure. It is therefore assumed that by following the results of the inspections/OSIMs, the County will be following a strategy that prioritizes maintenance works as required to maximize the lifecycle of the bridge assets.

Projection of Works

To understand the needs and projected works on the bridges within a 10-year period, a summary of the recommendations from the 2021 OSIM reports (prepared by Keystone Bridge Management Corp.) is used. A summary of the annual expenditure for maintenance works or replacement is in **Table 3-9**.

Table 3-9: Projection of Works for Bridges

Year	Total Estimated Maintenance and Repair Costs	Number of Bridges
2022	$1,200,000	1
2023	$2,107,000	2
2024	$1,078,000	2
2025	$1,146,000	2
2026	$1,222,000	4
2027	$2,016,000	1
2028	$2,038,000	1
2029	$476,000	2
2030	$2,380,000	1

While the asset management plan timeframe extends until 2031 (10 years), there are no current projected works for that year.

The potential for replacement of structures was also reviewed, based on the age and expected useful life of the assets. There were two bridges identified for replacement within the reviewed timeline: Dixon Bridge in 2028, and Blakeney Bridge in 2024. Within the recommended works from the 2021 OSIM reports, the Dixon Bridge is recommended for replacement in 2027, and Blakeney is recommended for repairs in 2023, however the repairs to the Blakeney bridge will be deferred in favour of full construction in 2024. Accordingly, no additional cost was carried as these structures were both already considered for works.

To complete all recommended work within the next 10 years is estimated to cost a total of $13,663,000. The average annual cost (total) is just over $850,000.

3.7.2 Asset Management Strategy – Structural Culverts

The asset management strategy for culverts greater than 3 m in diameter is based on maintaining the structures in sufficient condition and performance to allow for continued access to crossings and adequate service delivery. The strategy considers the requirements set out by applicable regulations, and builds on those to include the lifecycle activities summarized above.

Under O. Reg. 160/02: Standards for Bridges, the County is required to complete one inspection of all large culverts every two years to identify condition and produce a report outlining the recommended work for a 1- to 10-year period. The inspection uses the Ontario Structural Inspection Manual (OSIM) 2008 and is referred to as the OSIM report. The most recent condition assessments and studies were completed in 2018 and 2020, with the next inspection expected to be in 2022.

In general, the strategy for the culverts greater than 3 m diameter will be consistent with that set out for the bridges (which are also governed by the requirement to complete OSIM inspections).

Projection of Works

To understand the needs and projected works on the culverts within a 10-year period, a summary of the recommendations from the 2018 and 2020 OSIM reports (prepared by Keystone Bridge Management Corp.) is used. The county has a capital plan that summarizes the individual maintenance or repair works recommended in the OSIM reports. A summary of the annual expenditure for maintenance works or replacement is in **Table 3-10**, noting that replacement works and maintenance/rehabilitation works were only identified for three years out of the analyzed ten-year timeframe.

Table 3-10: Maintenance and Replacements for Culverts Greater than 3 m Diameter

Year	Replacement Costs (from 2020 Report)	No. of Structures	Maintenance Costs (from 2020 Report)	No. of Structures	Maintenance Costs (from 2018 Report)	No. of Structures	Total
2025	$376,000	1	0	0	0	0	$376,000
2028	$780,000	1	0	0	$597,000	1	$1,377,000
2033	0	0	0	0	$458,000	1	$458,000

Note that for the purposes of this plan, it is assumed that works recommended for years prior to the current year (2022) have been completed as suggested within the OSIM reports.

In general, the requirements for the large culverts (greater than 3 m in diameter) are not extensive over the ten-year timeframe. The County should continue to conduct the works according to the recommendations set out in the plans, and continue to update those recommendations on a routine basis through OSIM or other inspections.

4.0 Stormwater

4.1 State of Local Infrastructure

Currently the Lanark County owns 1,437 stormwater culverts with a diameter less than 3 meters. The total length of these is 27,481 m. A summary of the 39 stormwater culverts, by culvert size can be found in **Table 4-1**.

Table 4-1: Current State Summary of Stormwater Culverts

Culvert Type	Total Number of Assets	Length of Culverts (m)	Total Replacement Cost	Average Latest Inspection Year	Average Remaining Lifespan
Less Than 1 metre	1,229	22,894	$19,459,900	2014	13
1 to 1.99 metres	173	3,685	$3,132,250	2014	14
2 to 2.99 metres	35	902	$766,700	2014	11
Total	**1,437**	**27,481**	**$23,358,850**	**2014**	**13**

Note that there are 21 stormwater culvert assets with a missing length, which have been omitted from the summary above.

The stormwater culverts are constructed of a variety of construction materials and types, as summarized in **Table 4-2**.

Table 4-2: Stormwater Culvert Material Summary

Material (Assumed)	No. of Culverts	Length of Culverts (m)
CSP	1,323	24,867
Concrete Box	56	1452
Intersection	32	661
HDPE	14	325
Concrete box & CSP	3	69
Unknown	3	39
Concrete	2	5
Entrance	2	20
PVC	1	34
Steel casing	1	29

4.1.1 Replacement Cost

The replacement cost was estimated by assuming a unit replacement cost of $850 per lineal meter of stormwater culvert. The unit cost was estimated by the County. The unit cost was applied against the total length of known culverts to estimate the replacement cost. Note that the replacement cost is missing for the culverts that have no length attributed.

4.1.2 Average Age

The County tracks the latest year inspection was undertaken on the stormwater culvert assets, which is used to inform the expected remaining useful life and establish the condition. The County does not have year of construction tracked for most culvert assets.

4.1.3 Expected Useful Life

The expected remaining useful life is estimated as part of the stormwater culvert inspection. To estimate the overall current expected useful life, the value at time of inspection was used, subtracting the amount of time that has passed since the inspection date.

4.2 Condition – Stormwater

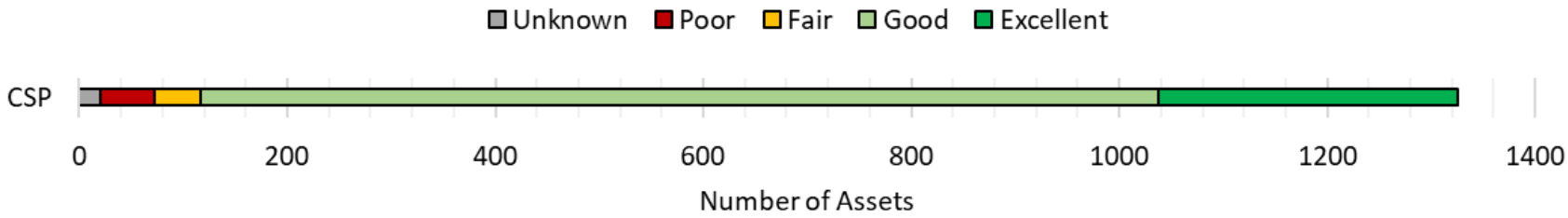
Condition for stormwater culverts were provided and assessed by the County using a descriptive condition scale from 'Excellent' to 'Poor' (note that for consistency in this report, 'very good' will be used as an equivalent descriptor for the 'excellent' condition rating). Some assets did not have a condition assigned, for which a condition was assumed based on the percentage of useful life elapsed at date of reporting (22 structures).

The condition ratings by stormwater culvert type (using the 2018 and 2020 BCIs from inspection) can be seen in **Figure 4-1** and **Figure 4-2** (separated due to the quantity of CSP culverts).

Using the condition ratings, 91% of the assets are considered in Good or Excellent condition, with the rest distributed between the good and fair condition (noting that there is unknown condition for 22 of the assets).

Figure 4-1: Condition Ratings by Stormwater Culvert Type

Figure 4-2: Condition Ratings by Culvert Type (CSP)



4.3 Current Levels of Service – Stormwater

The stormwater culverts have been considered stormwater management assets for the purpose of LOS definitions. The stormwater LOS definitions correspond with Table 3 of the Regulation.

In 2015, the County targeted a desired level of service of 81% of County stormwater culverts rated as 'Very Good' or 'Good'.

The following levels of service parameters expand on the levels of service definition.

The O. Reg. 588/17 level of service Community and Technical parameters are summarized in **Table 4-3** and **Table 4-4.**

Table 4-3: Community LOS for Stormwater Culverts

Service Attribute	Community Levels of Service (qualitative descriptions)	Response
Scope	Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system.	Stormwater culverts at the County are located adjacent to road infrastructure, including intersections, entrance culverts, road crossings, centreline culverts or located beside roads.

Table 4-4: Technical LOS for Stormwater Culverts

Service Attribute	Technical Levels of service (technical metrics)	Response
Scope	1. Percentage of properties in municipality resilient to a 100-year storm. 2. Percentage of the municipal stormwater management system resilient to a 5-year storm.	The percentage of properties in the County that are resilient to 100-year and 5-year storms are currently unknown. This metric is not tracked at the County, as it is the responsibility of the lower tier municipalities.

4.4 Current Performance – Stormwater

The current metric for performance used by the County, is that 81% of stormwater culvert assets have a condition rating of 'Good' or 'Very Good'. Additional indicators can be used to provide a fuller picture of asset performance. The County can consider developing additional stormwater related performance measures to continue to track at a greater specificity the performance of these assets.

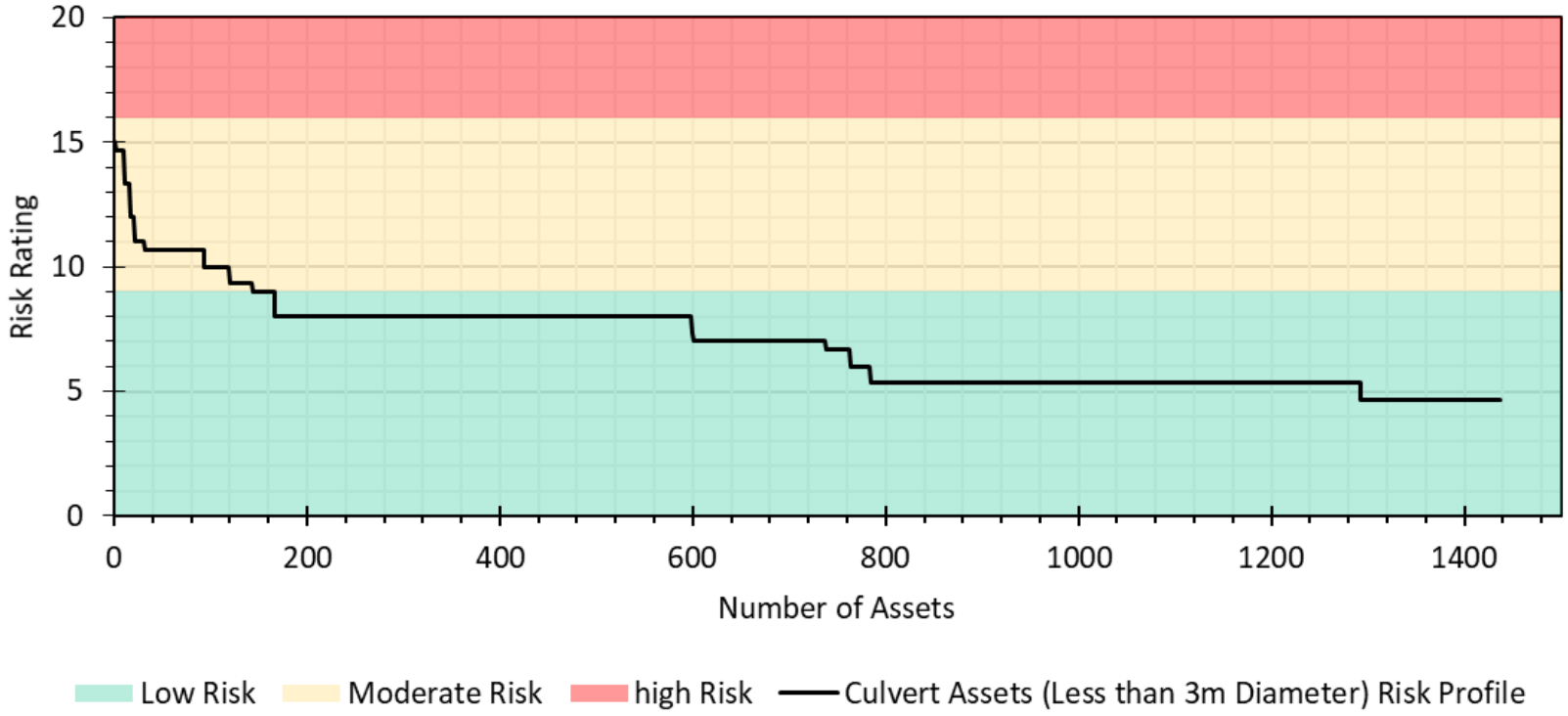
4.5 Risk Assessment – Stormwater

The risk assessment for stormwater culvert assets will be conducted according to the following assumptions and criteria:

- **Condition:** Determined based on a 5-point rating from the last inspection (ranging from 'Excellent' – 1 to 'Very Poor' – 5);
- **Performance:** Assessed by the County;
- **Climate** Change: Assumed a value of 5 – assets highly vulnerable to flood risks from climate change;
- **Impact:** Based on Average Annual Daily Traffic (AADT), with AADT over 2,000 given an impact value of 2, and lower volumes given impact values of 1; and
- **Importance:** Evaluated based on Highway Class of the road passing over the structure:
    - Low importance (value of 1) for Highway Classes 4 & 5;
    - Moderate importance (value of 2) for Highway Class 3;
    - High importance (value of 3) for Highway Classes 1 & 2; and
    - If no associated road segment was given, the asset was assumed to have Moderate importance (value of 2).

Using the assumptions and parameters listed above, a risk assessment was conducted. The distribution of risk ratings for small culvert assets is shown in **Figure 4-3**.

Figure 4-3: Risk Profile for Stormwater Culvert Assets



There are 143 assets that are within the Moderate risk range, with the highest rating at 15. These assets represent only just less than 10% of the network. The remainder of assets are within the low risk range.

4.6 Lifecycle Activities – Stormwater

The following section describes the lifecycle activities that can be implemented within the asset management strategy for stormwater culvert assets. The primary lifecycle activities include construction, inspections, maintenance and repair, replacement, and decommissioning/disposal.

4.6.1 Construction

The start of an asset's lifecycle is its construction. The design of a culvert structure should be done such that the culvert has sufficient capacity to allow for required flows and has sufficient structural considerations such that the surface above the culvert is supported. It may be pertinent to consider climate change during the design and construction of a culvert asset.

4.6.2 Maintenance

Culvert assets can be long-lived assets with estimated useful lives between 15 to beyond 75 years. Throughout the lifecycle of these assets the majority of expected needs will be maintenance and repair works.

Routine maintenance works are typically used to prolong the lifespan of assets and include both preventative and reactive activities designed to maintain the asset condition and function. Preventative activities are implemented to provide a predictive response to deterioration or possible performance issues by managing the contributing factors prior to an event occurring. Reactive maintenance is conducted in response to a condition or performance issue and designed to correct the issue before it causes asset deterioration and possible deficiencies. The scale of maintenance activities varies widely and is dependent on a variety of factors including the age, asset utilization, environment, and design.

Maintenance should be completed based on in section of the culvert, and can include (but is not limited to) cleaning, washing and flushing, and erosion control.

Repair works are driven by the identification and treatment of deficiencies to prevent the continued deterioration of the deficiency which may cause a reduction in asset condition, performance and LOS delivered.

4.6.3 Renewal

Renewal of the stormwater culvert assets can include structural or non-structural lining. A lining can be used where the condition has deteriorated, however structurally the pipe segment is still sound. A lining can extend the useful life of an asset and improve performance. Risks associated with lining of a culvert include the improper installation of the lining or continued deterioration of the original culvert such that the lining does not perform as expected.

4.6.4 Operating

Operating activities for the stormwater culvert assets include those activities that do not directly deal with the physical state of the culvert, but work to extend the assets useful life. The operating activities can include non-infrastructure policies, and monitoring/inspection of the assets. There is currently not an inspection program for the stormwater culverts in place; however, establishment of a program can include visual inspection at regular intervals, at a frequency that provides sufficient information to the County. Where culverts are difficult to assess, usage of CCTV or zoom camera can be implemented. Usage of the zoom camera technology has the risk of insufficient visual detail to make appropriate activity decisions.

4.6.5 Decommissioning

Decommissioning activities of the stormwater culverts should be implemented when a culvert has reached the end of its useful life, or has degraded to such a state that it can no longer provide the level of service for which it is intended. Decommissioning activities typically include abandonment or replacement of the asset. It is expected that the typical decommissioning practice would be the replacement in-place of the culverts due to the dependency of adjacent infrastructure on the location and proper functioning of the stormwater culverts (such as the dependency of a road on a culvert crossing a creek).

Disposal activities should be conducted such that health and safety protocols are being followed, and spent materials are disposed of at appropriate or approved facility.

4.7 Asset Management Strategy

The asset management strategy for stormwater assets (culverts less than 3 m in diameter) will maximize the lifecycle of the assets where appropriate, in consideration of specific needs of the County and existing infrastructure.

The condition, a major factor in the asset management strategy, should be established to assist in decision making. The County's current inspection program is to review the culverts every four years. During the inspection, the County provides a condition rating, provides any commentary on the condition or performance of the culvert, and estimates the remaining useful life of the structure at the time of inspection.

Another option for condition assessment is the use of camera technology (CCTV or Zoom cameras), the applicability for which can be based on a variety of factors such as length of culvert, size, location and accessibility.

When the condition of the asset has degraded such that an intervention is required, it is recommended that maintenance be reviewed as the first opportunity to extend the useful life. Maintenance works can include localized repair work, or relining of a culvert. Because of the non-intrusive nature of conducting relining, it can be done without significant impact to the overlying infrastructure (however, this will depend on the available access). Other factors will influence a culverts ability to be relined, such as its condition, accessibility, material, and maintenance history. Relining can be used only once in the asset's lifecycle.

Minor repairs and maintenance works are identified by the County during the inspection process, and works are carried out in the year following the inspection.

When the condition of the asset has degraded such that maintenance is no longer an appropriate activity, the segment can and should be reconstructed. The County should follow best practices and applicable design guidelines when designing the reconstruction works. Assets at the end of their useful life should be abandoned in place or removed.

Replacements are identified by the County during the inspection process, and are completed in the year following the inspection. The County utilizes a recurring annual budget amount to address culvert replacements, which has historically been $250,000 per year. When replacements are identified through the inspection, the replacements are prioritized and addressed by priority up to the budget is fully utilized.

There is efficiency in conducting capital reconstruction works where adjacent asset types can be reconstructed simultaneously. The County can review individual culverts or condition or potential works according to what adjacent infrastructure works are anticipated, such as road reconstruction. Where alignment in timing for works can be found, there can be efficiency in the costs required for design and construction, and can provide a reduced disruption to service delivery.

A summary of the culvert condition and associated lifecycle activities is provided in **Table 4-5**. Note that condition assessment should be undertaken on a routine basis throughout the lifecycle of the asset, and other factors should be considered when selecting a lifecycle activity.

Table 4-5: Small Culvert Lifecycle Activities and Condition Ranges

Condition Range	Lifecycle Activity Category	Lifecycle Activity
1 to 0.60	Maintenance	Maintenance Works (cleaning, flushing) Small section repairs
0.60 to 0.35	Rehabilitation	Localized repairs Structural relining
0.35 to 0	Reconstruction	Culvert replacement or abandonment

Selection of material for the new culvert will be dependent on the locations of the culvert and in-situ conditions. In general, most culverts in the County are constructed of CSP, which will be the anticipated construction material in new construction works.

Note that culvert assets that are located or are part of a municipal drain may require additional steps or processes for lifecycle management.

4.7.1 Projection of Works

To estimate the needs and projected works on the stormwater culverts within a 10-year period, the condition rating and estimated lifespan (from inspection) were used.

During regular inspection on the culverts, the County estimates the remaining lifespan from the date of inspection. Accordingly, the projection of works can be done using these values, and can be adjusted following completion inspections. The County's

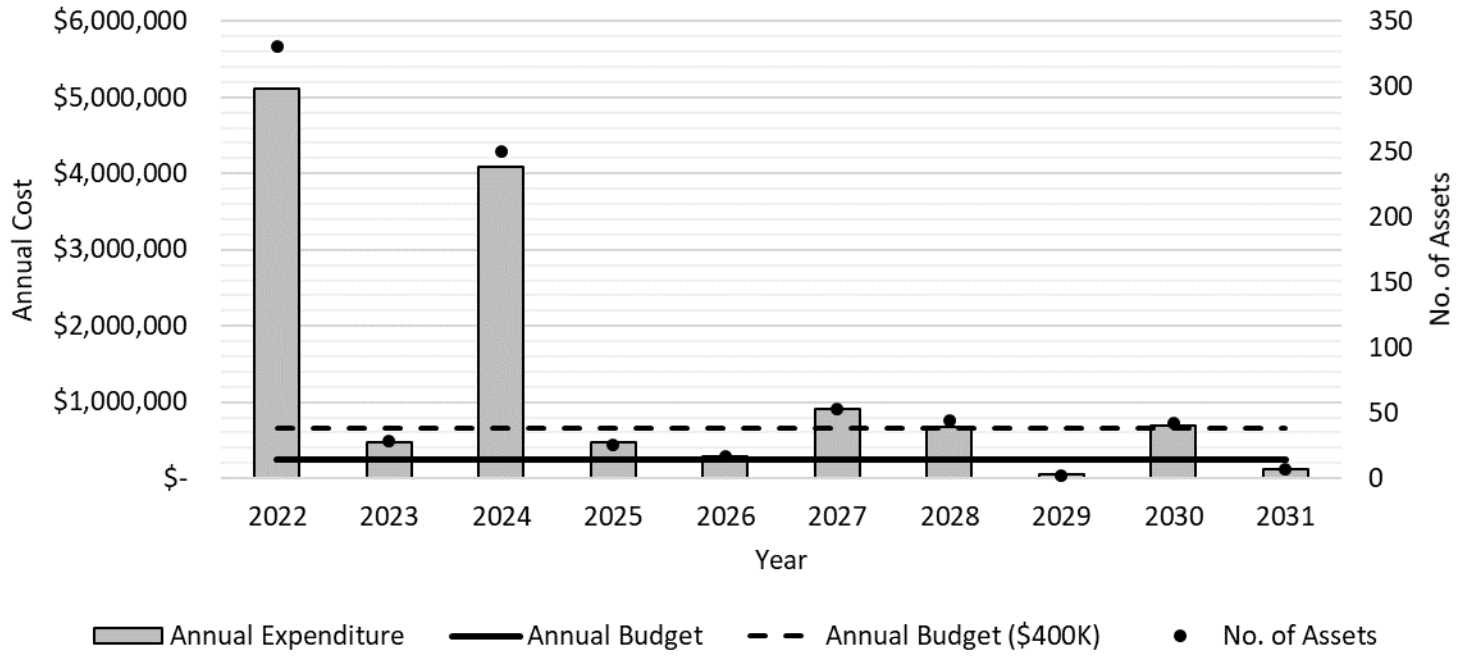
current system includes completing the works identified through inspection during the following calendar year, and does not include making longer-term maintenance projections. Accordingly, the County maintains a consistent annual budget to address the works projections, prioritizing the works identified within the limitations of the budget. There is a risk that this may allow buildup of a backlog of works due to constraints on the budget. The County has identified an annual budget of $250,000 per year to address works on culverts with a diameter less than 3 m. The performance, condition and maintenance status of the culvert scan determine if this budget amount is adequate. The culverts are currently exceeding the average condition targets that the County has set, therefore it is assumed that at present the budget is adequate.

