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KINCARDINE

ASSET MANAGEMENT PLAN

2022

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Executive Summary

The Municipality of Kincardine has updated its 2016 Municipal Asset Management Plan (AMP) in alignment with the Municipality's Strategic Asset Management Policy (2018) 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 (Chapter 1) 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.

Chapters 2 through 11 each present one of the asset categories as shown in the table below. The Financing Strategy is presented in Chapter 12.

Core Assets	Non-Core Assets
• Roads (Chapter 2) • Bridges and Culverts (Chapter 3) • Water (Chapter 4) • Wastewater (Chapter 5) • Stormwater (Chapter 6)	• Buildings (Chapter 7) • Fleet (Chapter 8) • Equipment (Chapter 9) • Parks and Yard Improvements (Chapter 10) • Land (Chapter 11)

Policy Alignment

The **Asset Management Vision** is to proactively manage its assets to best serve the Municipality's objectives, including:

- Prioritizing the need for existing and future assets to effectively deliver services;
- Supporting sustainability and economic development; and
- Maintaining prudent financial planning and decision making.

Key objectives in the Strategic Asset Management Policy include:

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

Service-Based Perspective: The Municipality will use a service-based (qualitative) perspective when applying this policy to municipal assets, rather than a monetary value (quantitative).

Regulatory Alignment

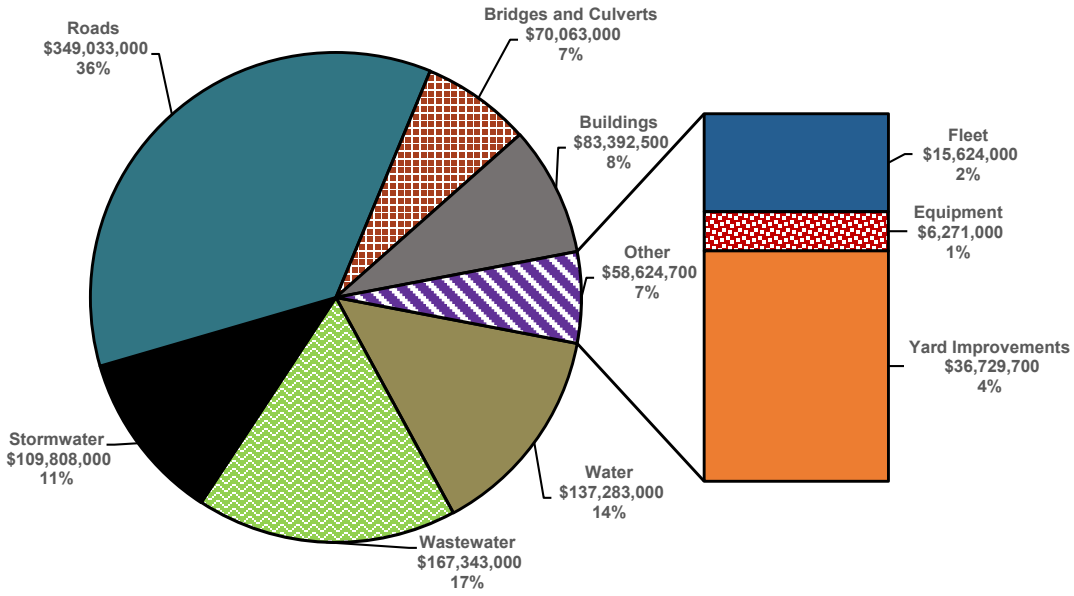
The 2022 AMP update is aligned with the requirements of **O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure** and as amended by O. Reg. 193/21 which requires all core assets to be covered in the asset management plan with current Level of Service (LOS). Core assets include water, wastewater, stormwater, roads and bridges/culverts. This update also includes non-core assets such as buildings, fleet and equipment as well approved proposed LOS, lifecycle management and financial strategy for 10-year period to achieve the proposed LOS.

Roadmap with Next Steps

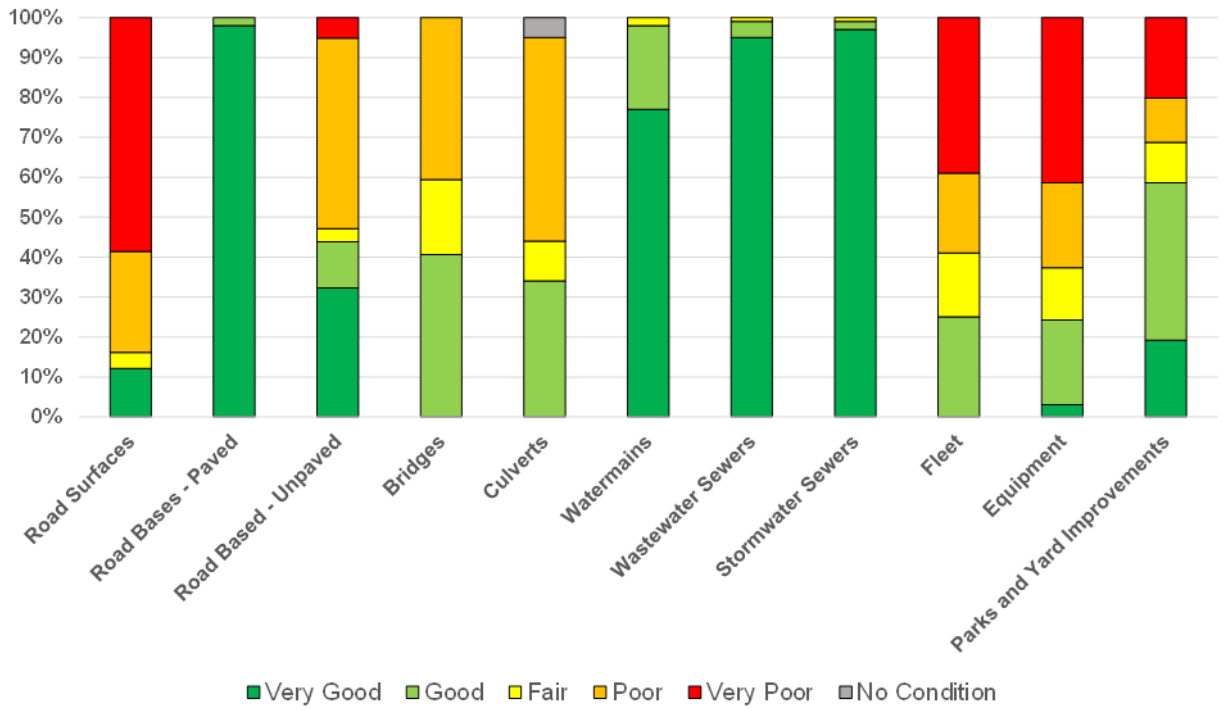
Future updates will need to include green infrastructure assets (i.e. natural assets) owned by the Municipality and further assessment on infrastructure vulnerability to the impacts caused by climate change related to operations, levels of service and lifecycle management.

Current Replacement Value

The total replacement cost for all infrastructure assets owned by the Municipality of Kincardine is $975.5 million (in 2022 dollars). The distribution of this replacement cost is shown in the figure below.



Condition Summary of Each Asset Category

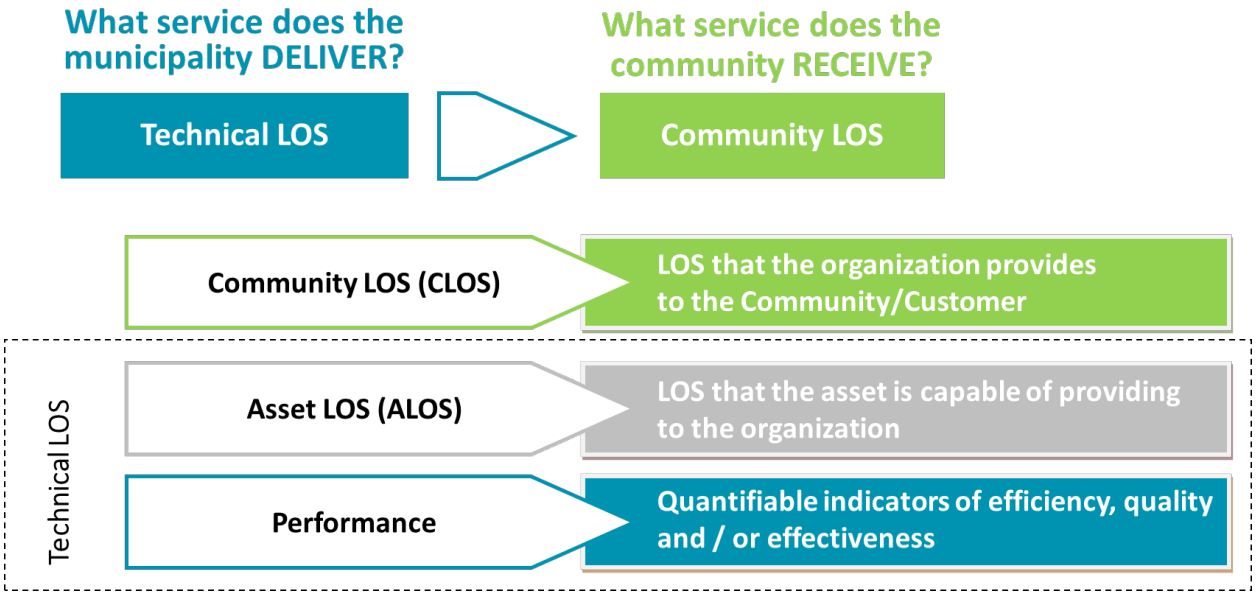


The current condition of each of the asset categories is presented in the figure above. On average, 39% of Kincardine's infrastructure assets have a condition rating of Very Good, 18% have a condition rating of Good, 7% have a condition rating of Fair, 19% have a condition rating of Poor, and 15% have a condition rating of Very Poor.

Levels of Service (LOS)

Levels of Service (LOS) are presented in the figure below 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 Municipality which is further measured by the performance of the asset, providing technical metrics that support the delivery of LOS.



Proposed Levels of Service (LOS)

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

To establish the proposed Levels of Service, the Municipality established the current LOS, and sought input from the public (through focus groups and LOS survey) and Council to understand the preferred levels of service targets. Through the process, three scenarios were 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.

Direction received through consultation with the public and Council indicated that the current Levels of Service were found to be sufficient. Accordingly, the proposed Levels of Service targets for 2031 have been set as maintaining the current LOS values established in 2019. This was accepted as part of a report to Council on December 13, 2021. In order to maintain the current LOS an increase in funding will be required to fund capital infrastructure replacements.

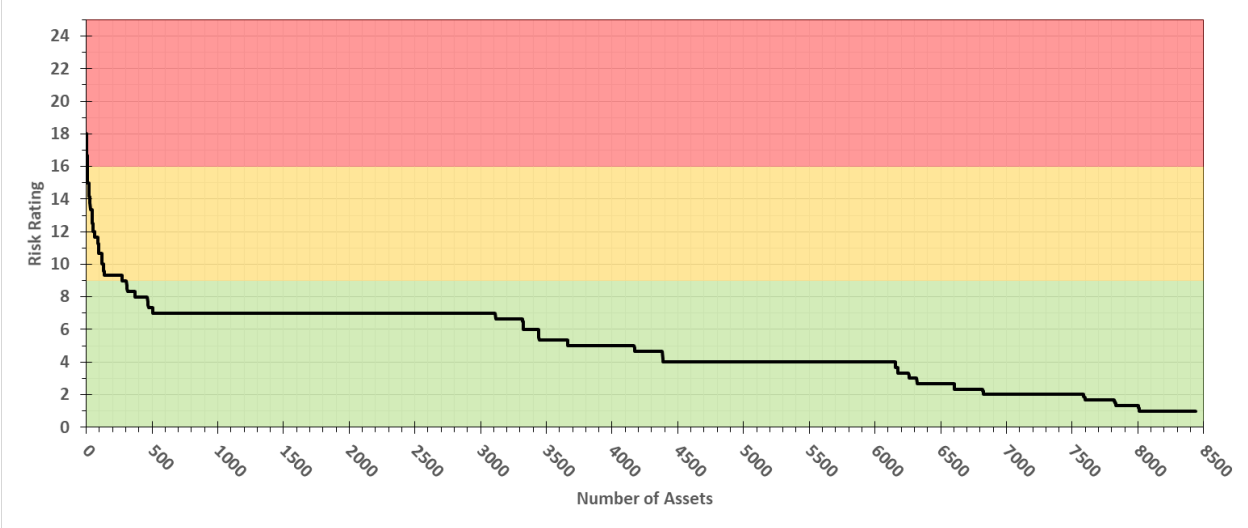
Specific proposed Levels of Service are described as part of each of the asset categories within this AMP, and summarized in the table below.

Summary of Current and Proposed Levels of Services (LOS)

Asset Service	LOS Parameter	LOS Measure	Current LOS Delivered	2031 Proposed LOS
Paved Roads	Quality	Average pavement condition index (PCI)	53 (fair)	53 (fair) or better
Unpaved Roads	Quality	Average surface condition	67 (fair)	67 (fair) or better
Bridges	Quality	Average bridge condition index (BCI) value	63.5 (fair)	63.5 (fair) or better
Structural Culverts	Quality	Average bridge condition index (BCI) value	56.4 (poor)	56.4 (poor) or better
Water Treatment	Reliability	Number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	6 days: 4,499 connected properties	0.13% or less
Water Distribution	Reliability	Number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system	7 days of service interruptions: 4,499 connected properties	0.16% or less
Wastewater Network	Reliability	The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system.	12 complaints of sewer backups or blockages/4,194 total connected properties	0.29% or less
Wastewater Treatment	Reliability	The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.	7 by-pass events/4,194 total connected properties	0.17% or less

Asset Service	LOS Parameter	LOS Measure	Current LOS Delivered	2031 Proposed LOS
Wastewater Treatment	Quality	Number of months where effluent quality exceeded CofA limits	0	0
Stormwater	Reliability	Percentage of the municipal stormwater management system resilient to a 5-year storm	TBD	TBD
Stormwater	Reliability	Percentage of properties in municipality resilient to a 100-year storm	TBD	TBD
Buildings	Customer Satisfaction	# buildings that meet AODA accessibility standards compared with all buildings in portfolio	TBD	100%
Buildings	Quality	# buildings that meet "fit for purpose" condition compared with all buildings in portfolio	TBD	100%
Fleet	Reliability	Maintained in good or better condition	23% fleet considered good, 11% fleet considered very good	34% fleet considered good or better condition

Risk Profile



Of the 8,442 assets tracked within the Municipality's asset management data only seven (7) are classified as High risk and 263 as Moderate risk. These assets are considered high and

moderate priorities for the implementation of lifecycle activities and possible replacement. The remaining assets are considered Low risk.

Financing Strategy

The average annual lifecycle cost of assets (at proposed levels of service) is estimated at $20.9 million. The current capital funding is approximately $9.7 million and the annual lifecycle funding gap estimated at $11.2 million. The financing strategy is designed to close the annual lifecycle funding gap by 2032.

The estimated impact on property tax bills to achieve full lifecycle funding by 2032 is an annual increase of approximately 5.3% from 2023 to 2032. The 2022 increase was 4.7% ($96 per average household). Impacts could be mitigated by reviewing existing user fees (e.g., Parks & Recreation fees, building permit fees, etc.), and exploring new funding sources (e.g., stormwater fees).

For water/wastewater, the total revenue generated form user fees would need to increase by approximately 7.9% annually to achieve full lifecycle funding by 2032. The 2022 increase was 3% ($31 per average household). Impacts should be assessed in detail through a rate review to consider the effects of customer growth.

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.

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About this Report

Dillon Consulting Limited was retained by the Municipality of Kincardine 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.

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1.0 Introduction

The Municipality of Kincardine is updating its 2016 Municipal Asset Management Plan (AMP) in alignment with the Municipality's Strategic Asset Management Policy (Kincardine GG.2.22: August 1, 2018 Resolution #08/01/18-02) and O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure.

The AMP documents the Municipality's assets and strategies based on known information at the time of writing the report. It is a snapshot of a period in time, in this case, in 2022. 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 for the Municipality.

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**.

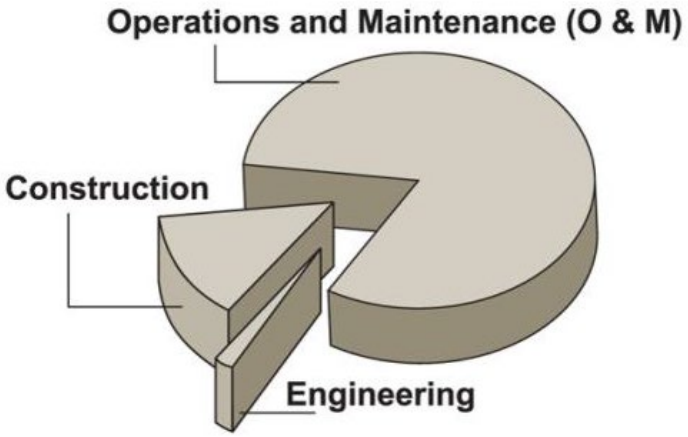


Figure 1-1: Lifecycle Approach (Infraguide 2005)

The essential questions for asset management, as described in the *InfraGuide: Managing Infrastructure Assets (Oct 2005)*, are:

1. What do you have and where is it?
2. What is it worth?
3. What is its condition and expected remaining service life?
4. What is the level of service expectation, and what needs to be done?
5. When do you need to do it?
6. How much will it cost and what is the acceptable level of risk(s)?
7. How do you ensure long-term affordability?

These seven essential questions align to four phases of asset management: asset inventory, condition, levels of service (LOS) and analysis and strategy development. See **Figure 1-2**.

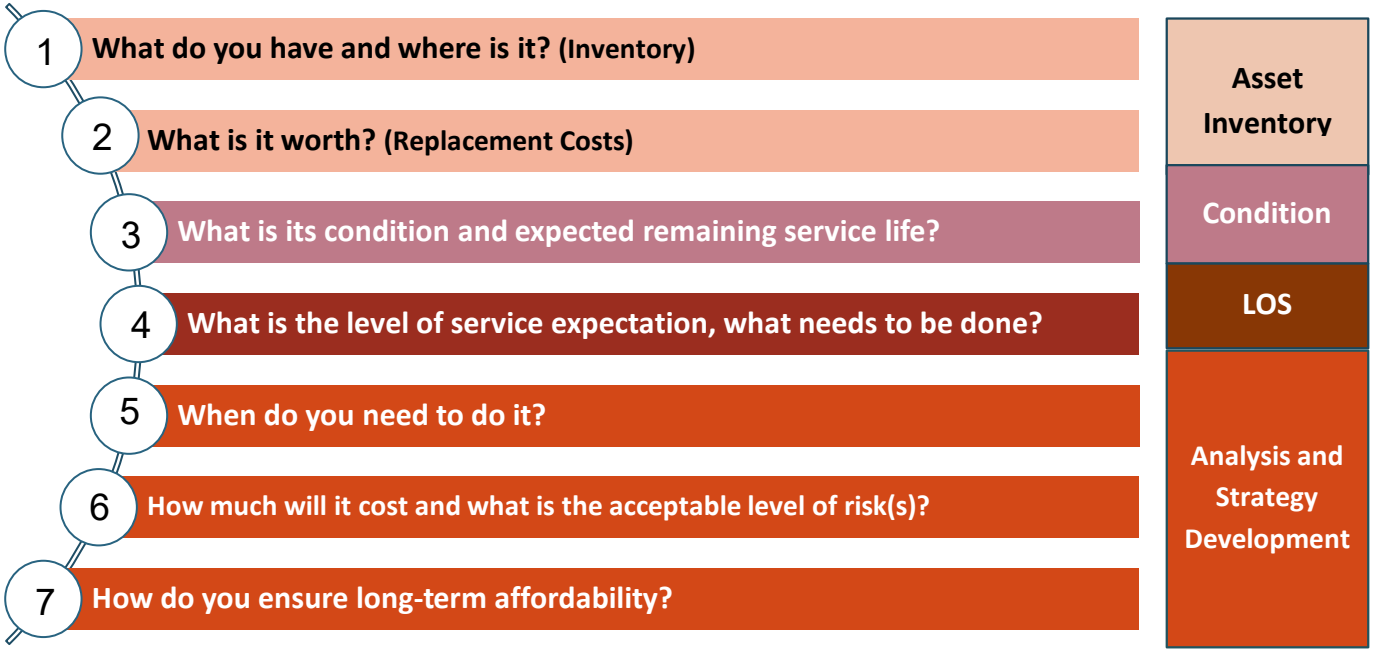


Figure 1-2: Essential Questions of Asset Management

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 assets included in the AMP are:

- Roads (Chapter 2);
- Bridges and Culverts (Chapter 3);
- Water (Chapter 4);
- Wastewater (Chapter 5); and
- Stormwater (Chapter 6).

The non-core assets included in the AMP are:

- Buildings (Chapter 7);
- Fleet (Chapter 8);
- Equipment (Chapter 9);
- Parks and Yard Improvements (Chapter 10); and
- Land (Chapter 11).

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.

Policy Alignment

Stakeholder Engagement: As established in the policy, the Municipality recognizes the importance of stakeholder engagement as an integral component of a comprehensive asset management approach. The Municipality commits to provide opportunities for residents and other stakeholders serviced by the Municipality to provide input into asset management planning.

This was achieved through workshops with staff, a level of service focus group with the public, and an on-line survey.

Service-Based Perspective: As stated in the policy, the Municipality will use a service-based (qualitative) perspective when applying this policy to municipal assets, rather than a monetary value (quantitative).

Asset Management Vision: To proactively manage its assets to best serve the Municipality's objectives, including:

- Prioritizing the need for existing and future assets to effectively deliver services;
- Supporting sustainability and economic development; and
- Maintaining prudent financial planning and decision making.

Key objectives include:

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

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.
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 includes proposed (target) levels of service and the financing strategy to meet the proposed levels of service for all core and non-core infrastructure assets, which meets phase 4 compliance.

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

1.1 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 municipality's approach to assessing the condition of the assets in the category, based on recognized and generally accepted good engineering practices where appropriate.

The Municipality of Kincardine owns infrastructure assets that provide services in the following asset categories: Roads; Bridges and Culverts; Water; Wastewater; Stormwater; Buildings; Fleet; Equipment; Park and Yard Improvements; and Land.

1.1.1 Asset Replacement Costs

The total replacement cost for the Municipality of Kincardine's infrastructure assets is $975.5 million (in 2022 dollars). The distribution of this replacement cost is shown in **Figure 1-3**.

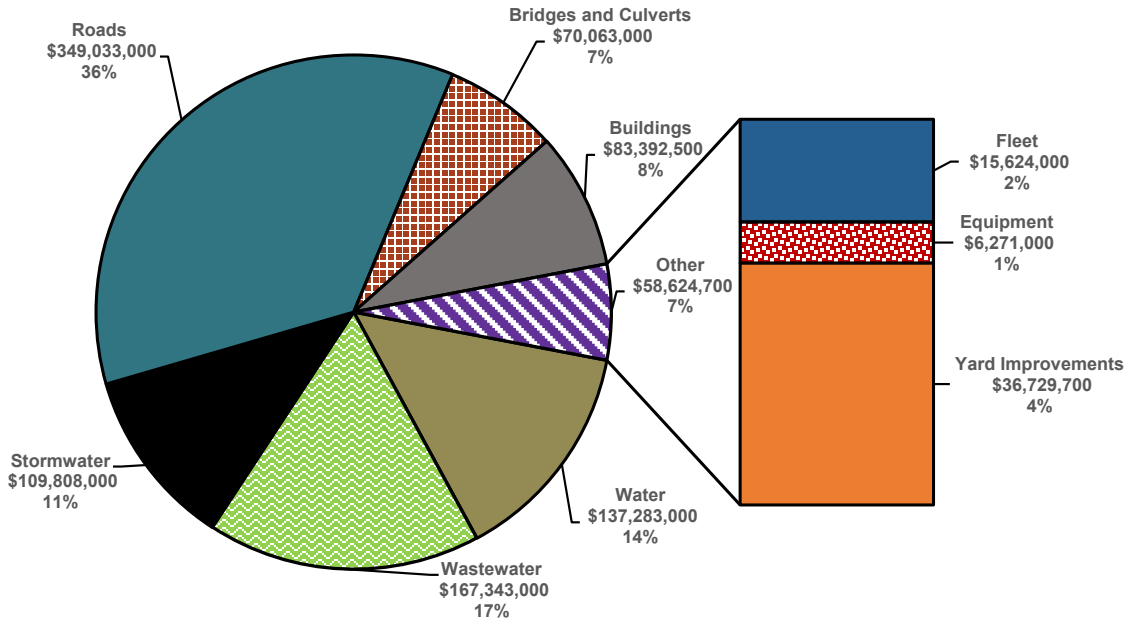


Figure 1-3: Distribution of Replacement Cost

For comparison purposes, the values presented as part of the 2016 AMP are shown for each asset category compared with the 2022 estimated replacement costs in **Figure 1-4**.

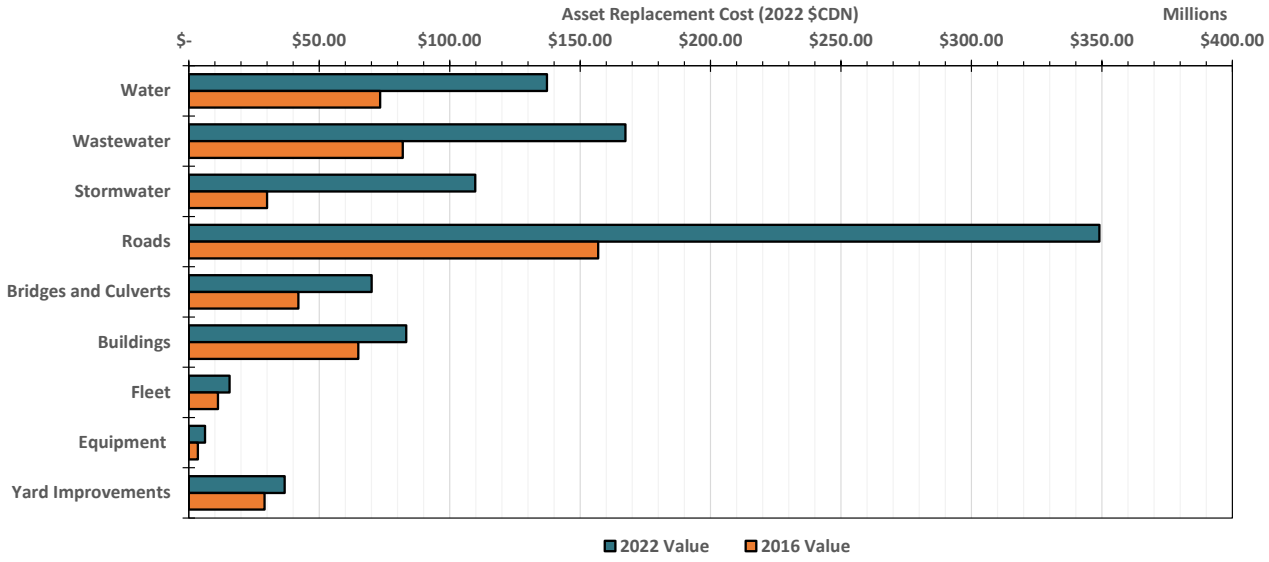


Figure 1-4: Total Replacement Cost of all Assets Considered within the Asset Management Plan (2016 and 2022 values)

The difference in asset replacement cost from the 2016 Asset Management Plan to the data presented in **Figure 1-4** is attributed to the different methods used to calculate replacement cost. The most significant difference occurs in linear assets: Roads, Water, Wastewater, Stormwater and Bridges and Culverts. The previous plan inflated the historical cost recorded for each asset in the Municipality's financial and asset data. The current plan utilizes unit costs based on current industry pricing for the material and construction to replace assets.

Buildings, Fleet, Equipment and Yard Improvements have minor differences between the 2016 and 2022 Asset Management Plans that are attributed to inflation and changes in asset quantity or type.

1.1.2 Asset Condition Summary

A summary of the condition for each of the Municipality of Kincardine's infrastructure assets is shown in **Figure 1-5.** On average, 39% of Kincardine's infrastructure assets have a condition rating of Very Good, 18% have a condition rating of Good, 7% have a condition rating of Fair, 19% have a condition rating of Poor, and 15% have a condition rating of Very Poor.

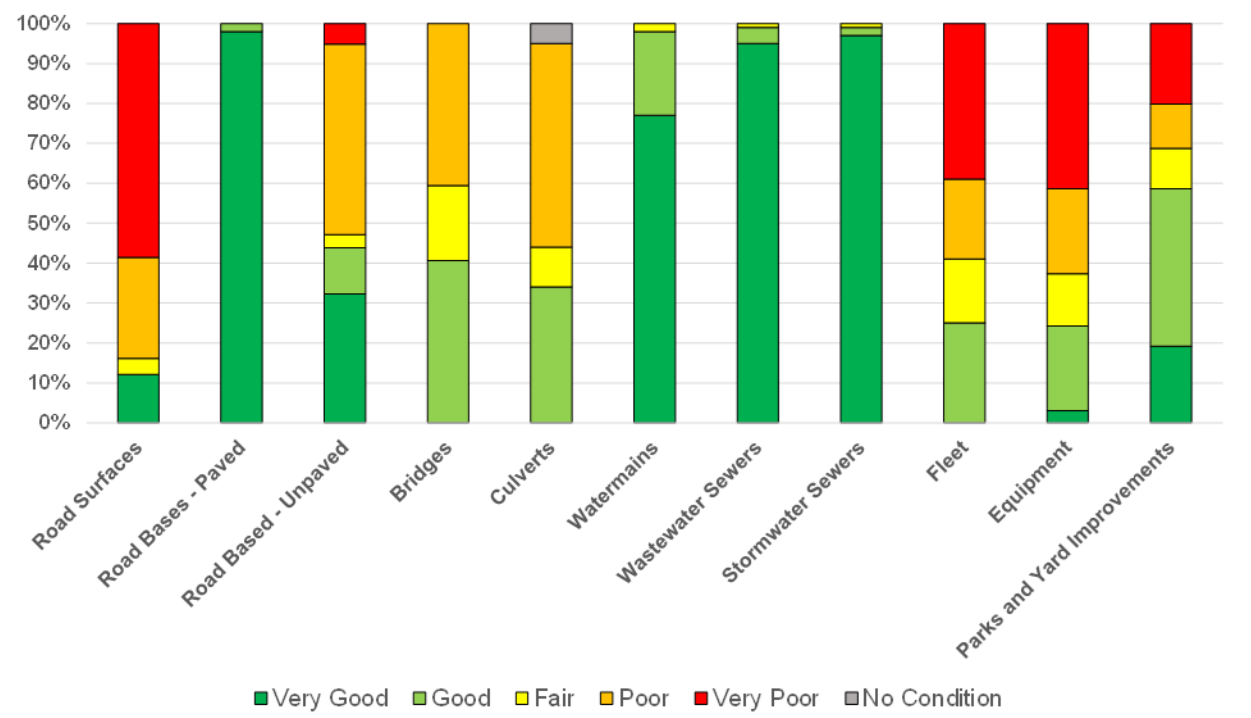


Figure 1-5: Summary of Condition of All Infrastructure Assets

Further to the conditions outlined above, the average condition of buildings owned by Kincardine are outlined in **Table 1-1.**

Table 1-1: Summary of Average Condition of Buildings

Buildings	Average Condition
Wastewater Buildings	**2.8**
Water Buildings	**2.7**
General Buildings	**2.1**

1.1.3 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 Municipality currently tracks their assets to a subcomponent level. An example of the componentry within the water network is shown in **Table 1-2**. The components of the assets have been defined with their category, assets, components and subcomponents.

Table 1-2: Asset Hierarchy Example

Category	Asset	Component	Subcomponent
Water Network	Watermains	Air Relief Chamber Blow-Off Curbstop Blow Off Curbstop Hydrants Meter Pits Meters Services Valve Chambers	none
Water Network	Watermains	Valves	Butterfly Valve Single Line Drain Valve Combination Air Release And Vacuum Valve

For this Asset Management Plan (AMP), the analysis will focus on assets at the 'asset' level for the linear assets, with the expectation that the condition and replacement of the components and subcomponents will be consistent with the linear mains. 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 section of this report.

1.1.4 Asset Inventory

The inventory includes assets that are owned by the Municipality of Kincardine. The Municipality maintains a comprehensive database of asset information, including GIS integration. The inventory was compiled prior to initiation of this work, and was provided by the Municipality.

1.2 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 1-6** 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 Municipality which is further measured by the performance of the asset, providing technical metrics that support the delivery of LOS.

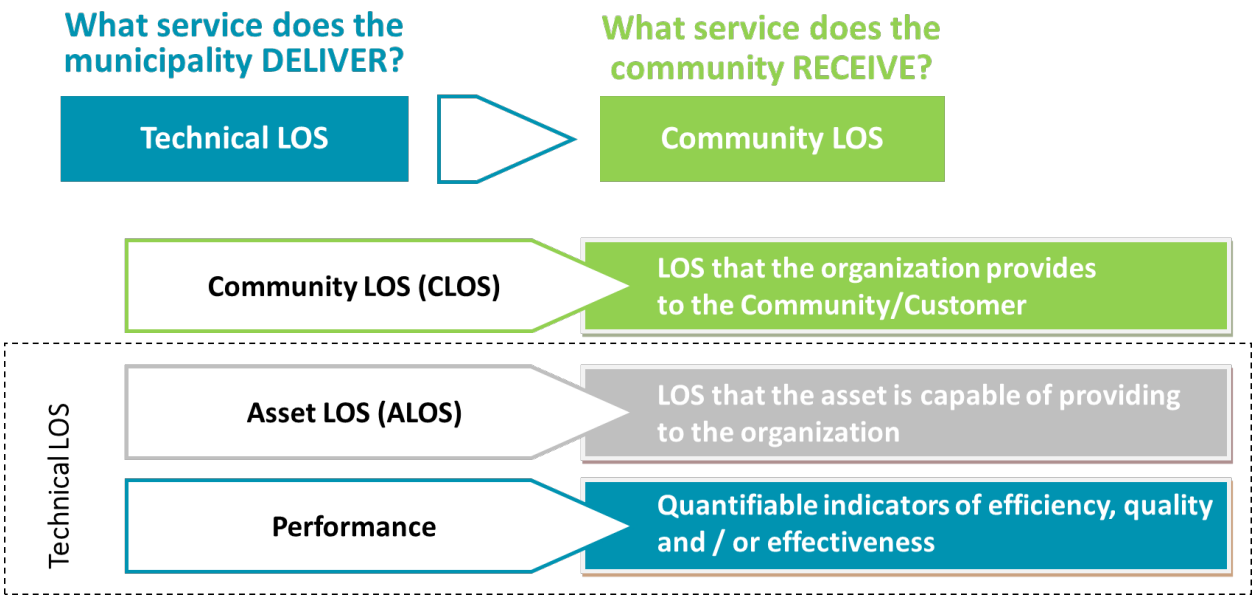


Figure 1-6: Levels of Service (Community LOS, Technical LOS and Performance)

Through the AMP development, the Municipality sought to establish current and proposed levels of service (LOS), in accordance with O. Reg. 588/17. As part of this process, the Municipality undertook education and working sessions with both internal and external stakeholders as well as Council to understand level of service concepts, and gain understanding of public perception of the levels of service delivered in the community.