If the County encounters a backlog in maintenance and repair works, the budget allocation can be revisited. Prioritization of the works should continue, and should consider the factors developed and discussed as part of the risk assessment within this AMP.

For a longer-term projection of works, the County can use the expected useful life and resulting replacement year for the assets. This will not provide as accurate of a projection of works as will be determined during the inspection process, however it can provide a general idea of the potential for upcoming works and where there may be need to increase a budget or increase inspection works.

During inspection, an estimated lifespan is given to each of the culverts. To estimate the replacement profile and projection of works, the estimated lifespan was added to the date of inspection. The replacement cost, as described above, was determined based on the unit replacement cost and the lineal length of each of the culverts. A summary of the projection of works is shown in **Figure 4-4**.

Figure 4-4: Projection of Works for Culverts Less than 3 m in Diameter



Note that there are 42 assets for which a replacement date was unavailable; however, it is expected that the impact of these assets on the overall projections would not be significant.

There is a significant expenditure noted for 2022 which includes 331 assets (or 23% of the network), and in 2024 which includes 250 assets (or 18% of the assets). The replacement years are based on estimations completed at time of inspection, where available, and estimated based on installation date where available. In 2012, there was inspection completed on a large number of the culverts, during which an estimated remaining lifespan of 10 or 12 years were allocated to many of the assets reviewed. That time having elapsed, each of these assets is now being considered for replacement. It is recommended, due to the size of the expenditure, that the County renew the condition assessment on these assets (prioritizing by risk) to reaffirm of revise the expected useful life remaining to potentially reprioritize the replacement years. Two of the plan years (2029 and 2031) have projected expenditures less than the County's budget of $250,000.

The County's condition information and results of the inspection will provide a more comprehensive review of the actual condition of the assets, and will be valuable in prioritizing and selecting culverts for maintenance and rehabilitation. During the inspections, it is recommended that the County continue to update the estimated lifespan remaining to continue to update and refine the longer-term projections as shown in the figure above.

5.0 Buildings & Facilities

5.1 State of Local Infrastructure

The County uses 12 facilities across multiple departments for service delivery, particularly for public works and administrative services. The assets are located at five sites across the County, including:

- 115 Christie Lake Road, Perth;
- 99 Christie Lake Road, Perth;
- 1982 Wolf Grove Road, Almonte;
- 4704 McDonald's Corners Road, McDonald's Corners; and
- 4752 County Road 29 N, Almonte.

A summary of the buildings and facilities is provided in **Table 5-1**.

Details related to Lanark Lodge long-term care facility are provided in **Table 5-2**.

Table 5-1: Current State Summary of Buildings & Facilities

Building Name	Replacement Cost (2022)	Asset Age (since last refurbishment)	Asset age as a proportion of expected useful life	Years Since Last Refurbishment
Administration Building	$4,892,500	37	93%	15
Almonte Coverall	$240,400	21	84%	N/A
Almonte Garage	$167,400	63	158%	N/A
McDonalds Corner Coverall	$236,300	12	48%	N/A
Perth Coverall #1	$351,100	7	28%	N/A
Perth Coverall #2	$206,000	7	28%	N/A
Perth Engineering Building	$2,188,800	39	98%	15
Perth Public Works Garage	$2,438,200	39	98%	15
Public Works Union Hall	$386,300	7	18%	N/A
Union Hall Coverall	$136,600	8	32%	N/A
Union Hall Sand/Salt Dome	$253,600	8	32%	N/A
Total	**$11,497,200**	**N/A**	**N/A**	**N/A**

Lanark Lodge has been separated by wing, as the date of construction of the wings varies, as shown in **Table 5-2**.

Table 5-2: Current State Summary of Lanark Lodge

Building Section Name	Replacement Cost (2022)	Asset Age (initial construction)	Date since Last Refurbishment	Asset age as a proportion of expected useful life
A Wing	$15,447,000	56	31	78%
B Wing	$7,269,200	56	31	78%
C Wing	$5,653,800	45	30	75%
D Wing	$14,174,900	34	34	85%
Total	**$42,544,900**	**N/A**	**N/A**	**N/A**

It is noted that during the refurbishments in each of the wings, the major systems were not always replaced; therefore, while renovations have happened there may be subcomponents of the facility that have a greater age than the refurbishment would suggest.

5.1.1 Replacement Cost

The replacement costs for the facilities were provided by the County, and were devised for 2021 costs. The replacement cost was then inflated by 3% to estimate a cost for 2022. The current replacement cost for buildings and facilities is $54 million.

5.1.2 Asset Age

The asset age is tracked based on the year of construction of the asset. The oldest assets were constructed in 1959 (Almonte Garage and PW Union Hall), and the newest having been constructed in 2015 (Perth coverall #1, #2, and Perth PW Garage). The average age of the buildings and facilities is 25 years.

Three buildings and facilities have had recent major renovations, including The Administration Building, Perth Engineering Building, and PW Union Hall. 15 years have elapsed since the renovation at the Administrative building and engineering buildings, with 8 years having elapsed since the renovation at the union hall.

Lanark Lodge has original construction dates that vary for the initial building and wings (ranging from 1966 to 1988). The wings have subsequently gone through renovations (ranging from 1988 to 1991).

5.1.3 Expected Useful Life

The County uses typical expected useful lives for their buildings and facilities, consistent across types of buildings. The values used within this report are:

- Buildings, garages: 40 years;
- Coveralls: 25 years; and
- Lanark Lodge: 40 years.

5.2 Condition – Buildings & Facilities

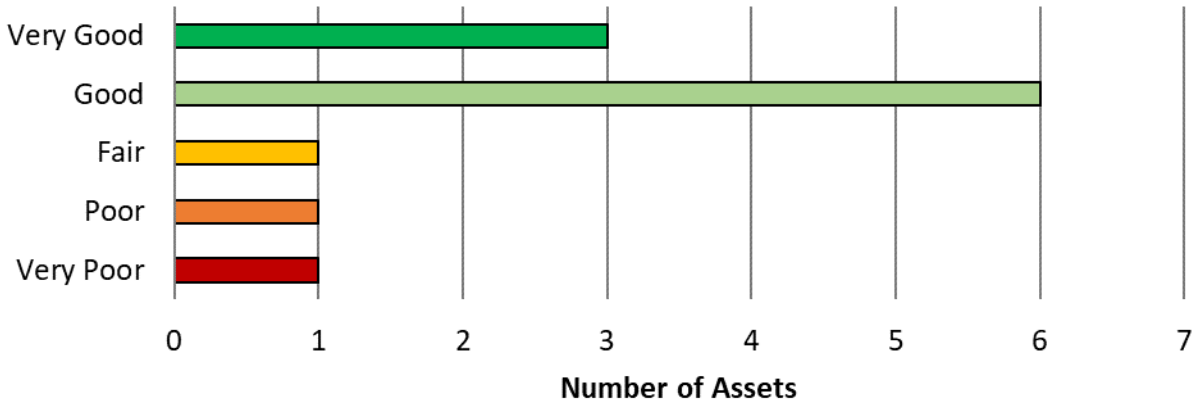
The County has established a condition rating system (ranging from Very Poor to Very Good), with corresponding descriptions of condition for the building assets. The descriptions relate to the maintenance and service required, and are as described in **Table 5-3**.

Table 5-3: Condition Ratings – Facilities and Buildings

Rating	Description of Condition
Very Good	Only planned maintenance required
Good	Minor maintenance required plus planned maintenance
Fair	Significant maintenance required
Poor	Significant renewal/upgrade required
Very Poor	Unserviceable

Condition of the building and facility assets was assessed in-house by County staff in 2021 using the criteria outlined above. (Note that this assessment did not involve detailed condition inspection of the assets). It is recommended that the County routinely assess the assets using this scale to monitor how condition is changing.

Figure 5-1: Condition Ratings of Building and Facility Assets



The Almonte Coverall was assessed to be in poor condition, and the Almonte Garage was assessed to be in very poor condition.

Condition rating for Lanark Lodge is based on provincial rating system for classification. Ministry rates as a "B" Class Facility but from a County perspective the Asset Condition is Acceptable for intended use, which corresponds to a 'fair' condition rating.

5.3 Levels of Service – Buildings & Facilities

5.3.1 Current Levels of Service

Buildings and facilities assets are considered a non-core asset under O.Reg. 588/17, and therefore do not have pre-defined levels of service statements. The County's current level of service metric tracks the condition of the buildings, with the target being 'good' condition for Lanark Lodge, and 'very good' condition for all other buildings.

The following levels of service parameters expand on the levels of service definition.

Table 5-4: Community LOS for Buildings & Facilities

LOS Parameter	Levels of Service Metric	Response
Scope	• Description, which may include maps of buildings and facilities	Locations of County buildings and facilities are shown in **Figure A-2** in **Appendix A**.
Quality	• Description of hours of operation and available services	• Municipal office provides administrative eservices, open 8:30 a.m. to 4:00 p.m. during the week • Other facilities are not open to the public. Used for administrative, public works service delivery
Quality	• Overall condition rating of buildings and facilities	• Overall average condition is 'Good'

Table 5-5: Technical LOS for Buildings & Facilities

LOS Parameter	Levels of Service Metrics	Response
Scope	Number of buildings by type providing service compared to the size of the community (geography or population) (Number of facilities per capita)	• Municipal Office: 1 (1 per 75,760 residents) • PW Office Building: 1 (1 per 75,760 residents) • PW Office Building & Garage: 1 (1 per 75,760 residents) • Coverall – Storage: 2 (1 per 37,880 residents) Coverall – Salt/Sand: 4 (1 per 18,940 residents)

LOS Parameter	Levels of Service Metrics	Response
		PW Garage: 2 (1 per 37,880 residents) • Lanark Lodge: 1 (1 per 75,760 residents) Note: population of 75,760 used per 2021 census data
Scope	Number of accident reports and calls for service per facility	• Provided in following table.
Scope	Size of buildings (square footage)	• Provided in following table.
Quality	Compliance with legal/regulatory/local standards	The quality of Buildings and Facilities include the following legal, regulatory and local standards for the services provided: • Accessibility (AODA Standards) • Health and safety • Facilities on their own water system must be operated to meet MOE drinking water quality standards • Buildings must comply with the Ontario Building Code

The additional details for individual details are shown in **Table 5-6** below.

Table 5-6: Level of Service Additional Information for Buildings and Facilities

Building	Size of buildings (square footage)
Admin Building	14,719
Perth PW Garage	11,900
Perth Eng Building	6,621
Perth Coverall #1	10,500
Perth Coverall #2	6,160
PW Union Hall	2,460
Union Hall Sand/Salt Dome	6,930
Union Hall Coverall	3,900
McDonalds Corner Coverall	7,000
Almonte Coverall	6,864
Almonte Garage	4,780
Lanark Lodge	126,420

5.4 Current Performance – Buildings & Facilities

The County currently tracks performance of the building and facility assets, assessing them on a descriptive scale that rates the reliability of the asset. Overall, most assets were rated as 'Very Good', with Almonte Coverall and Almonte Garage rated as 'Good'.

Additionally, the County tracks the performance of Lanark Lodge based on reliability of the facility. The County has identified that the asset has no reliability issues reported.

The current descriptor of performance is based on reliability, however additional indicators can be used to provide a fuller picture of asset performance. If more detailed performance tracking is warranted, the County can consider selection and tracking of relevant indicators, such as water or energy usage, cost per square footage, etc.

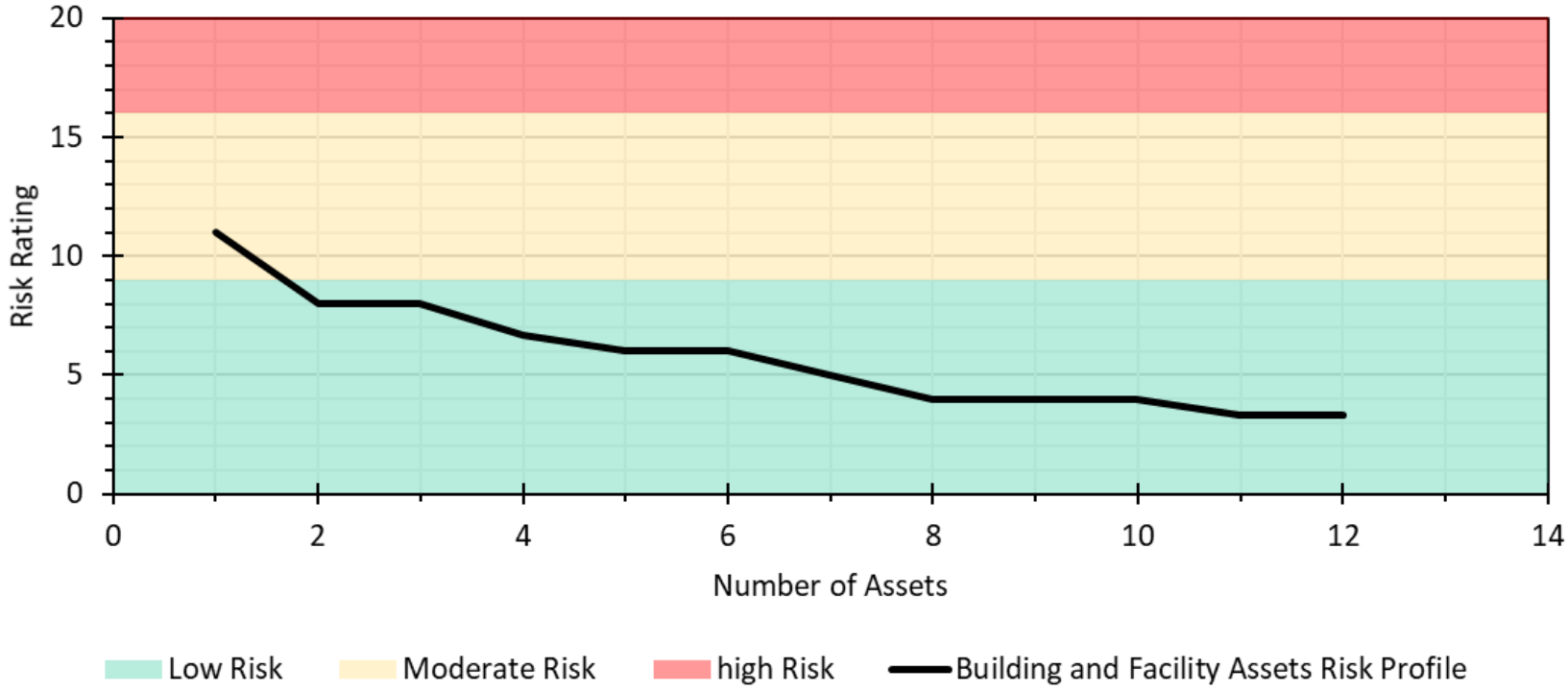
5.5 Risk Assessment – Buildings & Facilities

The risk assessment for building and facility assets will be conducted according to the following assumptions and criteria:

- **Condition:** Rated according to the results of the 2021 condition assessment completed by the County;
- **Performance:** Rated according to the ratings provided by the County, where: 'Excellent' performance considered 'always reliable' (value of 1) and 'Good' performance considered 'usually reliable' (value of 3);
- **Climate Change:** Assumed 'moderate' (value of 3) for all assets (Limited impact with slower recovery; mitigation plan not in place);
- **Impact:** Assumed 'moderate' (value of 1) impact for all assets; and
- **Importance:** Importance was evaluated based on input provided by the County of Lanark. If no rating was provided, the asset was assumed to have Moderate importance (value of 2); Moderate importance (value of 2) for administration buildings, public works garages, and salt domes; Moderate importance (value of 2) for administration buildings, public works garages, and salt domes; and High importance (value of 3) for Lanark Lodge (meeting legislative requirements for redevelopment).

Using the assumptions and parameters listed above, a risk assessment was conducted. The distribution of risk ratings for building and facilities assets is shown in **Figure 5-2**.

Figure 5-2: Risk Profile for Building and Facility Assets



5.6 Lifecycle Activities – Buildings & Facilities

The following section describes the lifecycle activities that can be implemented within the asset management strategy for building assets. Note that, as previously discussed, building assets refers to the entirety of the asset which is made up of varying component systems depending on the use of the building. The primary lifecycle activities include construction, maintenance, renewal, and decommissioning/disposal.

5.6.1 Construction

The start of a building asset lifecycle is its construction. The building should be constructed to adhere with the requirements of the Ontario Building code, and any and all other applicable regional codes and requirements for the building and its use. Each building should be designed and constructed to provide the services for which it is intended.

5.6.2 Maintenance

Throughout the full lifecycle of a building, the majority of the expected lifecycle activities to be undertaken will be maintenance works. Maintenance activities can be used to improve the level of service of an asset (or component), or to maintain it. Activities that fall under the maintenance category can be varied by response type and scale of maintenance requirements. Activities can be required through routine maintenance works, response to Poor condition or performance, or on an emergency basis. In general, the expected types of maintenance activities within the lifecycle of a building include:

- Preventative maintenance:
    - This type of maintenance activity is undertaken to prevent failure or Poor performance of a building asset component. Preventative maintenance works can be undertaken on an ad-hoc basis based on knowledge of condition, or be undertaken according to a maintenance schedule. Manufacturer directives and condition assessments should assist in determining frequency of preventative maintenance activities.

- Reactive maintenance:
    - This type of maintenance activity is undertaken in response to an issue or fault in the building or component systems, on an ad-hoc basis. Scale of reactive maintenance works will be variable depending on the system and type of failure or decrease in level of service.
- Major maintenance (replacement):
    - This type of maintenance activity is undertaken in response to a component which is no longer able to provide adequate level of service. Major maintenance (replacement) will be undertaken for one or more components of a building asset. Major maintenance works can be preventative (in anticipation of end of service life of a component), or in response to a system failure.

5.6.3 Renewal

Renewal works can be used to update a building asset for modernization, to achieve compliance with updated codes and requirements, to expand on an existing building, or to renovate to suit changes to services provided. Renovation works can include:

- Addition of new components to an existing building asset: New components can be added to an existing building with the existing building largely unchanged; and
- Updating of existing components: Updating of existing components can prolong the expected lifespan of a building asset.

5.6.4 Decommissioning/Disposal

Disposal activities can include the removal from service of a building, or a portion of a building and components. Disposal activities should be conducted such that health and safety and environmental protocols are being followed, and spent materials are disposed of at appropriate or approved facility.

Disposal activities can also include removal of the building from the County building portfolio through sale of property, if it is no longer required for service delivery.

5.7 Asset Management Strategy

The asset management strategy for building assets will maximize the lifecycle of the assets where appropriate, in consideration of specific needs of the County and existing infrastructure.

The County's asset management strategy for buildings relies on assessment of building condition to establish the current state of the assets (including information such as age, condition and performance), and to establish recommended works and associated timeframes. Building condition has recently been estimated by County staff based on knowledge of the assets.

Detailed condition assessment can be undertaken by County staff or a third-party consultant to assess the condition of the building and componentry. The usage of such assessments for complex building assets can provide the County reliable and repeatable condition information and projections that can be used for capital planning and asset management. The County should procure or undertake detailed building condition assessments at a sufficient frequency to have ongoing understanding of the condition and required works at the building assets, suggested to be every 5 years. These reports can be used to inform a maintenance schedule and capital works schedule, and to understand forecasting of asset improvements. If it is not possible to complete assessment of all buildings on a routine basis, priority buildings for the condition assessment program are suggested to be identified by the presented risk assessment, condition and performance measures. Buildings with high risk or poor condition/performance components should be prioritized in the condition assessment program. Where building assessments have not been conducted (on less complex building assets and structures), the County could consider adding these to the scope of the building condition assessments, or undertake simplified assessments on a regular basis through visual inspection by County staff.

In general, the building assets were found to be in good condition and performing adequately to provide the intended services. The County strategy should maintain (or improve where appropriate) the condition and performance adequately to provide the intended services. An industry standard of 2% of the current portfolio replacement value is recommended as a minimum annual investment into capital projects for major maintenance (replacement) and renewal activities; however, specific works

recommendations within building condition reports will provide a more tailored understanding of the County's recommended annual investment.

Implementation of the lifecycle activities for the building assets will vary across the assets, according to the components, condition, and services provided.

Routine maintenance schedules are assumed to be in place currently, and are recommended to continue assuming that they are currently providing sufficient level of maintenance. Maintenance works can include preventative maintenance, reactive maintenance (in the event that there is an issue), or major maintenance which can include the replacement of a component.

Renewal works are required when routine maintenance is insufficient to address an issue. Renewal can include update of a building asset for modernization, to achieve compliance with updated codes and requirements, to expand on an existing building (in response to service delivery change to accommodate growth), or to renovate to suit changes to services provided.

Reconstruction works are undertaken when an asset has reached the end of its useful life. The County should consider on a case-by-case basis if the asset is to be reconstructed to a similar level of service as was existing, if modifications need to be made to support current and future service delivery. This could include changes to the facility to accommodate new service delivery, accommodate growth requirements, changes to square footage, or changes based on accessibility.

Management of building assets should also include climate change considerations, in new construction, maintenance or renewal lifecycle activities. Assessment should be undertaken to understand vulnerability of building assets to a changing climate, which will inform lifecycle activity requirements, and potential changes to the way lifecycle activities are undertaken.

The County should continuously audit asset data to ensure information is current. It is suggested that additional classifications be implemented to clearly identify the lifecycle activities implemented for building components.

The County should provide annual updates to LOS and key performance indicator (KPI) measures to gauge performance of the assets against quantified targets. Where data is not yet available to LOS or KPI measures, a strategy for collecting, verifying and integrating the data should be developed and implemented.

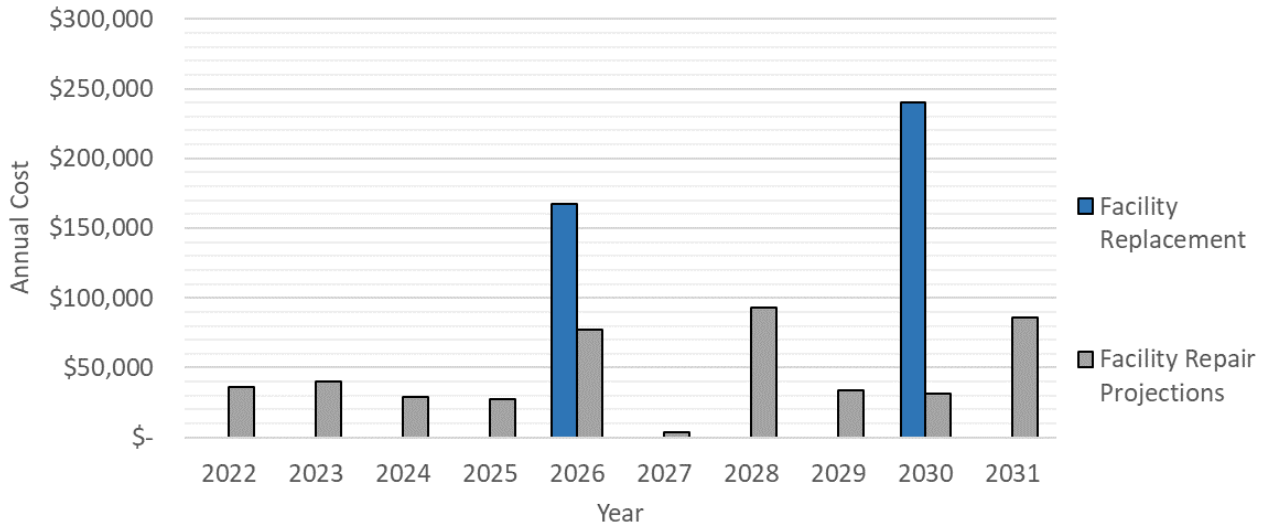
5.7.1 Current Projection of Works

The current projection of works for the County building and facility assets is based on the age and expected useful life of the assets. The County has also developed a capital plan which includes projections for operational and capital works to be done on the assets within a 13-year timeframe.

The County does not currently have detailed condition assessment of the buildings, however has done inspections of the facility assets, details of which inform the capital plan projections. Where inspection information and condition information are not available, the replacement of the building assets or building components is estimated based on the age of the asset/component and its expected useful life. This can be updated when new information is available on current condition of the buildings.

Projections for the works for the buildings then were estimated based on the current capital projections for repair as prepared by the County, as well as estimations of facility replacement based on the age and condition of the facility. The annual expenditure for replacement costs and the capital projections costs for a 10-year timeframe is shown in **Figure 5-3**.

Figure 5-3: Current Projection of Works for Buildings and Facilities



The projections made by the County for repair are consistently under $100,000, with the highest year occurring in 2028 with $93,000 required. The figure also shows projections for facility replacement based on the remaining estimated useful life considering the assessed condition of the facility. Due to the good condition and recent full renovations of the building and facility assets, there is not a significant expectation for investment required. The expenditure identified in 2026 is just under $200,000 for the replacement of the Almonte Garage, which will reach the end of its expected useful life at that time, and in 2030 for the Almonte Coverall for just over $240,000.

5.7.2 Lanark Lodge

The County intends to replace the current Lanark Lodge with a newly constructed building. As such, the selection and implementation of the lifecycle activities at the current facility will require consideration of the expected life of the asset and the criticality of the activity to the continuation of service delivery at the facility.

In general, the strategy for Lanark Lodge should be similar to that presented for the other buildings, with these additional considerations.

With construction of the new facility, the County has the opportunity to improve inventory tracking related to the facility, and can refine the level of detail in the asset hierarchy for which the building components will be tracked. This will allow for the County to track the major systems separately from the building entirety which may provide value in future maintenance and capital planning.

Implementation of the strategy and rehabilitation and repair works on the Lodge facility are estimated by the County to require significant annual expenditure. The County carries an estimate of $1M per year of expenditure for the facility.

An alternative for estimating the annual expenditure for assets is through estimation using the recommended reinvestment rate and the replacement value of the assets. The 2016 infrastructure report card suggests a reinvestment rate of 1.7-2.5% annually for buildings and facilities. The current replacement cost for Lanark Lodge is $42.5M, which suggests the reinvestment rates noted in **Table 5-7**.

Table 5-7: Reinvestment Rate for Lanark Lodge

Reinvestment Rate	Reinvestment Value
1.7%	$722,500
2.5%	$ 1,062,500

The higher reinvestment rate is similar to the amount the County has identified for expenditures.

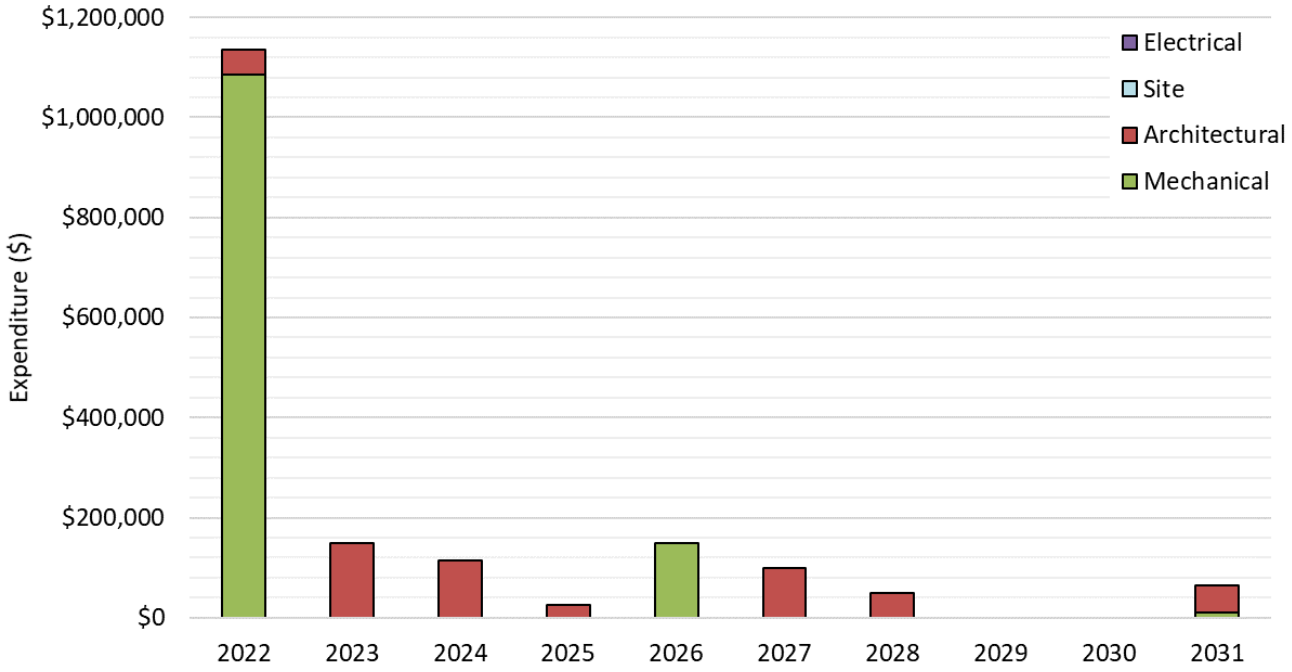
In addition, the County maintains updated projection of works in form of a capital plan for the Lodge, including the capital expenditure for the facility and the fixtures, furniture and equipment utilized in the facility. The capital plan is itemized with a cost projection and description of the works according to the needs identified for each asset through inspection, complaints, and other avenues of identification. The plan is developed for a ten-year timeframe. The projection of works according to the capital plan are discussed by asset type below.

The County's intention is to continue to follow the capital plan and implement required lifecycle activities to retain current level of service delivery for the residents and end users of the facility.

Capital Expenditures for the Facility

The facility capital expenditures are identified and categorized under four major building systems: Mechanical, Architectural, Site, and Electrical. A summary of the anticipated expenditure within these categories is shown in **Figure 5-4.**

Figure 5-4: Expenditure for Lanark Lodge Facility Components

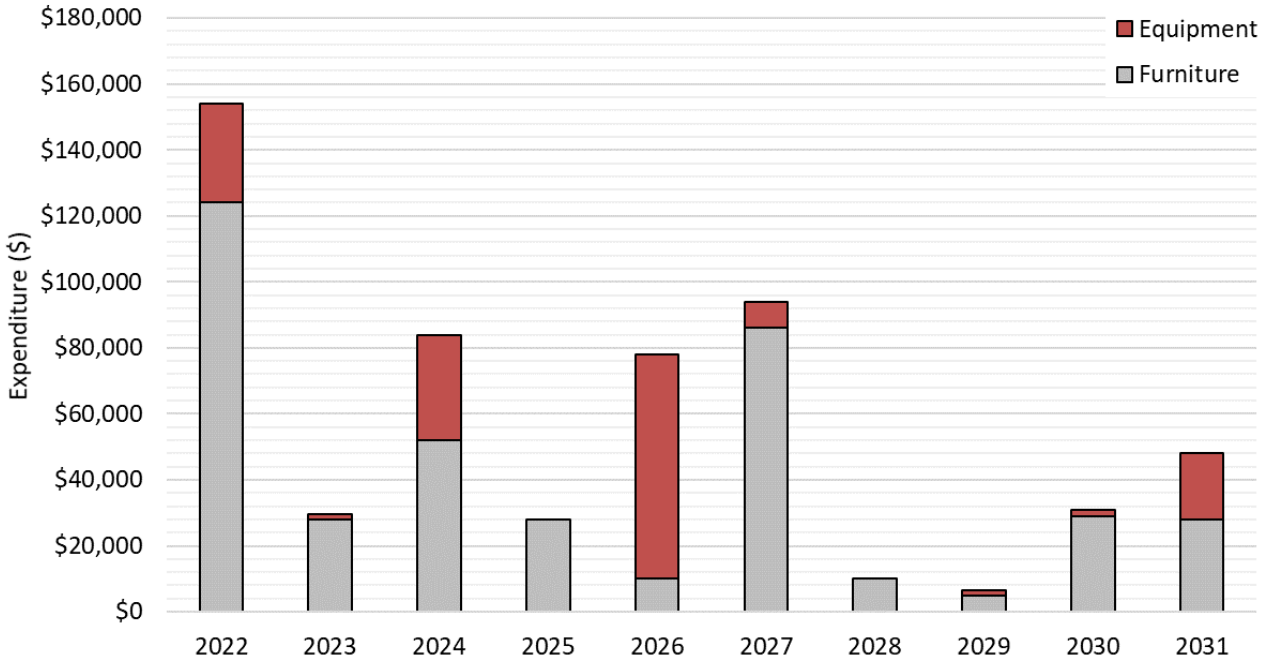


The large expenditure in 2022 is a generator replacement. Each year of the capital plan following 2022 projects less than $200,000 year expenditure for the Lanark Lodge. No capital expenditures are projected for 2029 and 2030 at the time of this report.

Expenditures for Fixtures, Furniture and Equipment

The facility expenditures are identified and categorized under three categories: fixtures, furniture, and equipment. A summary of the anticipated expenditure within these categories is shown in **Figure 5-5.**

Figure 5-5: Expenditure for Fixtures, Furniture and Equipment at Lanark Lodge

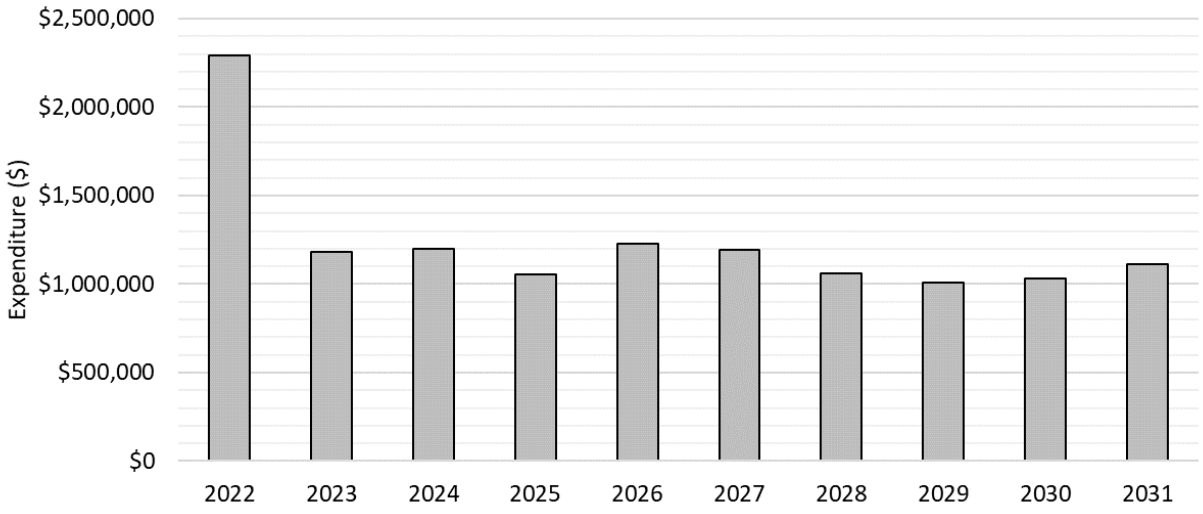


The average expenditure throughout the plan is $56,000, with costs ranging from nearly $160,000 in the first year of the plan to below $10,000 in 2029. Note that the yearly anticipated expenditures for the above noted three categories (fixtures, furniture and equipment) are in addition to the yearly anticipated capital expenditures outlined in **Figure 5-4.**

Total Expenditure

The total annual projections for the Lanark Lodge consider each of the funding requirements detailed above, and are summarized in **Figure 5-6**.

Figure 5-6: Total Expenditure for Lanark Lodge



5.8 Proposed LOS Increase

In the previous version of the AMP, the County identified specific LOS targets for the buildings and facilities, including the following:

- Lanark Lodge is rated as 'Good'; and
- Administration, Engineering, McDonalds Corner overall, Public Works facilities in Perth & Union Hall are rated as 'Very Good'.

The current LOS being provided at Lanark Lodge has the average condition at a 'Fair' instead of the target of 'Good'. This target will be maintained, therefore resulting in slight increase in LOS to achieve this. We note that the end of service life for the Lodge is expected to occur in the short term, and therefore the average condition may be lesser than the target as the County prioritizes lifecycle activities and balances costs and benefits.

The current LOS being provided for the other buildings and facilities is an average condition of 'Good' instead of 'Very Good'. This LOS target will be slightly reduced, targeting instead an average condition of 'Good' (therefore maintaining the current LOS).

6.0 Traffic Lights

6.1 State of Local Infrastructure

The County currently owns and maintains 12 traffic light assets, including one in Perth, three in Almonte, and eight in Carleton Place. The assets are tracked by intersection, noting that each intersection asset includes multiple components, which may include:

- Red, green, amber lights;
- Arrow;
- Pedestrian head;
- Push button; and
- Street lights.

Table 6-1 summarizes key information related to County owned traffic lights.

Table 6-1: Current State Summary of Traffic Lights

# of Traffic Lights	Total Replacement Cost	Average Asset Age	Asset Age as a Proportion of Expected Useful Life	Average Asset Condition
12	$3,000,000	20	67%	Good

The following sections contain descriptions of the summary components.

6.1.1 Replacement Cost

The total replacement cost for the assets was determined using an estimated unit replacement cost per intersection, as provided by the County. Each traffic light asset was estimated to have a replacement cost of $250,000 in 2021. Note that the replacement costs are approximated for the entire intersection.

6.1.2 Average Age

The average age for Lanark's 12 owned traffic lights is 20 years. The traffic lights located in Almonte (3 assets) are the oldest at 27 years each, having been constructed in 1995. The newest assets include 5 traffic lights in Carleton Place, at 15 years of age having been constructed in 2007. Every traffic light asset has had maintenance activities completed within the past 5 years, with the average improvement age since last improvement activity being 2.5 years.

6.1.3 Expected Useful Life

The County maintains an expected useful life of 30 years for traffic light assets.

6.2 Condition – Traffic Lights

The County has established a condition rating system (ranging from Very Poor to Very Good), with corresponding descriptions of condition for the traffic lights. The descriptions relate to the maintenance and service required, and are as described in **Table 6-2**. For the purposes of this assessment, a numerical value (condition score) has been attributed to each of the condition ratings.

Table 6-2: Traffic Light Condition Assessment Remaining Useful Life Rating System

Condition Rating	Description of Condition	Numerical Condition Score
Very Good	Only planned maintenance required	1
Good	Minor maintenance required plus planned maintenance	2
Fair	Significant maintenance required	3
Poor	Significant renewal/upgrade required	4
Very Poor	Unserviceable	5

Condition of the traffic light assets was assessed in-house by Public Works staff using the criteria outlined above, attributing a numerical value against each asset. (Note that this assessment did not involve detailed condition inspection of the assets). It is recommended that the County routinely assess the assets using this scale to monitor how condition is changing.

The results of the condition rating can be found in **Table 6-3**.

Table 6-3: Average Condition Ratings of Traffic Lights

Condition Rating	Number of Traffic Lights
1	1
2	11

92% of the assets are considered in Good condition, with the remaining 8% in Very Good condition.

6.3 Levels of Service

6.3.1 Current Levels of Service – Traffic Lights

Traffic Lights assets are considered a non-core asset under O. Reg. 588/17, and therefore do not have pre-defined levels of service statements. The County's current level of service metric is that traffic lights have an average asset condition rating of 'good'.

The following levels of service parameters expand on the levels of service definition.

Table 6-4: Community LOS for Traffic Lights

LOS Parameter	Levels of Service Metrics	Response
Scope	Description, which may include maps, of traffic signal locations in the municipality	Locations of signalized intersections is shown in **Figure A-3** in **Appendix A**, and summarized in corresponding **Table 6-5**.
Quality	Overall condition rating of Traffic Signals, description or images of levels of traffic signal condition	• 2, or 'Good', see descriptions in **Table 6-2**. (condition section)
Quality	Description of community complaints and service interruptions	• Complaints relate to push button, location
Quality	Description of contractor inspections and maintenance responsibilities	• Inspections are completed annually by County.

Table 6-5: Locations of County Traffic Lights

Corresponding Number on Map	Municipality	Road Name	Road Name
1	Perth	South Street	Gore Street
2	Carleton Place	Joseph Street	Townline Road
3	Carleton Place	Bridge Street	Townline Road
4	Carleton Place	McNeely Avenue	Townline Road
5	Carleton Place	Patterson Street	McNeely Avenue
6	Carleton Place	Lake Avenue	McNeely Avenue
7	Carleton Place	Coleman Street	McNeely Avenue
8	Carleton Place	Walmart	McNeely Avenue
9	Carleton Place	Independent Grocery	McNeely Avenue
10	Mississippi Mills	Almonte Street	County Road 29 North
11	Mississippi Mills	Ottawa Street	Martin Street North
12	Mississippi Mills	Mill Street	Bridge Street

Table 6-6: Technical LOS for Traffic Lights

LOS Parameter	Levels of Service Parameter	County LOS Response
Scope	Percentage of intersections with Traffic Signals	• 2%
Scope	Percentage of Traffic Signals with accessible pedestrian control signals	• 100%
Quality	Average response time of contractor to resolve customer complaints	• To be determined

6.4 Current Performance – Traffic Lights

The current metric for performance used by the County, is that traffic light assets are replaced at the end of their economic lifecycle. Additional indicators can be used to provide a fuller picture of asset performance. A summary of indicators of performance for the past two calendar years is shown in **Table 6-7**.