1.2.1 Internal LOS Workshop

A workshop was held with senior staff from the Municipality, representing all departments including Corporate Services, Infrastructure & Development, Community Services, and Strategic Initiatives, as well as representation from council. The workshop was held June 7, 2019, at the Municipal Office.

The intention of the workshop was to engage with stakeholders, and gather qualitative information regarding identification of current and selection of future levels of service.

The workshop attendees discussed the current services provided, usage of services, and the community's expectation in terms of current level of service. Comments of note included:

- Bruce Power is a large employer and attracts a large number of people to the area. These people can come with a higher expectation for services, when compared to other similar sized municipalities;
- The community expects good friendly service, professional delivery, respectful and helpful service providers. Consistency is important;
- Maintenance of assets and upgrades as needed is expected; and
- Core services are provided with minimal disruption and meet the needs of the community.

The proposed levels of service were also discussed with the attendees. Comments of note included:

- Priorities for service delivery in the next 10-20 years may include addition of transit, completion of natural gas servicing, attainable housing and new recreation facilities (pool, outdoor pickleball courts);
- Increases in emergency response time are possible as community grows due to location of the fire station;
- Services which attendees would be willing to pay more for including more recycling options and composting; and
- Snow removal, more access to clean drinking water, emergency services, and recreation services were all services which attendees were willing to pay more for in order to maintain current levels of service.

1.2.2 Stakeholder LOS Focus Group

A focus group was undertaken with stakeholders external to the Municipal organization, and included residents that represented varying parts of the community and service users. The workshop took place on July 4, 2019, at the Davidson Community Centre.

The intention of the workshop was to engage with stakeholders, and gather qualitative information regarding identification of current and selection of future levels of service.

The workshop attendees discussed the current services provided, usage of services, and current levels of service. Comments of note included:

- The Municipality has rural and urban residents, who use services differently and have different perspectives on importance;
- In general, of the Municipal services provided, consensus was that roads and water are the most important, noting however that the importance of services was dependent on where a resident lives;
- Expectation of the Municipality to have Levels of Service documented; and
- Extensive discussion regarding community engagement with Municipal services, noting frequent usage of roads, and focus of discussion on drainage services, and garbage and recycling.

The proposed levels of service were also discussed with the attendees. Comments of note included:

- Changing road usage should be considered for future planning and road design – noted that equipment using roads (agricultural or otherwise) is heavier, and volume is higher. Older high usage road segments may not be up to the standards of current usage;
- Recommendation for undertaking a study to evaluate roads and bridges, to determine priorities, and potential for closures to reduce maintenance and capital costs;
- Opportunity for some paved roads to be reconstructed as gravel, if review of lifecycle maintenance costs suggests any savings;
- Interest in seeing long term planning with road construction and maintenance considered; and
- Environmental sustainability should be important to the community – there has previously been an environmental committee, which could be reinstated to be involved in community decisions in consideration of environment and sustainability.

1.2.3 Levels of Service Survey

An important step in developing an AMP is gathering the community's feedback to ensure that the Plan reflects the desires, needs and values of the community. In order to gather community feedback, a survey was developed to help understand how to manage infrastructure assets that meet current and future needs of the community. The survey solicited feedback on the following:

- 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 using social media on the Municipality's Facebook and Twitter pages, the KincardineTalks engagement page, on the Municipal website and through notices. It was available to be completed online from July 21 to August 27, 2021. The survey was completed by 67 total respondents. Among these respondents, the large majority (94%) were full-time residents of the Municipality of Kincardine. A summary of the survey results was presented in a report, **Asset Management Level of Service: Survey Summary (October 2021)**.

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 half of the services listed in this survey are in need of improvement at this time;

- **Theme #3:** The majority of respondents would like to receive services from the Municipality at a "family diner" level of service, with medium cost;
- **Theme #4:** Overall, majority of residents are willing to pay an increase or slight increase in taxes to maintain the current levels of services; and
- **Theme #5:** The services that should be prioritized are household drinking water, street/road maintenance, snow removal and parks and recreation.

1.2.4 Proposed Levels of Service (LOS)

The proposed Levels of Service (LOS) is an established target for the Municipality's LOS, set to guide the Municipality 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 relates to the target to be achieved in 10-years, the year 2031.

To establish the proposed Levels of Service, the Municipality established the current level of service, and sought input from the public (through focus groups and levels of service survey) and Council to understand the preferred levels of service targets. Through the process, three scenarios were 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 are described in **Table 1-3**.

Table 1-3: Proposed Levels of Service Scenarios

Scenario 1	Scenario 2	Scenario 3
No Change in Funding	**Increase in Funding (Maintain)**	**Increase in Funding (Maintain Plus)**
Maintain the current 3% annual tax rate increase dedicated solely for capital/infrastructure replacement.	Increase the tax rate by 6.2% every year, solely for capital/infrastructure replacement. For water/wastewater, increase user fees by 9.4% annually.	Increase TBD on tax rate dedicated solely for capital/ infrastructure replacement For water/wastewater, increase user fees by 9.4% annually.
Result: Reduction in LOS (over time)	**Result**: Maintain current LOS. Achieve full lifecycle funding by 2031.	**Result**: If there is a "willingness to pay" for increased levels of service in the Municipality, the AMP can identify target LOS that reflect increases in specific areas of operation (to be determined), while maintaining or adjusting other areas.

Direction received through consultation with the public and Council indicated that the current Levels of Service were found to be sufficient, and so Scenario 2 was preferred for usage. Accordingly, the proposed Levels of Service targets for 2031 have been adopted as maintaining

the established LOS values from 2019. This was accepted as part of a report to Council on December 13, 2021.

Specific proposed Levels of Service are described as part of each asset categories in the sections that follow, and summarized in **Table 1-4**.

Table 1-4: Summary of Current and Proposed LOS

Asset Service	LOS Parameter	LOS Measure	Current LOS Delivered	2031 Proposed LOS
Paved Roads	Quality	Average pavement condition index (PCI)	53 (fair)	53 (fair) or better
Unpaved Roads	Quality	Average surface condition	67 (fair)	67 (fair) or better
Bridges	Quality	Average bridge condition index (BCI) value	63.5 (fair)	63.5 (fair) or better
Structural Culverts	Quality	Average bridge condition index (BCI) value	56.4 (poor)	56.4 (poor) or better
Water Treatment	Reliability	Number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	6 days: 4,499 connected properties	0.13% or less
Water Distribution	Reliability	Number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system	7 days of service interruptions: 4,499 connected properties	0.16% or less
Wastewater Network	Reliability	The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system.	12 complaints of sewer backups or blockages/4,194 total connected properties	0.29% or less
Wastewater Treatment	Reliability	The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.	7 by-pass events/4,194 total connected properties	0.17% or less
Wastewater Treatment	Quality	Number of months where effluent quality exceeded CofA limits	0	0
Stormwater	Reliability	Percentage of the municipal stormwater management system resilient to a 5-year storm	TBD	TBD

Asset Service	LOS Parameter	LOS Measure	Current LOS Delivered	2031 Proposed LOS
Stormwater	Reliability	Percentage of properties in municipality resilient to a 100-year storm	TBD	TBD
Buildings	Customer Satisfaction	# buildings that meet AODA accessibility standards compared with all buildings in portfolio	TBD	100%
Buildings	Quality	# buildings that meet "fit for purpose" condition compared with all buildings in portfolio	TBD	100%
Fleet	Reliability	Maintained in good or better condition	23% fleet considered good, 11% fleet considered 'very good'	34% fleet considered good or better condition

1.3 Risk Assessment

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 within the asset category generates a risk profile for the entire asset category.

The assets with the highest risk rating identify the priorities for the Municipality. 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 1-7** presents a risk "heat map" plotting likelihood and consequence.

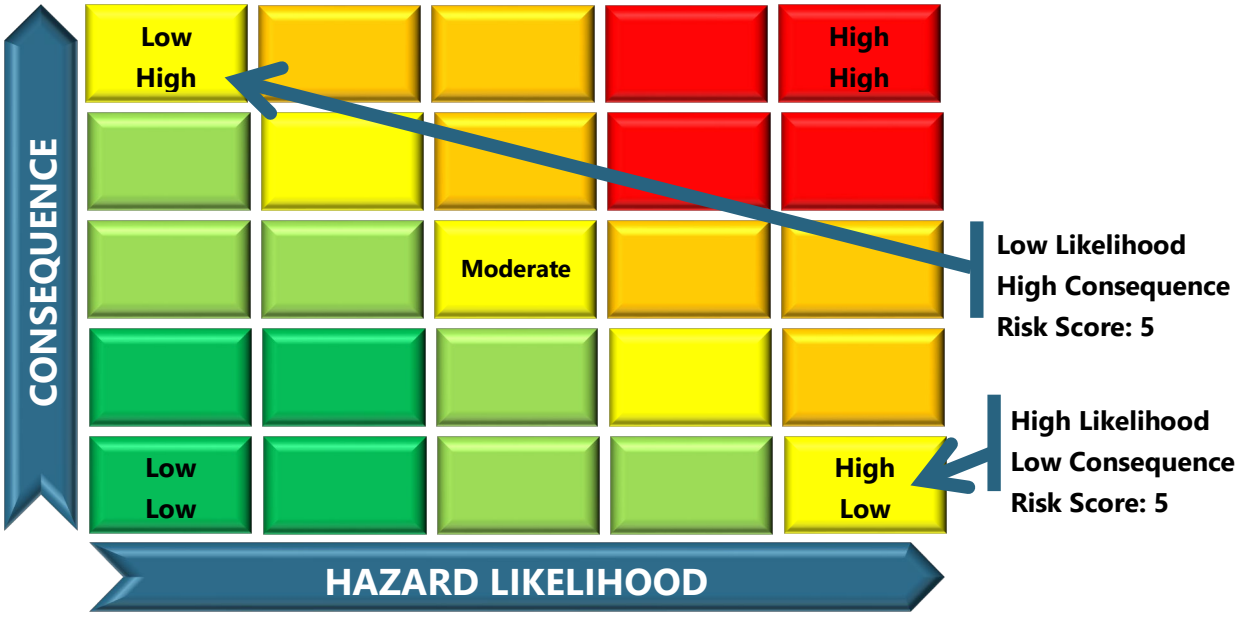


Figure 1-7: Risk Heat Map

A priority rating has been developed based on the calculated risk rating and displayed in **Figure 1-7** in a 5 by 5 matrix. High risks are shown in the red zone (risk rating 17 to 25), Moderate risks are shown in the orange zone (risk ratings of 10 to 16) and Low risks are in the green and yellow zone (risk ratings of 1 to 9).

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.

1.3.1 Risk Methodology Approach

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 (or under performance) 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 likelihood and the consequence, the maximum risk rating is 25 (high).

1.3.2 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, compared to those that are not performing, as well as Good condition assets that may not be reliable. 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).

1.3.3 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. Consequence will be 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.

An impact and consequence matrix developed with municipal staff is provided in **Table B-1** in Appendix B, which outlines the criteria established to apply impact ratings to assets.

The importance ratings were established in consultation with municipal staff. The most important assets for delivering service were identified, as well as moderate and low importance. How the importance rankings were applied in each asset category is presented in the section for each asset category.

1.3.4 Calculation of Risk

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

RISK = LIKELIHOOD X CONSEQUENCE

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

Where A = Condition

B = Performance

C = Climate Change

D = Impact or severity

E = Importance of the asset

The Risk profile for all the assets can be found in **Figure 1-8**. The relationship shown is fairly linear, with a sharp drop initially, indicating the Municipality has a broad range of risk across their assets and few High and Moderate risk assets. This is a good position to be in as it allows the management of risk and replacement of assets to move forward at a steady rate.

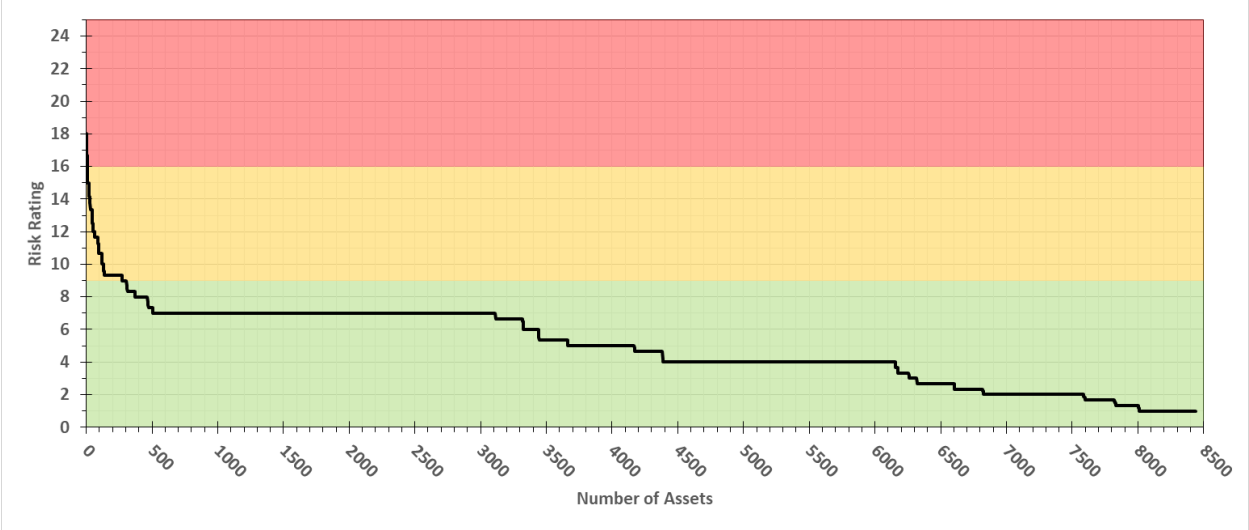


Figure 1-8: All Asset Risk Profile

Of the 8,442 assets tracked within the Municipality's asset management data only seven (7) are classified as High risk and 263 as Moderate risk. These assets are considered high and moderate priorities for the implementation of lifecycle activities and possible replacement. The remaining assets are considered Low risk.

Several other factors beyond risk are to be considered in identifying asset investment requirements and any associated projects. The Municipality must also consider:

- Coordination of projects of similar type or in shared locations;
- Changes in community needs and service requirements;
- Technological and regulatory changes;
- Climate change; and
- Long- and short-term cost benefit of investment.

1.3.5 Climate Change

In the Risk Workshop, municipal staff considered the following climate change scenarios and identified low, moderate or high vulnerability for 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.

In addition to identifying the climate change scenarios and the possible hazards, staff also identified mitigating measures for each hazard, either current measures or proposed measures. See **Table B-2** in Appendix B for information on each asset category.

1.3.6 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.
- Performance of individual assets was assumed as “Always Reliable” unless otherwise indicated by municipal staff, reviewed reports or provided asset data.

1.4 Lifecycle Activities

The lifecycle activities include activities that can be undertaken over an asset's useful life. These activities, under O. Reg. 588/17, are defined to include constructing, maintaining, renewing, operating and decommissioning of assets and all engineering and design work associated with these activities. Further, *Building Together – Guide for Municipal Asset Management Plans (Municipality of Infrastructure)* categorizes lifecycle activities into the following categories: non-infrastructure solutions, maintenance, renewal/rehabilitation, replacement, disposal, and expansion activities. Lifecycle activities have been identified for each of the asset categories considered within this AMP.

1.5 Growth

Population and household data for the growth projections outlined here were obtained from the *2019 Official Plan of the Municipality of Kincardine*, as well as a number of sources including the *2018 Water and Wastewater Servicing Master Plan*, *2018 Development Charges Background Study*, the *2010 County of Bruce Official Plan* and Statistics Canada Census data. In these reports it is noted that the data providing population projections was based on 2016 information.

The municipality comprises 538 square kilometres. The population and employment forecasts for the municipality are set out in its Official Plan as follows:

- As of 2016, the Municipality had approximately 11,400 residents; and
- The Municipality should plan to accommodate 13,529 residents by the year 2039.

As of 2021, the population had grown to 12,268 residents.

The projected population to 2039 is based on the following assumptions, taken from the Official Plan:

- Projected growth of slightly more than 2000 new residents across the Municipality over the 22 year period from 2017 to 2039;
- The distribution of new households throughout the Municipality is informed by the Water and Wastewater Servicing Master Plan;
- Expansion of the community will occur most logically to the north since the Kincardine Urban Area is constrained to the west by Lake Huron, the Municipal boundary to the south and to a certain extent by Highway 21 to the west.
- The Official Plan will provide land for residential, commercial and industrial growth, thereby encouraging a diverse economic base for Kincardine;
- The Central Business District will be the main focus of commercial activity in the Municipality;

- The qualities that will attract growth are created largely by the recreational attributes associated with Lake Huron, and the historical and cultural character of the Kincardine and Tiverton Urban Areas;
- The economy of the Municipality is dominated by the Bruce Nuclear Power Development (BNPD), one of the world's largest independent power generating facilities. The Bruce Nuclear power plant is a major employer in the area and has recently confirmed plans to undertake a major refurbishment project at the facility. Available information from Bruce Power was also reviewed in order to understand how the planned work could influence growth.
- Agriculture, tourism and retail also continue to play an important role in the economy of the Municipality as well as contributing to the character of the area;
- The Kincardine airport is important to future growth and accessibility of the area and shall be protected;
- Statistics Canada Census Profiles were utilized in order to understand historical growth for the Municipality. This data is collected every five years by the Government of Canada and provides data for the Municipality of Kincardine, Kincardine, and Bruce County.

These projected populations can be compared to the population of Bruce County, in which the Municipality of Kincardine is situated. The County encompasses an area of 4,048 square kilometres and supported a population of 68,147 people in 2016. The County is expected to have a population of 86,200 residents by 2046. The employment base is expected to increase by 10,700 jobs by 2046 and permanent housing is expecting to increase by 8,600 households by 2046

- Household size is expected to increase for Kincardine and Saugeen Shores due to the in-migration of younger families to work at Bruce Nuclear. However, the continued attraction of seniors to retire in the area during this time period will contribute to declines in household size. As a result, a decrease of 3.0% in household size was anticipated from 2001 to 2006. From 2006 to 2011 and 2011 to 2016 household size was not expected to decline or increase due to the families moving in and those moving out. A small decline of 3.0% was expected during 2016 to 2021 due to continued aging of the population.
- In all other areas, a decline in household size was expected due to the aging of the population.
- Statistics Canada data shows that Kincardine had 2.33 people per household in 2011 and 2.30 in 2016. Bruce County had 2.36 in 2011 and 2.31 in 2016.
- These household figures are accompanied by a population percentage change from 2011 to 2016 of 6.6% in Kincardine and 3.1% in Bruce County.

Each growth-related assumption and its impact on the lifecycle of the assets is presented in **Table 1-7**.

Table 1-7: The Lifecycle of Assets related to Growth Assumptions

Asset Category	Growth Impact Assumptions	How Assumptions Relate to Lifecycle of the Assets
Roads	• Increased traffic in Northern Development Area and Urban Centre	• Potential increase in road maintenance costs, capital expenditures (new roads) in Northern Development Area and Urban Centre.
Bridges & 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.
Water	• Increased service demands and expansion of network	• Potential increase in capital plan budget to expand network infrastructure and service requirements • Potential increase in operational costs to operate additional pumping and treatment equipment
Sanitary Sewers	• Increased service demands and expansion of network • Increased loading on wastewater treatment facility and effluent flow • Increased flow to central collection mains directly upstream of wastewater treatment facility	• Potential increase in capital plan budget due to increase in service network • Potential increase in operational costs due to increase in wastewater treatment volume
Storm Sewers	• Increased service demands and expansion of network • Increased storm volumes from urbanization	• Potential increase in capital plan budget due to increase in service network size and capacity
Buildings	• Increased facility usage • Changing service demands from aging population	• Increase in capital expenditure for facility development in response to development • Increase in operating costs for facility services and maintenance
Fleet	• Increase in service demands - requiring increased operation or capacity at greater distances	• Increased capital costs for purchase of additional assets to meet service needs • Increased operational costs in fleet maintenance and operational consumables
Equipment	• Increased development will occur as a result of growth	• Due to increased development, equipment required would be required to supply new facilities etc.

Asset Category	Growth Impact Assumptions	How Assumptions Relate to Lifecycle of the Assets
Yard Improvement	• N/A	• N/A
Land	• Increased land purchasing in order to provide facilities for tourism and recreation.	• Land required to accommodate residential development due to population growth and declining household size

The three key areas of growth that impact the services and programs of the Municipality include:

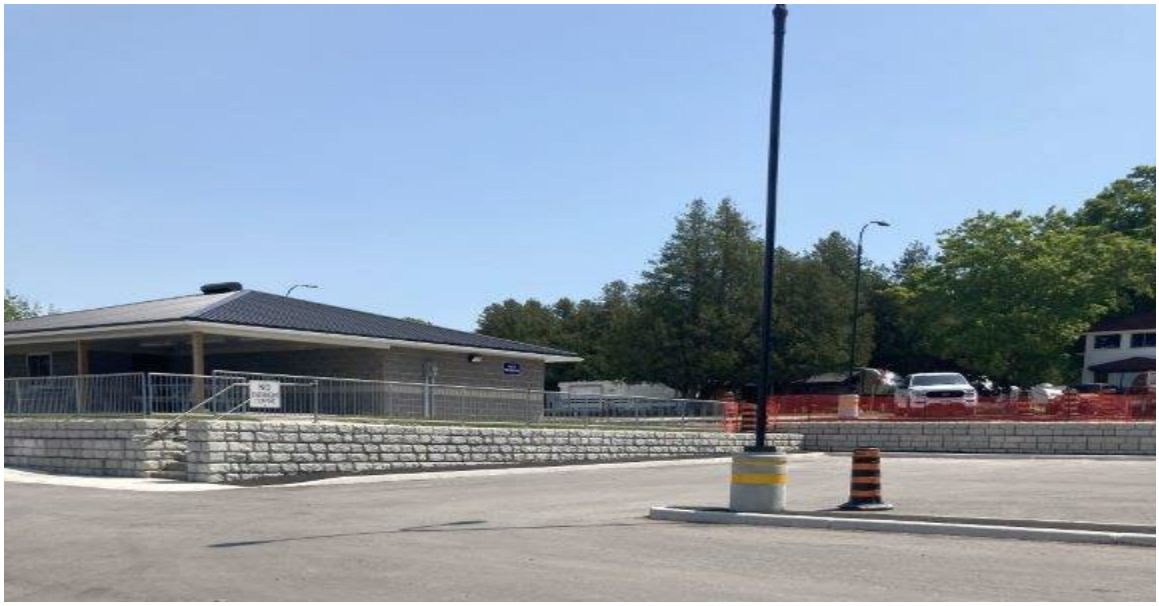
1. Highway 9/21 Business Park Development
    - Building Water and Sewer infrastructure at Highway 9/Highway 21 in order to develop a business park to attract businesses to the area.
2. Future development of Ontario Peninsula Farm (OPF) lands including Business Park and associated growth
    - Building Water, Sewer and Transportation infrastructure at Highway 21 and Sutton Street in order to develop Bruce Power Business Park and surrounding development.
3. Continued and future residential development throughout the municipality
    - Upgrades to Water, Sewer and Parks infrastructure required to service increased future demands based on current and estimated development.

Growth factors have been considered and five projects where growth is a driving factor have been identified by the Municipality. Project description, proposed schedule and estimated budget are presented in **Table 1-8**. New financing, such as development charges and special senior-level government funding, should be considered as part of any financial strategy for this plan to fund assets required for growth.

Table 1-8: Growth Related Projects, Schedule and Estimated Budget

Project Description	Proposed Schedule	Estimated Budget
Highway 9/21 Business Park Servicing – Phase 1 Note: Water Booster to be installed at time of development	Substantially Complete	$4,900,000
OPF Lands Development Servicing	Complete	$6,200,000
Huron Terrace Forcemain Replacement	Complete – restoration 2022	$8,600,000
Huron Terrace Sewage Pumping Station Upgrades	2022	$2,200,000
Maple Street Sewage Pumping Station Upgrades	2022 to 2023	$815,000

Project Description	Proposed Schedule	Estimated Budget
Tiverton Water Supply Alternatives Study and Connection	2026	$3,500,000
Durham Street Sewage Pumping Station	2022	$1,000,000
Durham Street Forcemain Replacement	2024	$200,000
Highland Drive and McLeod Avenue Watermain Replacement	2024	$2,470,000
Briar Hill Well Replacement	2023	$120,000
Dent Well Arsenic Treatment	2025	$400,000
Park Street Sewage Pumping Station Upgrades	2024	$1,430,000
Park Street Forcemain Replacement	2024	$2,630,000



1.6 Roadmap with Next Steps

1.6.1 Next Steps – 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 Municipality 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 Municipality and assessment of vulnerabilities caused by climate change on the performance of infrastructure.

1.6.2 Next Steps – 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 Municipality 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 (example five years).
- Assessment of **pedestrian bridges** in future bridge inspections for all pedestrian bridges greater than 3 metres in span.
- Establish a program for regular condition inspections (by professional service providers) to identify the required capital investments for **buildings and facilities**, including vertical assets as part of the water system and wastewater system.
- Establish/maintain a condition assessment program for the **sanitary sewers**. The recommendation is to use visual inspection facilitated by CCTV or Zoom camera inspection. A typical practice is to undertake assessment of 1/5 to 1/3 of the network annually, such that each pipe gets reviewed in a rotating 3 to 5 year basis.
- 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 Municipality is on target to meet the proposed LOS.

- Traffic counts over bridges to assess usage.
- The percentage of properties in the Municipality that are resilient to a 100-year storm currently unknown. It is recommended that further studies be completed in the future in order to report on the LOS metric.
- 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 ponds and catch basins. Recommended to track in future.
- Fleet performance: maintenance expense per utilization ($/km or hour). Not currently tracked, but it is recommended that the Municipality 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.

- Yard Improvements: Recommend tracking usage rates of facilities and customer feedback.

Financing Strategy

- It is recommended that the Municipality undertakes a Water and Wastewater Rate Study update to determine the impacts to user rates that would result from adopting the lifecycle strategies and associated funding needs identified in this asset management plan.

1.6.3 Next Steps – Operationalizing Asset Management

In operationalizing asset management practices within the Municipality, 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.
- 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.
- 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.

- 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.
- 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.
- 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 Municipality owns and maintains road assets, including paved and unpaved roads. 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;
- Curb and gutter;
- Signalized pedestrian intersections;
- Streetlight poles;
- Streetlight fixtures;
- Guide rails;
- Decorative lighting; and
- Signs.

2.1.1 Road Assets

The Municipality owns and maintains paved and unpaved road assets. In the asset inventory, the Municipality tracks these assets as road surfaces and road bases, including road bases (unpaved), road bases (paved), and road surfaces. A brief summary of the assets is presented in **Table 2-1**, including total length and construction materials.

Table 2-1: Summary of Road Assets

Road Asset Category	Construction Material	Total Length (km)
Road Bases – Paved	Granular A & B Gravel High Class Bituminous Hot Mix HL-4 Low Class Bituminous	335.4
Road Bases – Unpaved	Earth Gravel HCB	152.4
Road Surfaces	Asphalt Gravel High Class Bituminous Hot Mix (HL-3 or HL-4) Interlocking Brick Low Class Bituminous	338.9

Road Bases – Unpaved represents the gravel and unpaved road sections within the Municipality. *Road Bases – Paved* and *Road Surfaces* represent the paved sections within the Municipality, with each segment typically having both a base and surface. This equates to a total length of paved roads of 338.9 km and unpaved road segments of 152.4 km.

2.1.1.1 Replacement Cost

Replacement costs for road segments were developed by BM Ross in 2016 as part of the Roads Management Study (2016 Road Study). The unit price for a road segment is broken down to separate the base and surface costs. The unit costs considered roadside environment and surface type. A summary of unit prices per metre of road, as excerpted from the 2016 Road Study, are presented in **Table B-3** in Appendix B.

In addition to the replacement cost information, the 2016 Road Study also provided unit and average cost information for maintenance works and improvements to the road assets as outlined in **Table B-4** in Appendix B.

In order to establish the current replacement cost for road assets, the road replacement costs from the 2016 Road Study has been inflated to 2022 dollars. The current replacement cost for the roads category of assets is $349,033,000.

2.1.1.2 Average Age

The average age of the road network was calculated by asset category, and averaged by length of asset. The average age is included in **Table 2-2**: Average Ages of Road Assets.

Table 2-2: Average Ages of Road Assets

Road Asset Category	Average Age (years)
Road Bases – Paved	58
Road Bases – Unpaved	63
Road Surface – Earth and Gravel	62
Road Surface – LCB	21
Road Surface – HCB	23

A summary of the age distribution for the road assets, by length, is highlighted in **Figure 2-1.**

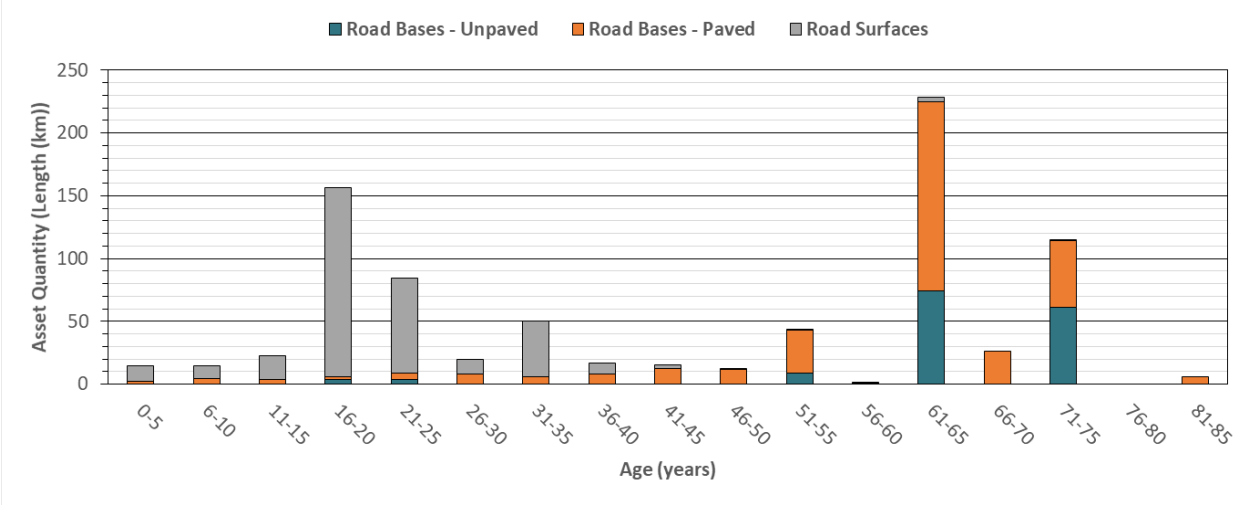


Figure 2-1: Age Distribution of Road Assets

2.1.1.3 Expected Useful Life

The expected useful life of the road assets is used to estimate the replacement schedule. The expected useful life values for each type of road surface within the network were provided and confirmed by the Municipality, and are summarized in **Table 2-3**.

Table 2-3: Expected Useful Life for Road Surfaces

Asset Component	Material Types	Expected Useful Life (years)
Road Surfaces	Asphalt, gravel, HCB, HL-3, HL-4, LCB	15
Road Bases	Paved and Unpaved	75

The Road Management Study provides additional detail regarding expected useful life of the road surfaces according to expected traffic volumes and road surface type. A range of values is therefore provided for each surface type. An expected useful life of 15 years was maintained for road surfaces to be conservative across all assets with varying road volumes.

2.1.2 Sidewalks

The Municipality maintains sidewalks throughout the Municipality adjacent to the road network and as walkways. The sidewalk network consists of asphalt, concrete and interlocking brick segments. The expected useful life of each sidewalk segment is 30 years, across all material types.

The total length of sidewalk assets throughout the Municipality is 35,889 m.

The average age of the assets (by length) is just under 25 years, the oldest segments having an in-service date of 1965, and the most recent constructions having taken place in 2020.

Replacement of the sidewalks may be done in response to a segment not meeting condition or performance requirements, or as part of a road segment reconstruction project.

Provision for replacement of sidewalks has been included within the reconstruction costs for the road network. The unit cost for placement of new concrete sidewalk to be used in both of these scenarios is $50 per square metre, and removal of existing sidewalk is $10 per square metre. Inflating these replacement costs by 3% annually from the date of report (2016) until current day (2022), these costs are expected to be $60 and $12 per square metre, respectively.

Using these unit costs, it is anticipated that the value of the sidewalk assets (not considering removal) is $2,153,000.

2.1.3 Curb and Gutter

A component of road assets are curb and gutter, which the Municipality tracks separately. The total length of curb and gutter in the Municipality is 152,859 metres, of asphalt and concrete/cement construction.