Table 6-7: Performance for Traffic Lights Assets

Performance Indicator	County Performance Data 2020 to 2021
Number of service interruptions	1-2 annually due typically to power interruption
Inspection and maintenance frequency	Annually
Average contractor response time/time spent waiting for repairs	2-4 hours
Pedestrian accessibility upgrades	To be established

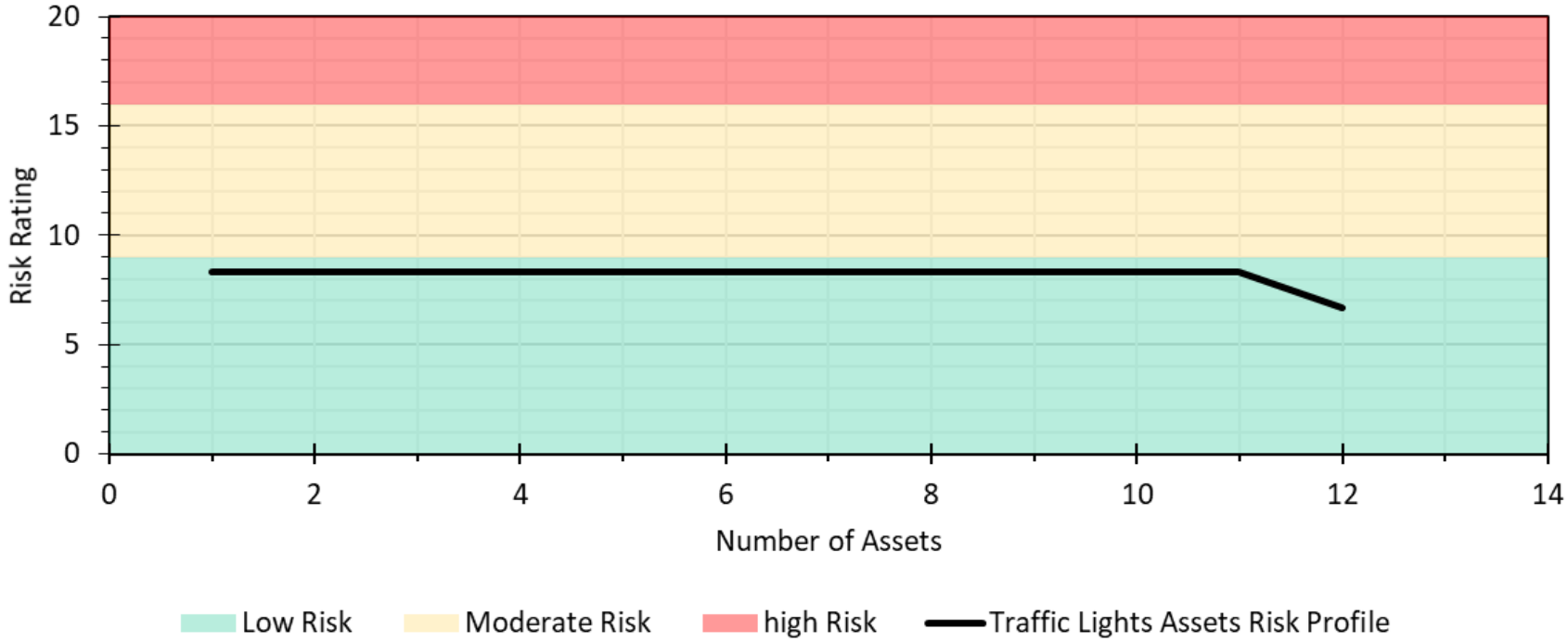
6.5 Risk Assessment – Traffic Lights

The risk assessment for traffic signal assets will be conducted according to the following assumptions and criteria:

- **Condition:** Assessed by the County;
- **Performance:** Assessed by the County;
- **Climate Change:** Assumed a value of 1 (assets vulnerable to extreme weather events from climate change, however not substantially impacted by other risks);
- **Impact:** Assumed a value of 1; and
- **Importance:** Assumed a value of 1 (properly functioning assets were noted as highest importance in the Risk workshop.

Using the assumptions and parameters listed above, a risk assessment was conducted. The distribution of risk ratings for traffic lights assets is shown in **Figure 6-1**.

Figure 6-1: Risk Rating for Traffic Lights Assets



All of the traffic lights assets were assessed to be in the low risk range, with most assets having a rating of 8.3 (the lowest risk asset being the traffic light asset that was assessed at a better condition rating).

6.6 Lifecycle Activities – Traffic Lights

In the lifecycle of a traffic light asset, there are multiple activities that can be undertaken, depending on the asset attributes. The expected lifecycle activities to be used on these assets include acquisition, maintenance, and operation and replacement/disposal.

6.6.1 Acquisition

Acquisition of a traffic light asset should consider the intended usage of the asset and compliance with the most recent accessibility standards. Acquisition should be undertaken based on an understanding of the requirements of the asset for providing service delivery, and should follow municipal procurement procedures. Acquisition of a new asset can provide the County with an asset in Very Good condition.

Acquisition activities can also include direct replacement of existing traffic light assets. When an asset reaches the end of its useful life, and the asset is found to be adequate for providing service delivery required, the acquisition activity may be asset replacement.

6.6.2 Maintenance

Maintenance activities will vary across the traffic light assets due to the usage of asset components and accessibility requirements. The maintenance activities should be undertaken according to manufacturer specifications, evolving accessibility standards and as required to address condition, accessibility and performance issues that arise through regular usage. Maintenance activities should include regular inspections of traffic lights for condition, and recording of maintenance activities undertaken. Typical maintenance activities undertaken on traffic light assets at the County include:

- LED Display Upgrade (traffic control heads, signal heads, pedestrian heads);
- New or upgrade to traffic controller (can include cabinet and Y pole);
- New or upgrade to UPS battery system;
- New or upgrade to pedestrian crossing accessories such as push buttons or pedestrian signals; and
- Timer upgrade.

6.6.3 Decommissioning/Disposal

Disposal activities can include the removal from service through disposal, sale of asset or transfer of an asset to a different department. Disposal activities should be conducted such that health and safety protocols are being followed, and out of service assets are disposed of at appropriate or approved facility.

6.7 Asset Management Strategy

The asset management strategy for the traffic lights assets would seek to maximize the useful lifespan of the assets, such that they can continue to be used in service delivery across the County.

The County's current strategy is driven by the age and performance of the assets. New at time of construction, traffic lights undergo maintenance throughout their useful life, and are replaced when required, such as when the useful life has elapsed, the asset no longer performs satisfactorily, or to suit upgrades (technological or otherwise). At the end of its lifecycle, the usage is evaluated to determine the appropriate replacement or upgrade required.

The rating system for the performance and condition of the traffic light assets is not formalized, and should be documented such that routine inspection and assessment of the assets can be conducted to understand more fully their current state. This can include visual assessment of the lights, tracking of maintenance logs, or otherwise.

Generally, if acquired new, the assets will begin their expected useful life in very good condition and performance. Throughout the lifecycle of the assets, routine maintenance should be conducted. As required, specific maintenance should be conducted. As an asset ages and approaches the end of its useful life, it is expected that the risk and maintenance costs associated with the asset will increase. There will be a point in the lifecycle where the risk and maintenance costs are such that replacement of the asset will be the preferred solution. This point will vary depending on the type of asset, and can be impacted by factors such as build quality, and utilization. At the end of the lifecycle the County should review the requirement for service delivery for the asset to determine if it requires replacement, and if so what upgrades may be required.

The County currently contracts out maintenance and repair of the traffic lights. Any improvement works are provided to the County, where it is updated into the traffic lights inventory maintained by the County.

6.7.1 Projection of Works

To estimate the needs and projected works on the traffic lights within a 10-year period, the condition rating and expected useful life of the assets was used, as well as the budget information provided by the County related to ongoing maintenance and rehabilitation works.

The traffic light assets have all been recently upgraded with componentry such as LED displays and controllers, with 1 to 4 assets being upgraded each year since 2016.

The condition ratings provided by the County indicated that most of the traffic lights were in Good condition, with one in Very Good condition. These ratings were used to interpolate the likely remaining useful life of the assets based on the 30-year expected useful life. Accordingly, it is estimated that the assets in Good condition have approximately 18 years of life left, and therefore (based on the condition year being 2021) will not need replacement until 2039. The final asset, rated as Very Good, similarly has an estimated replacement year of 2045. These expected replacement years fall outside of the timescale within this AMP.

For a more conservative projection, the projection of works was reviewed based on age of asset, omitting the influence of the condition rating. Within the 10-year timeframe of this AMP, there were four assets that are expected to be at the end of their useful life, including: 3 assets in 2025 (CR29 at CR16, CR 16A at Mill St, and CR16A at Ottawa St) which have a construction year of 1995, and one asset in 2027 (CR 1 at CR 10). The County also budgets $31,000 annually to contract out ongoing maintenance and rehabilitation works.

It is not expected that significant works will be required on the traffic lights assets based on the two methods of projection. The replacement projections can be adjusted if the condition and performance is found to be adequate to extend the useful life, or if an asset is found to deteriorate at a rate faster than expected. The potential for adjustment can be informed by inspection, maintenance and rehabilitation records, and other sources as appropriate.

7.0 Fleet

7.1 State of Local Infrastructure

The County owns 59 assets within its fleet, including the following types of vehicles detailed in **Table 7-1**.

Table 7-1: Current State Summary of Fleet Assets

Class	Class Description	No. of Assets	Total Replacement Cost	Average Asset Age	Average Typical Useful Life	Asset Age as a Proportion of Expected Useful Life
61100	Light trucks	17	$619,499	6.0	11	55%
61200	Crew cabs	3	$195,000	7.7	11	70%
61300	Tandem trucks	12	$3,600,000	6.3	12	53%
61400	Patrol/Plow trucks	1	$65,000	5.0	11	45%
62000	Graders	2	$473,865	18.5	N/A	N/A
62000	Water Flusher Unit	1	$49,819	8.0	15	53%
63000	Loaders	8	$1,270,000	6.9	15	46%
64000	Trailers	6	$153,419	10.8	23	46%
65000	Roadside equipment	3	$209,063	5.0	13	40%
67000	Miscellaneous equipment	6	$160,022	7.5	15	49%
N/A	**Total**	**59**	**$6,795,687**	**7.3**	**13.7**	**54%**

The fleet assets are utilized for multiple types of service delivery across the County.

Additional descriptions of the information presented in **Table 7-1** are detailed in the following section.

7.1.1 Replacement Cost

The replacement costs shown above were a summation by the type of vehicle of 2021 replacement values as provided by the County. Where a replacement value was not provided, the initial cost was inflated by 3% annually since the year of initial acquisition to current dollars.

The County specified that some assets will not be replaced in the future. For the replacement cost evaluation, any assets that were identified to not be replaced were not included. All assets that did not include commentary regarding replacement were assumed to require replacement and included in this evaluation.

7.1.2 Average Age

The age of fleet assets ranges from brand new to 21 years, with the overall average age of public works fleet assets being 7.3 years. Ages are based on the age of acquisition, and are current to 2022.

7.1.3 Expected Useful Life

The expected useful life of fleet assets ranges from 4.5 to 25 years and varies by vehicle type. The useful life information was provided by the County of Lanark. For some of the public works fleet asset classes, a range of typical useful life values were given. These ranges are summarized in **Table 7-2**.

Table 7-2: Expected Useful Life of Fleet

Class	Class Description	Minimum Typical Useful Life	Maximum Typical Useful Life
61100	Light trucks	4.5	15
64000	Trailers	15	25
65000	Roadside equipment	10	15
67000	Miscellaneous equipment	10	25

Across all fleet assets, the average expected useful life is 13.6 years.

7.2 Condition - Fleet

Condition of the fleet assets was assumed using the age and useful life of assets, or by odometer readings, both based on information tracked by the County. The age and expected useful life were used to make an estimation of condition based on percentage of useful life elapsed, while odometer readings were separated into ranges associated with varying condition ratings. Condition ratings were determined on a scale of 1 to 5, where 1 describes an asset in Very Good condition and 5 in Very Poor condition. The condition ratings and corresponding useful life remaining and odometer ranges are shown in **Table 7-3**.

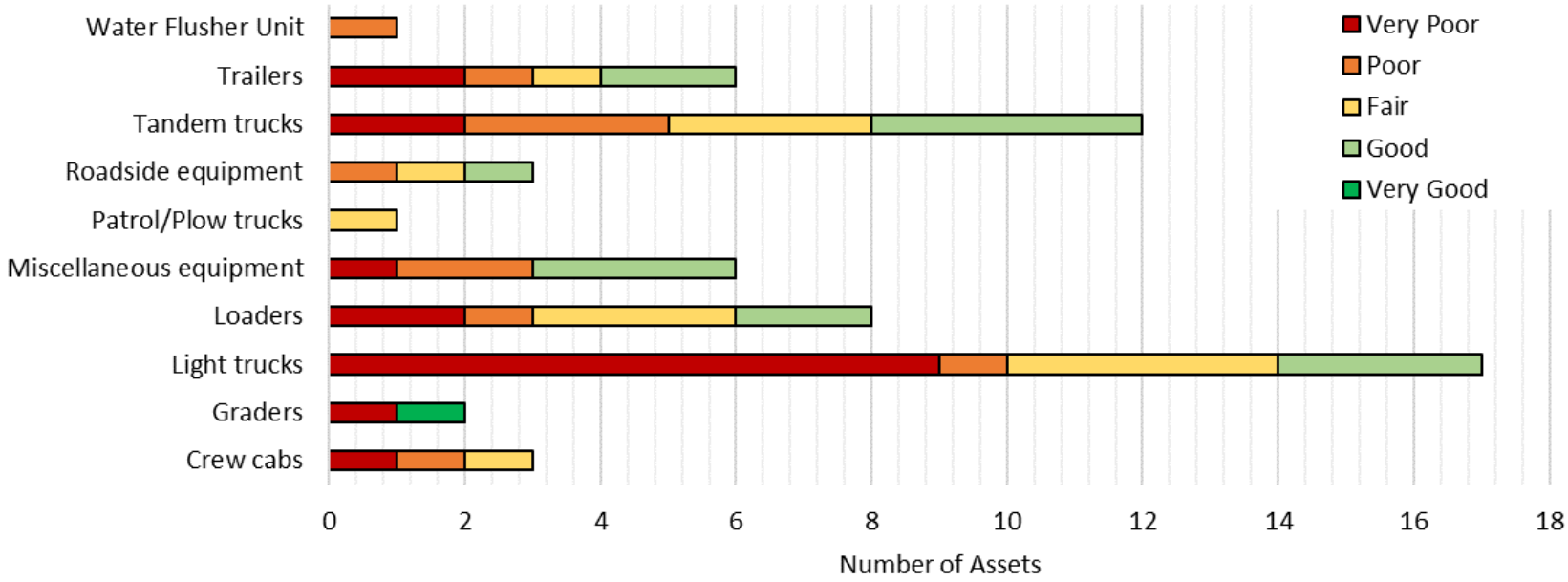
Table 7-3: Fleet Condition Assessment Remaining Useful Life Rating System

Condition Rating	Condition Rating Description	Expected Remaining Useful Life (%)	Odometer Reading Range (km)
1	Very Good	80 to 100	0 to 25,000
2	Good	60 to 80	25,000 to 75,000
3	Fair	40 to 60	750,000 to 125,000
4	Poor	20 to 40	125,000 to 200,000
5	Very Poor	0 to 20	200,000 and over

Condition was estimated using both methods for each asset (where data was available to do so), and the more conservative result was carried through assessment.

A summary of the condition ratings averaged by fleet asset type is shown in **Figure 7-1**.

Figure 7-1: Condition Ratings for Public Works Fleet Assets



The assets are fairly evenly distributed across the Very Poor to Good condition rating categories, with only one asset being rated as Very Good. A summary of the overall distribution is shown in **Table 7-4**.

Table 7-4: Summary of Public Works Fleet Assets Condition

Condition Rating	5	4	3	2	1
No. of Assets	18	11	14	15	1
Percentage of Assets	31%	19%	24%	25%	2%

With a total of 50% of assets being estimated as Very Poor or Poor condition, it is expected that more detailed condition assessment or replacement may be required for these assets.

7.3 Current Levels of Service – Fleet

Public Works Fleet assets are considered a non-core asset under O.Reg. 588/17, and therefore do not have pre-defined levels of service statements. The County's current level of service metric is that fleet assets are replaced at the end of their economic life.

The following levels of service parameters expand on the levels of service definition.

Table 7-5: Community LOS for Fleet

LOS Parameter	Levels of Service Metric	Response
Scope	Description, which may include maps of locations where fleet and equipment are stored	Locations of facilities of public works fleet storage are shown in **Table5 -6** in **Appendix A**, and includes garages and depots.
Quality	Description of fleet and equipment condition (i.e. maintained in 'good' or better condition in order to provide reliability)	Average condition is 'fair' to 'poor'.

LOS Parameter	Levels of Service Metric	Response
Reliability	Description of inspections and inspection results	• Inspections are conducted routinely by operators. Works identified through inspection are addressed through work orders. • Tracking of odometer readings

Table 7-6: Technical LOS for Fleet

LOS Parameter	Levels of Service Metric	Response
Availability	Provide breakdown of number of fleet providing service compared to the size of the community (geography or population)	• Crew cabs: 3 (1 per 1,009 sq. km) • Graders: 2 (1 per 1,513 sq. km) • Light trucks: 17 (1 per 178 sq. km) • Loaders: 8 (1 per 378 sq. km) • Miscellaneous equipment: 6 (1 per 504 sq. km) • Patrol/Plow trucks: 1 (1 per 3,026 sq. km) • Roadside equipment: 3 (1 per 1,009 sq. km) • Tandem trucks: 12 (1 per 252 sq. km) • Trailers: 6 (1 per 504 sq. km) • Water Flusher Unit: 1 (1 per 3,026 sq. km)

LOS Parameter	Levels of Service Metric	Response
		• Used a geographical area of 3,026 sq. km
Reliability	Average maintenance cost per asset	• To be established
Reliability	Average response time to complete repairs	• To be established
Safety	Legal/regulatory/local standards	The fleet assets must adhere to applicable legal, regulatory and local standards, including: • Equipment in vehicle must meet Ontario Provincial Equipment Standards • Manufacturer's recommendations or maintenance and life expectancy on equipment • Vehicle/equipment preventative maintenance program • Vehicle maintenance, safety • Driver training, equipment functioning (negligence, risk management).

7.4 Current Performance – Fleet

The current metric for performance used by the County, is that public works fleet assets are replaced at the end of their economic lifecycle. Additional indicators can be used to provide a fuller picture of asset performance. A summary of indicators of performance for the past two calendar years is shown in **Table 7-7.**

Table 7-7: Performance for Public Works Fleet Assets

Performance Indicator	County Performance Data 2020 to 2021
Number of service complaints	To be established
Maintenance cost per utilization ($/km or $/hour)	To be established

7.5 Risk Assessment – Fleet

The risk assessment for fleet assets will be conducted using the following assumptions and criteria:

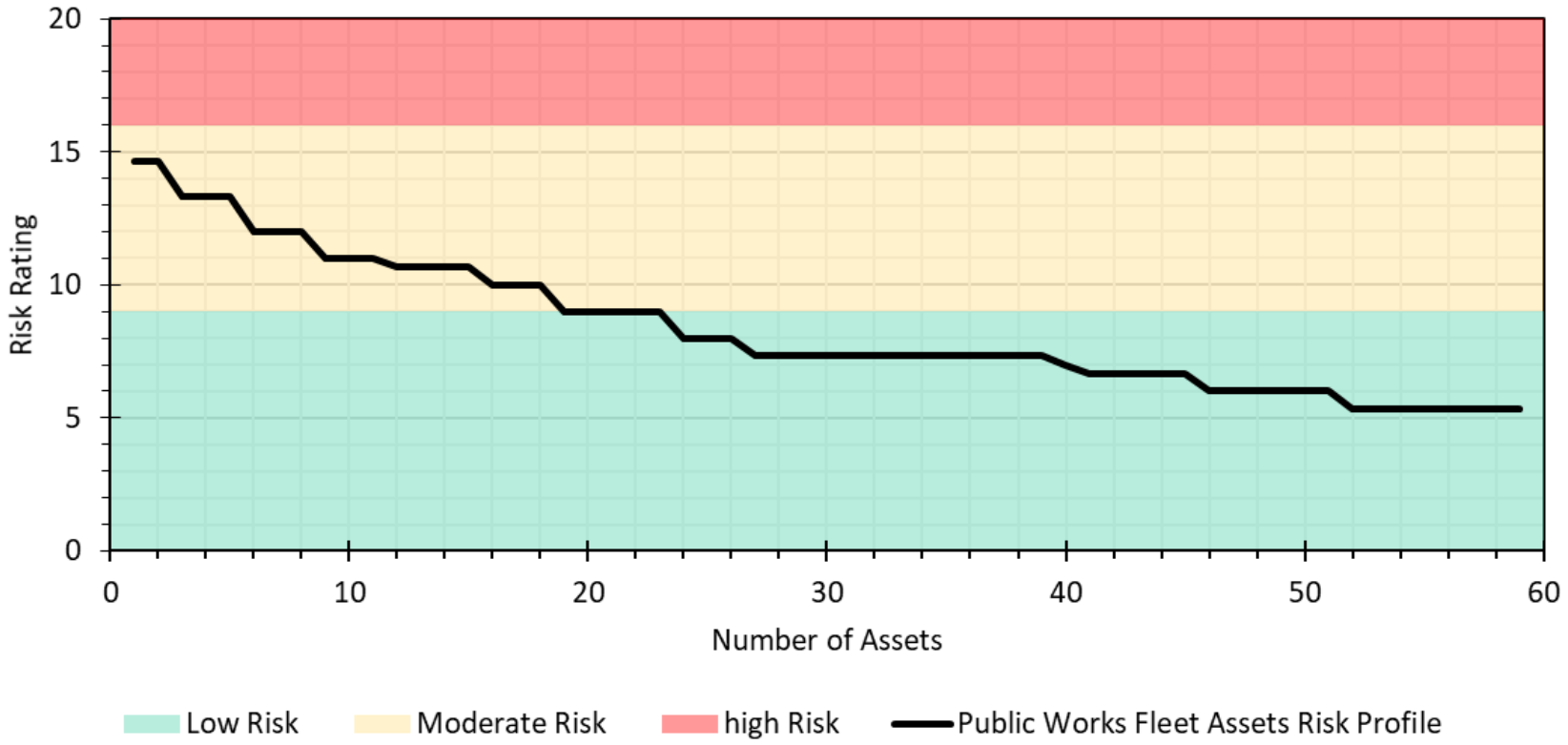
- **Condition:** Determined based on the most conservative condition rating of the estimated remaining life (age-based deterioration) and odometer using the criteria in **Table 7-8**;
- **Performance:** Assumed a moderate performance (usually reliable) (value of 3);
- **Climate Change:** Assumed a value of 3 (Limited impact with slower recovery; mitigation plan not in place);
- **Impact:** Moderate impact (value of 1); and
- **Importance:** High importance (value of 3) for snow removal equipment; Moderate importance (value of 2) for road maintenance equipment, patrol trucks; and Low importance (value of 1) for small vehicles and all other equipment.

Table 7-8: Condition Rating Description (Fleet)

Condition Category	Value	Description
Very Good	1	Odometer under 25,000 km or remaining life of 100%
Good	2	Odometer between 25,000 km and 75,000 km or remaining life between 75% and 100%
Fair	3	Odometer between 75000 km and 125,000 km or remaining life between 50% and 75%
Poor	4	Odometer between 200,000 km and 125,000 km or remaining life between 25% and 50%
Very Poor	5	Odometer between 200,000 km or remaining life between 0% and 25%

Using the assumptions and parameters listed above, a risk assessment was conducted. The distribution of risk ratings for public works fleet is shown in **Figure 7-2.**

Figure 7-2: Risk Rating for Fleet Assets



The majority of assets (41) are within the Low Risk range, with the remaining 18 within the moderate risk range.

Prioritization of works and lifecycle activities should consider the risk rating of the assets.

7.6 Lifecycle Activities – Fleet

In the lifecycle of a fleet asset, there are multiple activities that can be undertaken, depending on the asset attributes. The expected lifecycle activities to be used on the fleet assets include acquisition, maintenance, and operation and decommissioning/disposal.

7.6.1 Acquisition

Acquisition of a fleet asset should consider the intended usage of the asset. Acquisition should be undertaken based on an understanding of the requirements of the asset for providing service delivery, and should follow municipal procurement procedures. Acquisition of an asset could be as a new purchase, or purchase of a used asset. Acquisition of a new asset can provide the County with an asset in Very Good condition; however, the condition of a used asset could vary.

Acquisition activities can also include direct replacement of existing fleet assets. When a fleet asset reaches the end of its useful life, and the asset is found to be adequate for providing service delivery required, the acquisition activity may be asset replacement.

7.6.2 Maintenance

Maintenance activities will vary across the fleet assets due to the variability in type and usage of assets. The maintenance activities should be undertaken according to manufacturer specifications and as required to address condition and performance issues that arise through regular usage. Maintenance activities should include regular inspections of vehicle for condition, and recording of maintenance activities undertaken.

7.6.3 Decommissioning/Disposal

Disposal activities can include the removal from service through disposal, sale of asset or transfer of an asset to a different department. Disposal activities should be conducted such that health and safety protocols are being followed, and out of service assets are disposed of at appropriate or approved facility.

7.7 Asset Management Strategy

The asset management strategy for the public works fleet assets would seek to maximize the useful lifespan of the assets, such that they can continue to be used in service delivery across the County.

The County's current strategy is driven by the age and performance of the assets. Fleet assets are purchased new, and replaced following the expected useful life, or when it no longer performs satisfactorily. At the end of its lifecycle, the usage is evaluated and if required it is replaced with a new version of the vehicle and disposed of.

The rating system for the performance and condition of the public works fleet assets is not formalized, and should be documented such that routine inspection and assessment of the fleet assets can be conducted to understand more fully their current state. This can include visual assessment of the vehicles, tracking of maintenance logs, or logging of odometers readings.

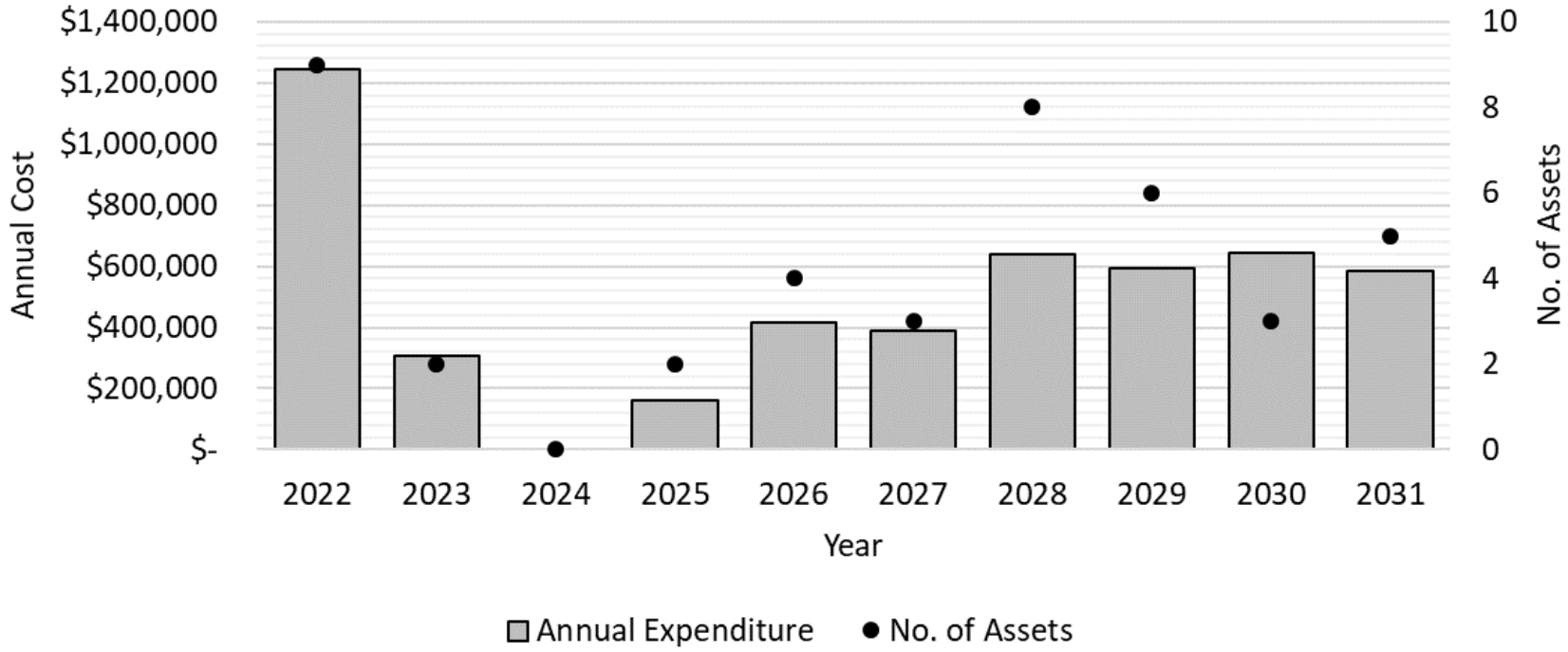
Generally, if acquired new, the assets will begin their expected useful life in very good condition and performance. Throughout the lifecycle of the assets, routine maintenance should be conducted. As required, specific maintenance should be conducted. As an asset ages and approaches the end of its useful life, it is expected that the risk and maintenance costs associated with the asset will increase. There will be a point in the lifecycle where the risk and maintenance costs are such that replacement of the asset will be the preferred solution. This point will vary depending on the type of asset, and can be impacted by factors such as build quality, and utilization. At the end of the lifecycle the County should review the requirement for service delivery for the asset to determine if it requires replacement. It is assumed that the assets will be replaced like for like.

The County should review usage of public works fleet assets to confirm if services are being provided adequately. The assets should also be routinely assessed and monitored for condition and performance, to inform any maintenance or replacement works required. The needs and monitoring of asset condition will fall within multiple departments at the County, due to the varied range of service the assets provide.

7.7.1 Projection of Works

The projection of works for the fleet asset considers the estimated replacement date based on the expected useful life, year of construction, and replacement cost of the assets. The year of replacement was determined assuming a linear deterioration of the assets, for their expected useful life beginning in the year of acquisition. The capital works projections are shown in **Figure 7-3.**

Figure 7-3: Projection of Works for Fleet Assets



The average expenditure over the 10-year timeframe is just under $498,000, with a maximum in 2022 at just over $1.2 M, and a zero-expenditure year in 2024. The County has the opportunity to adjust the replacement year of the assets (where appropriate) to make the plan more affordable on an annual basis.

The County should undertake a prioritization exercise with the assets to understand the impact of adjusting the projection of works, considering the condition, importance, risk, and usage of the assets to determine if any assets do not require replacement once they reach the end of their service life.

Additional condition assessment can help refine the projections above, as it can help determine whether an asset has exceeded its useful life with sufficient condition, or if it prematurely requires replacement.

7.8 Proposed LOS Increase

In previous version of the AMP, the County identified specific LOS targets for the fleet assets, including the following: Equipment replaced at end of economic life.

The current LOS being provided for fleet assets has some assets retained past their economic life, with 10% exceeding at the time of this AMP. The County's proposed LOS is to maintain the target for all assets to be replaced at the end of their economic life, therefore requiring a slight increase in the current LOS. We note that the fleet assets can sometimes perform adequately beyond their expected useful life, therefore the County can accept some divergence from their target LOS depending on the specific condition and performance of the assets.

8.0 Emergency Services

8.1 State of Local Infrastructure

The County reported 39 assets within its emergency services division, including the following types of assets detailed in **Table 8-1**.

Table 8-1: Current State Summary of Emergency Services Assets

Equipment Type	No. of Assets	Total Replacement Cost	Average Asset Age	Average Typical Useful Life	Average % Remaining Useful Life
Ambulance	10	$1,830,000	3.5	4.5	22%
Defibrillators	20	$640,000	1.0	7	86%
Emergency Response Vehicle	3	$230,500	5.7	8.5 (range: 7 to 10 years)	33%
Equipment	2	$668,800	7.5	7.5 (range: 7 to 8 years)	73%
Fire Communications System	1	$1,723,100	11.0	15	27%
Rescue vehicle	3	$600,000	13.0	15	13%
Total	**39**	**$5,692,400**			

In addition to the list above, the County uses five Ambulance Base facilities, which are discussed in the section below.

8.1.1 Ambulance Base Facilities

The County utilizes five ambulances bases as part of emergency service delivery, including:

- Almonte Ambulance Base;
- Carleton Place Ambulance Base;
- Lanark Village Ambulance Base;
- Perth Ambulance Base; and
- Smith Falls Ambulance Base.

The ambulance base facilities are leased by the County, and therefore capital asset management works are not a responsibility of the County. Accordingly, no further analysis is included for these assets.

8.1.2 Computers & Equipment

We note that the Emergency Services department uses computer assets and various equipment, however these assets had limited information to incorporate into the analysis:

- Computers were listed as an asset however unit quantities, ages, and replacement costs were not provided; therefore, no analyses were completed; and
- For equipment, ages were defined as “variable”; however, a cost year was listed. Therefore, age related analyses were completed assuming that the cost year was the age for all equipment.

8.1.3 Replacement Cost

The replacement costs were a summation of 2022 replacement values for each asset type, either as specified by the County or derived from initial replacement costs data from the provided dataset. From this data, the costs were inflated by 3% annually since the year of initial acquisition to current dollars.

8.1.4 Average Age

The age of emergency services ranges from one year to 13 years. The distribution does not consider computer assets as age data was not provided. The average asset age is approximately 6 years.

8.1.5 Expected Useful Life

The expected useful life varies by asset type, and range from 4.5 to 15 years. Information to quantify the total useful life was provided by the County. Some asset types had typical ranges for the useful life, which have been provided as well as the average. Across all emergency services assets, the average expected useful life is 11.5 years.

8.2 Condition – Emergency Services

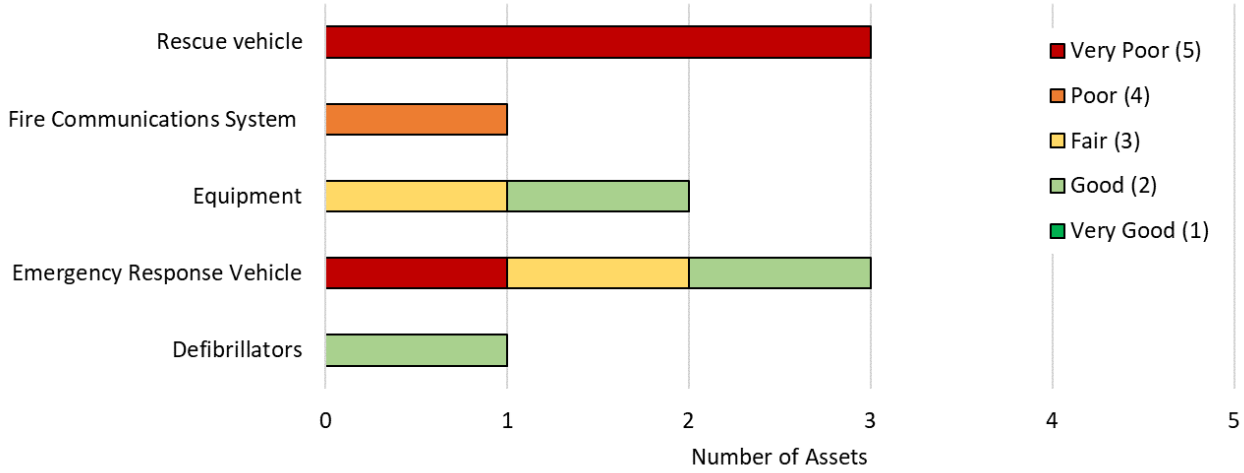
The conditions of the emergency services assets were determined using information provided by the County of Lanark, including information regarding age of assets and typical useful life. Using this information, a condition rating was assigned to each emergency services asset dependant on the expected remaining useful life. Condition ratings were determined on a scale of 1 to 5, according to the system shown in **Table 8-2.**

Table 8-2: Emergency Services Assets Condition Assessment Remaining Useful Life Rating System

Expected Remaining Useful Life (%)	Associated Condition Rating
80 to 100	1 (Very Good)
60 to 80	2 (Good)
40 to 60	3 (Fair)
20 to 40	4 (Poor)
0 to 20	5 (Very Poor)

The distribution of condition ratings per asset type are shown in **Figure 8-1.**

Figure 8-1: Condition Ratings for Emergency Services Assets



The condition of ambulances was omitted from the summary above. A typical lifecycle-based assumption for estimation condition is not applicable due to the replacement schedule used for these assets. The ambulances are replaced at a frequency of two per year on a rotating 5-year cycle. The intent of this replacement schedule is to remove the ambulance assets from service prior to deteriorating to a poor or very poor condition, due to the risk in operating an ambulance asset in such a condition.

Just over 40% of the assets are within the 'Poor' to 'Very Poor' condition range (based on useful life), indicated by ratings of 5 or 4. The remainder of assets are split between Fair and Good (3 and 2), and none are currently rated as Very Good (1). Note that these condition assessments are based on the expected useful life of the asset. The assets could continue to be reliable beyond their useful life. Additional condition and performance reviews can help expand on the understanding of condition, such as odometer readings, maintenance records and visual assessments.

Condition of the computer assets were not defined due the lack of age data available.

8.3 Current Levels of Service – Emergency Services

Emergency Service assets are considered a non-core asset under O.Reg. 588/17, and therefore do not have pre-defined levels of service statements. The County's current level of service metric is that equipment is replaced at the end of its economic life.

The following levels of service parameters expand on the levels of service definition.

Table 8-3: Community LOS for Emergency Services

LOS Parameter	Levels of Service Description	Response
Scope	Description, which may include maps of locations where of ambulance and emergency services equipment are stored	The County uses five ambulance base facilities for emergency service delivery: • Almonte Ambulance Base • Carleton Place Ambulance Base • Lanark Village Ambulance Base • Perth Ambulance Base • Smiths Falls Ambulance Base
Reliability	Description of ambulance and emergency services equipment condition (i.e. maintained in 'Good' or better condition in order to provide reliability)	Poor condition on average

Table 8-4: Technical LOS for Emergency Services

LOS Parameter	Levels of Service Description	Response
Scope	Provide breakdown of number of ambulances providing service compared to the size of the community (geography or population)	• Ambulances: 10 (1 per 7,576 residents) (1 per 303 sq. km) • Emergency Response Vehicle: 3 (1 per 25,253 residents) (1 per 1,009 sq. km) • Rescue vehicle: 3 (1 per 25,253 residents) (1 per 1,009 sq. km)
Availability	Average response time compared to Provincial Standards and Self-Imposed Standards	To be determined
Safety	Legal/regulatory/local standards	• Equipment in vehicle must meet Ontario Provincial Equipment Standards • Manufacturer's recommendations or maintenance and life expectancy on equipment • Ambulances based on call volume and kilometres travelled • Vehicle/equipment preventative maintenance program • Vehicle maintenance, safety • Driver training, equipment functioning (negligence, risk management).

8.4 Current Performance – Emergency Services

The current metric for performance used by the County, is that emergency services assets are replaced at the end of their economic lifecycle. Additional indicators can be used to provide a fuller picture of asset performance. A summary of indicators of performance for the past two calendar years is shown in **Table 8-5**.

Table 8-5: Performance for Emergency Services

Performance Indicator	County Performance Data 2022 to 2021
Response time	To be determined
Service vehicles/equipment per capita	See LOS table above.
Percentage of assets in good or very good condition	26%

8.5 Risk Assessment – Emergency Services

The risk assessment for emergency services assets will be conducted using the following assumptions and criteria:

- **Condition:** Determined based on the estimated remaining life (age-based deterioration);
- **Performance**: Assumed to be usually to always reliable (value of 2);
- **Climate** Change: Assumed a value of 3 (Limited impact with slower recovery; mitigation plan not in place);
- **Impact:** Moderate impact (value of 1); and
- **Importance:** High importance (value of 3) – ambulances, all other emergency services assets and Moderate importance (value of 2) – fire communications.

Using these assumptions, nearly all assets fall into the 'moderate' risk range, with values ranging from 9.3 to 13.3. The remaining asset, the Fire Communication System, was considered 'low' risk, with a rating of 9.

8.6 Lifecycle Activities – Emergency Services

In the lifecycle of an emergency services asset, there are multiple activities that can be undertaken, depending on the asset attributes. The expected lifecycle activities to be used on these assets include acquisition, maintenance, and operation and decommissioning/disposal.

8.6.1 Acquisition

Acquisition of an emergency services asset should consider the intended usage of the asset. Acquisition should be undertaken based on an understanding of the requirements of the asset for providing service delivery, and should follow municipal procurement procedures. Acquisition of an asset could be as a new purchase, or purchase of a used asset. Acquisition of a new asset can provide the County with an asset in Very Good condition, however the condition of a used asset could vary.

Acquisition activities can also include direct replacement of existing emergency services assets. When an asset reaches the end of its useful life, and the asset is found to be adequate for providing service delivery required, the acquisition activity may be asset replacement.

8.6.2 Maintenance

Maintenance activities will vary across the fleet assets due to the variability in type and usage of assets. The maintenance activities should be undertaken according to manufacturer specifications and as required to address condition and performance issues that arise through regular usage. Maintenance activities should include regular inspections of vehicle for condition, and recording of maintenance activities undertaken.

8.6.3 Decommissioning/Disposal

Disposal activities can include the removal from service through disposal, sale of asset or transfer of an asset to a different department. Disposal activities should be conducted such that health and safety protocols are being followed, and out of service assets are disposed of at appropriate or approved facility.

8.7 Asset Management Strategy

The asset management strategy for the emergency services assets would seek to maximize the useful lifespan of the assets, such that they can continue to be used in service delivery across the County.

The County's current strategy is based on replacement of the assets at the end of their economic life. The criticality of the services provided by these assets means that there is less flexibility in the timing for maintenance and replacement of the assets.

The emergency services assets are purchased new, and replaced following the expected useful life, or when it no longer performs satisfactorily. At the end of its lifecycle, the usage is evaluated and if required it is replaced with a new version of the vehicle and disposed of.

The rating system for the performance and condition of the emergency services assets is not formalized, and should be documented such that routine inspection and assessment of the fleet assets can be conducted to understand more fully their current state. This can include visual assessment of the vehicles, tracking of maintenance logs, or logging of odometers readings.

Generally, if acquired new, the assets will begin their expected useful life in very good condition and performance. Throughout the lifecycle of the assets, routine maintenance should be conducted. As required, specific maintenance should be conducted. As an asset ages and approaches the end of its useful life, it is expected that the risk and maintenance costs associated with the asset will increase. There will be a point in the lifecycle where the risk and maintenance costs are such that replacement of the asset will be the preferred solution. This point will vary depending on the type of asset, and can be impacted by factors such as build quality, and utilization. At the end of the lifecycle the County should review the requirement for service delivery for the asset to determine if it requires replacement. It is assumed that the assets will be replaced like for like.

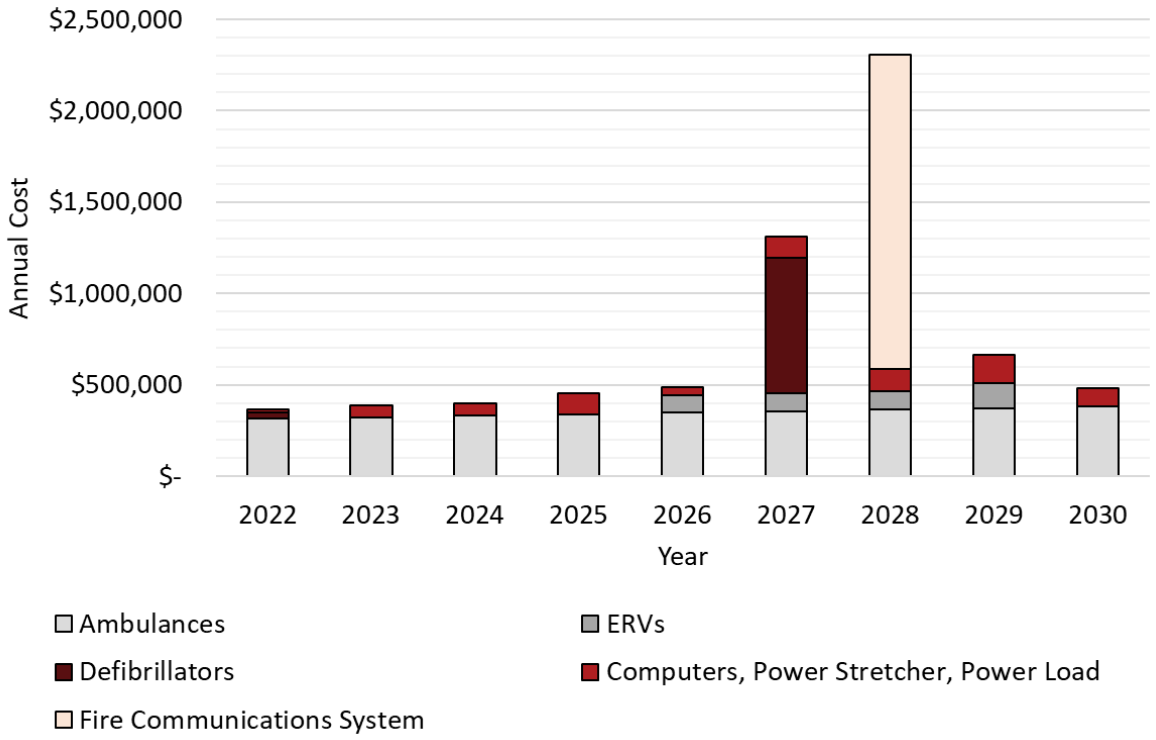
The County should review usage of emergency services assets to confirm if services are being provided adequately. The assets should also be routinely assessed and monitored for condition and performance, to inform any maintenance or replacement works required. The needs and monitoring of asset condition will fall within multiple departments at the County, due to the varied range of service the assets provide.