The assets have an average age (by length) of 25 years, and an expected useful life of 30 years.

The costs for replacement of curb and gutter are typically considered within the replacement cost of the road segment. Within the Road Management Study undertaken for the Municipality by BM Ross in 2016, the unit cost for replacement of roads includes provision for curb and gutter (where included in the cross-section). The unit replacement cost used in this study was $45 per metre. Although tracked individually, replacement of curb and gutter is considered within the roads replacement, and will therefore not be analyzed separately.

2.1.4 Streetlights

The Municipality maintains an inventory of their street lighting assets, tracked by component. The network includes luminaries and poles tracked separately for decorative and standard lighting. A summary of the network is included in **Table 2-4**.

Table 2-4: Streetlight Asset Summary

Asset Component	Quantity	Average Age (years)	Expected Useful Life	Current Replacement Cost
Street Light Fixtures, Arms, Wiring	1,042	6.9	30 Years	$1,705,700

Asset Component	Quantity	Average Age (years)	Expected Useful Life	Current Replacement Cost
Streetlight Poles	478	34.2	80 years (concrete) 70 years (steel) 30 years (wood)	$2,043,800
Decorative Lighting – Poles	85	16.5	70 Years	$218,900
Decorative Lighting - Luminaries	155	7.5	30 Years	$263,200

The replacement costs reflect the cost to replace all assets within the category. The pricing was based on unit pricing from an Ontario municipality in 2019, inflated by 3% annually to estimate 2022 values.

The replacement cost (based on 2019 unit costs) was compared to inflation of the historical construction costs, at a rate of 3% per year since the in-service date of each asset. The total replacement costs using the two methods were found to be similar, with the unit prices providing a slightly more conservative estimate.

In general, the street lighting assets have been in service for a small percentage of their expected useful lives, as shown in **Table 2-4** above.

2.1.5 Other Road Assets

In addition to the components presented above, the Municipality tracks other assets under the Roads network category. These assets are not considered core assets within O. Reg. 588/17. Individual analysis of these assets will not be included in this report; however, a summary is included in **Table 2-5**.

Table 2-5: Other Road Assets Summary

Asset Category	Quantity	Average Age (years)	Expected Useful Life	Current Replacement Cost
Road Signs	934	11.6	20 Years	$241,600
Guide Rails	24,517 m	52.9	60 Years	$1,124,000
Signalized and Pedestrian Intersections	15	10.7	20 Years	$1,110,000
TOTAL	-	-	-	**$2,475,600**

The road signs and signalized intersections have on average been in service for approximately half of their expected useful life. The guide rails, on average, are within the last decade of their expected useful life.

The replacement cost shown in **Table 2-5** is the expected cost for replacement of the entirety of each asset category, and is based on the adjusted accounting cost provided by the Municipality, inflated by 3% per year since the assets' in-service date.

2.2 Condition – Roads

Condition of the roads is routinely collected by the Municipality. The most recent condition assessment was undertaken in 2021 using Streetscan technology, which evaluated the condition of the paved road surfaces. The results of the assessment on a scale of 0-100, where 100 represented a road in excellent condition, and 0 was a failed asset. A summary of the road condition rating system and total length of road within each condition category is shown in **Table 2-6**.

Table 2-6: Road Condition Summary (2021 Streetscan)

Condition Description	Condition Rating	Total Length of Road (m)	Percentage of Network
Excellent	85 to 100	46,219.28	13.9%
Good	70 to 85	43,132.20	12.9%
Fair	55 to 70	45,767.07	13.7%
Poor	40 to 55	66,153.69	19.9%
Very Poor	25 to 40	129,629.03	38.9%
Serious	10 to 25	2,343.07	0.7%
Failed	0 to 10	0	0.0%

The distribution of the pavement evaluations (by length) is shown in **Figure 2-2.**

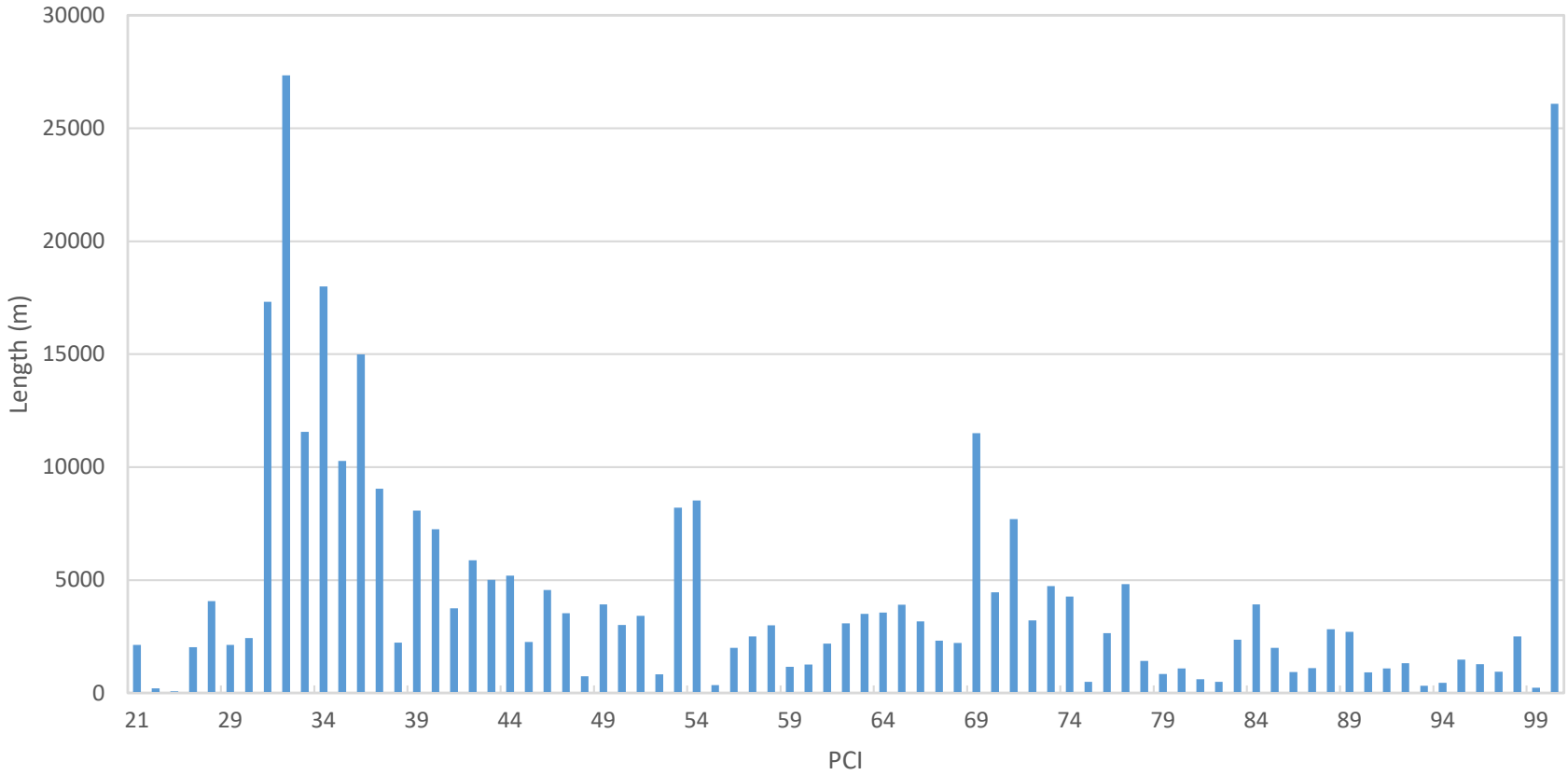


Figure 2-2: Distribution of Road Surface Conditions (Streetscan, 2021)

Previously, condition of the road surfaces and bases was determined during a study undertaken by BM Ross in 2016 (2016 Road Study). The data for this study can continue to be used for the non-paved surfaces. Within this study, road surface segments were given a condition rating between 1 and 10, with a higher condition rating indicating a better condition road, noting that ratings were given based on visual condition of the surface. The 2016 Road Study was based on the condition rating scale of 1 to 10. This was converted to PCI (scale 1 to 100) and the Very Good to Very Poor scale to be used in the AMP as outlined in **Table 2-7**.

Table 2-7: Road Condition Rating Conversion

2016 Road Management Study Condition Score	Conversion to PCI	AMP Condition Rating
8.6 to 10.0	86 to 100	Very Good
7.1 to 8.5	71 to 85	Good
5.6 to 7.0	56 to 70	Fair
4.1 to 5.5	41 to 55	Poor
0.0 to 4.0	0 to 40	Very Poor

Where a *Road Surface* or *Road Base – Unpaved* segment condition was not included in the 2016 Road Study or the roads segments had been replaced between 2017 and 2020, the condition was estimated based on a deterioration curve, and the age of the asset. The deterioration curves are generated based on the expected useful life of an asset, and its material type.

Condition of Road Bases – Paved was estimated based on a deterioration curve and the age of the asset as the condition of the base was not included in the 2016 Road Study.

The condition estimates were updated to a 2022 rating by further degrading the 2016 data along the material type deterioration curve.

The average condition ratings of the road bases are summarized in **Figure 2-3**.

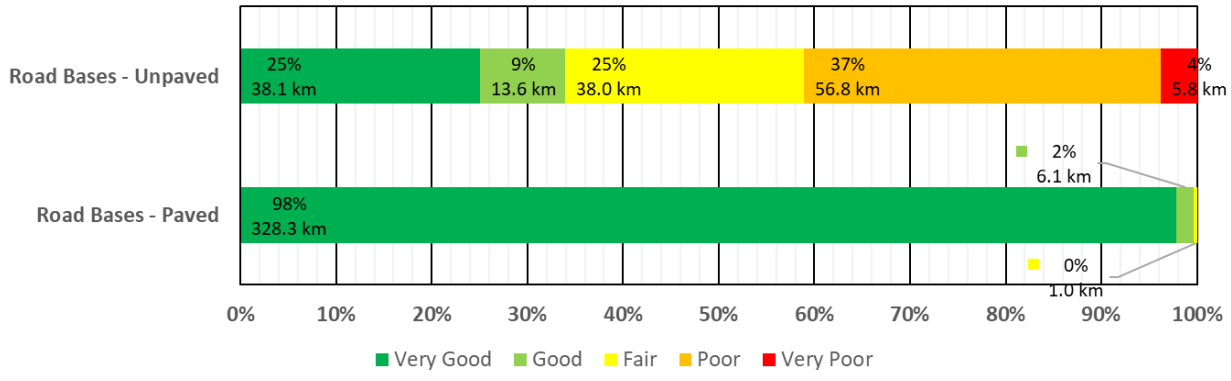


Figure 2-3: Road Base Condition Rating Distribution

The condition ratings determined through the Streetscan assessment for the paved road surfaces was found to be slightly better on average than the deteriorated condition based on the 2016 condition assessment, noting that the Streetscan assesses actual condition, and the deteriorated value was a theoretical estimation based on previous actual condition information.

We note that in the theoretical determination of the condition (based on age or from a predetermined condition value), there is risk that the asset may deteriorate differently in the field due to field conditions, and there may be variability in the actual condition. Further, visual inspection of the assets can result in subjectivity and inconsistency in evaluation.

Routine inspection done by repeatable technologies (such as the current Streetscan program), supplemented by staff self-reporting and visual inspections should allow the Municipality to have up to date, repeatable condition information to use in managing the road assets.

2.3 Current Levels of Service − Roads

Levels of service for road assets are outlined in Table 4 of the regulation, O. Reg. 588/17. **Table 2-8** and **Table 2-9** outline the Municipality's current community and technical levels of service for roads.

Table 2-8: Community Level of Service – Roads

LOS Parameter	Community Levels of Service *O.Reg. 588/17* – Qualitative Description	Municipality of Kincardine Community LOS
Scope	Description, which may include maps, of the road network in the Municipality and its level of connectivity.	The roads in the Municipality are intended to serve local and through traffic in urban and rural settings, throughout the Municipality. A map of the road network is in **Figure A1**.
Quality	Description or images that illustrate the different levels of road class pavement condition.	Pavement condition was most recently assessed during completion of the Streetscan evaluation in 2021. The road segment surfaces were assessed and provided a condition rating from 0 to 100, where lower ratings described road segments with the most structural distress. The rating was assumed to have followed MTO manual guidance.

Table 2-9: Technical Level of Service – Roads

LOS Parameter	Technical Levels of Service O.Reg. 588/17 – Technical Metrics	Municipality of Kincardine Technical LOS
Scope	Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square	The number of lane-kilometres of roads as a proportion of square kilometres of land area of the Municipality is in **Table 2-10**.

LOS Parameter	Technical Levels of Service O.Reg. 588/17 – Technical Metrics	Municipality of Kincardine Technical LOS
	kilometres of land area of the Municipality.	
Quality	1. For paved roads in the Municipality, the average pavement condition index value.	The technical metric for the condition of roads is the Pavement Condition Index (PCI). The average PCI value for the paved surfaces in the Municipality 53, or POOR.
	2. For unpaved roads in the Municipality, the average surface condition (e.g., excellent, good, Fair or Poor).	The average surface condition of the unpaved roads is 67, or FAIR.

Table 2-10: Proportion of Lane Kilometres

Road Type	Length of Lane-Kilometres	Lane kilometres as Proportion of sq. km of Land Area
Arterial	25.3 km	0.05 km per 1 km^2
Collector	14.0 km	0.03 km per 1 km^2
Local	931.8 km	1.7 km per 1 km^2

2.4 Current Performance – Roads

Asset performance measures were determined in consultation with the Municipality, which provide relevant metrics against which the Municipality can gauge the performance of their assets. The performance measures for Roads, and their current values are shown in **Table 2-11**.

Table 2-11: Road Performance Measures

Asset Performance Measure	Current Value

Roads with load restrictions	• North Street (year round)
	• Spring thaw half load restrictions on the following (5 tonnes per axle for commercial vehicles)
	  ○ Bruce Avenue (Highway 21 to Princess Street S)
	  ○ All concession and sideroads

Percentage of roads in Fair or Better condition	Roads in Fair or Better condition: 17%

2.5 Risk Assessment – Roads

The risk ratings for the assets in the road network followed the risk methodology and approach, presented in **Section 1.3**. Risk profiles of Road Surfaces (Paved), Road Bases – Paved and Road Bases – Unpaved are provided in **Figure 2-4**.

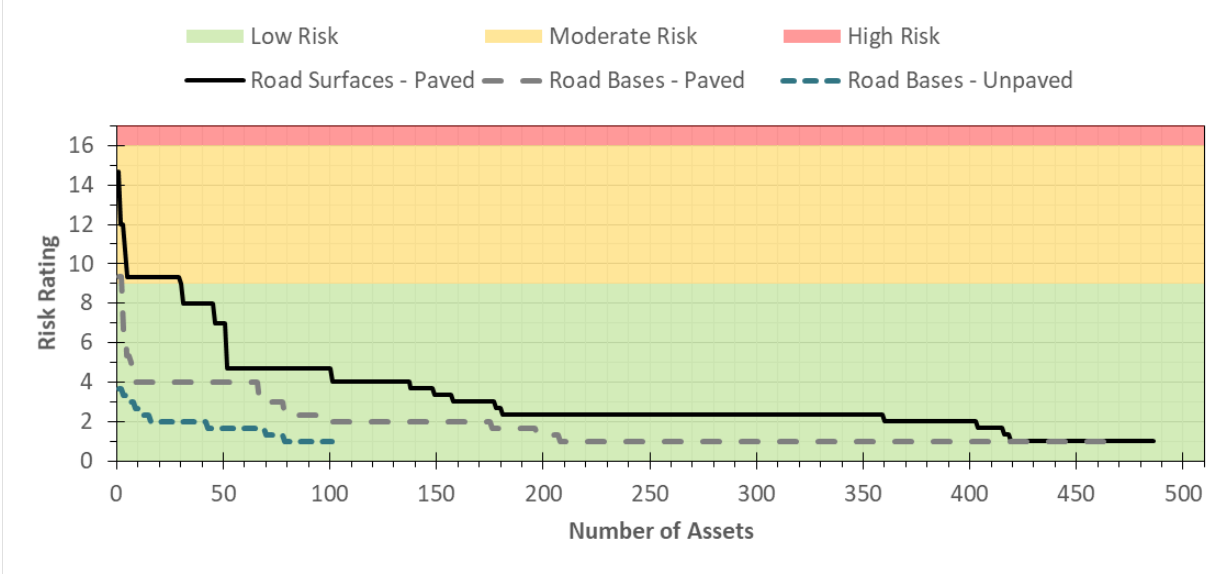


Figure 2-4: Road Risk Profile

In analyzing the risk profiles of Road Surfaces and Road Bases – Paved, assets covering the same segment of road will be considered together. **Figure 2-4** indicates there is one paved road segment with the highest risk rating (14.7) representing approximately 84 m of the road network

(less than 1%). Risk scores between 9 and 16 are considered moderate priority. There are 29 paved road segments with a moderate risk rating, representing 6.2 km of the road network (approximately 2% of the paved surfaces).

Figure 2-4 also indicates there are two unpaved road section with a risk rating of 3.7 (the highest value for these road types) representing approximately 820 m of the road network (less than 1%). Risk scores between 0 and 9 are considered low priority. All unpaved road segments are classified with a low risk rating, representing 152.5 km of the road network.

It is important to highlight that the risk rating is used to inform the capital plan and the development of the capital plan takes into account other factors in addition to risk rating, such as scheduling, accessibility during construction and availability of funding.

Other criteria used to prioritize work are:

- Findings of traffic studies;
- Traffic safety;
- Community benefits; and
- Project readiness.

2.5.1 Performance

Performance ratings for individual assets were assumed to be Always Reliable unless otherwise indicated by municipal staff, available reports or asset data. Roadways with permanent or seasonal load restrictions that differ from those applied to the network as a whole were used to identify areas of poor performance. The following assets were identified by municipal staff and assigned a Not Reliable performance rating:

- North Street

2.5.2 Importance

Road segment importance was determined in consultation with the municipal staff, as described in **Section 1.3.3**. High importance road segments were generally collector/arterial roads, residential streets within Kincardine urban center and roads which access essential municipal facilities. **Table 2-12** provides additional details on road segment importance classifications.

Table 2-12: Importance Ranking – Roads

Importance Ranking	Roads
High (3)	Arterial Roads: • Bruce Avenue • Kincardine Avenue • Russell Street • Durham Street

Importance Ranking	Roads
	• Broadway Street • Sutton Street • Queen Street Residential and Access Roads: • Mahood Johnson Drive • Concession Road 2 (Highway 23 to Tie Road) • Tie Road • Farrell Drive
Moderate (2)	Arterial Roads: • Huron Terrace Concession Roads Access Roads to Core Infrastructure (e.g.: water treatment plants, Davidson Centre, etc.)
Low (1)	Residential Streets Side Roads

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, improvement, maintenance, and decommissioning/disposal.

The lifecycle activities presented below are consistent with best practices for road asset management and maintenance, and with the recommendations in the 2016 Road Study. Additional description and details of the lifecycle activities can be found within the report.

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. 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 roadside environment (e.g., rural, urban).

Improvement

Improvement lifecycle activities include works that encompass the full surface of a road segment. Improvement activities, as described in the RMS, include:

- Hot mix resurfacing;
- Full depth pulverize and pave;
- Full reconstruction;

- Full depth removal and pave;
- Urban paving; and
- Return to gravel:
    - The Municipality previously upgraded gravel roads to paved surfaces. If a review of the road usage warrants, such a road segment can be improved through a return to gravel surface type.

Selection of an improvement activity will depend on multiple factors, such as:

- Lifecycle stage of the asset (previous lifecycle activities undertaken);
- Condition and type of wear on road surface;
- Road surface material;
- Condition of underlying road base; and
- Roadside environment.

Additional information regarding the improvement activity options are detailed within the 2016 Road Study.

Maintenance

Maintenance lifecycle activities are smaller in scale than improvements and can be used to address localized issues on the road surface ("spot maintenance"), or to improve or maintain road asset-adjacent components ("specific maintenance"). A spot maintenance activity is typically appropriate when the location for maintenance is less than 60 m in length. Specific maintenance activities are not length based, and address maintenance to non-road surface components. The types of maintenance under each of these categories can include:

- Specific Maintenance:
    - Ditching improvements;
    - Edge widening; and
    - Installation of subdrain.
- Spot Maintenance:
    - Ditch Spot Location;
    - Paving Patch; and
    - Spot repair (paved or gravel road).

Crack sealing can be used on an ad-hoc basis, typically on better condition roads where the severity of the cracks is minimal. Where cracks are more advanced or widespread, more comprehensive maintenance or improvement works will be required.

To gather condition assessment information, the Municipality can continue their combined condition assessment program, which uses self-evaluation and reporting (by in house roads department staff), with third party assessment, such as Streetscan. The Municipality's program

will engage the third party review on a routine basis, and supplement with the self-evaluation as required.

Decommissioning/Disposal

Disposal activities can include the removal from service of a road segment. These activities can be implemented when a road segment has been determined to be no longer required. A road may be removed from service by removal and 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 – Roads

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

The road assets will deteriorate on a non-linear basis, and the lifecycle activities can be implemented at varying stages within an assets deterioration. **Figure 2-5**, excerpted from the 2016 Roads Management Study, provides a visualization of the theoretical deterioration curve for an asset, and the expected differences in trajectory with usage of lifecycle activities.

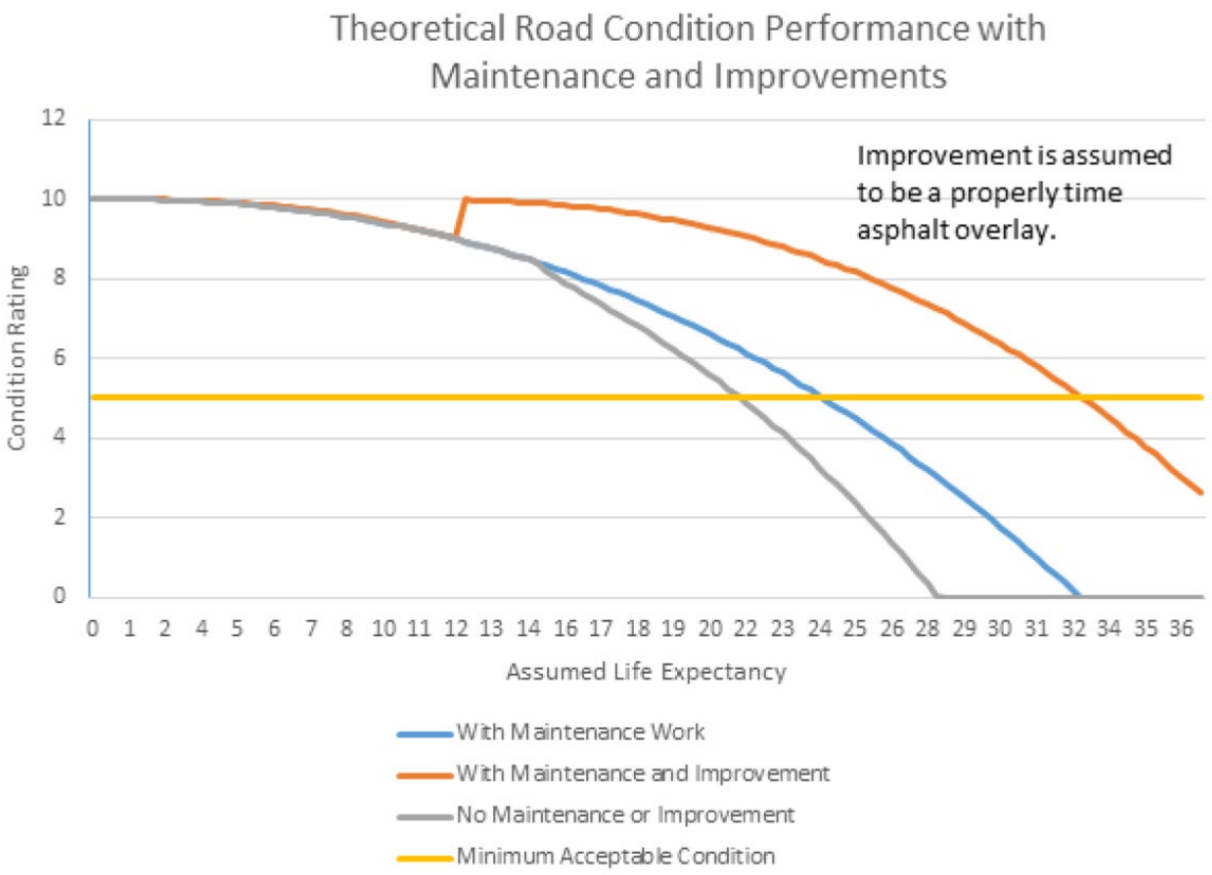


Figure 2-5: Road Condition with Lifecycle Activities (2016 Roads Management Report, BM Ross)

The condition and usage of the road assets is a key driver in the determination of lifecycle activities to use. The condition was determined in 2016 as part of the 2016 Road Study, and updated by the Streetscan study in 2021. The Municipality is encouraged to continue a regular update of the condition of the road network. Condition of the roads can be completed on scheduled basis wherein the entirety of the network is reviewed in annual portions over a defined duration (example five years). A condition rating program can also be implemented that considers the importance or risk of a road segment, and prioritizes frequency and timing of condition assessments to higher usage or higher importance roads.

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. The Roads Management Study has identified specific maintenance activities that can be implemented to address issues with the road asset outside of deterioration of the surface. 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.

Improvement activities should be undertaken on an asset when it has deteriorated past the point where maintenance activities would be adequate to address condition issues. Selection of the appropriate improvement activity will depend on the road surface material, stage in lifecycle, and severity and type of deterioration.

In general, the current strategy for the road assets at the Municipality is to allow the road surface asset to degrade near to the end of its expected lifecycle, and reconstruct the road surface when required. The road base has a much longer expected useful life than the road surface, and is dealt with as required during road works. The requirement for reconstruction of the road base is determined through a combination of staff knowledge of the road condition, and conducting boreholes to assess the viability of the road base. The Municipality does not currently undertake boreholes for every road segment to be reconstructed.

As urban roads are reconstructed, the Municipality's current strategy is to construct the roads to a full urban road cross-section, including areas that currently are not built to this standard. As such, road bases are being improved as required to facilitate the change in road type.

Gravel roads in the Municipality should be managed through a separate strategy, as the types of maintenance and requirement for reconstruction differs from paved surfaces. In the Roads Management Study, it is recommended that the gravel roads be graded regularly, and gravel applied annually. The strategy also includes localized repairs and maintenance where required. Reconstruction of these roads may be required if condition is found to have deteriorated, however the expected lifespan is long.

2.7.1 Scenario Analysis

To understand the needs and projected works on the roads assets within a 20-year outlook, reconstruction of the road surface was reviewed under varying budget values to understand the impact on overall network condition. In this analysis, it is assumed that intermittent resurfacing works are not undertaken, according to the current strategy, and that road bases do not require reconstruction. Further study should be undertaken for future road works to determine the needs for road base reconstruction through evaluation of boreholes or staff knowledge of asset condition and performance. Gravel roads are also omitted from analysis, as they are maintained through operations and not reconstructed at the same frequency as the paved roads. The budgets analyzed included:

1. Unlimited budget – To determine backlog of works.
2. 2% of network value – Best practice of investment.
3. 4% of network value – Best practice of investment.
4. $ Amount to achieve 60 – Expenditure required to achieve a 60 average condition rating by the end of the analyzed timeframe.
5. Maintain Current PI/ 2016 AMP Funding Level – Analysis of the funding level as provided within the 2016 AMP*.

6. * Municipality indicated that the 2016 AMP funding level encompasses road works as well as works for other asset categories such as buildings, fleet, etc.
   * Note that the investment value required to maintain the current average condition is consistent with the 2016 AMP funding level.

Note that the network value used for calculations was determined using the surface costs only, omitting the reconstruction costs of the base.

A multi-year projection scenario was run using the budgets noted above using reconstruction works for the road surfaces only.

A summary of the analyses is below in **Table 2-13**.

Table 2-13: Road Total Expenditures and Average Condition Index Based on Budget Scenarios

Scenario	Budget Scenarios	Annual Value	Average Annual Investment over Timeframe	Total Investment over Timeframe	Average Condition Index (End of Timeframe)
1	Unlimited budget	Unlimited	$12,939,518	$258,790,360	94
2	2% of network value	$2,816,000	$2,812,815	$56,256,307	30
3	4% of network value	$5,632,000	$5,630,312	$112,606,234	49
4	Amount to achieve 60	$6,500,000	$6,497,758	$129,955,150	60
5	Maintain current PI	$3,900,000	$3,897,681	$77,953,629	41

Each of the analyzed budget scenarios has a significant expenditure across the 20 year timeframe, with varying results in the average condition of the assets.

The modelling was completed using the condition information from the 2016 assessment as the starting point of condition. The results of the 2021 assessment indicated that the overall condition was slightly better than the theoretical deteriorated, therefore the scenarios analyzed above may result in a higher level of service for the assets, and may help to build a reserve for future investment.

The unlimited scenario is used to identify any current needs on the assets, the results of which indicate that there is an existing backlog of $81M in reconstruction works for roads that have a condition index of 35 or below. The average annual expenditure for the unlimited scenario is approximately $12.9M.

Best practice suggests maintaining an average condition index of 60 across the system. The estimated required annual budget to achieve this result at the end of the evaluated timeframe is $6.5M. Annual investments below this value may cause the overall condition rating to decrease, and may allow assets to degrade to failure.

The current overall condition average of the paved road surfaces is just below 40 (on a scale of 0-100). The Municipality has the option to maintain the current condition of the assets going forward, which would require investment to achieve approximately a 40 rating at the end of the studied timeframe. To achieve this, the Municipality should invest approximately $3,900,000 annually. This is approximately equivalent to the 2016 AMP recommended funding value. Using this scenario, the Municipality would spend just under $78M over the studied timeframe.

Note that, as previously stated, this does not include road bases or gravel roads, as the lifespan for the gravel roads is significantly higher than that of the road surfaces, and the gravel roads are maintained through operations and not reconstructed frequently under capital projects.

2.8 Proposed Levels of Service – Roads

The current levels of service established in 2019 are to be maintained as the proposed levels of service through the year 2031, per resolution by Council. It is recommended that the Municipality continue to monitor levels of service being provided by road assets on an annual basis to monitor and adjust proposed levels of service accordingly in the future.

3.0 Bridges & Culverts

3.1 State of Local Infrastructure

The Municipality owns 27 roadway bridges and 56 structural culverts for a total of 83 structures.

An additional 11 pedestrian bridges are owned and operated by the Municipality. These bridges are included in **Section 11.0.** Non-structural culverts (less than 3 m in span) are considered in **Section 6.0.**

The Ontario Structure Inspection Manual (OSIM) 2008 was used to classify bridges and culverts for consideration. Bridges and structural culverts are defined as structures providing vehicle or pedestrian passage across and obstruction, gap or facility that are greater than or equal to 3 m in span.

Roadway Bridges

The Municipality owns 27 roadway bridge structures. The inventory of assets is further categorized to include deck surface and structure. For the purposes of this infrastructure summary, each deck surface and structure have been considered an individual assets, resulting in a total asset count of 54.

The bridge construction types vary, and include the following:

- 3 Span Pre-stressed Concrete;
- CIP Girder;
- Concrete Beam;
- Concrete Girders;
- Concrete Rigid Frame;
- I-Beam;
- I-Girder;
- Precast Concrete Girder, Integral Abutment;
- Rigid Frame;
- Solid Slab; and
- Steel Girder.

Structural Culverts

The Municipality owns 56 structural culvert assets. The structural culvert construction types vary, and include the following:

- Arch Culvert;
- Barrel Arch;

- Concrete Arch (Barrel);
- Ellipse Culvert;
- Ellipse Culvert and Round Relief;
- Rectangular Culvert;
- Rectangular Culvert ,Cast-in-place concrete Rigid frame;
- Round Culvert;
- Solid Slab;
- Standard Concrete Culvert; and
- Twin Rectangular Culvert.

One structure, located on Huron-Kincardine Rd, was replaced in 2019, with the costs being shared by the Township of Huron-Kinloss.

Pedestrian Bridges

The Municipality owns 11 pedestrian bridge assets. The construction types vary, and include the following:

- Steel truss and wood deck;
- Steel beam and wood deck;
- Wood beam and wood deck; and
- Steel beam with steel grating deck.

Historically, pedestrian bridges did not receive OSIM inspection. During the 2019 OSIM inspections completed for the Municipality by BM Ross and Associated Ltd, pedestrian bridges that meet to OSIM requirements for bridge structures received a preliminary inspection with comments on current condition. This activity did not include a full inspection of these structures. Seven of the pedestrian bridges owned by the Municipality are classified as bridge structures under OSIM and should receive full inspection moving forward.

Pedestrian bridge assets are managed as part of Parks & Yard Improvements, and accordingly are analyzed as part of **Section 11.0**.

3.1.1 Replacement Costs

The replacement costs of the roadway bridges and structural culverts are based a Technical Memo produced for the Municipality by BM Ross and Associates Ltd. The document identifies approximate unit costing for roadway bridges and structural culverts and produces a total estimated replacement cost for Bridge – Deck, Bridge – Structure and Culvert assets. All replacement costs were provided in 2019 Canadian Dollars.

To estimate the replacement values in current (2022) dollars, the 2019 replacement costs were inflated by 3% annually. Where 2019 replacement costs were not available, the original construction cost was similarly inflated by 3% annually to estimate current (2022) dollars. The total replacements costs for bridges and culverts is $70,063,000.

The breakdown of the total replacement cost of the bridges and culverts within the network are shown in **Table 3-1**.

Table 3-1: Total Estimated Replacement Costs of Bridges and Culverts

Asset Type	Total Replacement Cost (2019)	Total Replacement Cost (2022)
Bridges – Deck	$16,590,000	$16,846,000
Bridges – Structure	$22,810,000	$23,161,000
Culverts	$30,153,000	$30,056,000
TOTAL	**$69,553,000**	**$70,063,000**

3.1.2 Average Age

The roadway bridge network varies in age distribution from 2 years (constructed in 2020) to 82 years (constructed in 1940), with the average age of 47 years. The average age of Bridge – Structure is
48.7 years and Bridge – Deck is 45.7 years. Note that the chart below counts Bridge – Structure and Bridge – Deck as separate assets, as there are instances where the age of each component differ for the same bridge.

The culvert network varies in age distribution from 2 years (structure replacement in 2020) to 88 years (in-service date of 1934), with the average age of 44.7 years. The age distribution for the bridges and culverts in the network is highlighted in **Figure 3-1**.

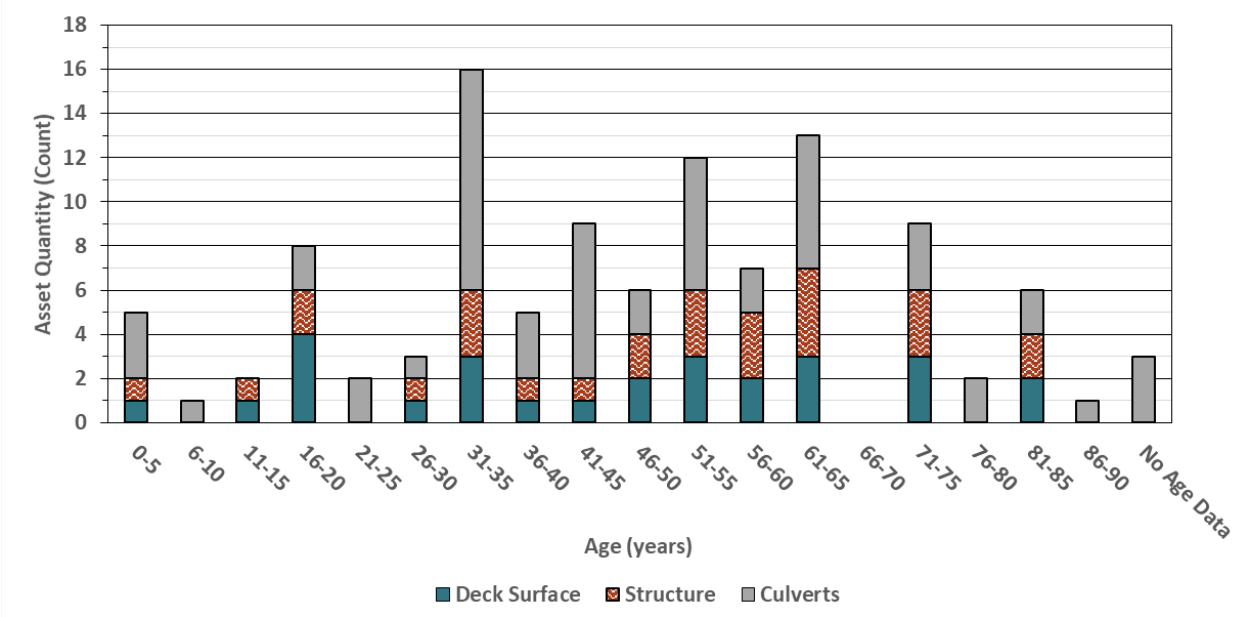


Figure 3-1: Age Distribution of Bridge and Culvert Assets

3.1.3 Expected Useful Life

The expected useful life of the bridge assets is broken down into the deck surface and structure components. The expected useful life for both of these segments are consistent across all bridge construction types. The useful life values, as provided by the Municipality, are summarized in **Table 3-2**.

Table 3-2: Expected Useful Life of Bridge and Culvert Assets

Component Type	Expected Useful Life (years)
Bridge – Deck	15
Bridge – Structure	75
Culvert	75

The expected useful life of the culvert asset is generally consistent across the network. The Municipality has previously attributed a useful life of 75 years to each of the culvert assets, with the exception of three, as follows:

- Asset ID 45068 (Kincardine Avenue) – attributed a lifespan of 35 years;
- Three assets – round culvert construction – attributed a lifespan of 50 years;
- Asset ID 25362 (Hayes Bridge) – Solid slab construction – attributed a lifespan of 95 years;
- Asset ID 25361 (Small's Bridge (Sideroad 10)) – Solid slab construction – attributed a lifespan of 100 years; and
- Asset ID 25322 (Sideroad 15) - Standard concrete culvert construction - attributed a lifespan of 125 years.

3.2 Condition – Bridges and Culverts

The Municipality has previously undertaken condition assessment for bridge and structural culvert assets, determined through completion of OSIM inspections, the most recent having been completed in 2019 by BM Ross and Associates Ltd.

The Bridge Condition Index (BCI) included in the OSIM is used to measure the condition of bridges and structural culverts. The Ontario Ministry of Transportation (MTO) has developed a general categorization for BCI values which will be used to convert BCI scores to the 1-5 condition rating scale, provided in **Table 3-3**. This categorization will be used for all bridges and structural culverts.

Table 3-3: Building Condition Index Related to 1-5 Condition Scale

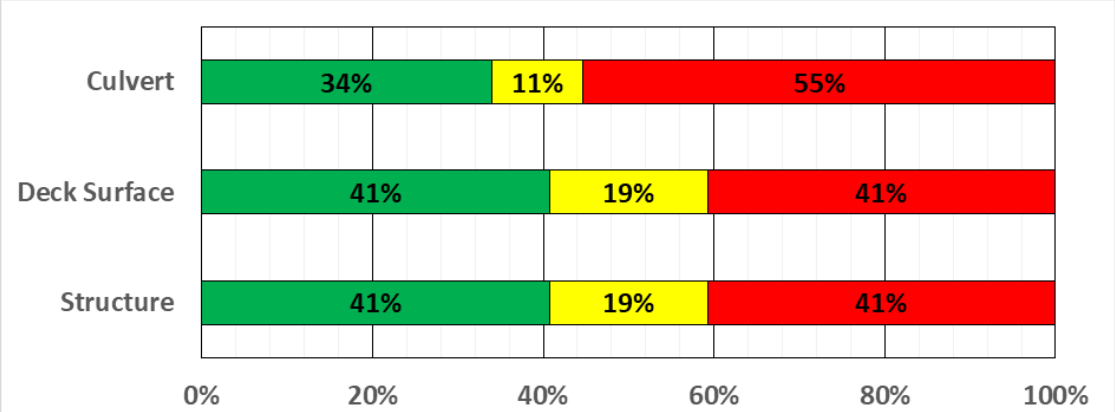
BCI Value	Condition Rating	Condition Score
70-100	Good	1
60-70	Fair	3
Less than 60	Poor	5

Bridges

The summary of condition ratings for bridge assets are shown in **Figure 3-2**. An even split (41%) of bridges received Good or Poor condition ratings during the 2019 OSIM inspections.

Structural Culverts

A summary of the condition ratings are shown in **Figure 3-2**. Over half of all structural culverts (55%) received a Poor condition rating during the 2019 OSIM inspection. It should be noted that OSIM inspections apply a single rating to the deck and structure of a bridge. The assets are considered separately within the asset management plan due to differences in typical lifespans for each.



	Structure	Deck Surface	Culvert
Good	11	11	19
Fair	5	5	6
Poor	11	11	31

Figure 3-2: Bridge and Culvert Condition Distribution

3.3 Current Levels of Service – Bridges and Culverts

Levels of service for bridges and culverts are outlined in Table 5 of the regulation, *O.Reg. 588/17*. **Table 3-4** and **Table 3-5** outline the Municipality's current community and technical levels of service for bridges and culverts.

Table 3-4: Community Levels of Service – Bridges and Culverts

LOS Parameter	Community Levels of Service O.Reg. 588/17 – Qualitative Description	Municipality of Kincardine Community LOS
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	The Municipal roadway bridge and structural culvert network is designed to support various vehicle types, including: • Heavy transport vehicles • Motor vehicles • Emergency vehicles • Agricultural vehicles and equipment • Pedestrians • Cyclists. The Municipality pedestrian bridges, included in **Section 11.0 Parks and Yard Improvements** are designed to support pedestrian and cyclist traffic.
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 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 culverts in Good condition typically operate as designed and would not receive any additional restrictions or limitations beyond those designed. Bridges and 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 3-5: Technical Levels of Service – Bridges and Culverts

LOS Parameter	Technical Levels of Service O. Reg. 588/17 – Technical Metrics	Municipality of Kincardine Technical LOS
Scope	Percentage of bridges in the Municipality with loading or dimensional restrictions.	An OSIM bridge inspection report conducted in 2019 by BM Ross and Associates Ltd. identified four roadway bridges/ culverts that are posted with loading restrictions. This represents 5% of the total 83 bridges and culverts in the network. As per the 2019 report, the postings were recommended to remain for two years, and included the following structures: • Asset ID 25363 (Bervie Bridge (Bervie Sideroad)) – Solid slab construction – Posted load restriction of 5 tonnes • Structure ID 2139 (Bervie Sideroad (north of Structure 2112)) – Rectangular culvert construction – Posted load restriction of 5 tonnes • Asset ID 25361 (Small's Bridge (Sideroad 10)) – Solid slab construction – Posted load restriction of 15 tonnes • Asset ID 25330 (Shewfelt Bridge (Sideroad 20)) – Arch culvert construction – Posted load restriction of 10 tonnes
Quality	1. For bridges in the Municipality, the average bridge condition index value.	The latest bridge condition index (BCI) value for the bridge network was extracted from the 2019 BMRoss OSIM report. The average index across the bridge network is 63.5, Fair.
Quality	2. For structural culverts in the Municipality, the average bridge condition index value.	The latest bridge condition index (BCI) value for the structural culvert network was extracted from the 2019 RM Ross OSIM report. The average index across the culvert network is 56.4, Poor.

3.4 Current Performance – Bridges and Culverts

Asset performance measures were determined in consultation with the Municipality, which provide relevant metrics against which the Municipality can gauge the performance of their

assets. The performance measures for the bridges and culverts, and their current values are shown in **Table 3-6**.

Table 3-6: Current Performance Measures for Bridges and Culverts

Asset Performances Measure	Current Value
Traffic counts over bridges to assess usage	Not currently available, but recommended to monitor in future
Number of bridge or culvert failures/road closures	9 (2018), 15 (2019)
Number of structures with load restrictions	4
Percentage of bridges and culverts in Fair or better condition	59% of Bridges 45% of Culverts

3.5 Risk Assessment – Bridges and Culverts

The risk ratings for bridges and culverts followed the risk methodology and approach, presented in **Section 1.3**. The risk profile for bridges and culverts are shown in **Figure 3-3**.

Each bridge is composed of both a Deck Surface and Structure. **Figure 3-3** combines the Deck Surface and Structure of each bridge as a single data point. The majority of bridges fall in the Moderate and Low risk ratings, with 14 bridges (52% of bridge assets) classified as Moderate risk and 12 bridges (44% of bridge assets) classified as Low risk. Only one bridge asset was classified as High risk, representing 4% of bridge assets.

Culverts are predominantly classified as Low risk with 49 culverts (91% of culvert assets) receiving risk ratings between 0 and 9. The remaining five culverts (9% of culvert assets) are classified under the Moderate risk category, receiving a risk rating between 9 and 16.

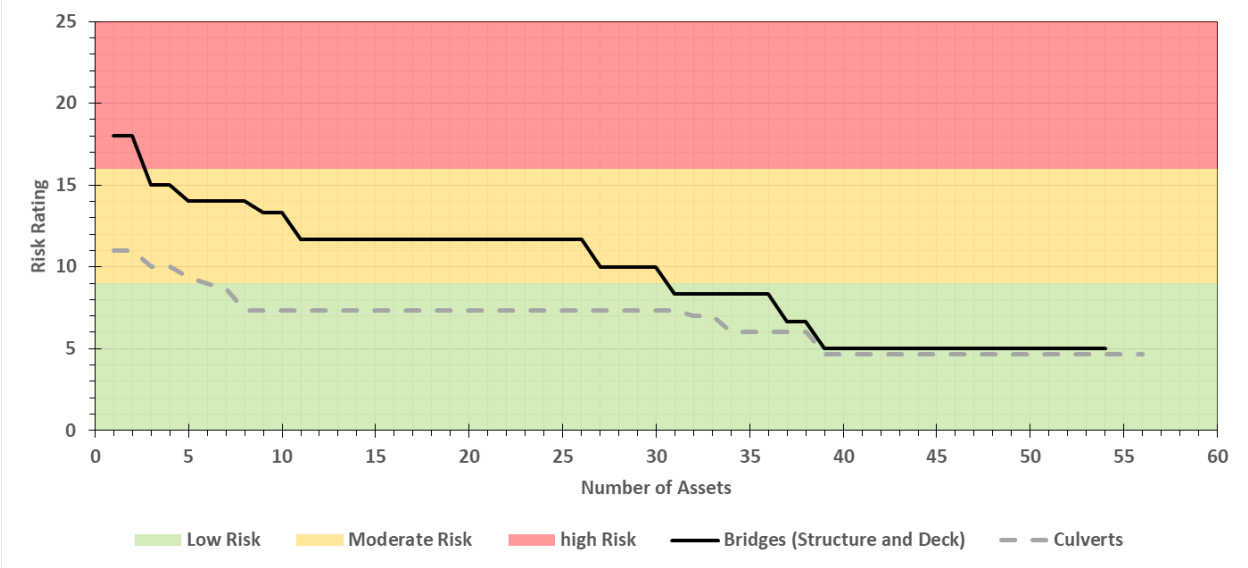


Figure 3-3: Bridge and Culvert Risk Profile

The replacement value of High risk bridge and culvert assets is approximately $3,511,400. The replacement value of Moderate risk and Low risk assets is approximately $25,648,000 and $37,902,600, respectively.

It is important to highlight that the risk rating is used to inform the capital plan and the development of the capital plan takes into account other factors in addition to risk rating, such as scheduling, accessibility during construction and availability of funding.

Other criteria used to prioritize work are:

- Planned road work or replacement;
- Development and changes service demands;
- Community benefits; and
- Project readiness.

3.5.1 Performance

Performance ratings for individual assets were assumed to be Always Reliable for all bridges other than those with load restrictions. Existing load restriction data was provided by OSIM reports and input from municipal staff. **Table 3-7** provides the rating criteria for Performance based on bridge load restrictions.

Table 3-7: Performance Ratings – Bridges

Performance	Maximum Load Restriction
Always Reliable (1)	No Load Restriction

Performance	Maximum Load Restriction
Always-Usually Reliable (2)	25 tonnes
Usually Reliable (3)	15 tonnes
Usually-Not Reliable (4)	10 tonnes
Not Reliable (5)	5 tonnes

3.5.2 Importance

Bridge and culvert importance was determined in consultation with the municipal staff, as described in **Section 1.3.3**. High importance bridges were generally major or multilane structures within the Town of Kincardine's urban center, which see the highest traffic relative to the overall network. **Table 3-8** provides additional details on the general importance classification of bridge and culvert assets.

Table 3-8: Importance Rating – Bridges and Culverts

Importance Rating	Bridges and Culverts
High (3)	• Queen Street • Broadway Street • Durham Street • Russell Street • Huron Terrace
Moderate (2)	• Concession Road 5 • Upper Lorne Beach Road • Victoria Street • Kincardine Avenue • Bruce Avenue • Albert Road • Other bridges within Kincardine urban center
Low (1)	• Side road bridges and culverts • Concession road bridges and culverts

3.6 Lifecycle Activities – Bridges and Culverts

The following section describes the lifecycle activities that can be implemented within the asset management strategy for roadway, bridge and structural culvert assets. Note that, as previously discussed, roadway bridge assets refers 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 or 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 bridge and its use. Each bridge or structural 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 Municipality is required to complete one inspection of all bridges and structural 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 Municipality should continue the current biennial OSIM Bridge Inspections along the current schedule, with the next inspections scheduled for 2021 and 2023. The inspections should include all bridges and culverts with a single or combined span greater than 3 m.

Maintenance and Repairs

Bridge and culvert assets are 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 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 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 near-by asset LOS and replacement or maintenance requirements of connected infrastructure.

Disposal

Disposal activities from bridges and culverts can include the removal from service of a bridge or culvert, 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 or culvert structural 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.

3.7 Asset Management Strategy – Bridges and Culverts

The asset management strategy for bridges and structural culverts in the Municipality will employ the lifecycle activities to maximize the useful life of each asset.

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

- Consequence of asset failure;
- Asset risk score;

- Condition of adjacent assets;
- Replacement requirements for adjacent infrastructure (watermain, storm, sanitary or roadworks); and
- Community growth and capacity requirements.

As the Municipality continues to age and develop, 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.

Under O. Reg. 160/02: Standards for Bridges, the Municipality is required to complete one inspection of all bridges and structural 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 assessment and study was completed in 2019.

It is recommended that the Municipality use the OSIM report to identify and forecast lifecycle activities for bridge and structural culvert assets. For detailed recommendations of asset management strategies refer to the Bridge Inspection Report, prepared in 2019 by BM Ross and Associates Ltd.

3.7.1 Scenario Analysis

To understand the needs and projected works on the roadway bridges and structural culverts within a 10 year period, a summary of the recommendations from the Bridge Inspection Report, prepared in 2019 by BM Ross and Associates Ltd is presented in **Table 3-9.**

The prices provided by BM Ross and Associates Ltd were presented in 2019 Canadian Dollars and are reflective of the quantity of work required as of 2019. Costing includes engineering, design, administration and a 10% contingency. Quantities are expected to increase over time as assets continue to deteriorate. These costs have been inflated to reflect 2022 prices using an estimated annual inflation rate of 3%.

Table 3-9: Projection of Works for Bridge and Culvert Assets

Timing of Needs	Estimated Repair Cost	Estimated Replacement Costs	Total Estimated Cost
Within 1 Year	$ 90,640	-	$ 90,640
1 to 5 Year Period	$ 4,099,400	$ 6,653,800	$ 10,753,200
6 to 10 year Period	$ 1,670,660	$ 1,348,270	$ 3,018,930

To complete all recommended work within the next 5 years is estimated to cost an average of $ 2,215,118 per year over the 5 year period. To complete all recommended work within the next 10 years is estimated to cost an average of $ 1,386,277 per year over the 10 year period.

An initial assessment of the needs and projected works on the pedestrian bridges within a 5 year outlook was included in the Bridge Inspection Report, prepared in 2019 by BM Ross and Associates Ltd. It is estimated that $15,000 of repair work is required within a 5 year period for pedestrian bridges. It is recommended the Municipality include a full assessment of pedestrian bridges in future Bridge Inspections for all pedestrian bridges greater than 3 metres in span.

3.8 Proposed Levels of Service – Bridges and Culverts

The current levels of service established in 2019 are to be maintained as the proposed levels of service through the year 2031, per resolution by Council. It is recommended that the Municipality continue to monitor levels of service being provided by bridge and culvert assets on an annual basis to monitor and adjust proposed levels of service accordingly in the future.

4.0 Water

4.1 State of Local Infrastructure

The Municipality owns and operates a water network, including assets specific to potable and non-potable systems. The asset inventory includes linear pipes and appurtenances. A summary of the quantity of assets within the network is provided in **Table 4-1.**

Table 4-1: Water Asset Quantity Summary

Water Network Asset Type	Potable System	Non-Potable System	Total	Unit of Measure
Blow Off	70	-	70	Quantity
Curbstop	4,814	-	4,814	Quantity
Hydrants	450	11	461	Quantity
Mains	101,609	4,217	105,827	Length (m)
Meter Pits	14	1	15	Quantity
Meters (pooled)	4,214	6	4,220	Quantity
Services	50,845	-	50,845	Length (m)
Valve Chambers	774	-	774	Quantity
Valves	25	6	31	Quantity

As previously discussed within **Section 1.1**, according to the asset hierarchy, the analysis within this report will be limited to 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.

4.1.1 Linear Water Assets

The Municipal water network includes approximately 105 km of watermain. The material types for watermain construction are summarized in **Table 4-2.**

Table 4-2: Material Types of Watermains (Total Length and Percentage of System)

Material Type	Total Length (m)	Percentage of System
Asbestos Cement	1,773	2%
Cast Iron	13,216	13%
Copper	429	0.4%

Material Type	Total Length (m)	Percentage of System
Ductile Iron	30,833	29%
HDPE	987	1%
PE	1,479	1%
PVC	56,066	53%
Steel	92	0.1%

4.1.1.1 Replacement Costs

Replacement costs for the water network were determined based on recent tender information and product information. The replacement costs include costs necessary for full reconstruction of a segment, including trench and surface restoration. It is assumed that reconstruction works on the network will be done using PVC piping.

The reconstruction costs are shown in **Table 4-3**.

Table 4-3: Reconstruction Costs for Water Network

Diameter	Reconstruction Unit Cost ($/m)
Up to 250 mm	$950
251 mm – 400 mm	$1,200
Over 400 mm	$1,550

Using the units costs provided in **Table 4-3**, the total replacement costs for the water network can be determined. The total replacement costs for Kincardine's water network is $109,010,000. This value does not include the replacements costs for buildings within the water asset category. Replacements costs for water building assets are outlined in Section 4.1.2.1 of this report.

4.1.1.2 Average Age

The average age of the linear water assets water network was calculated by pipe material, weighted by length of asset. The average age is summarized in **Table 4-4**.

Table 4-4: Average Age of Linear Water Assets by Pipe Material

Pipe Material	Average Age (years)
Asbestos Cement	45.7
Cast Iron	45.9
Ductile Iron	18.8
HDPE	38.1

Pipe Material	Average Age (years)
PE	32.5
PVC	18.1
Copper	18.0
Steel	2.0

A summary of the age distribution for the water assets is shown in **Figure 4-1** and **4-2**.

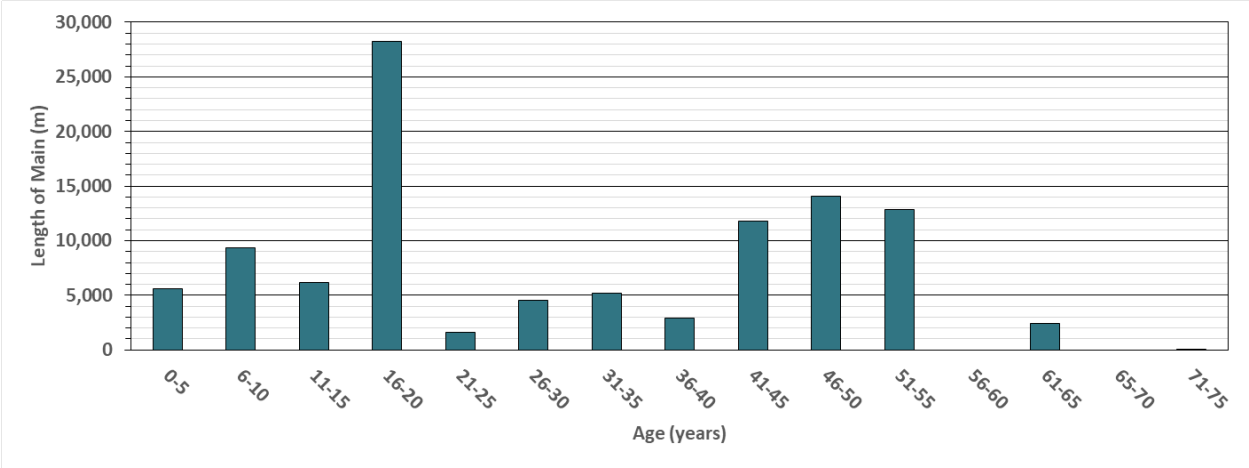


Figure 4-1: Age Distribution of Linear Water Assets (Watermains)

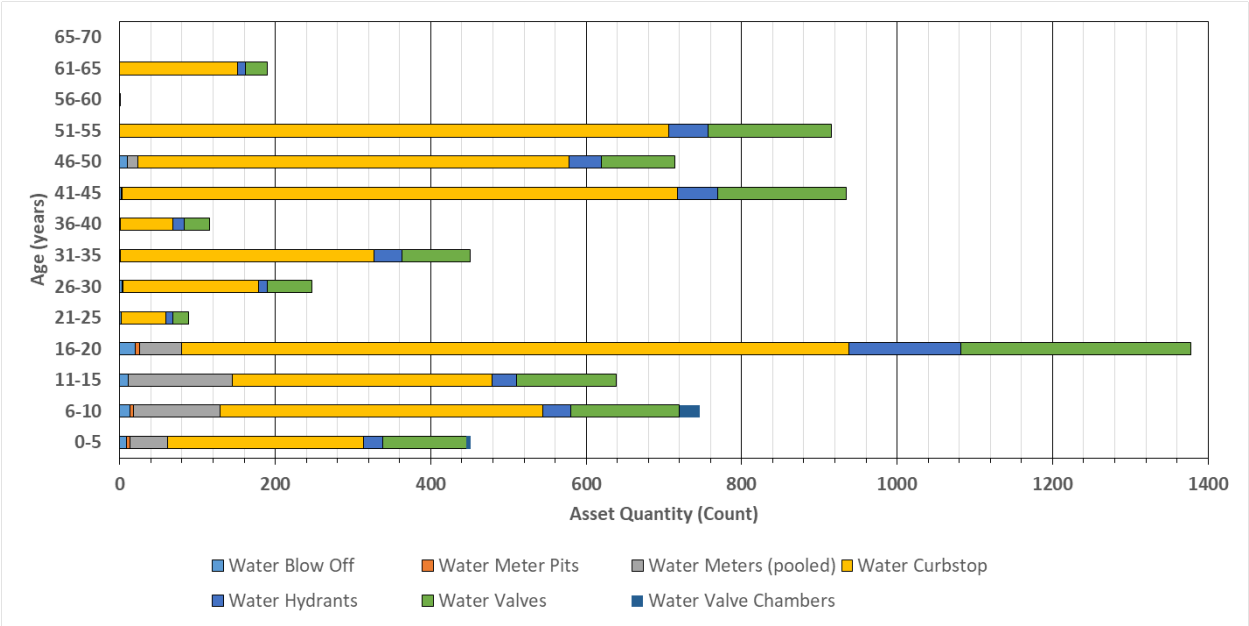


Figure 4-2: Age Distribution of Point Water Assets

4.1.1.3 Expected Useful Life

The expected useful life of the water assets is used to estimate the replacement schedule. The expected useful life values for each type of water pipe material within the network were provided and confirmed by the Municipality, and are consistent with 2010 PSAB 3150 values. The expected useful lives are summarized in **Table 4-5**.

Table 4-5: Expected Useful Life for Water Pipe Materials

Pipe Material	Expected Useful Life (years)
Asbestos Cement	80
Cast Iron	70
Copper	80
Ductile Iron	70
HDPE	60
PE	60
PVC	60
Steel	60

As data continues to be available regarding useful life of the watermain construction materials, these values can be reviewed and updated as appropriate.

4.1.2 Water Building Assets

In addition to the linear watermain assets, the water network includes ancillary assets that facilitate treatment and distribution services as outlined in **Table 4-6**.

Table 4-6: Water Building Assets

Water Building Name	Asset Type
Armow Well	Well
BEC Water Tower	Water Tower
Briar Hill Well (1)	Well
Briar Hill Well (2)	Well
Dent Well	Well
Inverhuron Chlorine Station	Chlorine Station
Kincardine Water Tower	Water Tower
Lake Huron Highlands Well	Well
Scott's Point Pumphouse	Pumphouse
Scott's Point Well and Treatment Building	Well

Water Building Name	Asset Type
Tiverton Water Tower	Water Tower
Underwood Well	Well
Water Treatment Plant	Water Treatment Plant

The building assets are complex, and include multiple components. The types of components for each building vary, and are described further below.

4.1.2.1 Replacement Costs

Replacement costs were also determined for the water building assets, summarized by type of asset in **Table 4-6** below. The table provides a summary of the building components for each building, as well as the quantity of facilities. The costs were determined using historical costs of the buildings, inflated by 3% annually since the in-service date.

Table 4-6: Water Building Asset Replacement Costs

Building Components per Building Type*	Chlorine Station	Pumphouse	Water Tower	Water Treatment Plant	Well
Electrical	1	-	4	-	12
Mechanical	1	-	6	-	13
Structural	1	-	5	2	12
Mixing System – Mechanical	-	-	2	-	-
Mixing System – Structural	-	-	2	-	-
Civil/Architectural	-	-	-	2	-
Electrical Process	-	-	-	2	-
Instrumentation	-	-	-	3	-
Mechanical Equipment	-	-	-	2	-
Process Piping	-	-	-	2	-
Single Asset**	-	2	-	-	
Count of Facilities	**1**	**1**	**3**	**1**	**7**
Current Replacement Cost	**$315,000**	**$428,000**	**$7,042,000**	**$18,838,000**	**$1,650,000**

* Betterment/ replacement activities included in count

**Single Asset building component represents assets where building components where not clearly identifiable and the associated costs could not easily be disaggregated.

The total replacements costs for water building assets is $28,273,000.

A summary of the building assets including component information and individual replacement costs can be found in **Appendix C**.

4.1.2.2 Average Age

The average age for each type of water related building was also determined, as the average age of all components. **Table 4-7** summarizes the average age for water building assets, by building type. The age distribution of all components if further provided in **Figure 4-3**.

Table 4-7: Average Age of Water Building Assets

Building Type	Average Age	Estimated # of Capital Improvements	Current Value of Historical Capital Improvements
Chlorine Station	17.0	0	$0
Pumphouse	22.5	1	$18,400
Water Tower	14.0	10	$2,148,00
Water Treatment Plant	30.8	7	$5,220,400
Well	25.2	16	$1,280,900

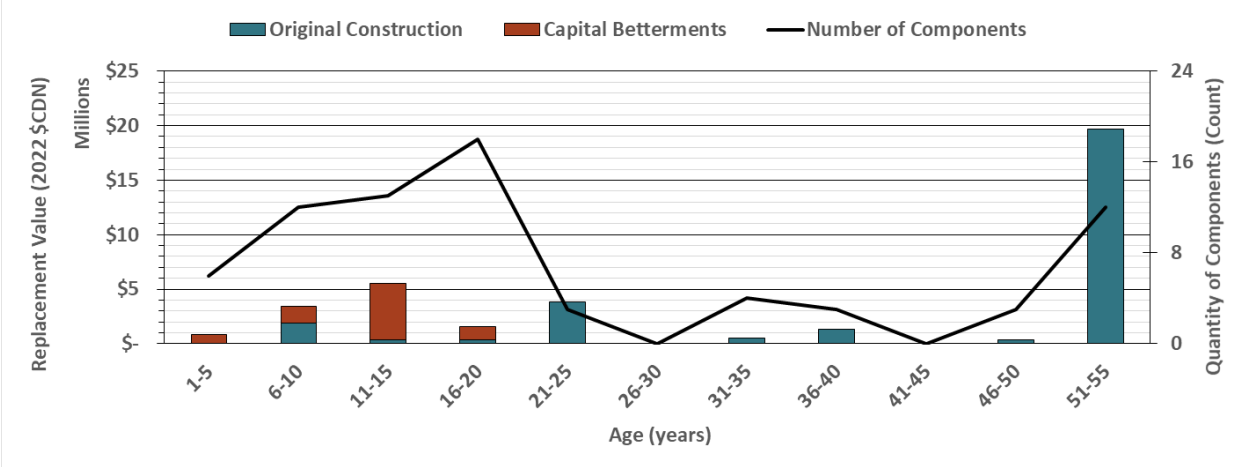


Figure 4-3: Average Age of Water Building Components

4.1.2.3 Expected Useful Life

For the water building assets, expected useful life was assigned at the building component level to reflect the complexity and variation in lifespan of the different building systems. The typical expected useful life for each building component type was assigned by the Municipality and used to determine approximate replacement timing of assets. **Table 4-8** provides the typical useful life applied to each building component.

Table 4-8: Expected Useful Life of Water Building Components

Building Component Type	Expected Useful Life (Years)
Electrical	15
Mechanical	20
Structural	50
Mixing system - Mechanical	15
Mixing system – Structural	50
Civil/Architectural	25
Electrical Processes	15
Instrumentation	10
Mechanical Equipment	20
Process Piping	25 to 52
Single Asset	25

Expected useful life for each asset may be modified based on individual characteristics and differences in timing between the asset construction and acquisition date. The values presented in **Table 4-8** are typical of most assets owned by the Municipality.

The expected useful life for a building asset is determined as an average of the expected useful life of each of its components.

4.2 Condition – Water

Condition of the water network was determined through a deterioration model, which estimates an asset condition based on the age and construction material of the segment. The condition rating is estimated based on deterioration curves customized to the material and useful life of pipe materials at the Municipality.

4.2.1 Linear Water Assets

A summary of the average condition of watermain assets, weighted by length of pipe, is included in **Table 4-9**. The condition is reported on a scale of 0 to 100, where 100 represents an asset in perfect condition. The average condition of all linear watermain assets (by length) is 91 or Very Good.

Table 4-9: Average Condition of Watermain Assets

Pipe Material	Total Length (m)	Average Condition Score	Average Condition Rating
Asbestos Cement	1,773	85.1	Very Good
Cast Iron	13,216	78.4	Good
Copper	429	98.5	Very Good
Ductile Iron	30,833	89.5	Very Good
HDPE	987	79.8	Good
PE	1,479	87.5	Very Good
PVC	56,066	94.0	Very Good
	92	99.8	
Steel	1,773	85.1	Very Good

4.2.2 Water Building Assets

The condition of the water building assets was determined through desktop assessment. Further information regarding the assessment process is included in **Section 7.4**. A summary of the water building asset components and their assessed condition rating is included in **Table 4-10**. The condition ratings range from Very Good (1) to Very Poor (5) representing like new to failed physical states.