8.7.1 Projection of Works

The emergency services assets are replaced at the end of their expected useful life. The County had previously prepared an emergency services capital plan, which projects costs for replacement of the assets. The plan is based on replacement of the assets at the end of their useful life, and considers sequencing of the replacements.

The replacement costs shown were provided by the County, and consider a base inflation rate of 2.5% annually. A summary of the projections is shown in **Figure 8-2.**

Figure 8-2: Projection of Works for Emergency Services Assets



The capital plan considers a relatively consistent replacement cost for the ambulances each year, allowing for constant refreshing of the assets. The plan projects replacement of all defibrillators at once, occurring in 2027 for an estimated cost of $740,000. Note that within the inventory and this plan, the defibrillators are considered one asset group, and therefore multiple acquisitions are included in the instance of replacement. The County may review if there is an opportunity to stagger the acquisition of new defibrillators to reduce the large expenditure projected for 2027.

In addition to the replacements projected within the County's capital plan, based on the age of the asset it is projected that the Fire Communications System should be considered for replacement in 2028. This replacement carries a significant cost, at over $1.7M.

9.0 Social Housing

9.1 State of Local Infrastructure

The County provides social housing through the Lanark County Housing Corporation (LCHC) which owns and maintains the units. The LCHC is a separate corporation, owned by the County. The social housing assets include apartment buildings, single- and multi-unit homes, and associated parking lots. A summary of the current state of social housing assets is shown in **Table 9-1**.

Table 9-1: Current State Summary of Social Housing Assets

Asset Class or Type	No. of Assets	No. of Units (total across asset type)	Total Square Footage	Total Replacement Cost (2022)	Average Asset Age (2022)	Useful Life	Average Remaining Life	Asset Age as a Proportion of Expected Useful Life
Single Family Home	26	26	28,192	$6,292,373	66	50	-16	133%
Duplex	2	4	5,060	$887,386	45	50	6	89%
Row Housing	8	28	131,663	$30,152,343	47	50	3	94%
Semi attached home	2	2	3,660	$423,525	47	50	3	94%
Apartment Building	13	336	241,387	$47,561,540	45	50	5	90%
Parking Lot	18	N/A	111,425	$797,550	45	25	-20	181%
Total	**69**	**N/A**	**521,387**	**$86,114,717**	**N/A**	**N/A**	**N/A**	**N/A**

Descriptions of the summary components are in the following sections.

9.1.1 Replacement Cost

As part of their inventory, the County maintains an expected replacement cost for each of the individual assets, with a replacement year associated. The majority of assets had replacement costs identified for the year 2008. Where recently constructed, the replacement cost was updated to reflect the actual construction cost. To estimate the replacement cost in 2022 value, the replacement costs provided were inflated at a rate of 3% per year since the year of replacement cost.

9.1.2 Average Age

The average age was determined based on the age of the entire asset, since year of initial construction.

9.1.3 Expected Useful Life

The expected useful life for all social housing assets is 50 years (for the entire asset). Parking lots for social housing assets have a 25-year expected useful life.

9.2 Condition – Social Housing

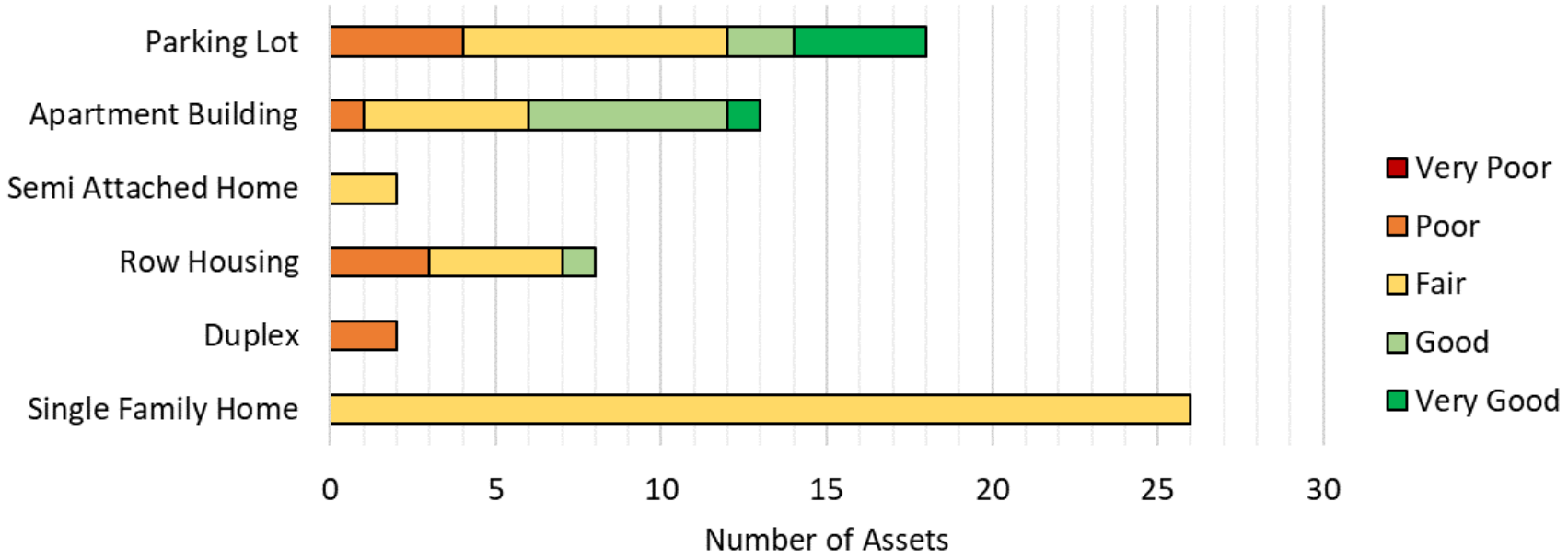
Condition of the assets was assessed in 2021 by the municipal staff at the County. The assets were assessed on a descriptive scale from Very Poor to Very Good, according to the following condition descriptions as defined by the County.

Table 9-2: Social Housing Condition Rating Scale

Rating	Description of Condition
Very Good	Only planned maintenance required
Good	Minor maintenance required plus planned maintenance
Fair	Significant maintenance required
Poor	Significant renewal/upgrade required
Very Poor	Unserviceable

The majority of assets (46 of 70) were in Fair condition. There were no assets in Very Poor condition. The distribution of asset condition found during the 2021 assessment is below.

Figure 9-1: Distribution of Social Housing Condition Assessments (2021)



9.3 Current Levels of Service – Social Housing

Social Housing is considered a non-core asset under O.Reg. 588/17, and therefore do not have pre-defined levels of service statements. The County's primary indicator for levels of service for Social Housing is the condition, including the following targets set within the previous asset management plan:

- 100% of social housing building assets rated Good and Very Good; and
- 85% of social housing parking lots rated Good and Very Good.

The following levels of service parameters expand on the levels of service definition.

Table 9-3: Community LOS for Social Housing

LOS Parameter	Levels of Service Metrics	Response
Scope	Description, which may include maps of locations of social houses and social housing parking lots	Social housing assets are located in multiple communities across the County, including Smiths Falls, Carleton Place, Perth, and Almonte.
Quality	Description of social housing and social housing parking lot conditions (i.e. maintained in 'fair' or better condition in order to provide reliability)	• Building average: Fair 88% of assets are Fair/Good/Very Good • Parking Lot average: Fair/Good 44% of assets are Good/Very Good • Overall average: Fair (based on 2021 assessment)
Quality	Quantity of complaints received	• Jan. – Dec. 2021: 257; 2 parking, 100 property standards, 145 social

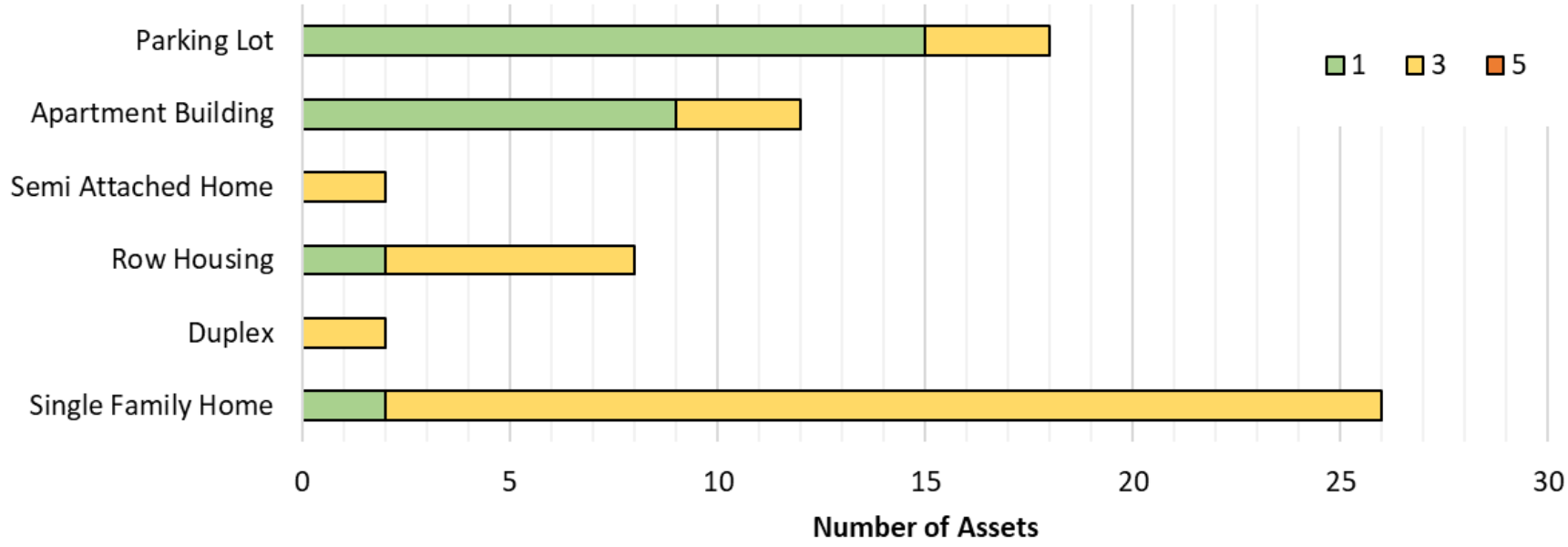
Table 9-4: Technical LOS for Social Housing

LOS Parameter	Levels of Service Metrics	Response
Scope	Provide breakdown of annual maintenance and utility costs	• Supplies: $169,500 • Operations: $383,000 • Capital: $780,000 • Total Budget: 1,332,500
Quality	Provide a breakdown of non-compliances noted in annual inspections compared to the repair turnaround time	• Annual Fire Code Inspection 2021: 167 Work Orders • Average time to completion: 30 days
Quality	Percentage of vacant units and average turnaround time between tenants	• Average turnaround time is 30 days • Vacancy rate is less than 1%
Quality	Average waiting time on list for occupancy	• 2.46 years (2015) • 2021 – wait is 3 to 8 years
Quality	Legal/regulatory/local standards	• Accessibility (AODA Standards) • Health and safety • Buildings must be in compliance with Ontario Building Code.

9.4 Current Performance – Social Housing

Performance of the social housing assets is currently tracked by the County through performance of condition indicators, and as an overall performance rating, (indicating reliability). The County assigns numerical performance rating to each asset to generally indicate its reliability, with 1 being the highest reliability and 5 being the lowest. A summary of the performance rankings completed in 2021 are shown in **Figure 9-2.**

Figure 9-2: Performance Ratings for Social Housing Assets



Additional indicators can be used to provide a fuller picture of asset performance. A summary of indicators of performance for the past two calendar years is shown in **Table 9-5.**

Table 9-5: Performance for Social Housing Assets

Performance Indicator	County Performance Data 2020 to 2021
Condition Performance	Majority of assets are below the target: 16% of building assets at Good and Very Good; 33% of parking lot assets are Good and Very Good (in 2021)
Vacancy rates	Less than 1%
Parking, accessible spaces	3 (2021) 1 (2020)
Utility and maintenance costs	Budget (2021): $1,332,500 Budget (2020): $1,352,788

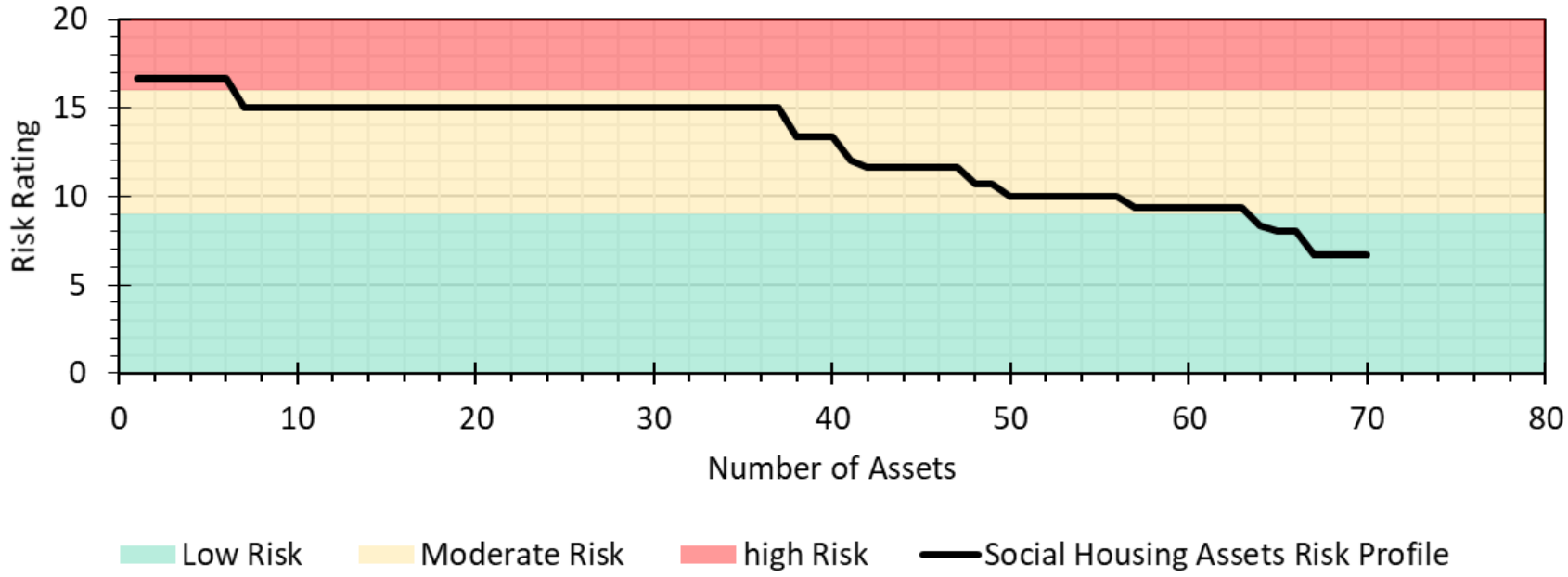
9.5 Risk Assessment – Social Housing

The risk assessment for facilities assets will be conducted using the following assumptions and criteria:

- **Condition:** Determined based on 5-point scale assessed by the County (ranging from 'Very Good' – 1 to 'Very Poor' – 5);
- **Performance:** Consistent with County assigned performance ratings in 2021;
- **Climate Change:** Assumed a value of 3, housing may be impacted by climate change, but mitigation options available;
- **Impact:** Impact was assumed to be High (value of 2) for living units as loss of asset will lead to housing challenges for displaced family. Impact was assumed to be Moderate (1) for parking lots due to high demand for parking and challenges finding parking spaces; and
- **Importance:** Importance ratings were previously provided by the County, and included a High rating for all social housing assets (buildings and parking lots). For risk assessment, this High equates to a value of 3.

Using the assumptions and parameters listed above, a risk assessment was conducted. The distribution of risk ratings for social housing assets is shown in **Figure 9-3**.

Figure 9-3: Risk Rating for Social Housing Assets



Six assets are identified with a 'high risk' rating, including the following assets:

- Smiths Falls Units:
  - Duplex (3A & 3B Anne);
  - Row Housing (15 to 21 Empress);
  - Row Housing (43, 45, 47 Sussex, 42,A to H Empress);
  - Duplex (9A & 9B Lanark); and
  - Row Housing (43 to 47 Empress).
- Almonte Units:
  - Apartment Building (176 Robert).

These assets commonly were found to be in poor condition, while being of high importance and moderate performance.

9.6 Lifecycle Activities – Social Housing

The following section describes the lifecycle activities that can be implemented within the asset management strategy for social housing assets. Note that, as previously discussed, the social housing assets refers to the entirety of the asset which is made up of varying component systems depending on the use of the building. The primary lifecycle activities include construction, maintenance, renewal, and decommissioning/disposal.

9.6.1 Construction

The start of a social housing asset lifecycle is its construction. The housing should be constructed to adhere with the requirements of the Ontario Building code, accessibility requirements, and any and all other applicable regional codes and requirements for the building and its use. Construction of a new asset should be done such that the current needs of the County are being addressed. The design and construction should be consistent with the recommendations in the County's Housing and Homelessness plan (current version dated 2019). Each building should be designed and constructed to provide the services for which it is intended.

9.6.2 Maintenance

Throughout the full lifecycle of an asset, the majority of the expected lifecycle activities to be undertaken will be maintenance works. Maintenance activities can be used to improve the level of service of an asset (or component), or to maintain it. Activities that fall under the maintenance category can be varied by response type and scale of maintenance requirements. Activities can be required through routine maintenance works, in response to customer complaints, or on an emergency basis. In general, the expected types of maintenance activities within the lifecycle of a building include:

- Preventative maintenance:
    - This type of maintenance activity is undertaken to prevent failure or poor performance of a housing asset component. Preventative maintenance works can be undertaken on an ad-hoc basis based on knowledge of condition, or be undertaken according to a maintenance schedule. Manufacturer directives and condition assessments should assist in determining frequency of preventative maintenance activities.
- Reactive maintenance:
    - This type of maintenance activity is undertaken in response to an issue or fault in the building or component systems. Scale of reactive maintenance works will be variable depending on the system and type of failure or decrease in level of service.
- Major maintenance (replacement):
    - This type of maintenance activity is undertaken in response to a component which is no longer able to provide adequate level of service. Major maintenance (replacement) will be undertaken for one or more components of a building asset. Major maintenance works can be preventative (in anticipation of end of service life of a component), or in response to a system failure.

9.6.3 Renewal

Renewal works can be used to update a building or housing unit for modernization, to achieve compliance with updated codes and requirements, to upgrade the condition or performance of the unit or building, or to renovate to suit changes to services provided. Renovation works can include:

- Addition of new components to an existing housing or building asset; and
- Updating of existing components:
    - Updating of existing components can prolong the expected lifespan of an asset.

9.6.4 Decommissioning/Disposal

Disposal activities can include the removal from service of a housing unit or building, or a portion of a building and components. Disposal activities occur when the asset is no longer required for service delivery, has reached the end of its useful life, or no longer meets the County's needs for various reasons.

Disposal activities should be conducted such that health and safety and environmental protocols are being followed, and spent materials are disposed of at appropriate or approved facility.

Disposal activities can also include removal of the housing asset from the County portfolio through sale of property.

9.7 Asset Management Strategy

The asset management strategy for social housing assets will maximize the lifecycle of the assets where appropriate, in consideration of specific needs of the County and existing infrastructure.

The County's asset management strategy for social housing relies on condition assessments to establish the current state of the assets (including the asset as a whole and individual componentry within the units). The results of the condition assessments are used to establish recommended works and associated timeframes. Condition assessments are completed by the County on a regular basis, depending on the requirement for the inspection. Minor or localized inspections can be conducted as a

result of complaints; inspections can be conducted following termination of tenancy; or as required according to regulatory requirements.

In general, the County aims to provide the highest possible condition of the buildings, within the limits of affordability.

The inspections undertaken are expected to provide sufficient information to the County to provide the preferred level of service delivery to the tenants. The County should continue the frequency and quality of inspections accordingly. If additional information is required for assessing condition, the County can undertake or procure by a third party a comprehensive non-intrusive visual inspection of the assets and componentry. The usage of such assessments can provide reliable and repeatable condition information and projections that can be used for capital planning and asset management. A detailed condition assessment as such could be undertaken at a frequency preferred by the County, suggested to be every 5 years, or as preferred to have ongoing thorough understanding of the condition and performance of the assets and componentry. These assessments can be used to inform maintenance and capital planning schedules, and for forecasting improvements. If it is not possible to complete assessment of all social housing assets on a routine basis, priority can be assessed through risk assessment, condition and performance measures. Priority should be given to those with higher risks.

In general, the building assets were found to be in fair condition and performing adequately to provide the intended services. The County strategy should maintain (or improve where appropriate) the condition and performance adequately continue to maintain the services. An industry standard of 2% of the current portfolio replacement value is recommended as a minimum annual investment into capital projects for major maintenance (replacement) and renewal activities; however, specific works recommendations within condition reports will provide a more tailored understanding of the County's recommended annual investment.

Implementation of the lifecycle activities for the social housing assets will vary across the assets, according to the components, condition, and services provided.

Routine maintenance schedules are assumed to be in place currently, and are recommended to continue assuming that they are currently providing sufficient level of maintenance. Maintenance works can include preventative maintenance, reactive maintenance (in the event that there is an issue), or major maintenance which can include the replacement of a component.