Table 4-10: Condition of Water Building Assets

Building Components per Building Type*	Chlorine Station	Pumphouse	Water Tower	Water Treatment Plant	Well
Electrical	2.0	-	3.2	-	3.0
Mechanical	2.0	-	2.9	-	2.8
Structural	2.0	-	2.0	2.7	3.1
Mixing System – Mechanical	-	-	3.5	-	-
Mixing System – Structural	-	-	3.5	-	-
Civil/Architectural	-	-	-	2.0	-
Electrical Process	-	-	-	2.0	-
Instrumentation	-	-	-	3.0	-
Mechanical Equipment	-	-	-	2.5	-
Process Piping	-	-	-	3.0	-
Single Asset**	-	3.2	-	-	
Average Condition	2.0	3.2	3.0	2.5	3.0

4.3 Current Levels of Service – Water

Levels of service for water assets are outlined in Table 1 of the regulation, O. Reg. 588/17. **Table 4-11** and **Table 4-12** outline the Municipality's current community and technical levels of service for water assets.

Table 4-11: Community Levels of Service - Water

LOS Parameter	Community Levels of Service O.Reg. 588/17 – Qualitative Description	Municipality of Kincardine Community LOS
Scope	Description, which may include maps, of the user groups or areas of the Municipality that are connected to the municipal water system.	The water distribution system provides water service to properties across the Municipality. The extents of the network are shown in **Figure A-2** in Appendix A.
Scope	Description, which may include maps, of the user groups or areas of the Municipality that have fire flow.	Fire flow is only available within the Kincardine and Tiverton water distribution systems. Approximately 1% of the Kincardine system and approximately 26% of the Tiverton system have fire flows less than 40 L/s.
Reliability	Description of boil water advisories and service interruptions.	In 2019, the Municipality experienced two boil water advisories, nine watermain breaks and one service interruption due to construction. In 2020, the Municipality experience zero boil water advisories.

Table 4-12: Technical Levels of Service – Water

LOS Parameter	Community Levels of Service O.Reg. 588/17 – Technical Metrics	Municipality of Kincardine Community LOS
Scope	Percentage of properties connected to the municipal water system.	The percentage of properties within the Municipality with connection to the municipal water system is 80%. This is based on 4,499 metered customers throughout the Kincardine, Tiverton, Armow, Scott Point, Underwood and BEC distribution systems (as of November 2019).
Scope	Percentage of properties where fire flow is available.	The percentage of properties within the Municipality where fire flow is available is 75%.
Reliability	The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system.	There were two boil water advisories in 2019: • March 31 to April 2, 2019 (3 days) • September 10 to 12, 2019 (3 days) This equates to a total of 6 days compared to the 4,499 properties connected to the water distribution systems. There were no boil water advisories in 2020.
Reliability	The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system.	In 2019, there were 9 watermain breaks (2 category 2's and 7 category 1's) equating to a total of 7 days of service interruption per year, compared to the 4,499 properties connected to the water distribution systems.

4.4 Current Performance – Water

Asset performance measures were determined in consultation with the Municipality, which provide relevant metrics against which the Municipality can gauge the performance of their assets. The performance measures for the water network, and their current values are shown in **Table 4-13**.

Table 4-13: Performance Measures – Water

Asset Performances Measure	Current Value
Number of annual non-compliances	In 2020, the number of annual non-compliances were 7
Cost efficiency (operating cost to provide service – $/household for water services)	$806.66 per household to provide water services
Number of watermain breaks and repair time	In 2020, there were 7 watermain breaks with average repair time of 4 hours.
Service interruptions (duration and number of users impacted)	In 2020, 8 service interruptions impacting 66 customers.

4.5 Risk Assessment – Water

The risk ratings for the distribution network included watermains and related facilities, following the risk methodology and approach, presented in **Section 1.3**. The risk profile for watermains is shown in **Figure 4-4** and for related facilities is **Figure 4-5**.

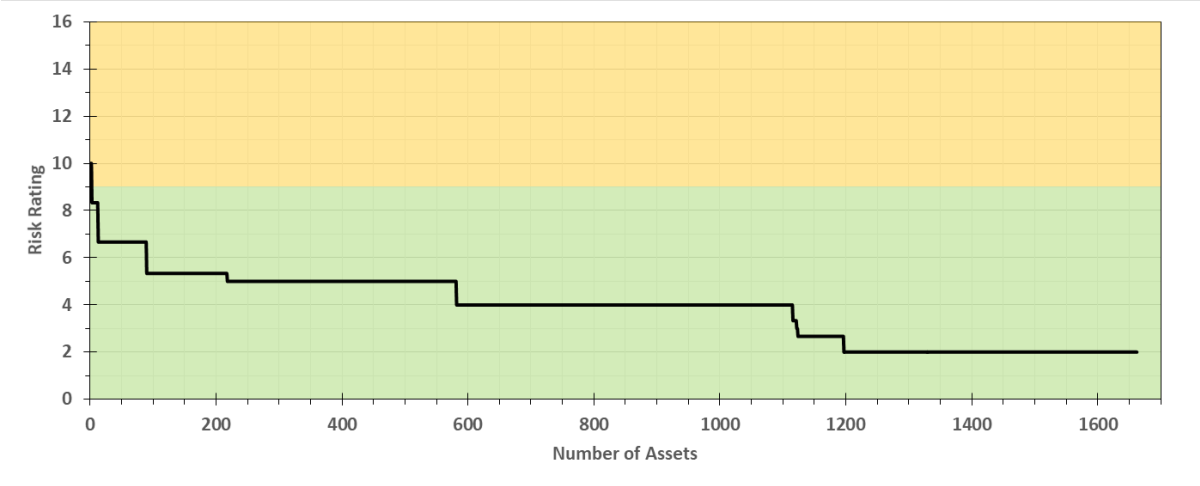


Figure 4-4: Watermain Risk Profile

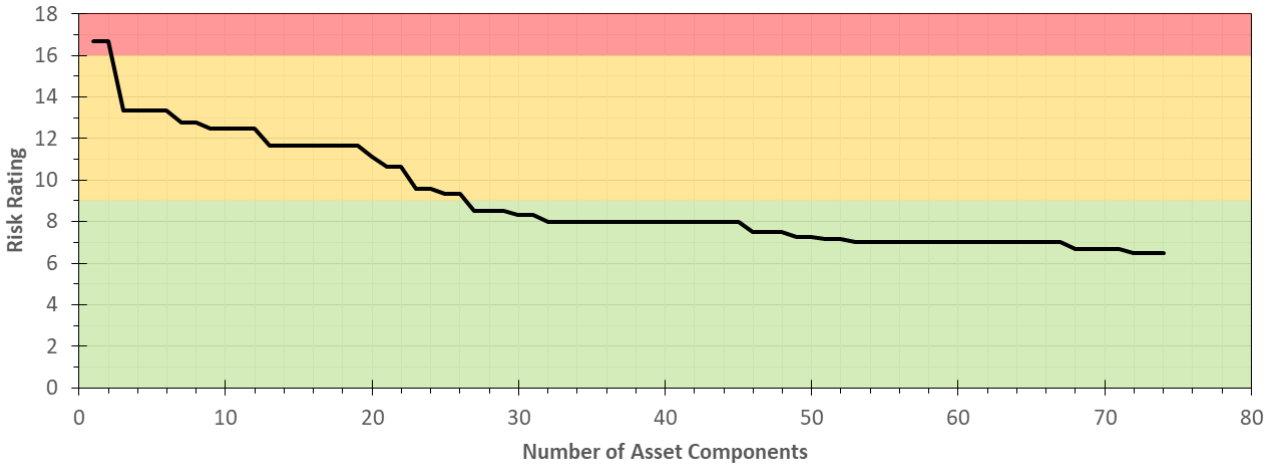


Figure 4-5: Water Related Facilities Risk Profile

Figure 4-4 shows only two water main segments were identified with the moderate risk rating (10) representing approximately 800 meters of the water main network (less than 1%).. All other water main segments were classified within the Low risk category.

It is important to highlight the intake for the Durham St Water Treatment Plant was identified as a Moderate risk due to input from staff on potential decreases in lake level caused by climate change which could disrupt service of this high importance asset.

Figure 4-5 shows two facility components identified with the highest risk rating (16.7). A total of 22 (30%) building components were identified with risk scores between 9 and 16 and are considered moderate priority.

It is important to highlight that the risk rating is used to inform the capital plan and the development of the capital plan takes into account other factors in addition to risk rating, such as scheduling, accessibility during construction and availability of funding.

Other criteria used to prioritize work are:

- Planned road work or replacement;
- Development and changes in water service demands;
- Community benefits; and
- Project readiness.

4.5.1 Performance

Performance of water distribution network assets was determined through consultation with municipal staff and facility operators. For assets where no performance issues were noted it was assumed the systems were Always Reliable.

Facility component performance data was collected from operations staff as a desktop exercise based on their understanding and experience of facility component reliability and performance.

4.5.2 Importance

Importance of water distribution mains and facilities was determined in consultation with the municipal staff, as described in **Section 1.3.3**. An importance ranking criteria was applied to all water mains as described in **Table 4-14**. High importance assets were generally in Kincardine's urban center or serving essential infrastructure. Water treatment and distribution related facilities were identified as High importance by municipal staff.

Table 4-14: Importance Rating – Water

Importance Rating	Description
High (3)	• Located in main business area/urban center and greater than 10 metres in length. • Servicing emergency service facility. • Directly upstream or downstream of water treatment or distribution related facility. • Directly connected to fire hydrant.
Moderate (2)	• Community/residential distribution mains greater than 10 metres in length.
Low (1)	• Community/residential distribution mains less than 10 metres in length.

4.6 Lifecycle Activities – Water

The following section describes the lifecycle activities that can be implemented within the asset management strategy for water assets. The water assets includes linear and vertical assets, lifecycle activities for each presented separately. The lifecycle activities for water assets include construction, maintenance, renewal, and decommissioning/ disposal.

4.6.1 Linear Water Assets

Construction Activities

Construction of new assets is recommended to be in line with recommendations as part of growth, master plan, or other municipal strategies. The design of the new assets should be consistent with jurisdictional design requirements, including provincial design guidelines and local requirements. New construction of assets will occur where no previous water servicing is available. The risk associated with new construction includes the high cost of brand new assets relative to ability to recoup costs through user rates or development charges.

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 growth usage projections.

Maintenance Activities

Maintenance activities are undertaken on the assets throughout their useful life to maintain their operating condition and performance. Maintenance works includes routine maintenance (flushing, cleaning), and minor repairs to assets (localized pipe repair, appurtenance repair). There exists the risk that a maintenance activity may be implemented that does not adequately mitigate a performance or condition issue, and additional costs are then required for further repair or replacement.

Renewal Activities

Renewal of the watermain assets can include pipe lining (structural, semi-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.

A renewal activity specific to ductile iron pipes is the implementation of cathodic protection. This can act to prevent corrosion of the watermain, prolonging the lifespan. Risks associated with these renewal activities include the improper installation of the renewal works, or continued/advanced deterioration of the original watermain such that the renewal works do not perform as expected.

Operating and Decommissioning Activities

Operating activities for the watermain assets include those activities that do not directly deal with the physical state of the watermains, but work to extend the asset's useful life. The operating activities can include non-infrastructure policies, and monitoring/ inspection of the assets. Condition assessment of watermain pipes is challenging to achieve. It is recommended that reactive maintenance works (watermain repairs, etc.) be reviewed and tracked such that they can provide additional information to the Municipality regarding condition of the pipe segments (beyond the theoretical condition determined through age of pipe and deterioration rate). Operating activities can be used throughout the useful life of an asset.

Decommissioning of the watermain assets includes abandonment or replacement of the asset at the end of its useful life. Removal of the expended asset can provide additional space for new underground assets to be constructed within a right-of-way.

4.6.2 Water Building Assets

The lifecycle activities for the vertical (building) assets will be generally consistent with those expected for general municipal buildings presented in **Section 7.6**, which includes:

Construction

- Beginning of an asset's lifecycle. To be constructed to adhere to applicable standards and codes.

Maintenance

- Types of maintenance include preventative, reactive and major maintenance. These activities are to be done on a routine basis to retain good condition and performance of the assets, and in response to issue or fault in a component or building asset. Maintenance activities will be undertaken throughout the lifecycle of the asset.

Renewal

- Addition to or update of existing building component(s) to achieve modernization, compliance with updated codes and requirements, and/or to suit changes to services provided.

Decommissioning/ Disposal

- Removal from service of a building asset or component. Disposal can be through decommissioning or sale. Activities should comply with applicable health, safety and environmental protocols.

As the water building assets are specialized for treatment and distribution services, there are additional factors that must be considered:

- Water treatment and distribution facilities are highly regulated. Any and all lifecycle activities undertaken must be done in compliance with codes and regulations.
- Expansion of existing facilities may be required for additional water treatment and distribution capacity as a result of growth. Expansion activities may encompass multiple lifecycle stages, such as construction for additional infrastructure required, and renewal for expansion of existing infrastructure such as the treatment facility.

Additional detail for the expected lifecycle activities can be found in **Section 7.6** (Lifecycle Activities – Buildings).

4.7 Asset Management Strategy – Water

4.7.1 Linear Assets

The asset management strategy for the water assets in the Municipality 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 (sanitary, storm or roadworks);
- Expansion requirements; and
- Maintenance frequency and type.

As the Municipality continues to age and develop, 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 assets deterioration. **Figure 4-6** 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.

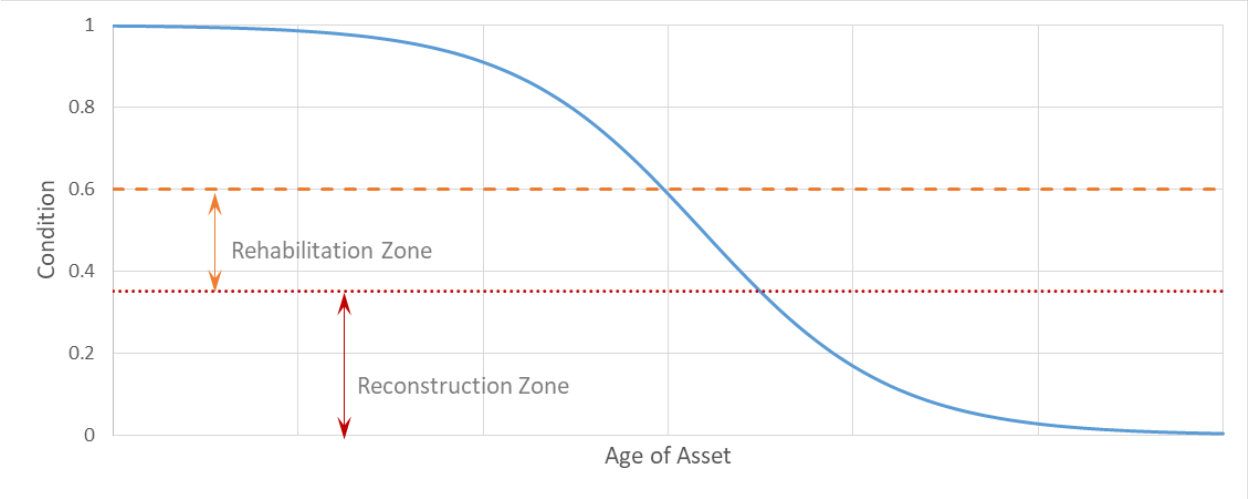


Figure 4-6: Deterioration of Watermain Assets and Lifecycle Activity Opportunities

The condition of an asset, a major factor in the asset management strategy, should be established to assist in decision making. Due to the difficulty in undertaking visual inspection of a watermain, the Municipality should monitor the expected condition of the pipes, based on the age and tracking of maintenance activities completed for each segment.

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 pipe segment. Because of the non-intrusive nature of conducting relining, it can be done on an individual pipe segment at a time, or to localized repairs.

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 Municipality should follow best practices and local design guidelines when designing the reconstruction works. Assets at the end of their useful life should be abandoned in place or removed.

A summary of the watermain condition and associated lifecycle activity is provided in **Table 4-15**.

Table 4-15: Watermain Lifecycle Activities and Condition Ranges

Condition Range	Lifecycle Activity Category	Lifecycle Activity
1.0 to 0.60	Maintenance	Maintenance Works (cleaning, flushing) Small pipe section repairs
0.60 to 0.35	Rehabilitation	Localized repairs Structural relining
0.35 to 0.0	Reconstruction	Pipe replacement or abandonment

Current best practices suggest that that reconstruction and new construction works on the assets will be done using PVC material for all pipe diameters.

The current level of service being provided in water service delivery is generally a high average condition of the assets (resulting in low service interruptions and boil water advisories), and treatment quality within the C of A limits. To maintain these LOS values, the Municipality's strategy should continue to maintain a very good condition of the linear assets.

4.7.2 Water Building Assets

The asset management strategy for water building assets seeks to maximize the useful life and economy of each asset, using the lifecycle activities. The strategy is generally consistent with what is recommended for buildings, as detailed in **Section 7.6**.

The primary drivers of lifecycle activities for these assets is the condition and service delivery requirements. The Municipal water building assets are complex, the componentry for which are expected to have differing rates of degradation and expected useful lives. As such, lifecycle activities will be required to be implemented at varied frequency and timelines.

The expected useful life of the asset components should be used to approximate the timing and frequency of lifecycle activities, however this should be refined by undertaking detailed condition assessment of the buildings for an understanding of the actual condition of the assets.

A maintenance schedule and forecast of asset improvements should be based on this detailed review, which should be updated at a frequency suitable to the Municipality, suggested to be every five years. If it is not possible to complete the condition assessment of all buildings in the near term, 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.

In preparing a building condition assessment program, the Municipality may engage Municipal staff or third-party consultant for assessment. The approach should consider the capabilities of the intended assessor, and level of detail required. A hybrid approach can be utilized that engages a consultant for assessment of critical assets or more objective data collection.

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.

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.

Works should also be undertaken as required to maintain the treatment efficiency and capacity to meet regulations and user requirements.

The current level of service being provided in water service delivery is generally a high average condition of the assets (resulting in low service interruptions and boil water advisories), and treatment quality within the C of A limits. To maintain these LOS values, the Municipality's strategy should continue to maintain the condition of the water building assets, and provide upgrades and replacements according to projections to retain quality and quantity of treatment capacity.

4.7.3 Scenario Analysis

4.7.3.1 Linear Assets

To understand the needs and projected works on the linear watermain assets within a 20-year outlook, replacement activities were reviewed under varying budget values to understand the impact on overall asset condition. The budgets 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. 2% of network value – Best practice of investment;
4. 4% of network value – Best practice of investment; and
5. 2016 AMP Funding Level – Analysis of the funding level as provided within the 2016 AMP.

A multi-year projection scenario was run using the budgets noted above. The results of the varying scenarios indicated reconstruction works identified during a 20-year timeframe. A summary of the analysis is outlined in **Table 4-15** below.

Table 4-16: Budgets Reviewed for Water Work Projections

Scenario	Budget Scenarios	Annual Value	Average Annual Investment over Timeframe	Total Investment over Timeframe	Average Condition Index (End of Timeframe)
1	Unlimited budget	Unlimited	$902,294	$18,045,900	0.79
2	No budget	$ -	$ -	$ -	0.72
3	2% of network value	$2,181,000	$712,218	$14,244,400	0.79
4	4% of network value	$4,361,000	$821,232	$16,424,600	0.79
5	2016 AMP Funding Level	$1,917,000	$699,044	$13,980,900	0.79

Best practice recommends maintaining an average condition index of 0.6 across the system. Note that the overall condition of the assets is such that through all scenarios, including the 'no budget' scenario with zero annual spending, after the 20 year timeframe the average condition would be within the acceptable range, however some assets would likely degrade to failure.

Using the unlimited budget scenario to determine immediate needs on the network, only $27,292 in needs were found for the initial year, with no other needs identified within the first nine years. Needs are incurred in nearly each year of the subsequent 11 years in the plan. The average investment over the 20 year timeframe is $902,294, an annual expenditure lower than the allowable annual maximum considered within all of the scenarios reviewed as part of this analysis. At the end of the 20 year projection, through all scenarios, the average condition index of the linear water assets declines however remains in Good condition. Based on these results, the Municipality can proceed with maintaining the recommended 2016 AMP funding level for management of the linear water assets, the analysis results for which are shown in **Figure 4-7.**

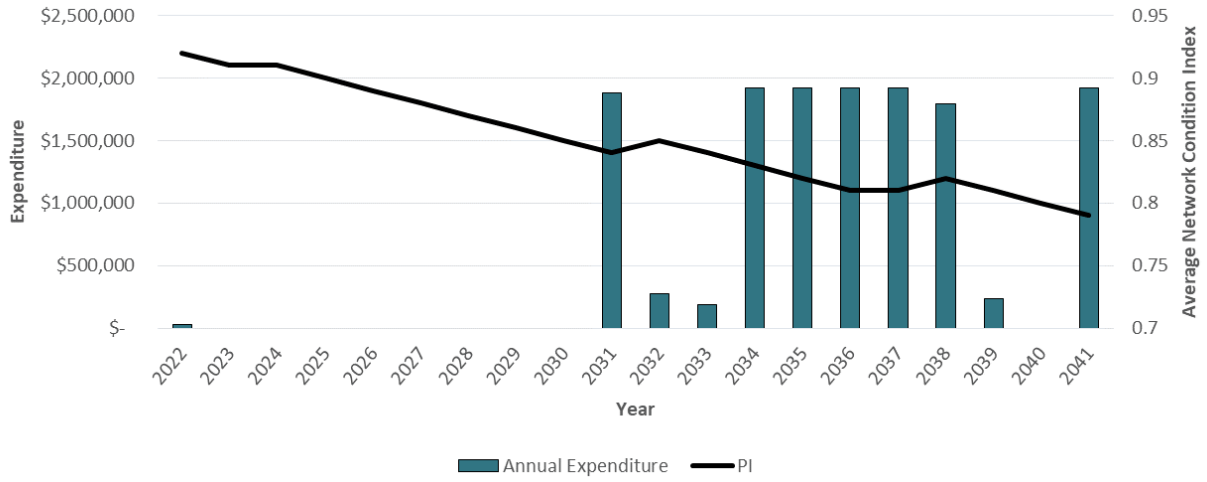


Figure 4-7: Investment and Condition Index with 2016 AMP Funding Level (Scenario 5)

We note that the above investment is based on the expected useful life of the asset, assuming that lifecycle activities are implemented as required and construction is undertaken appropriately such that the expected lifespan of the asset can be realized. There may be cases in practice where due to field conditions, the full lifecycle of the asset cannot be realized, and therefore earlier need for replacement may be required.

At the end of the timeframe, the average condition rating drops just below the 'Very Good' threshold into the 'Good' range. Because of the age and lifespan of the assets, and the condition index at which works are triggered, there

Because the majority of assets are still within the first half of their lifecycle, the average overall condition of the system will continue to deteriorate with the assets, however the majority of assets will not reach the threshold for implementation of works, therefore the overall condition

can continue to decrease without need for intervention. The result of this is by the end of the current proposed level of service time range (end of 2031), the condition of the assets will be less than the 2019 condition, however it is expected to still be in the 'Good' range (at an estimated 0.84) and will still be likely to provide sufficient service delivery.

4.7.3.2 Water Building Assets

In the absence of engineering condition assessments the capital forecasts provided by the Municipality for 2020 to 2024 (**Table 4-16**) were used to estimate the proposed works. Based on the data Kincardine has planned to invest approximately $3.2 million over the 2020 to 2024 period, which represents an average annual investment of 2% of the total replacement cost for water building assets, in alignment with industry standards for annual capital investment. It is recommended that the Municipality continue to use this standard practice for future capital investment planning in the short term. It is recommended that a program for regular condition inspections by professional service providers be implemented to provide additional detail and guide the planned capital investment into building asset investment.

Table 4-17: Capital Forecast 2020 to 2024

	2020*	2021	2022	2023	2024	TOTAL
Forecasted Capital Budget	$ 2,699,000	$ 520,000	$ -	$ -	$ -	$ 3,219,000
% of Replacement Value	10%	2%	0%	0%	0%	2%

*Note: 2020 includes carry forward investments. It is assumed planned investments will occur in the year as indicated.

4.8 Proposed Levels of Service – Water

The current levels of service established in 2019 are to be maintained as the proposed levels of service through the year 2031, per resolution by Council. It is recommended that the Municipality continue to monitor levels of service being provided by water assets on an annual basis to monitor and adjust proposed levels of service accordingly in the future.

5.0 Wastewater

5.1 State of Local Infrastructure

The Municipality owns and operates a wastewater collection and treatment system, containing linear mains and appurtenances, and buildings that facilitate wastewater treatment and collection. A summary of the quantity of linear assets and appurtenances within the network is provided in **Table 5-1**.

Table 5-1: Wastewater Asset Quantity Summary

Asset Type	Quantity of Assets	Unit of Measure	Length
Wastewater Mains (Gravity)	1,051	Length (m)	68,257 m
Wastewater Forcemain Pipes	73	Length (m)	18,439 m
Wastewater Curbstops	31	Quantity	-
Wastewater Grinder Lines	51	Length (m)	2,004 m
Wastewater Laterals	3,852	Length (m)	38,630 m
Wastewater Manholes	942	Quantity	-
Wastewater Valves	11	Quantity	-
Wastewater Valve Chambers	37	Quantity	-
Wastewater Meters	3	Quantity	-
Sanitary Cleanouts	25	Quantity	-
Lagoons	621,000	Volume (m^3)	-

As previously discussed within **Section 1.1**, according to the asset hierarchy, the analysis within this report will be limited to 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.

5.1.1 Linear Wastewater Assets

The linear assets (sanitary sewer mains) are constructed of varying materials. A summary of the length of the assets of each material is in **Table 5-2**.

Table 5-2: Material Types of Sanitary Sewer Mains

Material Type	Total Length (m)	Percentage of System
Asbestos cement	31,596	36%
Ductile Iron	1,365	2%
HDPE	3,113	4%
PE	1,312	2%
PVC	49,309	57%

For the analysis of the overall state of the sewer networks, we have included each asset individually, and have not done any grouping according to type, location or connectivity.

5.1.1.1 Replacement Cost

Replacement costs for the sanitary sewer linear assets were determined based on recent tender information and product information. The replacement costs, in 2022 dollars, include costs necessary for full reconstruction of a segment, including trench and surface restoration. It is assumed that reconstruction works will be done using PVC piping for pipes that are 400 mm in diameter or less, and concrete piping for sizes larger than 400 mm diameter. The reconstruction costs are shown in **Table 5-3**.

Table 5-3: Replacement Costs for Sanitary Sewer

Pipe Material	Pipe Diameter (mm)	Reconstruction Unit Cost ($/m)
PVC	Up to 250 mm	$1,400
PVC	251mm – 400 mm	$1,400
Concrete	Over 400 mm	$1,750

Using the units costs provided in **Table 5-3**, the total replacement costs for sanitary sewer linear assets can be determined. The total replacement costs for Kincardine's sanitary sewer linear assets is $125,316,000. This value does not include the replacements costs for buildings within the wastewater asset category. Replacements costs for wastewater building assets are outlined in **Section 5.1.2.1** of this report.

5.1.1.2 Average Age

Wastewater gravity mains and forcemains have an average age by length of 33 and 31 years, respectively, and an overall average age by length of just under 33 years. A summary of the age distribution for sanitary sewer assets is shown in **Figure 5-1.**

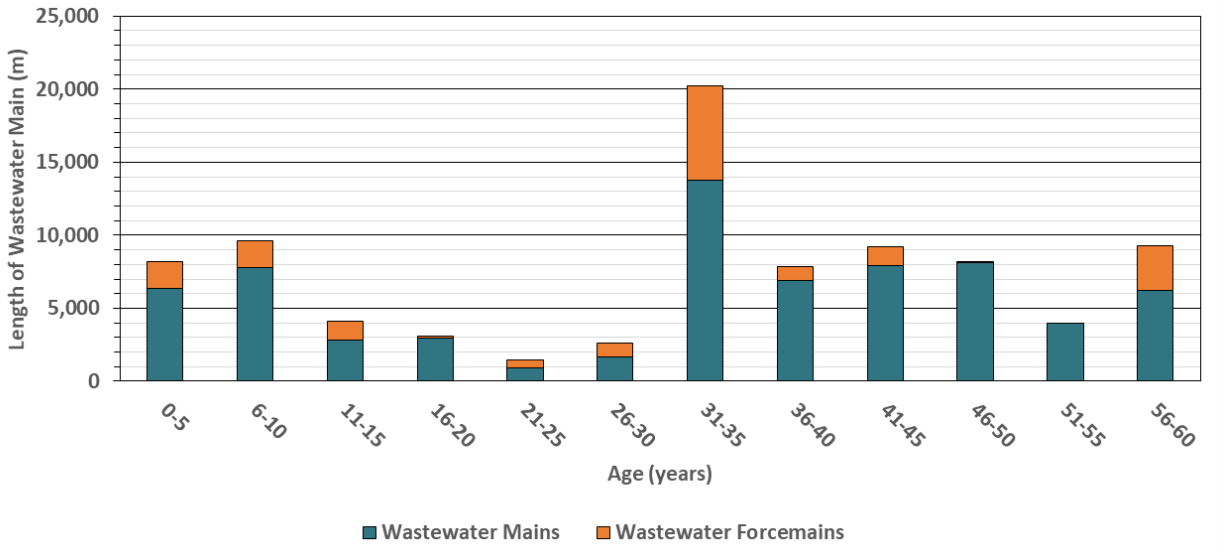


Figure 5-1: Age Distribution of Linear Sanitary Sewer Assets

The Municipality also tracks the age of the appurtenances of the other assets. The age distribution of the wastewater assets (linear and appurtenances) is shown in **Figures 5-2 and 5-3.**

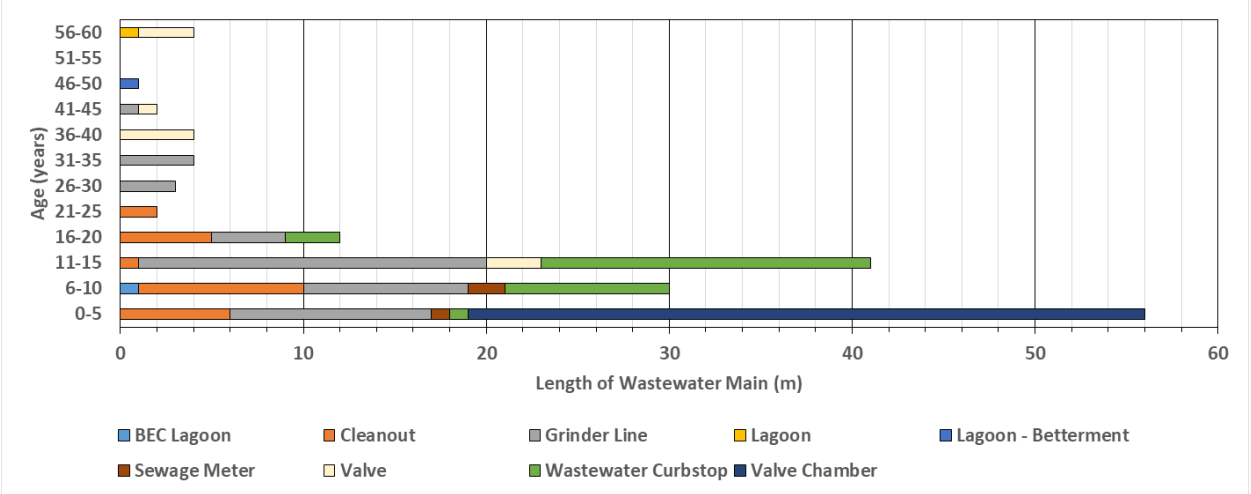


Figure 5-2: Age Distribution of Sanitary Sewer Assets & Appurtenances

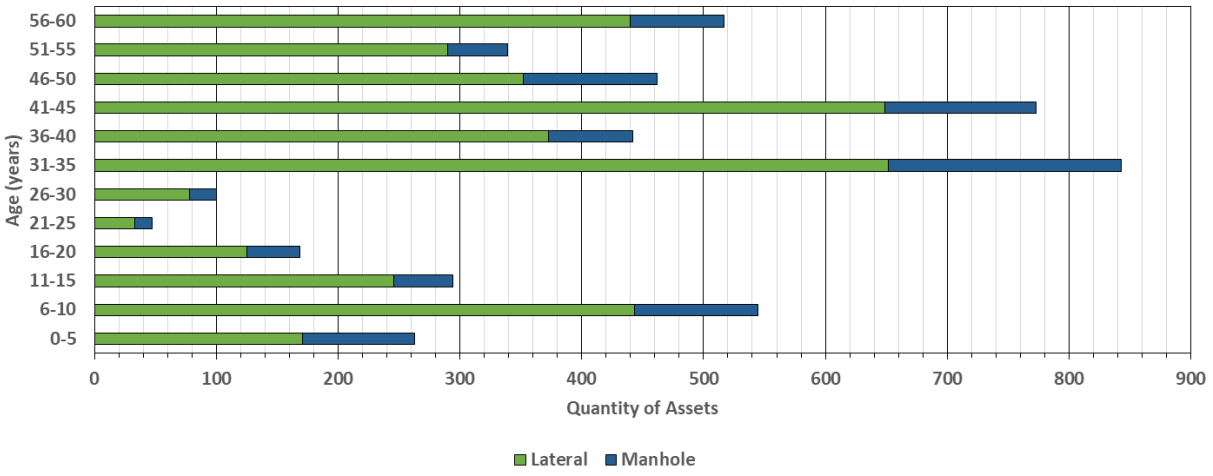


Figure 5-3: Age Distribution of Sanitary Sewer Laterals and Maintenance Holes

5.1.1.3 Expected Useful Life

The expected useful life of the sewer assets is used to estimate the replacement schedule. The expected useful life values for each type of sewer material within the network were provided and confirmed by the Municipality, and are consistent with 2010 PSAB 3150 values. The expected useful lives are summarized in **Table 5-4**.

Table 5-4: Useful Life for Sanitary Pipe Materials

Pipe Material Type	Useful Life (years)
HDPE	60
PVC	60
AC	80
PE	60
Ductile Iron	70

As data continues to be available regarding useful life of the sanitary sewer construction materials, these values can be reviewed and updated as appropriate.

5.1.2 Wastewater Building Assets

In addition to the linear sanitary sewer assets, the wastewater system includes ancillary assets that facilitate treatment and collection services, summarized in **Table 5-5**.

Table 5-5: Wastewater Building and Facility Assets

Building Name	Building Type
Bruce Energy Centre (BEC) Wastewater Plant	Wastewater Treatment Plant
Chlorine Station	Wastewater Treatment Plant
Connaught Park Lift Station	Lift Station
Durham Street Lift Station	Lift Station
Goderich Street Pumping Station	Pumping Station
Harbour Street Lift Station	Lift Station
Hunter's Ridge Lift Station	Lift Station
Huron Terrace Pumping Station	Pumping Station
Inverhuron Park Pumping Station (Bldg only)	Pumping Station
Inverhuron Pumping Station	Pumping Station
Kincardine Ave. Pumping Station	Pumping Station
Kincardine Wastewater Treatment Plant (WWTP)	Wastewater Treatment Plant
King Street Lift Station	Lift Station
Maple Street Pumping Station	Pumping Station
MCR Office Complex	Pumping Station
Park Street Pumping Station	Pumping Station
Queen Street Lift Station	Lift Station
UV Disinfection Shelter	Wastewater Treatment Plant

The building assets are complex, and include multiple components. Each of the listed sanitary sewer building assets contains electrical, mechanical, structural components, and the wastewater treatment plant containing one single asset (where no componentry is identified).

5.1.2.1 Replacement Cost

Replacement costs were also calculated for the wastewater building assets, summarized by type of building asset in **Table 5-6** below. These costs were determined using historical cost of the building, inflated by 3% annually since the in-service date.

Table 5-6: Wastewater Number of Building Components and Asset Replacement Costs

Building Component	Lift Station	Pump Station	Wastewater Treatment Plant
Electrical	6	7	4
Mechanical	6	9	5

Building Component	Lift Station	Pump Station	Wastewater Treatment Plant
Structural	6	9	4
Single Asset**	-	-	1
Count of Facilities	6	8	2
Current Replacement Cost	**$ 1,771,000**	**$3,746,700**	**$36,510,100**

**Single Asset building component represents assets where building components where not clearly identifiable and the associated costs could not easily be disaggregated.

The total replacements costs for wastewater building assets is $42,027,800.

5.1.2.2 Average Age

Wastewater treatment lagoons at the Kincardine Wastewater Treatment Plant (constructed in 1963) and BEC Wastewater Treated Plant have an average age of 38 years, which includes betterment works completed to the Kincardine lagoons in 1976. **Table 5-7** summarizes the average age of each lagoon.

Table 5-7: Average Age of Wastewater Lagoon Assets

Wastewater Treatment Lagoon	Average Age (years)
BEC Wastewater Treatment Plant	32
Kincardine Wastewater Treatment Plant	52.5*

The average age for each wastewater building type is determined as the average age of all components. **Table 5-8** provides the average age for each building type for wastewater buildings.

Table 5-8: Average Age of Wastewater Building Assets

Building Type	Average Age (years)
Lift Station	23
Pumping Station	30
Wastewater Treatment Plant	22.1

The age of each component within the wastewater buildings is tracked, which provides a different perspective on the age of the buildings. The distribution of the components age is shown in **Figure 5-4**.

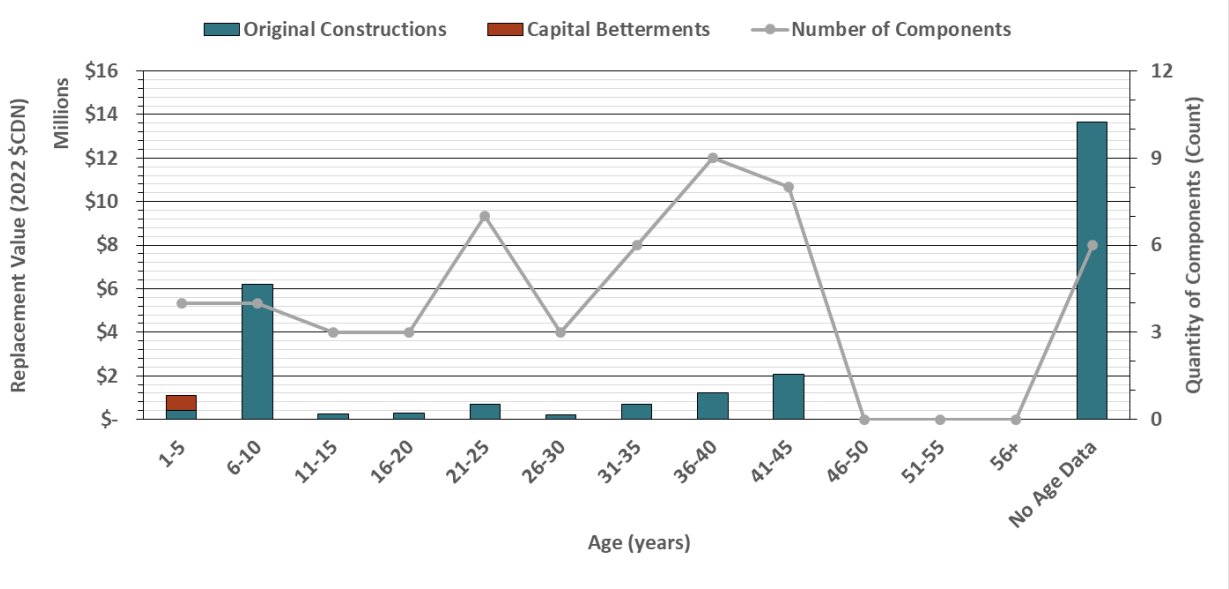


Figure 5-4: Age Distribution of Wastewater Building Asset Components

Building components at the Kincardine Wastewater Treatment plant were not included in the asset data and age information was not available. The Kincardine Wastewater treatment plant has an estimated replacement value of $14,470,900 (including the lagoon) and ten building components.

5.1.2.3 Expected Useful Life

For the wastewater building assets, expected useful life was assigned at the building component level to reflect the complexity and variation in lifespan of the different building systems. The typical expected useful life for each building component type was assigned by the Municipality and used to determine approximate replacement timing of assets. **Table 5-9** provides the typical useful life applied to each building component.

Table 5-9: Expected Useful Life of Wastewater Building Asset Components

Building Component Type	Expected Useful Life (Years)
Electrical	12
Mechanical	21
Structural	50
Single Asset	30

Expected useful life for each asset may be modified based on individual characteristics and differences in timing between the asset construction and acquisition date. The values presented in **Table 5-9** are typical of most assets owned by the Municipality. The expected useful life for a

building asset is determined as an average of the expected useful life of each of its components.

5.2 Condition – Wastewater

Condition of the sanitary sewer network was determined through a deterioration model, which estimates an asset condition based on the age and construction material of the segment. The condition rating is estimated based on deterioration curves customized to the material and useful life of pipe materials at the Municipality.

A summary of the average condition of sanitary sewer assets, weighted by length of pipe, is included in **Table 5-10**. The condition is reported on a scale of 0 to 100, where 100 represents an asset in perfect condition. The average condition score of all linear sanitary sewer assets (weighted by length) is 92 (very good).

Table 5-10: Average Condition of Sanitary Sewer Pipe Assets

Pipe Material	Total Length (m)	Average Condition Score	Condition Rating
AC <= 250mm	25,018	88	Very Good
AC > 400mm	2,909	93	Very Good
AC 251 to 400mm	3,693	81	Very Good
Ductile Iron 251 to 400mm	1,365	87	Very Good
HDPE <= 250mm	3,113	98	Very Good
PE <= 250mm	1,298	89	Very Good
PE 251 to 400mm	14	85	Very Good
PVC <= 250mm	36,707	94	Very Good
PVC >400mm	3,876	99	Very Good
PVC 251 to 400mm	9,821	95	Very Good

The condition of the wastewater building assets was determined through desktop assessment by municipal staff. Further information regarding the assessment process is included in **Section 7.4**. A summary of the wastewater building asset components and their assessed condition rating is included in **Table 5-11**. The condition ratings range from Very Good (1) to Very Poor (5) representing like new to failed physical states.

Table 5-11: Condition of Sanitary Sewer Building Assets

Building Component	Lift Station	Pump Station	Wastewater Treatment Plant
Electrical	2.7	3.2	3.0
Mechanical	2.6	2.9	3.0
Structural	2.3	2.6	3.1
Single Asset	-	-	2.7
Average Condition	2.5	2.9	3.1

5.3 Current Levels of Service – Wastewater

Levels of service for wastewater assets are outlined in Table 2 of the regulation, O. Reg. 588/17. **Table 5-12** and **Table 5-15** outline the Municipality's current community and technical levels of service for wastewater assets.

Table 5-12: Wastewater – Community Level of Service

LOS Parameter	Community Levels of Service O.Reg. 588/17 – Qualitative Description	Community LOS
Scope	Description, which may include maps, of the user groups or areas of the Municipality that are connected to the municipal wastewater system.	The Municipality provides wastewater collection and treatment services for properties, primarily located in the urban and semi-urban settings. A map showing the areas connected to the wastewater system is in **Figure A-3** in Appendix A.
Reliability	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes.	The Municipality's sanitary sewer system does not include any combined segments.
Reliability	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches.	The Municipality's sanitary sewer system does not include any combined segments.
Reliability	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes.	Storm water has the potential to enter into the municipal sanitary sewer system through multiple points of entry, including: • Direct connections from properties, including roof leaders, sump pumps, etc. • Inflow and infiltration within manholes and damaged pipes and joints.

LOS Parameter	Community Levels of Service O.Reg. 588/17 – Qualitative Description	Community LOS
Reliability	Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described in paragraph 3.	Resiliency in the sanitary sewer system, in the event that inflow of stormwater occurs, is created through: • Prohibition of discharging of stormwater into the sanitary sewer under the Kincardine Sewer Use By-Law (By-Law No. 2016 – 128) • Municipal Development and Servicing Guidelines, which provide minimum sizing and design standards for sanitary sewer infrastructure (BM Ross, 2017).
Reliability	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system.	The Municipality reports annually on performance of the wastewater treatment system, including description of the effluent discharged from the sewage treatment plants. **Table 5-13** describes the volume of effluent flow from 2015-2020, as noted within the 2019 and 2020 Annual Performance Reports. The quality parameters of the effluent are also tracked, and are summarized in **Table 5-14**. The source of the table is from the 2019 and 2020 Annual Performance Reports.

Table 5-13: Annual Effluent Flow 2015-2020

Year	Kincardine Wastewater Treatment Plant Annual Effluent Flow (m^3)	Bruce Energy Centre (BEC) Lagoon System Annual Effluent Flow (m^3)
2015	833,943	334,402
2016	890,329	256,329
2017	1,099,752	293,758
2018	1,111,004	256,240
2019	1,135,261	300,122
2020	1,108,680	254,770

Table 5-14: Wastewater Effluent Quality Monthly Averages (2019, 2020)

Effluent Parameter	WWTP 2019	WWTP 2020	WWTP C of A Limit	BEC Lagoon System 2019	BEC Lagoon System 2020	BEC Lagoon System C of A Limit
CBOD5 (mg/L)	13.5	15.2	30	5.9	8.2	30
Total Suspended Solids (mg/L)	19.2	24.2	40	9.5	15.1	30
Total Phosphorus (mg/L)	0.21	0.20	1.0	0.25	0.2	1.0
E. coli (monthly geometric mean density)	3	3	200 E. Coli / mL	-	-	-
Total Ammonia (Freezing Period) (mg/L)	-	-	-	4.6	4.3	7.5
Total Ammonia (Non-Freezing Period) (mg/L)	-	-	-	1.3	0.80	15
Total Residual Chlorine (mg/L)	-	-	-	0.2	0.3	0.5
pH	6.9 – 9.2	6.8 – 8.9	6.0 – 9.5	7.6 – 9.4	6.5 – 8.9	6.0 – 9.5

Table 5-15: Wastewater – Technical Level of Service

LOS Parameter	Technical Levels of Service O. Reg. 588/17 – Technical Metrics	Technical LOS
Scope	Percentage of properties connected to the municipal wastewater system.	The percentage of properties in the Municipality with connection to the wastewater system is 74%. This is based on 3,660 billed customers for the Kincardine wastewater system and 534 for the BEC wastewater system (as of November 2019).
Reliability	The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system.	The Municipality's wastewater system does not include any combined sewers.
Reliability	The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system.	The Municipality received complaints of sewer backups or blockages, compared with 4,194 total properties that are connected to the wastewater system as follows:

LOS Parameter	Technical Levels of Service O. Reg. 588/17 – Technical Metrics	Technical LOS
		2019: 12 complaints (equivalent to 0.3% of properties) 2020: 8 complaints (equivalent to 0.2% of properties)
Reliability	The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.	The Municipality experienced: **2019**: 5 by-pass events at the KWWTP (est. vol. 109 m^3) and 2 by-pass/spill events at the BEC Lagoon System (est. vol. 105 m^3), due to heavy precipitation or equipment failure. (Equivalent to 0.2% compared to the 4,194 total properties connected to the municipal wastewater system). **2020**: 1 bypass event at KWWTP (est. vol. 101 m^3) due to heavy precipitation, and 3 bypass events at the Maple St SPS (est. vol. 155 m^3) due to heavy precipitation and snow melt. (Equivalent to 0.2% compared to the 4,194 total properties connected to the municipal wastewater system). The Municipality experienced zero (0) months where effluent quality exceeded C of A limits.

5.4 Current Performance – Wastewater

Asset performance measures were determined in consultation with the Municipality, which provide relevant metrics against which the Municipality can gauge the performance of their assets. The performance measures for Roads, and their current values are shown in **Table 5-16**.

Table 5-16: Wastewater – Performance Measures

Asset Performance Measures	Current Value
Cost efficiency (operating cost to provide service – $/household for wastewater services)	Total wastewater operating of $3.2 million (2019) per 4,194 properties serviced = $761 per household
Number of customers that have experienced a service interruption in the last year (2019)	Sewer lateral blockages/repairs (2019): • On municipal side: five properties • On private property: seven properties
Percentage of wastewater flows that meet environmental objectives when discharged	Wastewater flows which met objectives when discharged: 100% (2019, 2020)

5.5 Risk Assessment – Wastewater

The risk ratings for the wastewater network and facilities was completed for sewer mains and sewer conveyance and treatment facilities following the risk methodology and approach, presented in **Section 1.3**. The risk profile for sanitary sewer mains is shown in **Figure 5-5** and risk profiles for facilities in **Figure 5-6**.

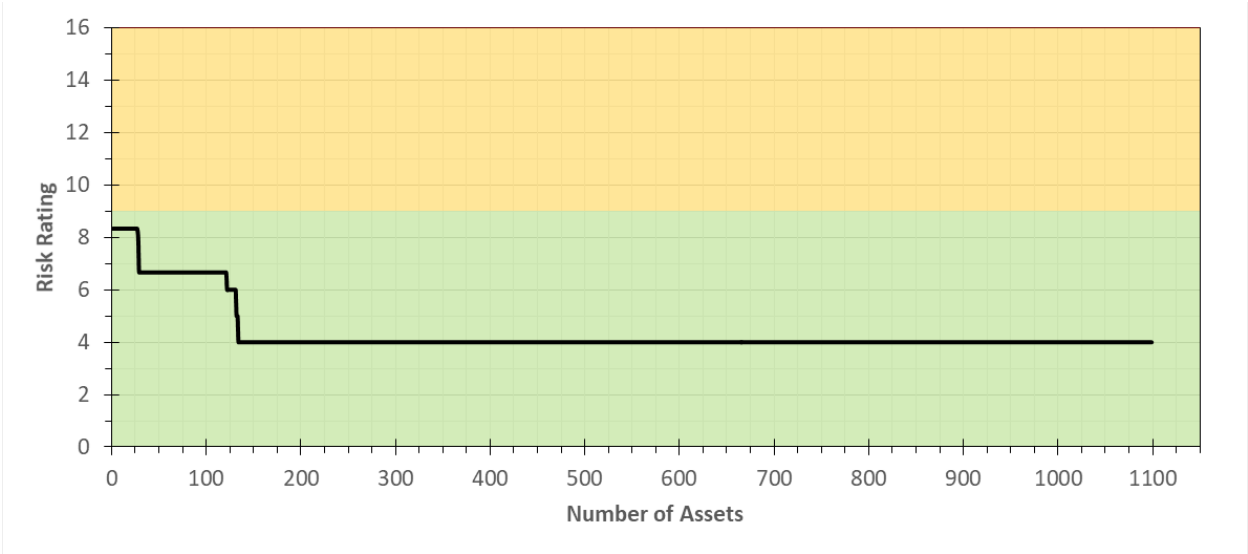


Figure 5-5: Sanitary Sewer Risk Profile

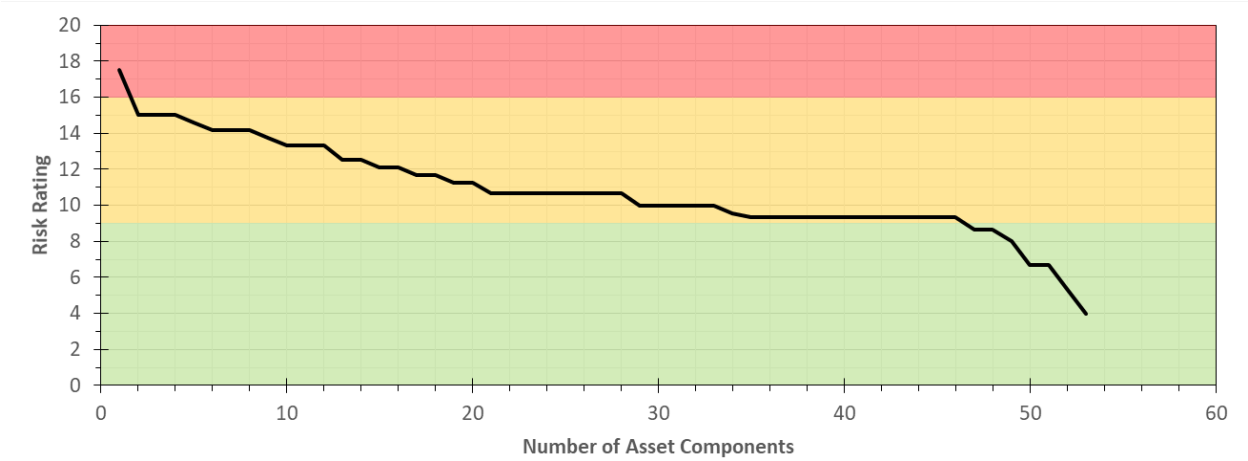


Figure 5-6: Wastewater Facility Risk Profile

All sanitary sewer mains are currently classified as Low risk, receiving risk rating score between 0 and 9. The highest assessed risk rating of 8.33 classifies 27 segments of sanitary sewer pipe, representing 5.2 km of the Sanitary Sewer main network length (6% of the network length).

The majority of wastewater facility components are classified as Moderate risk, with 45 (85%) of facility components receiving a risk rating between 9 and 16. One facility component received a High risk rating and the remaining seven facility components were evaluated as Low risk.

It is important to highlight that the risk rating is used to inform the capital plan and the development of the capital plan takes into account other factors in addition to risk rating, such as scheduling, accessibility during construction and availability of funding.

Other criteria used to prioritize work are:

- Planned road work or replacement;
- Development and changes in wastewater service demands;
- Community benefits; and
- Project readiness.

5.5.1 Performance

Performance of sanitary sewer network assets was determined through consultation with municipal staff and facility operators. For assets where no performance issues were noted it was assumed the systems were Always Reliable.

Facility component performance data was collected from operations staff as a desktop exercise based on their understanding and experience of facility component reliability and performance.

5.5.2 Importance

Sanitary sewer asset importance was determined in consultation with the municipal staff, as described in **Section 1.3**. A high importance rating was applied to all sanitary sewer forcemains and treated effluent outfall gravity mains. A moderate importance was applied to all gravity sanitary sewer mains. A high importance was applied to all wastewater system facilities.

5.6 Lifecycle Activities – Wastewater

The following section describes the lifecycle activities that can be implemented within the asset management strategy for sanitary sewer assets. The sanitary sewer assets includes linear and vertical assets, lifecycle activities for each presented separately. The lifecycle activities for sanitary sewer assets include construction, maintenance, renewal, and decommissioning/disposal.

5.6.1 Linear Assets

In the lifecycle of a sanitary sewer pipe asset, there are multiple activities that can be taken, depending on the asset attributes. The expected lifecycle activities to be used on the Municipality assets are as follows.

Construction Activities

Construction of new assets is recommended to be in line with recommendations as part of growth, master plan, or other municipal strategies. The design of the new assets should be consistent with jurisdictional design requirements, including provincial design guidelines and local requirements. New construction of assets will occur where no previous sanitary servicing is available. The risk associated with new construction includes the high cost of brand new assets relative to ability to recoup costs through user rates or development charges.

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 requirements.

Maintenance Activities

Maintenance activities are undertaken on the assets throughout their useful life to maintain their operating condition and performance. Maintenance works includes routine maintenance (flushing, cleaning), and minor repairs to assets. There exists the risk that a maintenance activity may be implemented that does not adequately mitigate a performance or condition issue, and additional costs are then required for further repair or replacement.

Renewal Activities

Renewal of the sanitary sewer 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 pipe include the improper installation of the pipe or continued deterioration of the original pipe such that the lining does not perform as expected.

Operating and Decommissioning Activities

Operating activities for the sanitary sewer network include those activities that do not directly deal with the physical state of the pipe, but work to extend the assets useful life. The operating activities can include non-infrastructure policies, and monitoring/inspection of the assets. The inspection of sanitary sewer assets can be undertaken through a condition assessment program, recommended to be visual inspection through CCTV or zoom camera means. Usage of the zoom camera technology has the risk of insufficient visual detail to make appropriate activity decisions.

Decommissioning activities of the sanitary sewer assets includes abandonment or replacement of the asset at the end of its useful life. While typically assets are abandoned in place, the removal of the expended asset can provide additional space for new underground assets to be constructed.

5.6.2 Vertical Assets

The lifecycle activities for the vertical (building) assets will be generally consistent with those expected for buildings, including:

Construction

Beginning of an asset's lifecycle. To be constructed to adhere to applicable standards and codes.

Maintenance

Types of maintenance include preventative, reactive and major maintenance. These activities are to be done on a routine basis to retain good condition and performance of the assets, and in response to issue or fault in a component or building asset. Maintenance activities will be undertake throughout the lifecycle of the asset.

Renewal

Addition to or update of existing building component(s) to achieve modernization, compliance with updated codes and requirements, and/or to suit changes to services provided.

Decommissioning/Disposal

Removal from service of a building asset or component. Disposal can be through decommissioning or sale. Activities should comply with applicable health, safety and environmental protocols.

As the sanitary sewer building assets are specialized for treatment and collection services, there are additional factors that must be considered:

- Wastewater treatment and collection facilities are highly regulated. Any and all lifecycle activities undertaken must be done in compliance with codes and regulations; and
- Expansion of existing facilities may be required for additional wastewater treatment and collection capacity as a result of growth. Expansion activities may encompass multiple lifecycle stages, such as construction for additional infrastructure required, and renewal for expansion of existing infrastructure such as the treatment facility.

Additional detail for the expected lifecycle activities can be found in **Section 7.6**.

5.7 Asset Management Strategy – Wastewater

5.7.1 Linear Wastewater Assets

The asset management strategy for the linear wastewater assets in the Municipality 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 be also consider other factors, such as:

- 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.

As the Municipality continues to age and develop, 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 assets deterioration. **Figure 5-7** 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.

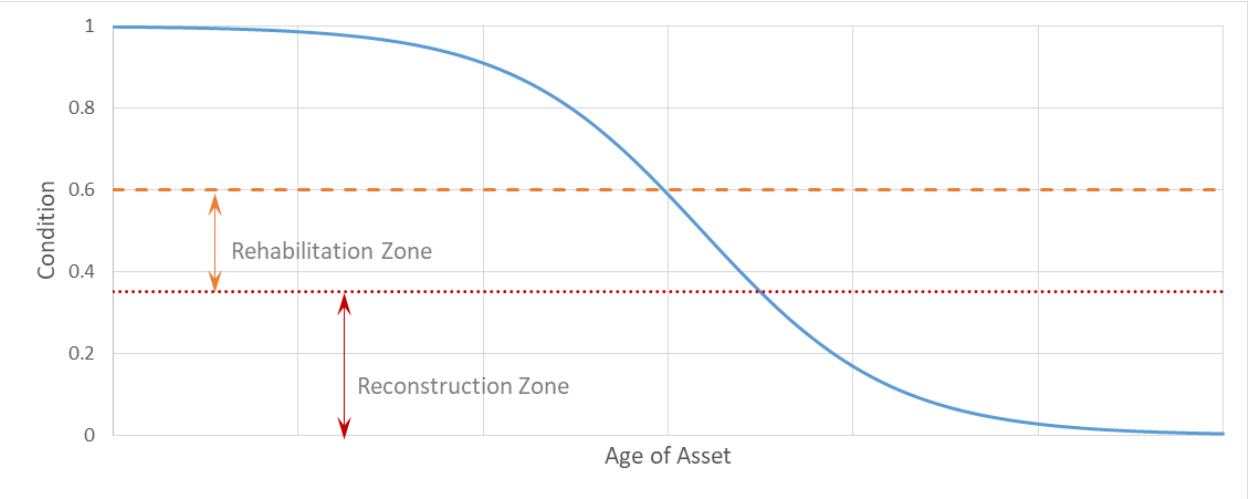


Figure 5-7: Deterioration of Sewer Assets and Lifecycle Activity Opportunities

The condition, a major factor in the asset management strategy, should be established to assist in decision making. The Municipality should establish/maintain a condition assessment program for the sanitary sewers. The recommendation is to use visual inspection facilitated by CCTV or

Zoom camera inspection. A typical practice is to undertake assessment of 1/5 to 1/3 of the network annually, such that each pipe gets reviewed in a rotating 3 to 5 year basis.

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 pipe segment. Because of the non-intrusive nature of conducting relining, it can be done on an individual pipe segment at a time, or to localized repairs.

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 Municipality should follow best practices and local design guidelines when designing the reconstruction works. Assets at the end of their useful life should be abandoned in place or removed.

A summary of the pipe condition and associated lifecycle activity is provided in **Table 5-17**. 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 5-17: Sanitary Sewer Lifecycle Activities and Condition Ranges

Condition Range	Condition Description	Lifecycle Activity Category	Lifecycle Activity
1 to 0.60	Very Good to Good	Maintenance	Maintenance Works (cleaning, flushing) Manhole repairs Small pipe section repairs
0.60 to 0.35	Good to Fair	Rehabilitation	Localized repairs Structural relining
0.35 to 0	Poor to Very Poor	Reconstruction	Pipe replacement or abandonment

Current best practices suggest that that reconstruction and new construction works on the assets will be done using PVC material for pipes that are 400 mm in diameter or less, and concrete material for sizes larger than 400 mm diameter.

The current level of service being provided in wastewater service delivery is generally a high average condition of the assets (resulting in low quantity of complaints or issues), and treatment quality within the C of A limits. To maintain these LOS values, the Municipality's strategy should continue to maintain a very good condition of the linear assets.

5.7.2 Wastewater Building Assets

The asset management strategy for wastewater building assets seeks to maximize the useful life and economy of each asset, using the lifecycle activities. The strategy is generally

consistent with what is recommended for general municipal buildings, as detailed in **Section 7.6**.

The primary drivers of lifecycle activities for these assets is the condition and service delivery requirements. The Municipal wastewater building assets are complex, the componentry for which are expected to have differing rates of degradation and expected useful lives. As such, lifecycle activities will be required to be implemented at varied frequency and timelines.

The expected useful life of the asset components should be used to approximate the timing and frequency of lifecycle activities, however this should be refined by undertaking detailed condition assessment of the buildings at regular intervals for an understanding of the actual condition of the assets. A maintenance schedule and forecast of asset improvements should be based on this detailed review, which should be updated at a frequency suitable to the Municipality, suggested to be every five years.

If it is not possible to complete the condition assessment of all buildings in the near term, 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.

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.

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.

Works should also be undertaken as required to maintain the treatment efficiency and capacity to meet regulations and user requirements.

The current level of service being provided in wastewater service delivery is generally a high average condition of the assets (resulting in low quantity of complaints or issues), and treatment quality within the C of A limits. To maintain these LOS values, the Municipality's strategy should continue to maintain the condition of the wastewater building assets, and provide upgrades and replacements according to projections to retain quality and quantity of treatment capacity.
Scenario Analysis

5.7.3 Scenario Analysis

5.7.3.1 Linear Assets

To understand the needs and projected works on the sanitary sewers within a 20 year outlook, replacement and relining activities were reviewed under varying budget values to understand the impact on overall network condition. The budgets 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. 2% of network value – Best practice of investment ($2,628,000).
4. 4% of network value – Best practice of investment ($5,255,000).
5. 2016 AMP Funding Level – Analysis of the funding level as provided within the 2016 AMP ($1,476,000).

A multi-year projection scenario was run using the budgets noted above. Through each scenario, it was found that the sanitary pipe assets are in Very Good condition, and during a 20-year timeframe few assets degraded to a sufficiently Poor condition (index of 0.35 or below) to trigger reconstruction.

There were six years within the 20-year timeframe that incurred reconstruction, with seventeen individual segments.

Table 5-18: Summary of Expenditure using Unlimited Budget

Plan Year	Number of Segments	Total Cost
2029	3	$ 227,800
2031	7	$ 946,000
2033	1	$ 4,600
2036	1	$ 102,000
2040	3	$ 238,000
2041	2	$ 20,600

The reconstruction works found were consistent across all of the budget scenarios, as the maximum expenditure (in year 2031) was found to be lesser than each of the scenarios considered.

As the expenditure and number of reconstruction works within the analyzed timeframe were below the analyzed budget value for each year, a longer timeframe scenario was also run to understand future needs for budgeting and planning beyond the 20-year timeframe. The results of this scenario indicated that works were incurred annually in the subsequent 10 year timeframe (years 2042 – 2051). The average expenditure across these ten years was $5 million, with a maximum in 2051 of greater than $23 million.

Relining is assumed to be an appropriate lifecycle activity when a pipe asset has a condition rating of between 0.35 and 0.60. Thus, relining activities are triggered if a segment is within that range at the outset of the analysis period, or when an asset degrades to a 0.60 condition rating. Further, relining is not expected to return an asset to perfection condition, therefore the condition index reaches only a 0.8 after relining work is completed.

An analysis was also undertaken to understand impacts of relining activities on the overall condition of the network, and associated costs. The unit costs for relining are shown in **Table 5-19**.

Table 5-19: Expected Unit Relining Costs for Sanitary Sewers

Pipe Diameter	Relining Unit Cost ($/m)
Under 250 mm	$250
250 mm – 400 mm	$400
Larger than 400 mm	$1,000

Relining was analyzed using an unlimited budget, to understand the potential for implementation of relining on the assets, and its impact to the average network condition. The results of the analysis found that an annual average expenditure of $397,750, and an average condition rating of 0.78 at the end of the timeframe, just slightly better than the average condition index of the assets if no interventions are used. A summary of the unlimited relining analysis compared with the no investment scenario are shown in **Figure 5-8.**

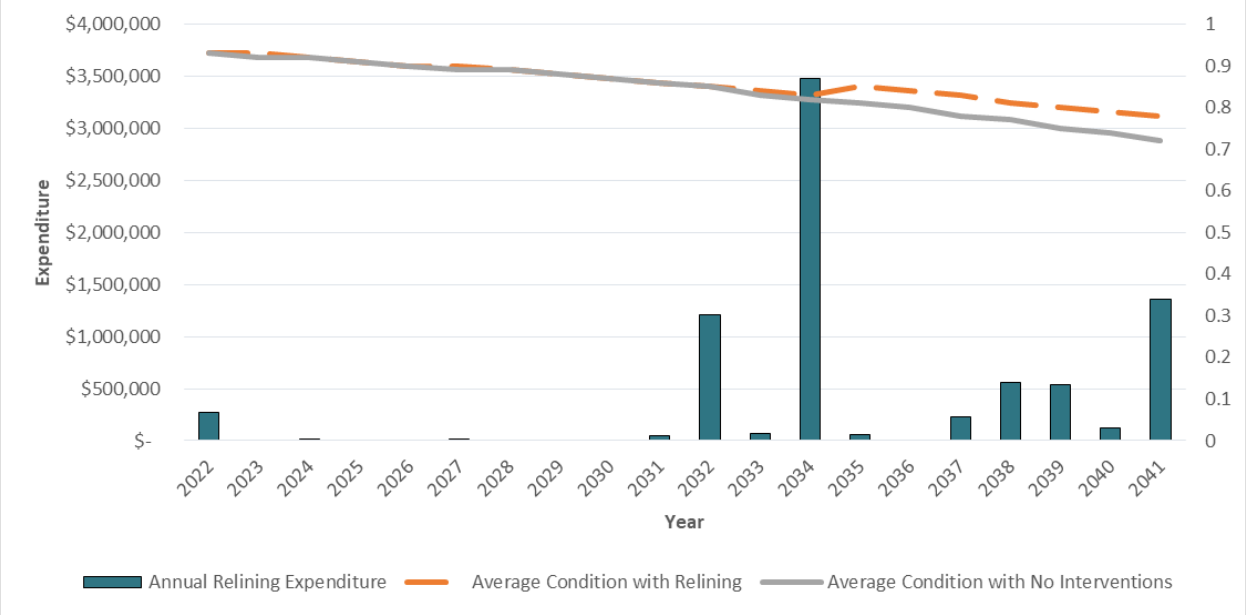


Figure 5-8: Average Condition for Unlimited Budget Relining and No Investment Scenarios

Relining activities are recommended to be undertaken once per asset lifecycle, after which the pipe should be a candidate for reconstruction once condition has sufficiently degraded. The activities shown in the table above are limited to one occurrence of relining per segment.

The investment required for the relining works fluctuates across the 20-year timeframe. The costs for relining activities are less than that of reconstruction, and can extend the useful life.