Renewal works are required when routine maintenance is insufficient to address an issue. Renewal can include update of a building asset for modernization, to achieve compliance with updated codes and requirements, to expand on an existing building (in response to service delivery change to accommodate growth), or to renovate to suit changes to services provided.

Reconstruction works are undertaken when an asset or a component has reached the end of its useful life. The County should consider on a case-by-case basis if the asset is to be reconstructed to a similar level of service as was existing, if modifications need to be made to support current and future service delivery. This could include changes to the facility to accommodate new service delivery, accommodate growth requirements, changes to square footage, or changes based on accessibility.

Management of social housing assets should also include climate change considerations, in new construction, maintenance or renewal lifecycle activities. Assessment should be undertaken to understand vulnerability of building assets to a changing climate, which will inform lifecycle activity requirements, and potential changes to the way lifecycle activities are undertaken.

The County should continuously audit asset data to ensure information is current. It is suggested that additional classifications be implemented to clearly identify the lifecycle activities implemented for building components.

The County should provide annual updates to LOS and KPI measures to gauge performance of the social housing assets against quantified targets. Where data is not yet available to LOS or KPI measures, a strategy for collecting, verifying and integrating the data should be developed and implemented.

9.7.1 Considerations from Foundations for the Future

The County has developed a 10-year Housing and Homelessness Plan, most recently updated in December 2019, Foundations for the Future. The report provides a framework for improving access to safe and healthy homes for residents of the County. The report provides strategic direction and recommended actions related to housing, which may influence the strategy for the social housing asset management. The strategic directions listed in the report include:

- Strategic Direction #1: Increase the Supply of Affordable Housing;
- Strategic Direction #2: Plan for a Diverse Range of Housing Choices;
- Strategic Direction #3: Stabilize and Revitalize Current Social Housing Stock;
- Strategic Direction #4: Ensure an Adequate Supply of Appropriate, Supportive and Universal Housing; and
- Strategic Direction #5: Educate the Community on Local Housing Needs and Offer Incentives to Build Affordable Housing.

In general, the County is working towards expanding the social housing inventory to meet demands, including a variety of housing types. The County is continuing to focus on the current social housing inventory, acknowledging that the housing is aging, which is expected to increase the requirement for maintenance and rehabilitation costs. Accordingly, the County's strategy for social housing assets should continue to be developed to help achieve the strategic directions.

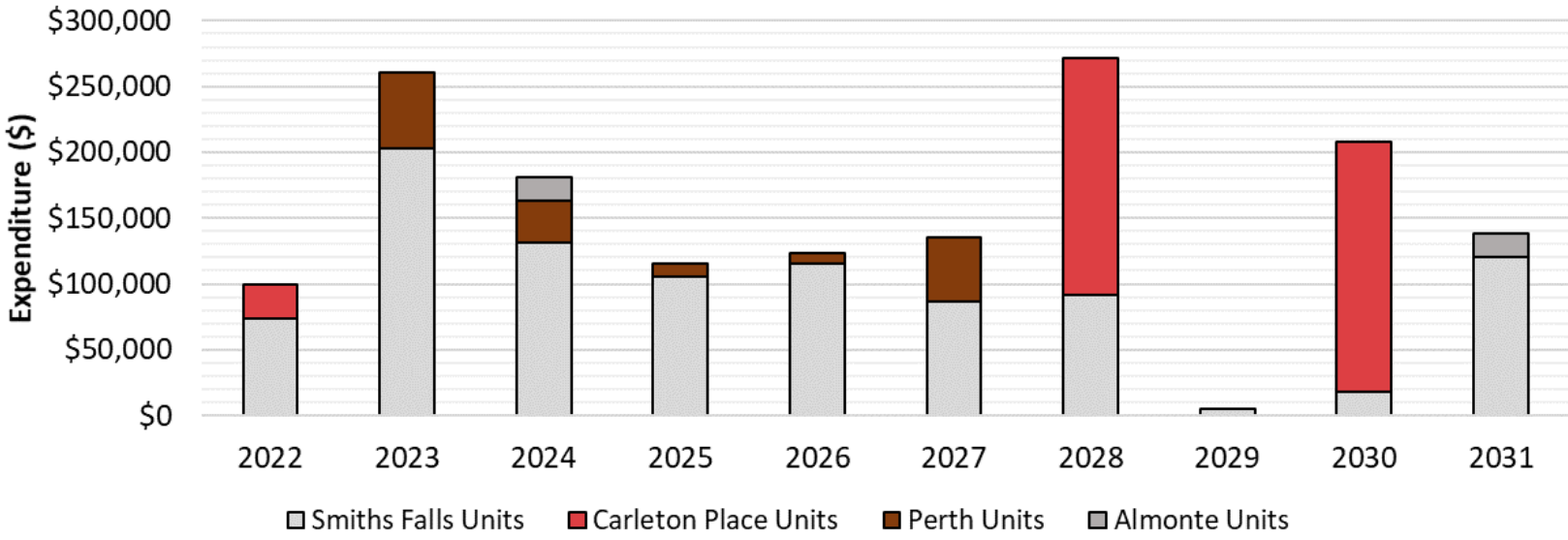
9.7.2 Projection of Works

The County maintains updated projection of works in form of a capital plan for the social housing assets. The capital plan is itemized with a cost projection and description of the works according to the needs identified for each asset through inspection, complaints, and other avenues of identification. The plan is developed for a ten-year timeframe. The projection of works according to the capital plan are discussed by asset type below.

9.7.3 Family Units

Across the ten-year timeframe, the County has identified 146 instances of works required to the family units, ranging in individual cost from $750 to $190,000. For years 2022 through 2026, the single-family homes in Smith Falls are identified to undergo the same improvements, which may allow the County to find some efficiencies in costing. A summary of the annual expenditure for these assets, summarized by community per year, is shown in **Figure 9-4.**

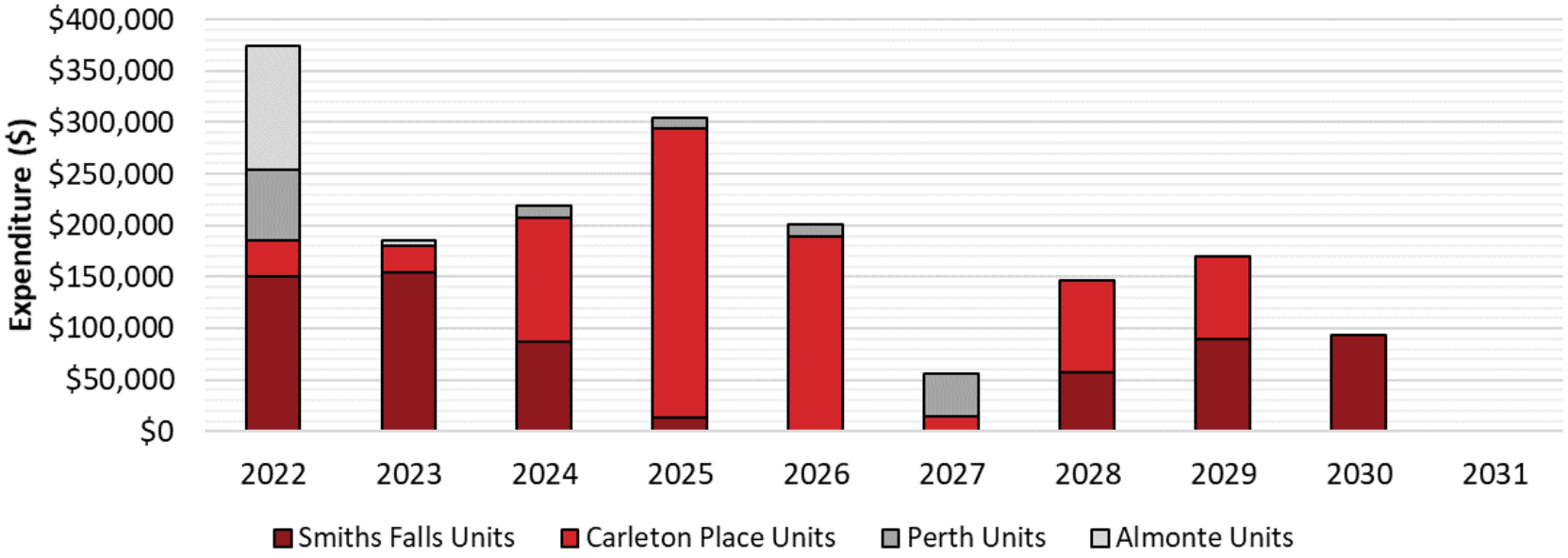
Figure 9-4: Capital Expenditure Projections for Social Housing Family Units



9.7.4 Apartment Buildings

Across the ten-year timeframe, the County has identified 38 instances of works required to the apartment buildings, ranging in individual cost from $5,000 to $280,000. A summary of the annual expenditure for these assets, summarized by community per year, is shown in **Figure 9-5.**

Figure 9-5: Capital Expenditure Projections for Social Housing Apartment Buildings

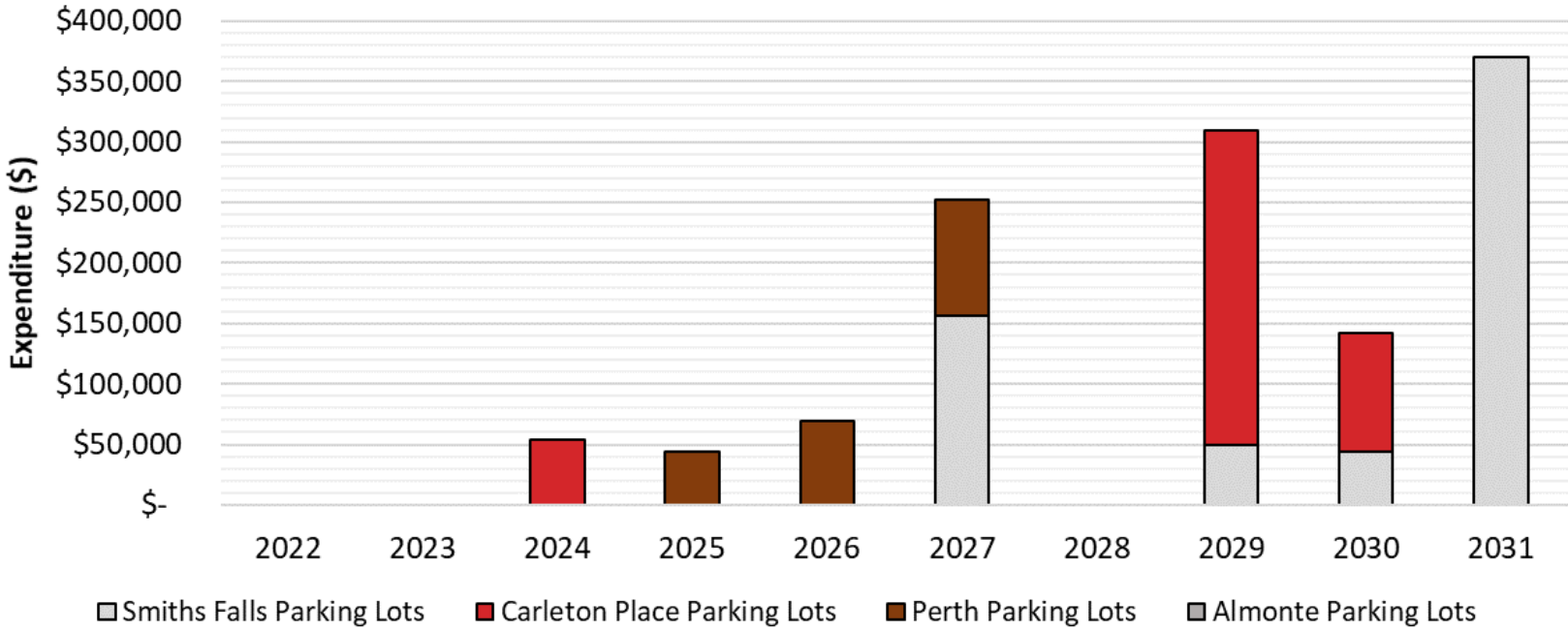


The initial years (2022 through 2026) show a higher expenditure than the following years of the capital plan. If the expenditures are higher than what is currently affordable at the County, a risk assessment and prioritization can be done to defer some works to years where the expenditure is lower. Further, as the assets continue to be utilized and deteriorate, there may be additional works and improvements identified that may increase the expected expenditure towards the end of the current capital plan.

9.7.5 Parking Lots

Across the ten-year timeframe, the County has identified only 13 instances of works required to the social housing parking lots, ranging in individual cost from $44,000 to $250,000. Each instance of works is for full replacement of the parking lot. A summary of the annual expenditure for these assets, summarized by community per year, is shown in **Figure 9-6.**

Figure 9-6: Capital Expenditure Projections for Social Housing Parking Lots

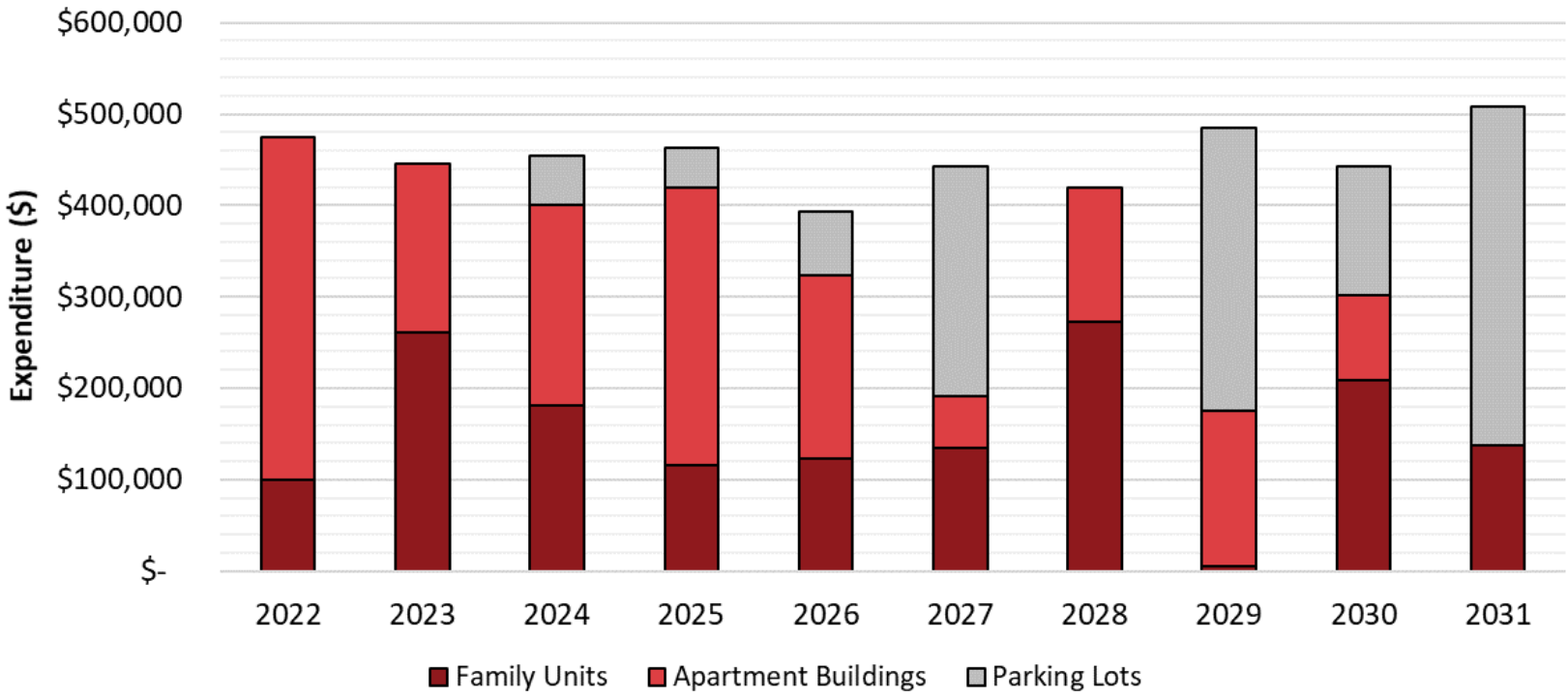


Three years of the capital plan have no improvements scheduled, and three additional years have works scheduled with capital costs of under $100,000. Contrarily, three years exceed $250,000. The County can continue to monitor the condition of these parking facilities to identify any opportunities for prioritization of the works and moving expenditures to different years to allow for a more consistent and affordable annual expenditure.

9.7.6 Overall Projection of Works

In consideration of the works identified for the Social Housing assets, we can project an overall annual expenditure for the assets, as shown in **Figure 9-7**.

Figure 9-7: Capital Expenditure Projections for Social Housing (All Assets)



The annual expenditure is relatively consistent across the timeframe, ranging from just below $400,000 to just over $500,000. The average annual expenditure through the 10-year timeframe is approximately $452,000.

9.8 Proposed LOS Increase

In previous version of the AMP, the County identified specific LOS targets for the social housing assets, including the following:

- 100% of buildings are rated as Very Good and Good; and
- 85% of Parking lots are rated as Very Good and Good

The current LOS being provided for social housing assets has the average condition rating at 'Fair', with 88% of assets being in the 'Fair' or better condition categories. The current LOS is considered adequate for the service being delivered, and the County can therefore consider adjusting the LOS target to expand and include 'Fair' condition assets within the 100% target.

10.0 IT Infrastructure

10.1 State of Local Infrastructure

The County owns 15 assets within its IT infrastructure, detailed in **Table 10-1** below.

Table 10-1: Current State Summary of IT Infrastructure Assets

Class	Class Description	No. of Assets	Total Replacement Cost (2022)	Average Asset Age	Average Typical Useful Life	Asset Age as a Proportion of Expected Useful Life
IT001	UPS Battery Backup system	1	$31,960	2	5	40%
IT002	VXRail Qty 3 x P570	3	$119,770	2	5	40%
IT003	VXRail Qty 3 x E560F	3	$254,420	2	5	40%
IT004	Dell EMC Switches (8)	8	$101,910	2	5	40%
N/A	**Total**	**15**	**$508,060**	**2**	**5**	**40%**

Additional descriptions of the information presented in the above table are detailed below.

10.1.1 Replacement Cost

The replacement costs (total of $508,060) were provided by the County, based on the recent acquisition of IT infrastructure assets. The prices were provided in 2021 dollars. To inflate to 2022 dollars, the replacement costs were inflated by 3%.

10.1.2 Average Age

The current inventory of assets was all acquired in 2020 which makes the age of the assets as two years.

10.1.3 Expected Useful Life

The expected useful life of IT infrastructure assets is consistent across all components, at 5 years.

10.2 Condition – IT Infrastructure

The condition of the IT infrastructure assets was estimated by County staff in 2021. All of the assets were rated as 'Very Good' condition. It is expected that the condition of the asset may change on a rapid basis due to the short useful life of the IT infrastructure.

10.3 Current Levels of Service – IT Infrastructure

IT Infrastructure assets are considered a non-core asset under O. Reg. 588/17, and therefore do not have pre-defined levels of service statements. The County does not currently have a level of service definition associated with these assets. The following levels of service parameters may provide the County a definition.

The following levels of service parameters expand on the levels of service definition.

Table 10-2: Community LOS for IT Infrastructure Assets

LOS Parameter	Description	County LOS Response
Scope	Description of IT infrastructure assets and services provided	Network and communications services provided for County technological systems
Quality	Description of the condition of IT infrastructure assets	All rated to be in 'excellent' condition in 2021 inspection

Table 10-3: Technical LOS for IT Infrastructure Assets

LOS Parameter	Description	County LOS Response
Reliability	Provide breakdown of annual maintenance and utility costs	LOS to be tracked by the County

Availability	Average downtime due to planned or failure related outages	LOS to be tracked by the County

10.4 Current Performance – IT Infrastructure

The current metric for performance used by the County, is that IT infrastructure assets are replaced at the end of their economic lifecycle. Additional indicators can be used to provide a fuller picture of asset performance. A summary of indicators of performance for the past two calendar years is shown in **Table 10-4**.

Table 10-4: Performance for IT Infrastructure Assets

Performance Indicator	County Performance Data 2020 to 2021
Outage Occurrences/downtime	To be established
Maintenance cost	To be established

10.5 Risk Assessment – IT Infrastructure

The risk assessment for IT infrastructure assets will be conducted using the following assumptions and criteria:

- **Condition:** Assessed by the County;
- **Performance**: Assessed by the County;
- **Climate Change**: Assumed a value of 1 (Limited impact with slower recovery; mitigation plan not in place);
- **Impact:** Assumed High impact (value of 2); and
- I**mportance**: Assessed by the County.

Using the assumptions and parameters listed above, a risk assessment was conducted. All of the IT infrastructure assets were found to have a risk rating of 5, which is in the low risk range.

Prioritization of works and lifecycle activities should consider the risk rating of the assets.

10.6 Lifecycle Activities – IT Infrastructure

In the lifecycle of an IT infrastructure asset, there are multiple activities that can be taken, depending on the asset attributes. The expected lifecycle activities to be used on the assets include acquisition, maintenance, and operation and decommissioning.

10.6.1 Acquisition

Acquisition of a new IT infrastructure asset should consider the intended usage of the asset. Acquisition should be undertaken based on an understanding of the requirements of the asset for providing service delivery, and should follow County procurement procedures. Acquisition of an asset will include purchase of a new asset, which would therefore be in excellent condition at the start of its useful life.

10.6.2 Maintenance

Maintenance activities will vary across the IT infrastructure assets due to the variability in type and usage of assets. The maintenance activities should be undertaken according to manufacturer specifications and as required to address condition and performance issues that arise through regular usage. Maintenance activities should include regular inspections for condition, and recording of maintenance activities undertaken.

10.6.3 Disposal

Disposal activities can include the removal from service through disposal, sale of asset or transfer of an asset to a different purpose of use. Disposal activities should be conducted such that health and safety protocols are being followed, and out of service assets are disposed of at appropriate or approved facility.

10.7 Asset Management Strategy

The asset management strategy for the IT infrastructure assets seeks to use the lifecycle activities in a manner that will achieve cost-effective and sustainable management of the assets.