Relining activities projected to be undertaken within the first 10 years of the program are to assets that have low risk and importance ratings.

5.7.3.2 Vertical Assets

In the absence of engineering condition assessments, the capital forecasts provided by the Municipality for 2020 to 2024 (**Table 5-19**) were used to estimate the proposed works. Based on the data Kincardine has planned to invest approximately $8.8 million over the 2020 to 2024 period, which represents an average annual investment of 2% of the total replacement cost, in alignment with industry standards for annual capital investment. It is recommended that the Municipality continue to use this standard practice for future capital investment planning in the short term. It is recommended that a program for regular condition inspections by professional service providers be implemented to provide additional detail and guide the planned capital investment into wastewater facility asset management.

Table 5-20: Capital Forecast 2020 - 2024

	2020*	2021	2022	2023	2024	TOTAL
Forecasted Capital Budget	$5,065,000	$ 1,780,000	$ -	$ 2,000,000	$ -	$8,845,000
% of Replacement Value	21%	7%	0%	8%	0%	2%

**Note: 2020 includes carry forward investments. It is assumed planned investments will occur in the year as indicated.*

5.8 Proposed Levels of Service – Wastewater

The current levels of service established in 2019 are to be maintained as the proposed levels of service through the year 2031, per resolution by Council. It is recommended that the Municipality continue to monitor levels of service being provided by wastewater assets on an annual basis to monitor and adjust proposed levels of service accordingly in the future.

6.0 Stormwater

6.1 State of Local Infrastructure

The Municipality owns and operates a stormwater system which includes a storm sewer network and municipal drains. The asset inventory includes linear pipes and appurtenances. A summary of the quantity of assets is provided in **Table 6-1.**

Table 6-1: Sewer Asset Quantity Summary

Asset Type	Quantity of Assets	Unit of Measure	Length
Storm Sewer Catch Basins	1659	Quantity	---
Storm Sewer Manholes	573	Quantity	---
Storm Sewer Mains	2,377	Length (m)	81,046 m
Storm Sewer PDC	713	Length (m)	6,922 m
Storm Sewer Culverts <3m*	40	Quantity	---
Storm Sewer System	1	Quantity	---
Stormceptor	3	Quantity	---
Municipal Drain (improvement to roads)	10	Quantity	---

*Quantity represents a portion of the asset category. Additional inventory will be required for comprehensive quantity. At time of report, Municipality estimates approximately 1,200 culverts.

As previously discussed within **Section 1.1**, according to the asset hierarchy, the analysis within this report will be limited to 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.

The linear assets (storm sewer mains) are constructed of varying materials. A summary of the length of the assets of each material is in **Table 6-2**.

Table 6-2: Material Types of Storm Sewer Mains

Material Type	Total Length (m)	Percentage of System
Big O	483	1%
Boss 2000	577	1%

Material Type	Total Length (m)	Percentage of System
Clay	254	0.3%
Concrete	49,919	62%
CSP (Culvert)	9	0.01%
HDPE	19,293	24%
PE	229	0.3%
Perforated Drain	5,693	7%
PVC	3,854	5%
Steel	734	1%

For the analysis of the overall state of the sewer networks, we have included each asset individually, and have not done any grouping according to type, location or connectivity.

It is understood that at the time of this report, the inventory for the culverts under 3 m in diameter is incomplete. The information contained with this report represents known culverts constructed since 2010. It is recommended that the Municipality continue to update and complete this inventory for better understanding of current state and projected works.

6.1.1 Replacement Cost

Replacement costs for the storm sewer network were determined based on recent tender information and product information. The replacement costs include costs necessary for full reconstruction of a segment, including trench and surface restoration. It is assumed that reconstruction works on the assets will be done using PVC material for pipes that are 400 mm in diameter or less, and concrete material for sizes larger than 400 mm diameter.

The reconstruction costs for storm sewers are shown in **Table 6-3**.

Table 6-3: Replacement Unit Costs for Storm Sewer

Pipe Material	Pipe Diameter (mm)	Reconstruction Unit Cost ($/m)
PVC	Up to 250 mm	$1,100
PVC	251mm – 400 mm	$1,200
Concrete	Over 400 mm	$1,850

Replacement costs for the culverts under 3 m in diameter will vary based on a variety of factors, including size of the culvert, location, and soil types. Estimations for replacement costs should be undertaken per asset, according to the conditions of the particular culvert.

Using the units costs provided in **Table 6-3**, the total replacement costs for the storm sewer network can be determined. The total replacement costs for Kincardine's storm sewer network is $109,808,000. This value does not include the replacements costs for buildings within the wastewater asset category. Replacements costs for wastewater building assets are outlined in Section 5.1.2.1 of this report.

6.1.2 Average Age

The average age in years of each of the network categories are:

- Storm Sewer System (CBs, MHs, PDCs, etc) – 20.2 years; and
- Storm Sewer Mains – 26.3 years.

The storm sewer culverts (<3 m) inventory is incomplete, and with such unknowns in the system it is difficult to accurately estimate the average age of these assets. As these culverts would typically have been constructed at the time of road construction, the average age of assets can be estimated to be similar to the average age of the road bases and rural roads.

It is also noted that the ten (10) assets categorized as Municipal Drains range in age from 4 to 13 years, with an average age of 10.8 years

A summary of the age distribution for storm sewer assets is in **Figure 6-1** and **Figure 6-2.**

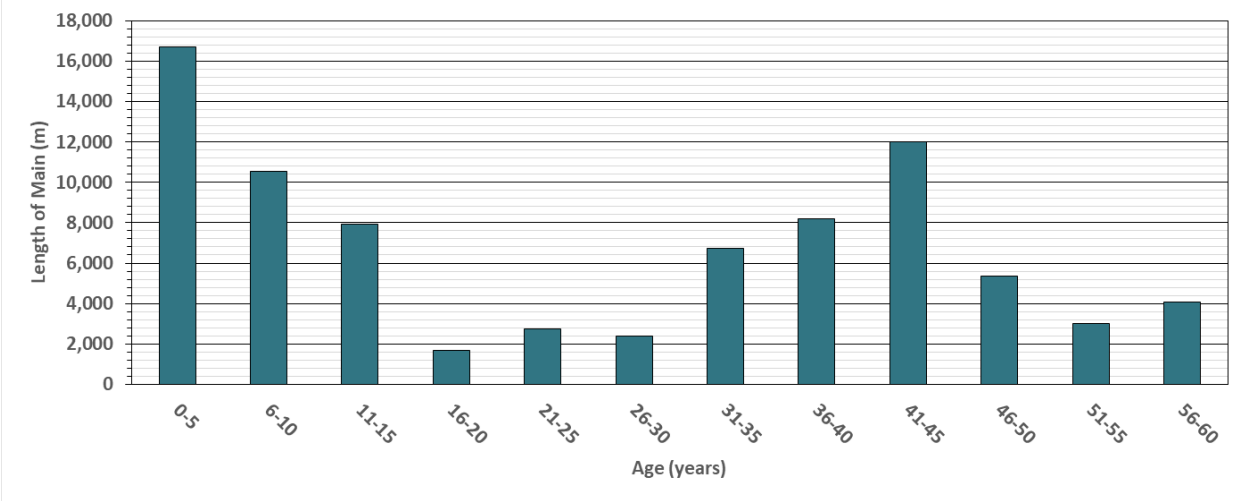


Figure 6-1: Age Distribution of Linear Storm Sewer Assets

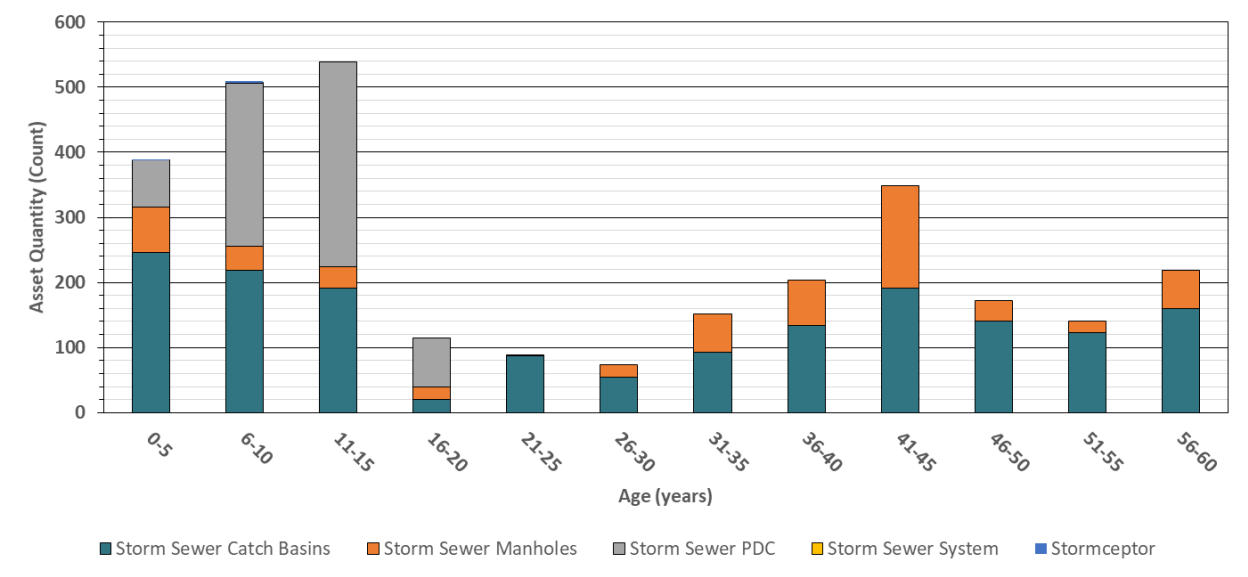


Figure 6-2: Age Distribution of Point Storm Sewer Assets

Note that in the figure above, the one Storm Sewer System asset is within the 6-10 year range, and the Stormceptor assets are within the 0-5 year range (1 asset) and 6-10 year range (2 assets).

The average age of the known culverts (<3 m) is 7.5 years, noting that the inventory is current to only those assets constructed in 2010 or later. A distribution of the known asset ages is shown in **Figure 6-3.**

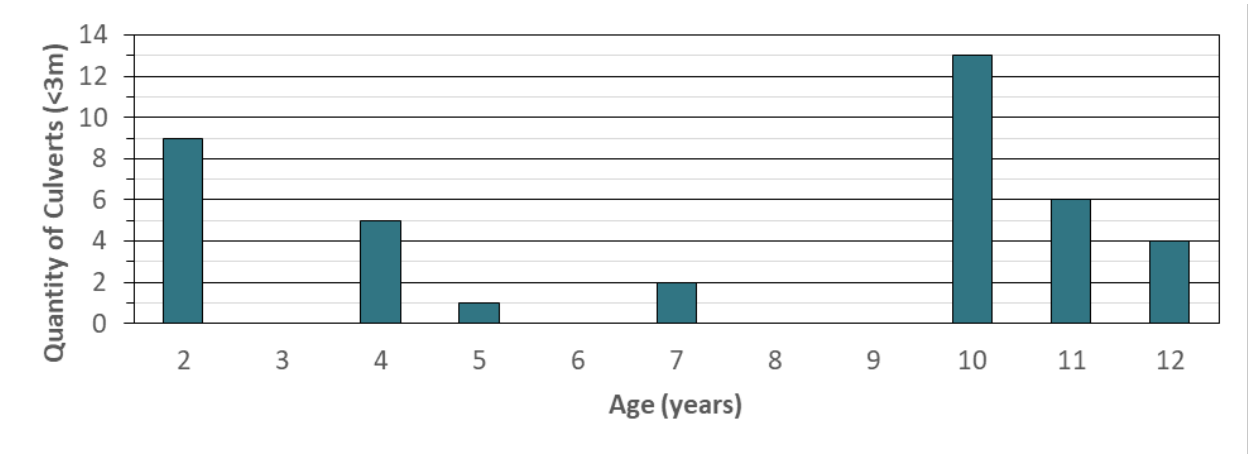


Figure 6-3: Age Distribution of Known Culvert Assets (<3 m)

6.1.3 Expected Useful Life

The expected useful life of the sewer assets is used to estimate the replacement schedule. The expected useful life values for each type of sewer material within the network were provided and confirmed by the Municipality, and are summarized in **Table 6-4**.

Table 6-4: Expected Useful Life for Pipe Materials

Pipe Material Type	Expected Useful (years)
Big O	60
Boss 2000	60
Clay	60
Concrete	100
CSP (Culvert)	25
HDPE	60
PE	60
Perforated Drain	60
PVC	60
Steel	60

6.2 Condition – Stormwater

Storm Sewer CCTV Review

Condition assessment was undertaken for a portion of the storm sewer network in 2019, through CCTV by BM Ross. The condition assessment considered structural and operation and maintenance condition, from which an aggregated condition score was given. The condition scores provided by BM Ross have been converted to a 0 to 100 scale where a higher value indicates better condition to be consistent with other measurement techniques throughout the report. **Table 6-5** shows the condition rating ranges for the reviewed sewers, by length of sewer, noting that the majority of the reviewed assets fall within a low condition rating value, indicating pipe segments in Poor condition. **Figure 6-4** provides the distribution of the condition ratings for CCTV inspected pipes.

Table 6-5: CCTV Storm Sewers Condition Ratings

Condition Score	Condition Rating	Number of Assets (Count)	Length (m)
0-10	Very Poor	0	0
11-20	Very Poor	0	0
21-30	Poor	1	96

Condition Score	Condition Rating	Number of Assets (Count)	Length (m)
31-40	Poor	1	101
41-50	Fair	1	97
51-60	Fair	2	150
61-70	Good	6	521
71-80	Good	14	821
81-90	Very Good	37	2,136
91-100	Very Good	89	4,984
TOTAL	**-**	**151**	**8,906**

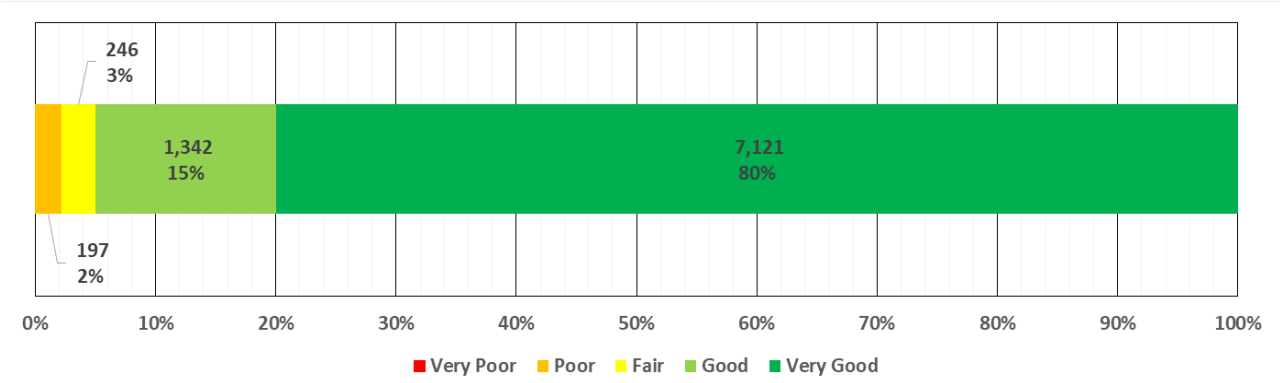


Figure 6-4: Condition of Storm Sewers by Length as Provided in the 2019 CCTV Review

The CCTV condition data provided represents a total of 11% of the storm sewer network.

Storm Sewer Condition

Where not collected through CCTV investigation, condition of sewers was determined through a deterioration model, which estimates an asset condition based on the age and construction material of the segment. The condition rating is estimated based on deterioration curves customized to the material and useful life of pipe materials at the Municipality. Combining this information with the available CCTV inspection condition data produces an overall condition profile available in **Table 6-4** and summarized in **Figure 6-5**.

Table 6-6: Overall Storm Sewers Condition Profile

Pipe Material	Total Length (m)	Average Condition Score	Condition Rating
Big O	483	99.5	Very Good

Pipe Material	Total Length (m)	Average Condition Score	Condition Rating
Boss 2000	577	99.	Very Good
Clay	254	90.3	Very Good
Concrete	49,919	95.4	Very Good
CSP (Culvert)	9	97.8	Very Good
HDPE	19,293	96.6	Very Good
PE	229	95.7	Very Good
Perforated Drain	5,693	99.6	Very Good
PVC	3,854	94.8	Very Good
Steel	734	97.5	Very Good

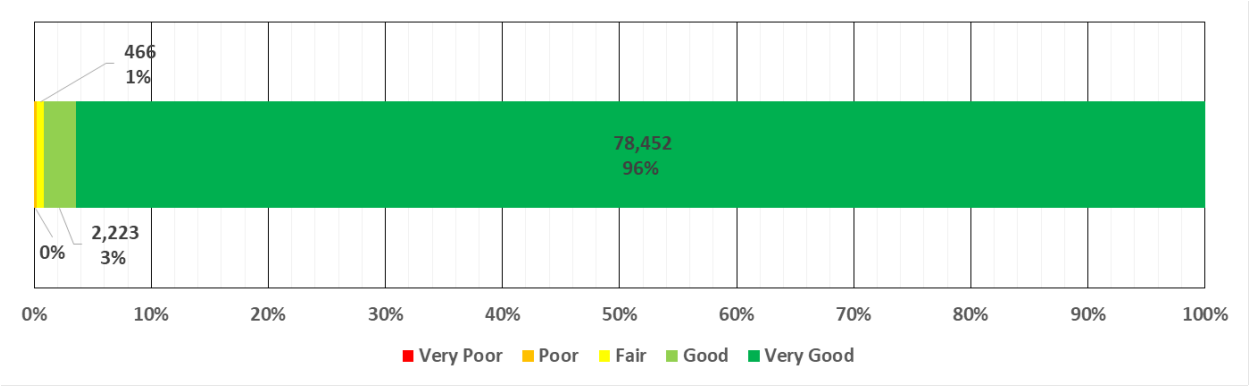


Figure 6-5: Condition of Storm Sewers by Length

Culverts under 3 m Condition

The condition of the culverts under 3 m in diameter were estimated based on the age and expected deterioration rate of the culverts. The inventory (noted to be incomplete) is of newly constructed assets, with all 40 of the culverts estimated to be in the range of 0.8-1.0 condition rating, on a scale from 0 to 1 where 1 represents an asset in perfect condition and 0 an asset at failure. These assets are thus considered in Very Good condition.

6.3 Current Levels of Service – Stormwater

Levels of service for stormwater assets are outlined in Table 3 of the regulation, O. Reg. 588/17. **Table 6-7** and **Table 6-8** outline the Municipality's current community and technical levels of service for stormwater assets.

Table 6-7: Community Levels of Service – Stormwater

LOS Parameter	Community Levels of Service O.Reg. 588/17 – Qualitative Description	Municipality of Kincardine Community LOS
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.	The stormwater management system in the Municipality is devised of a pipe network and drains, which provide conveyance of stormwater to protect properties. The extents of the network are shown in **Figure A-4** in Appendix A.

Table 6-8: Technical Levels of Service – Stormwater

LOS Parameter	Community Levels of Service O.Reg. 588/17 – Technical Metrics	Municipality of Kincardine Community LOS
Scope	Percentage of properties in municipality resilient to a 100-year storm.	The percentage of properties in the Municipality that are resilient to a 100-year storm currently unknown. It is recommended that further studies be completed in the future in order to assess the LOS metric.
Scope	Percentage of the municipal stormwater management system resilient to a 5-year storm.	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 assess the LOS metric.

6.4 Current Performance – Stormwater

Asset performance measures were determined in consultation with the Municipality, which provide relevant metrics against which the Municipality can gauge the performance of their assets. The performance measures for storm sewers, and their current values are shown in **Table 6-9**.

Table 6-9: Performance Measures – Stormwater

Asset Performances Measure	Current Value
Cost efficiency (operating cost to provide service – $/household for stormwater)	Total operating costs for stormwater (2019) was $78,221. Based on a total of 5,632 households in the Municipality, this equates to $13.90 per household.
Percentage of the community with stormwater quality and quantity control	It is recommended that future analysis be completed in order to track this performance measure.
Inspection frequency of stormwater ponds and catch basins	Not currently available, but recommended to be tracked in the future.

6.5 Risk Assessment – Stormwater

The risk ratings for the storm sewer main and non-structural culvert network followed the risk methodology and approach, presented in **Section 1.3**. The risk profile for Storm Sewer mains is shown in **Figure 6-6**.

The majority of storm sewer mains were assessed a risk rating between 0 and 9, with 99% of the storm sewer network (by length) receiving a Low risk rating. The highest risk rating for storm sewer mains was 10, considered Moderate risk, in which two sewer segments were classified.

The total length of Moderate risk assets represents less than 1% of the storm sewer main network length (0.2 km).

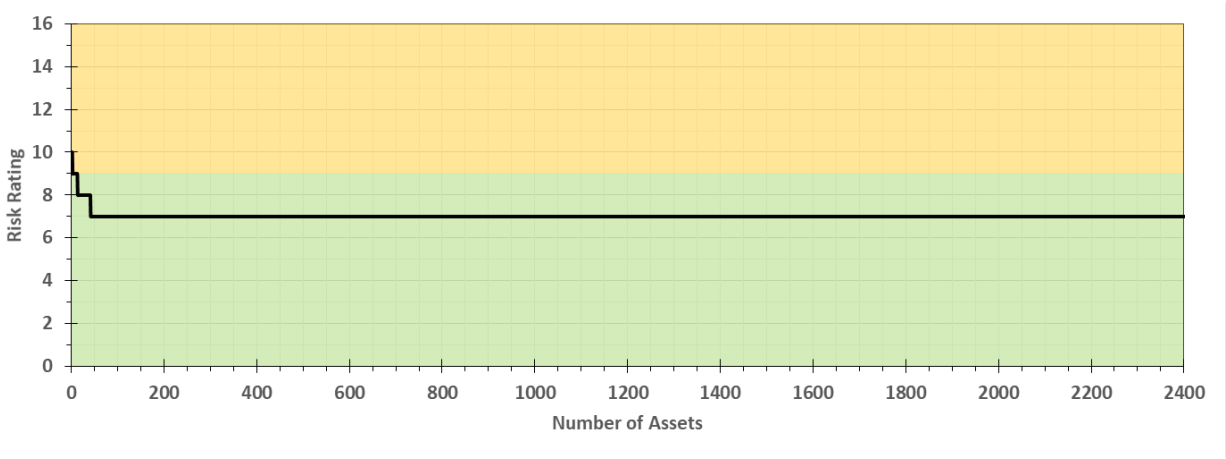


Figure 6-6: Storm Sewer Risk Profile

All storm water culverts were classified as Low risk based on the established criteria. The culverts have Very Good condition predictions and are well within their estimated useful life. The maximum risk rating of for storm water culverts was 4.7.

It is important to highlight that the risk rating is used to inform the capital plan and the development of the capital plan takes into account other factors in addition to risk rating, such as scheduling, accessibility during construction and availability of funding.

Other criteria used to prioritize work are:

- Planned road work or replacement;
- Development and changes in stormwater service demands;
- Community benefits; and
- Project readiness.

6.5.1 Performance

Performance of storm sewer network assets was determined through consultation with municipal staff and facility operators. For assets where no performance issues were noted it was assumed the systems were Always Reliable.

6.5.2 Importance

Storm sewer main and culvert importance was determined in consultation with the municipal staff, as described in **Section 1.3.3**. Moderate importance was applied to all storm sewer main and culverts.

6.6 Lifecycle Activities – Stormwater

In the lifecycle of a storm sewer pipe asset, there are multiple activities that can be taken, depending on the asset attributes. The expected lifecycle activities to be used on the Municipality assets are as follows:

Construction Activities

Construction of new assets is recommended to be in line with recommendations as part of growth, master plan, or other municipal strategies. The design of the new assets should be consistent with jurisdictional design requirements, including provincial design guidelines, local and conservation authority requirements. New construction of assets will occur where no previous stormwater servicing is available. The risk associated with new construction includes the high cost of brand new assets, and capacity for treatment and outlet of the stormwater flows.

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.

Maintenance Activities

Maintenance activities are undertaken on the assets throughout their useful life to maintain their operating condition and performance. Maintenance works includes routine maintenance (flushing, cleaning), and minor repairs to assets. There exists the risk that a maintenance activity may be implemented that does not adequately mitigate a performance or condition issue, and additional costs are then required for further repair or replacement.

Renewal Activities

Renewal of the storm sewer 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 pipe include the improper installation of the pipe or continued deterioration of the original pipe such that the lining does not perform as expected.

Operating and Decommissioning Activities

Operating activities for the storm sewer assets include those activities that do not directly deal with the physical state of the pipe, but work to extend the assets useful life. The operating activities can include non-infrastructure policies, and monitoring/inspection of the assets. 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. Usage of the

zoom camera technology has the risk of insufficient visual detail to make appropriate activity decisions.

Decommissioning activities of the storm sewer assets includes abandonment or replacement of the asset at the end of its useful life. While typically assets are abandoned in place, the removal of the expended asset can provide additional space for new underground assets to be constructed.

6.7 Asset Management Strategy – Stormwater

The asset management strategy for the storm sewers in the Municipality 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 be also consider other factors, such as:

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

As the Municipality continues to age and develop, 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 assets deterioration. **Figure 6-7** 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.

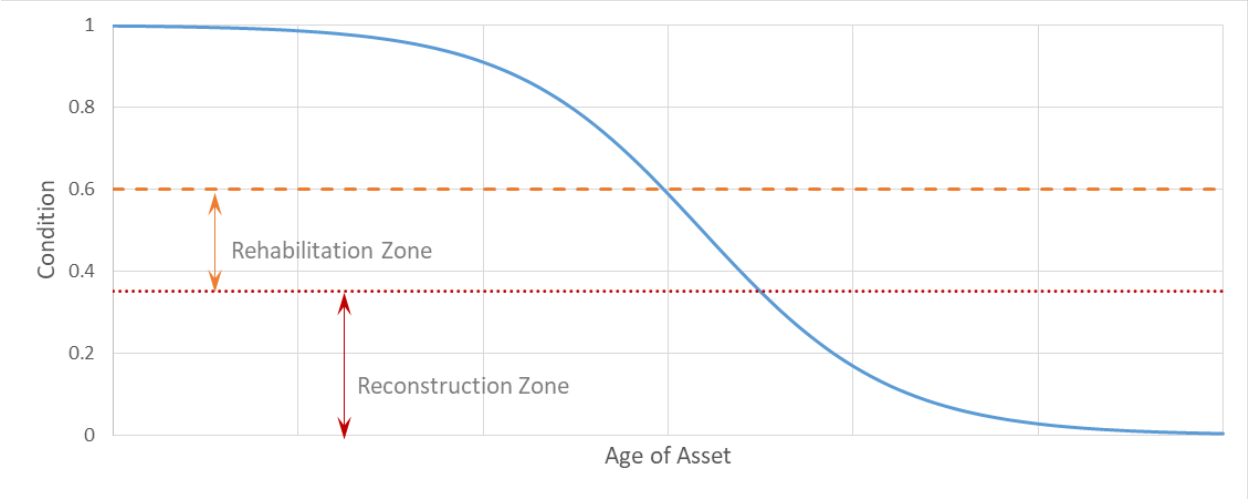


Figure 6-7: Deterioration of Sewer Assets and Lifecycle Activity Opportunities

In reference to **Figure 6-7**, 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.

The condition, a major factor in the asset management strategy, should be established to assist in decision making. The Municipality should establish/maintain a condition assessment program for the storm sewers. The recommendation is to use visual inspection facilitated by CCTV or Zoom camera inspection. 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.

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 pipe segment. Because of the non-intrusive nature of conducting relining, it can be done on an individual pipe segment at a time, or to localized repairs.

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 Municipality 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.

A summary of the pipe condition and associated lifecycle activity is provided in **Table 6-10**. 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 6-10: Storm Sewer Lifecycle Activities and Condition Ranges

Condition Range	Condition Description	Lifecycle Activity Category	Lifecycle Activity
1.0 to 0.60	Very Good to Good	Maintenance	Maintenance Works (cleaning, flushing) Manhole repairs Small pipe section repairs
0.60 to 0.35	Good to Fair	Rehabilitation	Localized repairs Structural relining
0.35 to 0.0	Poor to Very Poor	Reconstruction	Pipe replacement or abandonment

Current best practices suggest that that reconstruction and new construction works on the assets will be done using PVC material for pipes that are 400 mm in diameter or less, and concrete material for sizes larger than 400 mm diameter.

The strategy for management of the culverts less than 3 m in diameter should focus at this time on reactive maintenance in response to noted Poor condition and performance, or based on operator knowledge and public feedback. The current understanding of the network is limited to new culverts, and the Municipality should endeavour to inventory the remaining Municipal-owned culverts such that lifecycle forecasting and management can be estimated for the full inventory of these assets. Condition assessment of the assets can be undertaken during inventory to assist in lifecycle planning.

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

The current level of service being provided in stormwater service delivery is generally a high average condition of the assets. To maintain these LOS values, the Municipality's strategy should continue to maintain a very good condition of the linear assets.

6.7.1 Scenario Analysis

To understand the needs and projected works on the storm sewers within a 20 year outlook, replacement and relining activities were reviewed under varying budget values to understand the impact on overall network condition. The budgets 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. 2% of network value – Best practice of investment; and
4. 2016 AMP Funding Level – Recommended investment value from prior AMP.

Note that 4% of network value was not analyzed, as the annual expenditure within the other analyzed scenarios did not approach the 4% value.

A multi-year projection scenario was run using the budgets noted in the table above. The results of the varying scenarios indicated reconstruction works identified during a 20-year timeframe. A summary of the analysis is outlined below in **Table 6-11**.

Table 6-11: Budgets Reviewed for Storm Sewer Works Projections

Scenario	Budget	Annual Value	Average Annual Investment over Timeframe	Total Investment over Timeframe	Average Condition Index (End of Timeframe)
1	Unlimited budget	Unlimited	$134,925	$2,698,509	0.90
2	No budget	$0	$ -	$ -	0.89
3	2% of network value	$2,179,000	$134,925	$2,698,509	0.90
4	2016 AMP Funding Level	$329,000	$115,297	$2,305,940	0.90

Best practice recommends maintaining an average condition index of 0.6 across the system. Note that the overall condition of the assets is such that if no budget is spent on the system, after the 20 year timeframe the average condition would be within the acceptable range, with the average condition still in a 'Very Good' range.

The storm sewer assets were assessed to be in Very Good condition, with only $216,000 in immediate needs on the system, and no needs incurred again in the system until 2026. In the 20 year timeframe, needs were identified within ten of the years, with a maximum annual cost of $713,744, below the 2% network value but greater than the 2016 AMP funding level. The average investment over the 20-year timeframe (from the unlimited scenario) is $134,925, achieving an average condition index of 0.9 across the network.

The 2016 AMP funding level scenario resulted in a similar average condition index at the end of the timeframe as the unlimited budget and is therefore assumed to be adequate to continue to allocate for the management of these assets. **Figure 6-8** shows the annual expenditure under this budget value and its impact on the average condition index over the analyzed timeframe.

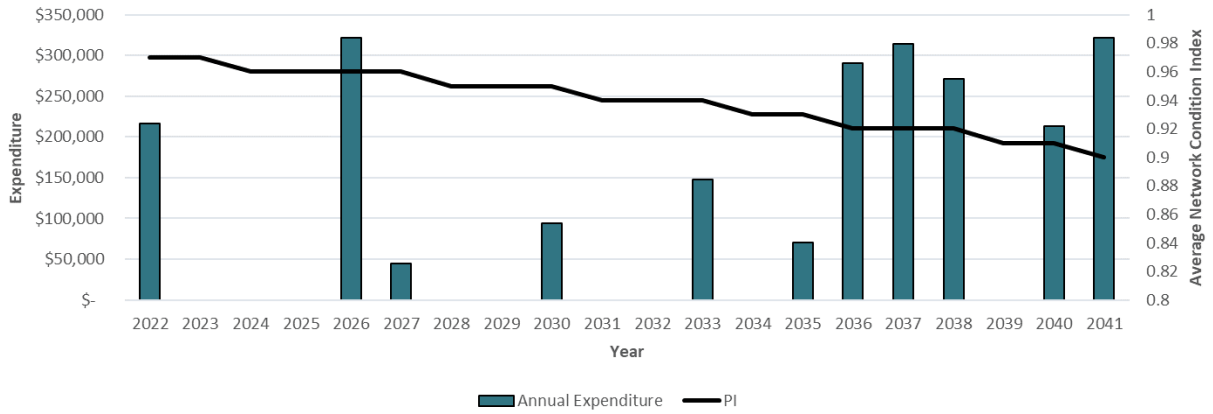


Figure 6-8: Investment and Condition Index with 2016 AMP Funding Level (Scenario

An analysis was also undertaken to understand impacts of relining activities on the overall condition of the network, and associated costs. The unit costs for relining are shown in **Table 6-12**.

Table 6-12: Expected Unit Relining Costs for Storm Sewers

Pipe Diameter	Relining Unit Cost ($/m)
Under 250 mm	$250
250 mm to 400 mm	$400
Larger than 400 mm	$1,000

Relining is assumed to be an appropriate lifecycle activity when a pipe asset has a condition rating of between 0.35 and 0.6. Thus, relining activities are triggered if a segment is within that range at the outset of the analysis period, or when an asset degrades to a 0.6 condition rating. Further, relining is not expected to return an asset to perfect condition, therefore the condition index reaches only a 0.8 after relining work is completed. Using an unlimited budget to understand the extents of relining that can be undertaken to prolong the useful lifecycle of the assets, the assets were analyzed to determine the potential needs for relining, and the impact on the average condition of the assets. Within a 20-year timeframe, a total cost of $2,664,925 is estimated to be required, incurring in 19 of the 20 years of the timeframe. The average annual expenditure is $133,246, and considering relining only, the average condition of the assets at the end of the analyzed timeframe is 0.91.