Generally, if acquired new, the assets will begin their expected useful life in very good condition and performance. Throughout the lifecycle of the assets, routine maintenance should be conducted. As required, specific maintenance should be conducted. As an

asset ages and approaches the end of its useful life, it is expected that the risk and maintenance costs associated with the asset will increase. There will be a point in the lifecycle where the risk and maintenance costs are such that replacement of the asset will be the preferred solution. This point will vary depending on the type of asset and the services delivered by each.

Due to the criticality of the IT infrastructure assets, at the end of the expected useful life, the asset is replaced, as the impact of asset failure is significant to proper function of the system. The County does not rely on assets to perform past their expected useful life. Similarly, when an asset begins to require an increase in maintenance activities prior to reaching the end of its useful life, it can be a candidate for replacement prior to its end of lifecycle. The IT infrastructure assets are therefore maintained and replaced on a routine basis to maintain proper functioning of the systems and to be utilizing current technologies.

The County should review usage of equipment assets to confirm if services are being provided adequately. The assets should also be routinely assessed and monitored for condition and performance, to inform any maintenance or replacement works required. The needs and monitoring of asset condition will fall within multiple departments at the County, due to the varied range of service the assets provide.

10.7.1 Projection of Works

The replacement for the IT infrastructure assets are expected to occur in the same year, at the end of the useful life of the current assets as they have the same year of purchase. The current assets were purchased in 2020, and having a 5-year expected useful life, are expected to be replaced in 2025, and again in 2030. The County has estimated that the 2025 and 2030 required expenditure for replacement of the assets is consistent with the replacement cost in 2021 dollars, which is expected to be $493,266.

11.0 Financing Strategy

This chapter identifies the funding required to sustainably finance the lifecycle management strategy presented in the previous sections.

O. Reg. 588/17 requires that by July 2025 municipalities have an approved proposed LOS and a 10-year lifecycle management and financial strategy to achieve the proposed LOS. Various financing options, including reserve funds, debt, and grants can be considered during the process of developing the financial strategy.

11.1 Funding Sources

The County's current financial strategy is to fund capital expenditures from the following sources: government funding and grants, a portion of property tax revenue, and capital reserves if necessary. The County has historically not used debt to fund capital expenditures. The County intends to continue following this financial strategy for the foreseeable future. This financial strategy should be examined and re-evaluated during the annual budgeting processes to ensure the sustainability of the County's financial position as it relates to its assets.

Table 11-1 summarizes the County's baseline capital funding capacity, based on the historical funding sources that are anticipated to continue over the 10-year capital plan forecast. The baseline capital funding capacity identified is not intended to reflect the County's maximum available funding; rather, it is intended to represent the standard amount of funding the County would have in a given year if they maintain the status quo. Additional project- and timing-specific grants and loans are expected to supplement this baseline funding where needed.

Table 11-1: Baseline Capital Funding Capacity

Funding Source	Amount
Federal Gas Tax	$1,983,000
Ontario Community Infrastructure Fund (OCIF)	$1,019,000
Tax Levy Allocated to Capital	$13,000,000
Total	**$16,002,000**

The County's funding capacity is anticipated to be higher than the baseline in 2023, based on the proposed budget, and will decrease slightly in 2027 and beyond as OCIF amounts are expected to decrease. These exceptions aside, the funding capacity has been projected at a constant amount for the purposes of analysis.

11.2 Capital Expenditures

Table 11-2 summarizes the 10-year forecast of capital expenditures required to achieve the capital asset lifecycle management strategy identified in the earlier sections of this report. The capital expenditure projections assume 5% inflation per year, which aligns with historical averages of Statistics Canada's Building Construction Price Index for the Ottawa-Gatineau census metropolitan area.

Table 11-2: Capital Expenditure Forecast ($000's)

Capital Expenditures	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Public Works - Roads & Bridges	15,928	10,760	13,321	12,285	12,115	16,056	15,382	14,086	19,038	14,923
Public Works - Fleet	1,245	320	-	185	506	498	859	836	953	904
Social Housing	474	468	501	536	478	565	562	682	655	788
Lanark Lodge	1,135	1,208	1,229	1,187	1,398	1,404	1,407	1,407	1,477	1,652
Other	403	450	471	1,131	892	1,678	3,218	979	1,843	888
Total Capital Expenditures	**19,185**	**13,206**	**15,522**	**15,324**	**15,389**	**20,201**	**21,428**	**17,990**	**23,966**	**19,155**

Note that projections provided in previous chapters are in current dollar values, and do not include inflation.

11.3 Financial Analysis

11.3.1 Forecasted Capital Investment

The capital expenditure forecast can be compared to the baseline capital funding capacity over the 10-year period to assess if there are any anticipated funding gaps, and assess if the proposed financial strategy allows the County to appropriately invest in its capital assets.

The County's baseline capital funding capacity is projected to be adequate to finance the forecasted capital expenditures until 2027, with excess funding being used to steadily build up reserve balances. In 2028 and on, capital expenditures will exceed the funding capacity in some years, but the reserves can be used to make up the difference. This results in the reserve balances being drawn down to $10.6 million. The projections are graphed in **Figure 11-1** and summarized in **Table 11-3**.

Figure 11-1: Forecasted Capital Expenditures, Funding Capacity, and Reserve Balances

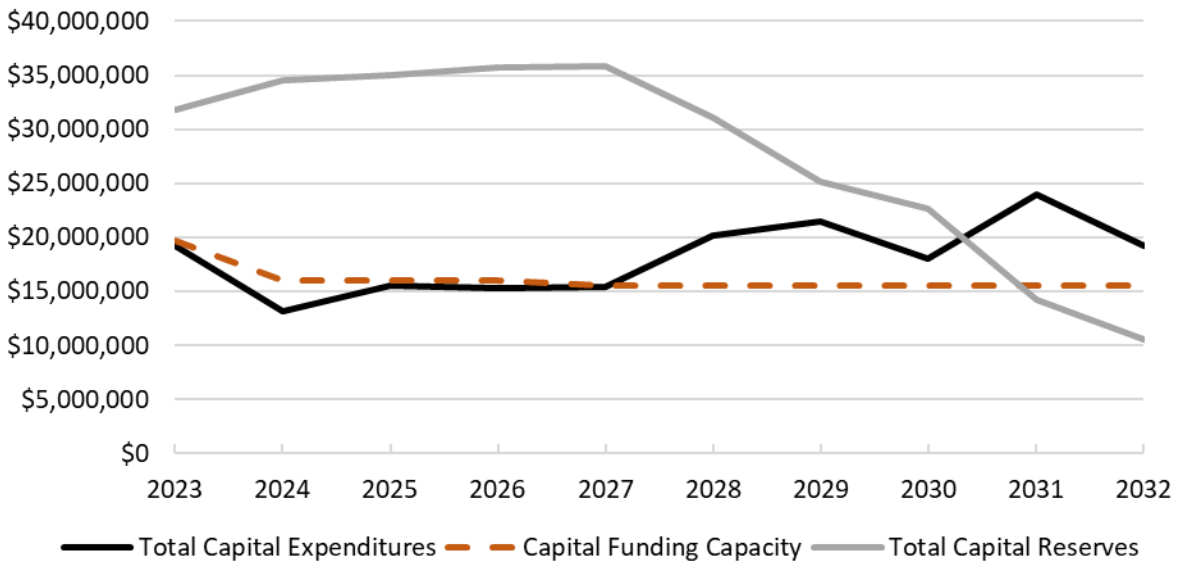


Table 11-3: Summary of Financial Projections ($000's)

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capital Expenditures	19,185	13,206	15,522	15,324	15,389	20,201	21,428	17,990	23,966	19,155
Baseline Capital Funding Capacity	19,748	16,002	16,002	16,002	15,493	15,493	15,493	15,493	15,493	15,493
Transfer To (From) Reserves	563	2,796	480	678	104	-4,708	-5,935	-2,497	-8,473	-3,662
Capital Reserves	31,771	34,567	35,047	35,725	35,829	31,121	25,186	22,689	14,216	10,554

The projections above assume that the County's capital funding remains relatively constant over the next 10 years. While this approach allows the County to make the required investments in capital, it does not allow the County to maintain or increase those reserve balances above current levels. It is important for the County to continue to increase annual contributions to capital reserves to build up healthy balances that can sustainably fund future capital investments, recognizing that capital expenditures will fluctuate from year-to-year.

The main lever the County has to increase capital funding and increase contributions to capital reserves is the tax levy. By increasing the portion of the tax levy that is allocated to capital by 4.0% each year, starting from the 2024 projection, the County's projected capital reserve balance in 2032 would be $31.1 million, similar to the current level.

Alternatively, if the County was able to maintain the proposed 2023 tax levy for capital of approximately $16.0 million, with no further increases, capital expenditures could be covered and reserve balances increased to $37.3 million by 2032.

11.3.2 Reinvestment Rates

Another useful perspective for evaluating the adequacy of an asset management financial strategy is reinvestment rates. The reinvestment rate is the annual capital investment as a percentage of the asset replacement value. While the projections presented earlier in this section have the benefit of highlighting years where there will be peaks in capital expenditure needs, reinvestment rates provide a simple annual target.

The 2016 Canadian Infrastructure Report Card found that rates of reinvestment are lower than targets recommended by asset management practitioners. The rate can vary based on factors such as the age of the infrastructure, the level of service and risk tolerance. The values provided are intended to be informative in nature. **Table 11-4** is an excerpt from the Canadian Infrastructure Report Card (Table 4) which demonstrates the gap between current and target reinvestment levels for the asset categories that the County owns. Insufficient reinvestment will result in a gradual decline of physical condition, reduced performance and levels of service that will impact municipal service delivery over time.

Table 11-4: Target Reinvestment Rates vs 2016 Canadian Average Reinvestment Rate

Infrastructure Category	Lower Target Reinvestment Rate	Upper Target Reinvestment Rate	Current Reinvestment Rate (2016)
Stormwater (linear)	1.0%	1.3%	0.3%
Stormwater (non-linear)	1.7%	2.0%	1.3%
Roads and Sidewalks	2.0%	3.0%	1.1%
Bridges	1.0%	1.5%	0.8%
Buildings	1.7%	2.5%	1.7%

The total replacement cost for the County's capital assets is estimated to be $491 million (in 2022 dollars). **Table 11-5** summarizes the equivalent reinvestment rate considering the projected capital expenditures, and considering the total baseline capital funding capacity considered in this report, as excess funding is assumed to be transferred to capital reserves and therefore still constitutes an investment in capital. The County's reinvestment rate is well above the Canadian average, and is toward the upper end of the recommended targets.

Table 11-5: Reinvestment Rates (2022$)

	Average Annual Capital Expenditures	Reinvestment Rate
Projected Capital Expenditures	$12,926,000	2.6%
Baseline Capital Funding Capacity	$16,002,000	3.3%

12.0 Reference Reports

Lanark County Documents

1. Strategic Asset Management Policy (Report # FIN-11-2019);
2. Sustainable Communities Official Plan, prepared by McIntosh Perry Consulting Engineers Ltd., Adopted June 27, 2022;
3. Lanark County Asset Management Plan, updated November 18, 2015;
4. Transportation Master Plan, prepared by Aecom October 2020; and
5. Development Charges Background Study, For Public Circulation and Comment, prepared by Watson & Associates Economists Ltd., October 8, 2021.

Housing Documents

1. Foundations of the Future – Lanark County 10-Year Housing and Homelessness Plan, prepared in December 2019.

Bridge and Culvert Documents

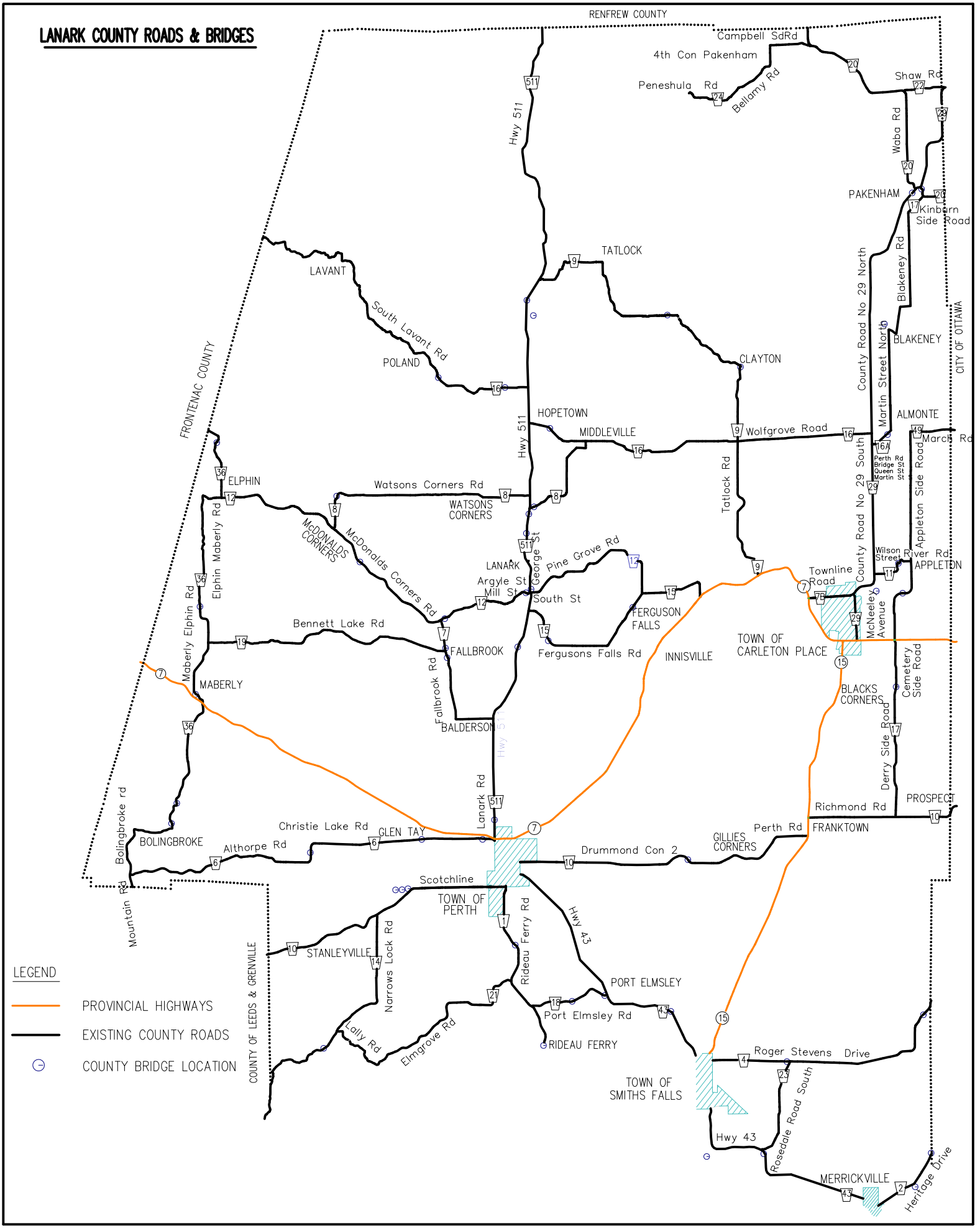
1. Culvert inspection report, prepared by Keystone Bridge Management Corp, 2018;
2. Culvert Inspection Report 2020, prepared by Keystone Bridge Management Corp, 2020; and
3. Bridge Inspection Report, prepared by Keystone Bridge Management Corp.

General Documents

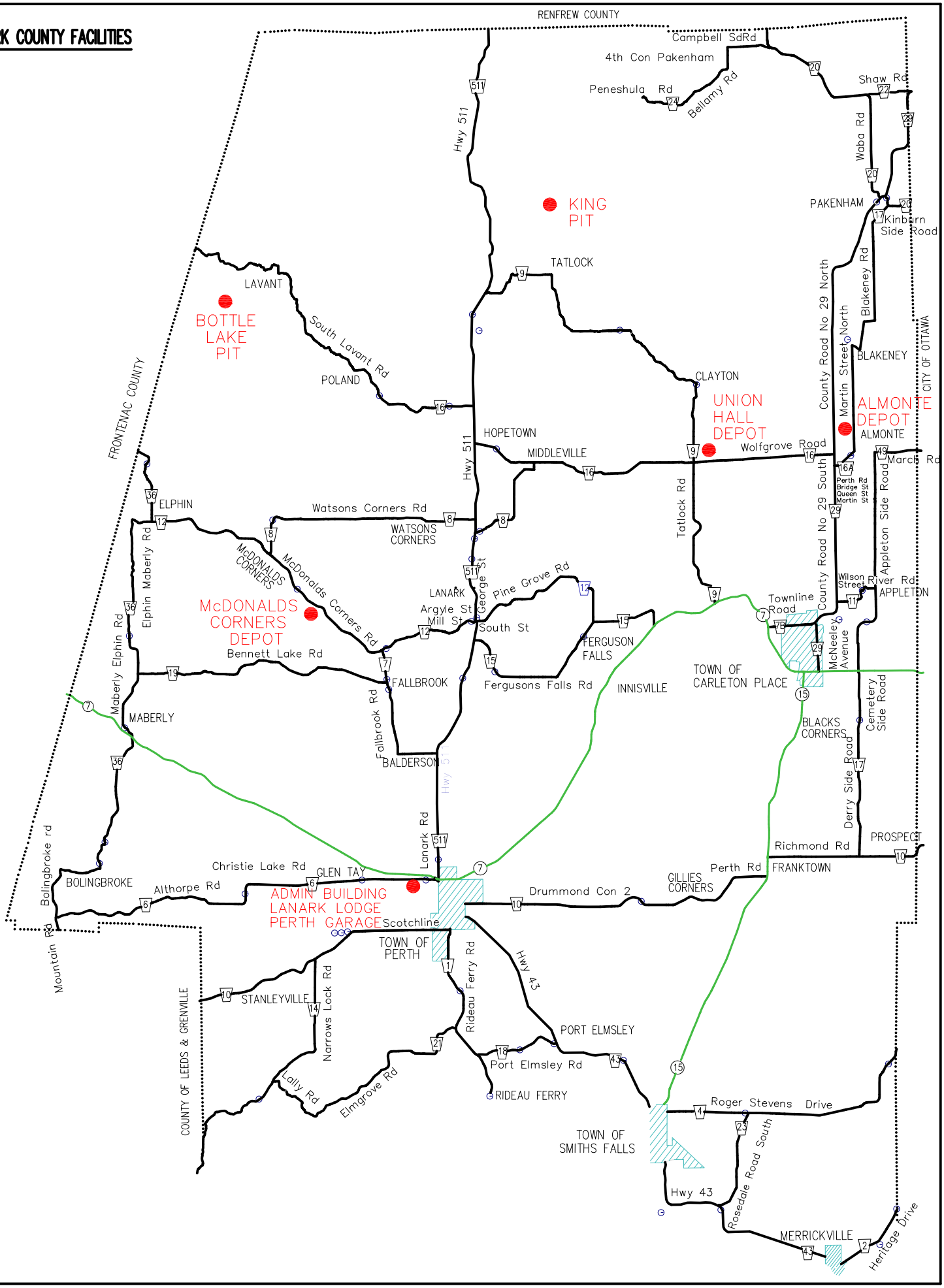
1. Canadian Infrastructure Report Card, 2016.

Appendix A

Figures


LANARK COUNTY ROADS & BRIDGES
RENFREW COUNTY
FRONTENAC COUNTY
COUNTY OF LEEDS & GRENVILLE
CITY OF OTTAWA
Campbell SdRd
4th Con Pakenham
Peneshula Rd
Bellamy Rd
Shaw Rd
Waba Rd
Hwy 511
PAKENHAM
Kinburn Side Road
Blakeney Rd
BLAKENEY
County Road No 29 North
Martin Street North
TATLOCK
LAVANT
South Lavant Rd
POLAND
CLAYTON
HOPETOWN
MIDDLEVILLE
Wolfgrove Road
ALMONTE
March Rd
Perth Rd
Bridge St
Queen St
Martin St
Appleton Side Road
ELPHIN
Watsons Corners Rd
WATSONS CORNERS
Tatlock Rd
County Road No 29 South
McDONALDS CORNERS
McDonalds Corners Rd
Elphin Maberly Rd
Maberly Elphin Rd
LANARK
George St
Argyle St
Mill St
Pine Grove Rd
South St
Wilson Street
River Rd
APPLETON
Townline Road
FERGUSON FALLS
Bennett Lake Rd
FALLBROOK
Fergusons Falls Rd
INNISVILLE
TOWN OF CARLETON PLACE
McNeeley Avenue
MABERLY
Fallbrook Rd
BALDERSON
Hwy 511
BLACKS CORNERS
Cemetery Side Road
Derry Side Road
Lanark Rd
Richmond Rd
PROSPECT
Christie Lake Rd
GLEN TAY
Perth Rd
FRANKTOWN
Bolingbroke rd
BOLINGBROKE
Althorpe Rd
Drummond Con 2
GILLIES CORNERS
Scotchline
TOWN OF PERTH
Mountain Rd
Rideau Ferry Rd
Hwy 43
STANLEYVILLE
Narrows Lock Rd
PORT ELMSLEY
Port Elmsley Rd
RIDEAU FERRY
Lally Rd
Elmgrove Rd
Roger Stevens Drive
TOWN OF SMITHS FALLS
Rosedale Road South
Hwy 43
MERRICKVILLE
Heritage Drive
LEGEND
PROVINCIAL HIGHWAYS
EXISTING COUNTY ROADS
COUNTY BRIDGE LOCATION

LANARK COUNTY FACILITIES



Map #	Municipality	Road Name	Road Name
1	Perth	South Street	Gore Street
2	Carleton Place	Joseph Street	Townline Road
3	Carleton Place	Bridge Street	Townline Road
4	Carleton Place	McNeely Avenue	Townline Road
5	Carleton Place	Patterson Street	McNeely Avenue
6	Carleton Place	Lake Avenue	McNeely Avenue
7	Carleton Place	Coleman Street	McNeely Avenue
8	Carleton Place	Walmart	McNeely Avenue
9	Carleton Place	Independent Grocery	McNeely Avenue
10	Mississippi Mills	Almonte Street	County Road 29 North
11	Mississippi Mills	Ottawa Street	Martin Street North
12	Mississippi Mills	Mill Street	Bridge Street