Relining activities are recommended to be undertaken once per asset lifecycle, after which the pipe should be a candidate for reconstruction once condition has sufficiently degraded. The activities shown in the table above are limited to one occurrence of relining per segment.

6.8 Proposed Levels of Service – Stormwater

The current levels of service established in 2019 are to be maintained as the proposed levels of service through the year 2031, per resolution by Council. It is recommended that the Municipality continue to monitor levels of service being provided by stormwater assets on an annual basis to monitor and adjust proposed levels of service accordingly in the future.

7.0 Buildings

7.1 State of Local Infrastructure

The Municipality owns and maintains 124 municipal buildings. These buildings have been organized by the service provided in **Table 7-1**. The buildings have been categorized into four groups within the Municipality.

Table 7-1: Municipal Buildings by Category

Building Group	Number of Buildings
General Municipal Buildings	73
Public Works – Wastewater	18
Public Works – Water	12
Bruce Telecom	21

Building types included within the Public Works, Wastewater and Water, include:

- Chlorine Station;
- Pumphouse;
- Water Tower;
- Water Treatment Plant;
- Well;
- Lift Station;
- Pumping Station; and
- Wastewater Treatment Plant.

Analysis of Water and Wastewater related buildings is included in their respective chapters, **Section 4.0** and **Section 5.0**.

Bruce Telecom buildings are not considered in the analysis of the asset management plan as the facilities are operated and maintained by Bruce Telecom, a subsidiary of the Municipality of Kincardine. A list of the building types is provided below:

- Office Building;
- Store;
- Shed/Storage Building;
- Works Garage;
- Sewage Pumping Station; and
- Switching Station.

Municipal buildings are owned and operated by the Municipality, these facilities aid in providing a variety of services to residents and visitors. A list of the different building types is provided below:

- Airport
- Arts Centre
- Cemetery Building
- Community Centre
- Fire Station
- Fish Cleaning Building
- Groundwater Pump Station
- Leachate Treatment Facility
- Library
- Lighthouse
- Medical Clinic
- Municipal Office
- Office Building
- Pavilion
- Recreation Centre
- Salt Shed
- Sand Shed
- Shed/Storage Building
- Washroom
- Works Garage

7.1.1 Replacement Cost

7.1.1.1 Municipal Building Assets

Municipal buildings provide a variety of services for the Municipality. This asset category includes buildings that are accessible and inaccessible to the public and aid in service delivery related to administration, recreation, culture, public works and fire services. Building assets have various levels of complexity and **Table 7-2** illustrates the major components of each building type owned by the Municipality. Included in **Table 7-2** are quantities, replacement values and typical components for each building type.

In total, it is estimated the municipal building assets have a total 2022 replacement cost of $83,392,500. Replacement costs were estimated based on a 2014 report prepared by Frank Cowan Company. Replacement costs were inflated using an inflation rate of 3% compounded annually. For buildings not captured in the 2014 Frank Cowan Company report, an inflated historical cost obtained from the Municipality's accounting data was used. An inflation rate of 3% compounded annually was applied to the historical cost provided in the Municipality's accounting data to estimate 2022 values.

Table 7-2: Building Components* and Replacement Cost

Building Type	Electrical	Mechanical	Structural	Single Asset**	Interior	Roof	Shell	Substructure	Services	Count of Facilities	Square Footage	2022 Overall Replacement Cost
Airport	-	-	-	-	3	4	2	2	2	2	9,400 ft^2	$946,000
Arts Centre	-	-	-	-	5	5	6	4	5	2	13,536 ft^2	$3,684,000
Cemetery Building	-	-	-	-	2	2	2	2	2	2	2,178 ft^2	$566,000
Community Centre	-	-	-	-	7	7	7	7	7	6	26,300 ft^2	$5,785,000
Fire Station	-	-	-	-	2	2	2	2	3	2	14,923 ft^2	$3,310,000
Fish Cleaning Building	-	-	-	-	1	1	1	1	1	1	400 ft^2	$86,000
Groundwater Pump Station	2	2	2	-	-	-	-	-	-	2	-	$453,000
Leachate Treatment Facility	-	-	-	-	1	-	1	1	1	1	-	$3,252,000
Library	-	-	-	-	3	2	3	3	3	2	18,094 ft^2	$3,105,500
Lighthouse	-	-	-	-	3	3	3	1	1	1	1,554 ft^2	$3,378,000
Medical Clinic	-	-	-	-	5	3	3	3	3	1	7,500 ft^2	$7,745,000
Municipal Office	-	-	-	-	4	3	3	2	3	2	17,675 ft^2	$8,099,000
Office Building	-	-	-	1	3	3	3	3	3	4	48,200 ft^2	$190,000
Pavilion	-	-	-	7	5	5	5	5	5	12	9,976 ft^2	$1,638,000
Recreation Centre	-	-	-	-	9	7	5	5	7	2	89,370 ft^2	$31,537,000
Salt Shed	-	-	-	1	-	-	-	-	-	1	5,650 ft^2	$49,000
Sand Shed	-	-	-	-	3	3	3	3	3	3	8,400 ft^2	$736,000
Shed/ Storage Building	-	-	-	4	10	10	10	10	10	14	-	$2,331,000
Washroom	-	-	-	-	8	8	8	8	8	9	6,226 ft^2	$1,610,000
Works Garage	-	-	-	-	7	7	7	7	7	4	26,565 ft^2	$4,892,000
TOTAL	-	-	-	-	-	-	-	-	-	73	-	$83,392,500

*Count of Building Components per Building Type, Betterment/ replacement activities included in count

**Single Asset building component represents assets where building components where not clearly identifiable and the associated costs could not easily be disaggregated.

7.1.1.2 Bruce Telecom Building Assets

A summary of Bruce Telecom building assets is available in **Table 7-3**, organized by building type. The replacement cost of these assets was calculated by applying a 3% inflation rate to historical construction cost data for the buildings.

Table 7-3: Replacement Value for Bruce Telecom Buildings

Building Type	Replacement Value
Office Building	$2,869,000
Store	$261,000
Shed/Storage Building	$61,000
Works Garage	$182,500
Sewage Pumping Station	$100,000
Switching Station	$267,000

All Bruce Telecom assets were established in 2018 based on the information provided in the Municipality's accounting data.

No further analysis of Bruce Telecom assets is included. The maintenance and management of these assets is determined by Bruce Telecom, a for profit organization owned by the Municipality.

7.1.2 Average Age

The average age and useful life for each building type is determined as the average age and useful life of all building components and major capital improvements completed to the facility. **Table 7-4** provides the average age, useful life and information on past capital improvements for each building type for general municipal buildings.

Table 7-4: Average Age of Buildings

Building Type	Average Age	Average Useful Life	Estimated # of Capital Improvements	Current Value of Historical Capital Improvements
Airport	30.2	39.7	4	$339,472
Arts Centre	33.2	47.4	15	$2,944,135
Cemetery Building	77.0	38.7	0	$0
Community Centre	35.3	35.7	0	$0
Fire Station	27.7	36.3	1	$23,387

Building Type	Average Age	Average Useful Life	Estimated # of Capital Improvements	Current Value of Historical Capital Improvements
Fish Cleaning Building	27.4	34.0	0	$0
Groundwater Pump Station	28.5	28.0	0	$0
Leachate Treatment Facility	6.0	35.0	0	$0
Library	53.4	34.3	1	$327,801
Lighthouse	12.5	42.3	6	$456,870
Medical Clinic	10.2	31.5	6	$2,966,876
Municipal Office	19.3	32.7	6	$2,553,665
Office Building	18.8	27.9	0	$0
Pavilion	31.1	32.7	0	$0
Recreation Centre	20.6	33.2	18	$9,310,735
Salt Shed	14.0	35.0	0	$0
Sand Shed	34.0	36.0	0	$0
Shed/Storage Building	38.6	33.9	0	$0
Washroom	17.3	32.7	0	$0
Works Garage	45.9	37.1	1	$30,082
TOTAL	**-**	**-**	**58**	**$18,953,022**

A summary of the age distribution of building components by number of building components is available and by replacement value in **Figure 7-1**. Building components from construction and replacement or renewal activities recorded in the Municipality's asset data were considered in the analysis below.

The analysis shows a fairly even distribution of component ages with periodic fluctuations in investment. Comparing the component age distribution for a count based to 2022 replacement value based analysis shows that a significant number of high value building components are between 46 and 50 years in age. This age group of components makes up an estimated 28% of the total building portfolio replacement value, which must be taken into account when planning asset replacement activities as typical component useful life is varies between 15 and 50 years based on component type.

Figure 7-1: Age Distribution and Replacement Cost of Buildings

7.1.3 Expected Useful Life

Expected useful life was assigned at the building component level to reflect the complexity and variation in lifespan of different building systems. The typical expected useful life for each building component type was assigned by the Municipality and used to determine approximate replacement timing of assets. **Table 7-5** provides the typical useful life applied to each building component.

Table 7-5: Useful Life of Building Components

Building Component Type	Expected Useful Life (Years)
Electrical	15
Mechanical	20
Structural	50
Single Asset	30
Interior	30
Roof	30
Shell	40
Substructure	50
Services	20

Expected useful life for each asset may be modified based on individual characteristics and differences in timing between the asset construction and acquisition date. The values presented in **Table 7-5** are typical of most assets owned by the Municipality.

7.2 Condition – Buildings

The Municipality does not have an existing building condition assessment program or data on condition of buildings. Condition data was provided for building components by operational staff. Staff were asked to rate the condition of typical building components for each facility. The data was collected as a desktop exercise based on municipal staff understanding of current building component conditions. The distribution of building component condition by building type is presented in **Table 7-6**.

The condition ratings range from Very Good (1) to Very Poor (5) representing like new to failed physical states.

Table 7-6: Building Condition by Component

Building Type	Electrical	Mechanical	Structural	Single Asset	Interior	Roof	Shell	Sub-structure	Services	Average Condition
Airport					2.0	1.0	2.0	2.3	2.3	1.9
Arts Centre					2.0	1.4	2.0	1.6	2.0	1.8
Cemetery Building					2.0	2.5	2.0	2.3	2.5	2.3
Community Centre					1.9	1.6	1.9	2.1	1.9	1.9
Fire Station					3.0	2.0	3.0	3.0	2.0	2.6
Fish Cleaning Building					2.0	3.0	2.0	2.0	2.0	2.2
Groundwater Pump Station	3.0	3.0	2.3							2.8
Leachate Treatment Facility					1.0		1.0	1.0	1.3	1.1
Library					2.0	1.5	2.0	2.3	2.2	2.0
Lighthouse					2.0	2.0	2.0	2.0	2.7	2.1
Medical Clinic					2.0	3.0	2.0	2.0	2.0	2.2
Municipal Office					1.8	1.3	1.7	1.8	2.0	1.7
Office Building				4.2	2.7	2.3	2.7	2.5	2.2	2.8
Pavilion				2.1	2.6	2.6	2.6	1.8	1.6	2.2
Recreation Centre					1.9	1.3	1.8	1.5	2.1	1.7
Salt Shed				1.5						1.5
Sand Shed					3.3	3.0	3.3	2.8	2.8	3.1
Shed/ Storage Building				2.0	2.6	2.3	2.6	2.5	2.4	2.4
Washroom					1.9	2.0	1.9	1.8	2.0	1.9
Works Garage					1.7	2.4	1.7	1.8	2.1	2.0
Average Condition	**3.0**	**3.0**	**2.3**	**2.5**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**

Using estimated building component replacement costs, **Figure 7-2** summarizes the condition of the Municipality's building components across all building types. The provided data table in **Figure 7-2** includes the replacement cost for building components classified by staff under each of the condition rating categories.

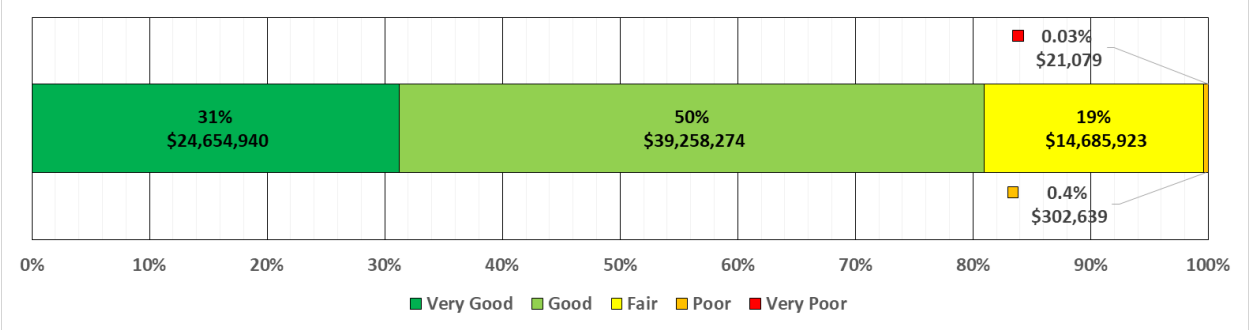


Figure 7-2: Building Condition and Replacement Cost

Table 7-6 and **Figure 7-2** show that the majority of building components, approximately 81% of municipal buildings, are considered to be in Good to Very Good condition by staff. Fair condition ratings were identified for 19% of building components, indicating an estimated $14.7 million replacement cost for components in mid-lifespan stages. Fair components should be monitored over the medium term to measure further deterioration and timing or replacement or renewals. Very few components, less than 1%, were identified as Poor or Very Poor condition by staff. Poor and Very Poor condition components have an estimated replacement value of $280,000 and the risk of these components should be further examined to evaluate asset lifecycle activities required.

Past asset management reporting utilized an age based analysis method. The typical useful life measurements were applied to a similar component structure and closely resemble the values provided in **Table 7-5**. Using an age based approach estimated that 28.5% of building components were in Good to Very Good condition, 8% in Fair condition and 62.5% in Poor to Very Poor condition as of 2016. Comparing the findings of an age based approach against staff input the two methods have produced very different results.

These findings indicate that the Municipality may be managing building components in a way which is extending the useful life beyond the estimated component useful life measures presented. However, the condition data collected as part of this study was a desktop exercise completed by operational staff. The accuracy of the data could not be confirmed and complete building condition assessment studies should be carried out by licensed professionals to confirm the preliminary results. Based on these studies, the Municipality may be able to further refine both useful life estimates for building components and the capital and operational investment strategy for each asset.

7.3 Current Levels of Service – Buildings

Levels of service for building assets are not defined in the regulation, O. Reg. 588/17 as buildings are not considered core assets. As such, level of services have been devised based on the content of the regulation, in consultation with the Municipality. **Table 7-7, Table 7-8** and **Table 7-9** outline the Municipality's current community and technical levels of service for buildings.

Table 7-7: Community Levels of Service – Buildings

LOS Parameter	Community Levels of Qualitative Description	Municipality of Kincardine Community LOS
Scope	Description, which may include maps of the asset category	The locations of building assets is shown in **Appendix A-5, A-6, A-7 and A-8**, including the locations of water and wastewater facilities.
Quality	Description or images that illustrate the different levels or condition (if applicable). Consider hours of operation and/or when the service is available. • Hours of operation • Available services	The quality of the buildings and accessibility vary, depending on the purpose of the building as follows: • Emergency Services are available 365 days a year, 24 hours a day, 7 days a week • Administrative offices are available during business hours Monday-Friday 8:30 am-4:30 pm • Public Works facilities are accessible by staff only • Bruce Telecom facilities are accessible by staff only • Library facilities are accessible during business hours • Recreation facilities (Marina and Parks) are available seasonally or rental basis. • Davidson Centre is available from 6 am – 11 pm daily.

Table 7-8: Technical Levels of Service – Buildings

LOS Parameter	Technical Levels of Service - Technical Metrics Description	Municipality of Kincardine Technical LOS
Scope	Provide breakdown of number of buildings by type providing service compared to the size of the community (geography or population)	The scope of the Municipal buildings includes their availability to provide service. In **Table 80** below, the building type, size, and number of buildings per capita per building type is provided.
Quality	Legal, regulatory and local standards	The quality of Buildings and Facilities include the following legal, regulatory and local standards for the services provided:

LOS Parameter	Technical Levels of Service - Technical Metrics Description	Municipality of Kincardine Technical LOS
		• Accessibility (AODA Standards) • Health and safety • Facilities on their own water system must be operated to meet MOE drinking water quality standards • Buildings must be in compliance with Ontario Building Code.

Table 7-9: Technical Levels of Service – Buildings

Building Type	Buildings per Capita	Square Footage of Buildings (total for type)
Airport	1 per 5,700 pop.	9,400 ft^2
Arts Centre	1 per 5,700 pop.	13,536 ft^2
Cemetery Building	1 per 5,700 pop.	2,178 ft^2
Community Centre	1 per 1,900 pop.	26,300 ft^2
Fire Station	1 per 5,700 pop.	14,923 ft^2
Fish Cleaning Building	1 per 11,400 pop.	400 ft^2
Groundwater Pump Station	1 per 5,700 pop.	--
Leachate Treatment Facility	1 per 11,400 pop.	--
Library	1 per 5,700 pop.	18,094 ft^2
Lighthouse	1 per 11,400 pop.	1,554 ft^2
Medical Clinic	1 per 11,400 pop.	7,500 ft^2
Municipal Office	1 per 5,700 pop.	17,675 ft^2
Office Building	1 per 2,850 pop.	48,200 ft^2
Pavilion	1 per 880 pop.	9,976 ft^2
Recreation Centre	1 per 3,800 pop.	89,370 ft^2
Salt Shed	1 per 11,400 pop.	5,650 ft^2
Sand Shed	1 per 3,800 pop.	8,400 ft^2
Shed/Storage Building	1 per 815 pop.	--

Building Type	Buildings per Capita	Square Footage of Buildings (total for type)
Washroom	1 per 1,270 pop.	7,626 ft^2
Works Garage	1 per 2,850 pop.	26,565 ft^2

Note: Area of Municipality (538.02 km^2.) and population (11,389) sourced from census information.

7.4 Current Performance – Buildings

Asset performance measures were determined in consultation with the Municipality, which provide relevant metrics against which the Municipality can gauge the performance of their assets. Considering each building as a single asset, the performance measures and corresponding units established for buildings and facilities are shown in **Table 7-10**. The current values for each performance measure by individual building are provided in **Appendix C**.

Table 7-10: Current Performance Measures for Buildings and Facilities

Asset Performances Measure	Units
Water usage	m^3 per year
Energy usage	kWh per year
Number of Staff	count
Parking, accessible spaces	count

Municipal staff also provided input on the performance of individual building components. This was a desktop exercise based on the building operations staff understanding of the current performance of building components. The distribution of building component performance by building type is presented in **Table 7-11**.

The performance ratings range from Always Reliable (1) to Not Reliable (5). No data was available on previous building component performance to compare the collected data.

Table 7-11: Building Component Performance

Building Type	Electrical	Mechanical	Structural	Single Asset	Interior	Roof	Shell	Substructure	Services	Average Performance
Airport					1.0	1.0	1.0	1.5	2.3	1.4
Arts Centre					1.0	4.6	1.0	1.0	1.4	1.8
Cemetery Building					2.0	2.0	2.0	2.5	2.5	2.2
Community Centre					1.3	1.0	1.3	1.6	1.4	1.3
Fire Station					2.5	2.5	2.5	3.0	1.0	2.3
Fish Cleaning Building					1.0	1.0	1.0	2.0	3.0	1.6
Groundwater Pump Station	3.0	3.0	2.0							2.7
Leachate Treatment Facility					1.0		1.0	1.0	1.5	1.1
Library					1.0	1.0	1.0	1.7	1.7	1.3
Lighthouse					3.0	3.0	3.0	2.0	2.3	2.7
Medical Clinic					1.0	2.3	1.0	1.0	1.4	1.4
Municipal Office					1.0	1.0	1.0	1.0	1.7	1.1
Office Building				4.4	1.7	2.3	1.7	1.8	2.0	2.3
Pavilion				1.6	1.0	1.2	1.0	1.4	1.4	1.3
Recreation Centre					1.9	1.0	1.8	1.0	1.6	1.5
Salt Shed				1.0						1.0
Sand Shed					2.3	3.7	2.3	2.0	3.3	2.7
Shed/ Storage Building				1.4	2.0	2.0	2.0	2.0	1.8	1.9
Washroom					1.8	1.5	1.8	1.5	2.0	1.7
Works Garage					2.1	2.7	2.1	2.0	2.1	2.2
Average Performance	**3.0**	**3.0**	**2.0**	**2.1**	**1.6**	**2.0**	**1.6**	**1.7**	**1.9**	**1.8**

Using estimated building component replacement costs, **Figure 7-3** summarizes the performance of the Municipality's building components across all building types. The provided

data table in **Figure 7-3** includes the replacement cost for building components classified by staff under each of the performance rating categories.

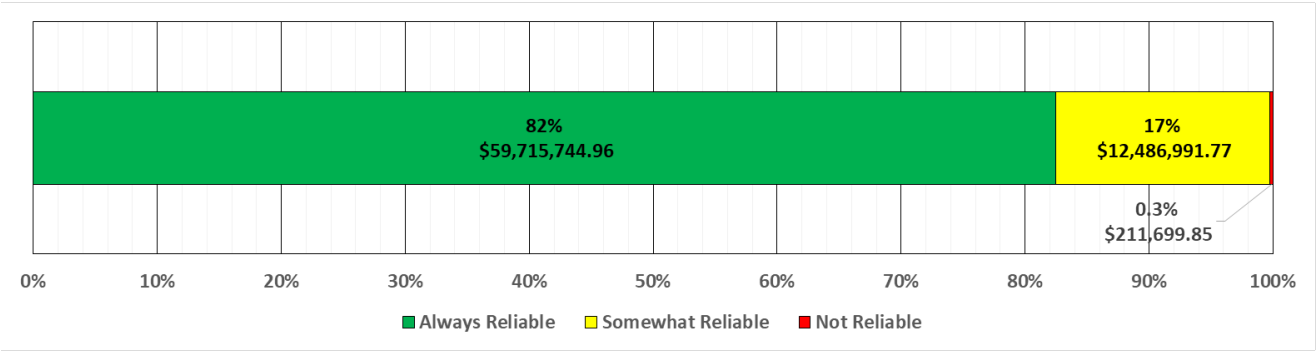


Figure 7-3: Building Performance and Replacement Cost

Table 7-11 and **Figure 7-3** show that the majority of building components are considered "Always Reliable" by staff. Reliability issues were identified by staff in 18% of the building components, which represents and estimated $12 million dollars in assets based on replacement value. The reliability of these assets should be inspected in the near term to examine the associated risks and treatment costs to identify potential projects on a basis of cost benefit.

7.5 Risk Assessment – Buildings

The risk ratings for the general municipal building network was developed following the risk methodology and approach presented in **Section 1.3**. The risk profile for municipal buildings includes a data point for each building component, shown in **Figure 7-4**.

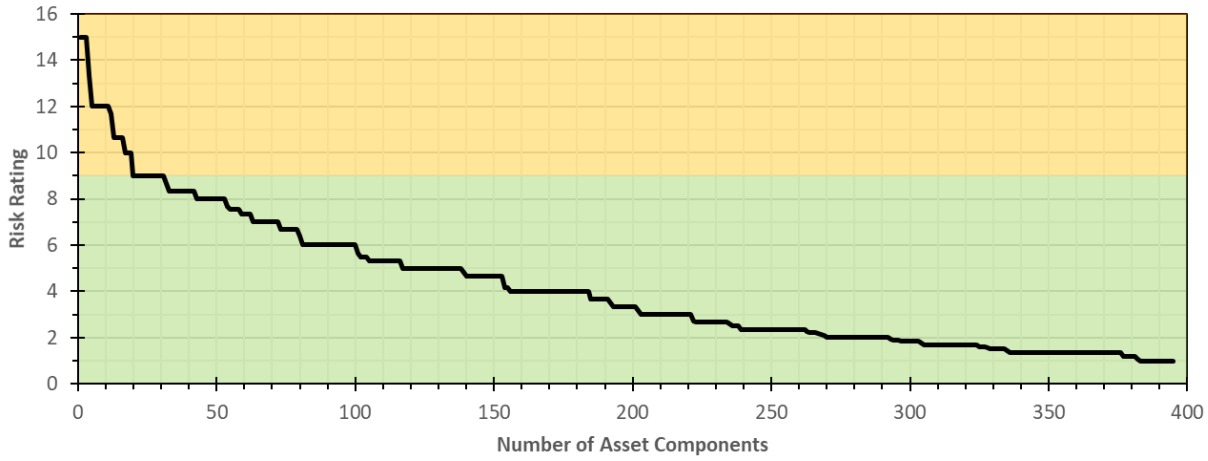


Figure 7-4: Building Risk Profile

The maximum evaluated risk rating for municipal building components was assessed as 15, with three building components receiving this rating and having an estimated replacement value of $427,520, representing less than 1% of the total portfolio replacement value. An additional 19 building components with an estimated replacement value of $4,619,860, representing approximately 6% of the portfolio replacement value were also evaluated as Moderate risk. The Moderate risk assets are considered a medium priority. The remainder of building components, 371 components with an estimated replacement value of $78,715,540, representing 94% of all general municipal building replacement cost, were evaluated as Low risk.

It is important to highlight that the risk rating is used to inform the capital plan and the development of the capital plan takes into account other factors in addition to risk rating, such as scheduling, accessibility during construction and availability of funding.

Other criteria used to prioritize work are:

- Planned development and community growth;
- Current and future user group and resident demands;
- Community benefits; and
- Project readiness.

7.5.1 Performance

Facility component performance data was collected from operations staff as a desktop exercise based on their understanding and experience of facility component reliability and performance.

7.5.2 Importance

Importance of municipal buildings was determined in consultation with the municipal staff, as described in **Section 1.3.3**. **Table 7-12** outlines the importance rankings developed with staff and utilized in risk calculations.

Table 7-12: Importance Rating – Buildings

Importance Rating	Building Asset
High (3)	• Davidson Recreation Centre • Tiverton Recreation Centre • Emergency Operations Centre • Municipal administration Centre • Kincardine Community Medical Clinic • Fire Halls

Importance Rating	Building Asset
Moderate (2)	• Public Works Garages • Waste Management • Underwood Municipal Office
Low (1)	• Lighthouse • Libraries • Arts Centre • Airport • Community Centres • Pavilions and Gazebos • Washrooms • Sheds and Storage Buildings

7.6 Lifecycle Activities – Buildings

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.

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.

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.

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.
- Updating of existing components:
    - Updating of existing components can prolong the expected lifespan of a building asset.

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 Municipal building portfolio through sale of property, if it is no longer required for service delivery.

7.7 Asset Management Strategy – Buildings

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

In general, the building assets were found to be in Good condition and performing adequately to provide the intended services. The Municipal strategy should maintain the condition and performance of the building assets such that the level of service to the customer is likewise maintained. 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.

Implementation of the lifecycle activities for the building assets will vary across the assets, according to the components, condition, and services provided. A detailed condition assessment of the building assets would guide the Municipality in determining what maintenance works are required at each of the building assets, and the expected remaining useful life of the components. A maintenance schedule and forecast of asset improvements should be based on this detailed review, which should be updated at a frequency suitable to the Municipality, suggested to be every 5 years. If it is not possible to complete the condition assessment of all buildings in the near term, 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.

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.

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 Municipality 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. Capital investments and betterments of existing assets should be included or amended to the asset data of the corresponding building components.

The Municipality should provide annual updates to LOS and KPI measures to gauge performance of the Municipality 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.

7.8 Proposed Levels of Service – Buildings

The current levels of service established in 2019 are to be maintained as the proposed levels of service through the year 2031, per resolution by Council. It is recommended that the Municipality continue to monitor levels of service being provided by building assets on an annual basis to monitor and adjust proposed levels of service accordingly in the future, recognizing that building assets comprise not only the fleet asset category but are part of service delivery associated with other asset categories, and therefore must be considered in monitoring of other areas of service delivery.

8.0 Fleet

8.1 State of Local Infrastructure

The Municipality owns 88 assets within its fleet, including multiple types of assets used for service delivery within various departments of the Municipality.

The fleet assets are utilized for service delivery within various departments of the Municipality. A summary of the number and types of fleet assets by department can be found in **Table 8-1**.

Table 8-1: Summary of Fleet Assets

Department	Service Area	Number of Assets	Fleet Asset Types
Community Services	Fire	13	Front Line Fire Vehicle Fire Utility Vehicle Vans Pickups
Community Services	Recreation – Parks	11	Tractors/Loaders/Backhoes Self-propelled rotary & reel mowers Pickups Trailers
Community Services	Recreation	3	Ice Resurfacer
Corporate Services	Administration	1	Vans
Corporate Services	Unassigned	3	Tractors/Loaders/Backhoes Vans
Infrastructure & Development	Building & Planning	1	Vans
Infrastructure & Development	Public Works	46	Tandem Dump Trucks (50-55,000 lb G.V.W.) Single Axle Dump Trucks (30-39,000 lb G.V.W.) Tractors/Loaders/Backhoes Bulldozers Graders Bombardiers & Trackless Units Self-propelled rotary & reel mowers Vans, Pickups Miscellaneous
Infrastructure & Development	Waste Management	3	Tractors/Loaders/Backhoes Compactor
Infrastructure & Development	Water & Wastewater	7	Tandem Dump Trucks (50-55,000 lb G.V.W.) Vans Pickups
	TOTAL	**88**	-

8.1.1 Replacement Cost

The individual replacement costs per fleet asset will vary due to the variance in types of fleet assets used and maintained by the Municipality. For an understanding of future replacement costs of the fleet assets the historical cost of each asset has been inflated by a value of 3%, compounded annually since the acquisition date for an expected present day cost. A summary of the replacement costs by Municipal department is included in **Table 8-2**.

Table 8-2: Replacement Costs of Fleet Assets

Department	Service Area	Number of Fleet Assets	Replacement Costs
Community Services	Fire	13	$4,969,000
Community Services	Recreation – Parks	11	$398,500
Community Services	Recreation	3	$354,800
Corporate Services	Administration	1	$27,000
Corporate Services	Unassigned	3	$241,200
Infrastructure & Development	Building & Planning	1	$29,800
Infrastructure & Development	Public Works	46	$7,496,000
Infrastructure & Development	Waste Management	3	$1,294,000
Infrastructure & Development	Water & Wastewater	7	$813,900
	TOTAL (rounded)	**88**	**$15,624,000**

The expected replacement cost for all fleet assets is approximately $15,624,000.

8.1.2 Average Age

The age of fleet assets ranges from one year to 38 years. The average age of the assets, by vehicle type, is summarized in **Table 8-3**.

Table 8-3: Average Age of Fleet Assets

Fleet Asset Type	Number of Assets	Average Age (years)
Front Line Fire Vehicle	9	17.8
Tandem Dump Trucks (50-55,000 lb G.V.W.)	10	10.6
Small Dumps (10-18,000 lb G.V.W.)	1	2.0
Single Axle Dump Trucks (30-39,000 lb G.V.W.)	2	17.0
Fire Utility Vehicle	2	7.5
Bombardiers & Trackless Units	4	7.3
Vans	6	7.2

Fleet Asset Type	Number of Assets	Average Age (years)
Tractors/Loaders/Backhoes	14	9.5
Ice Resurfacer	3	12.3
Pickup	23	6.7
Bulldozers	1	30.0
Compactor	1	17.0
Trailers	1	21.0
Self-propelled rotary & reel mowers	7	9.0
Miscellaneous	2	25.5
Graders	2	6.0

The distribution of age of fleet assets is highlighted in **Figure 8-1**. The distribution considers fleet assets across all Municipal departments. The average asset age is approximately 11.5 years.

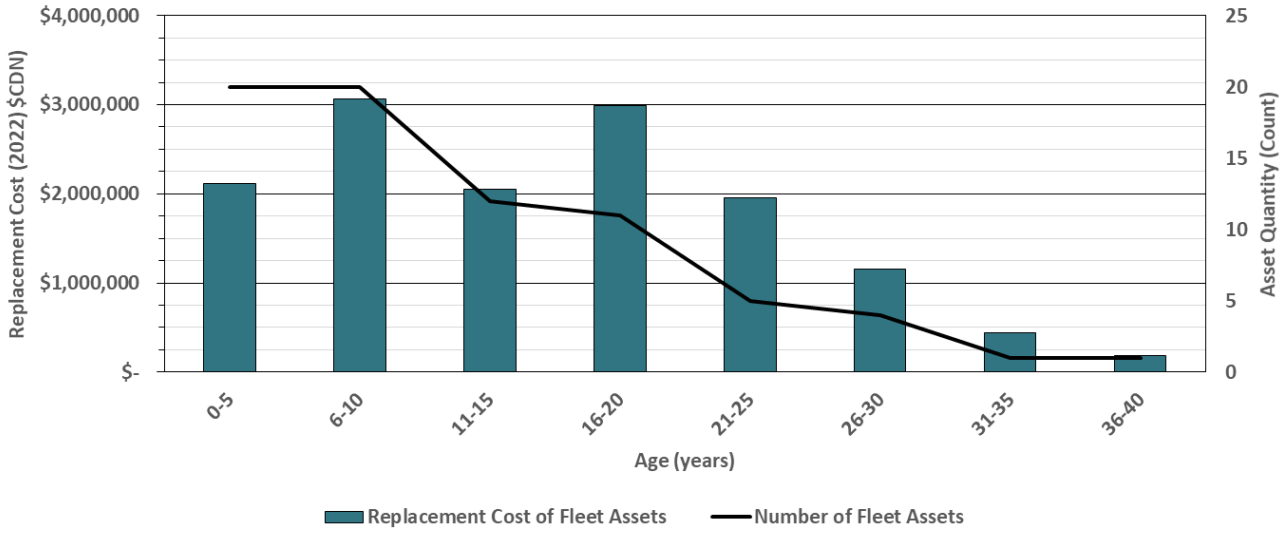


Figure 8-1: Age Distribution of Fleet Assets

8.1.3 Expected Useful Life

The expected useful life of the assets was provided by the Municipality, and is based on their tracking and useful life estimations. A summary of the expected useful life for fleet asset types is included in **Table 8-4**.

Table 8-4: Expected Useful Life of Fleet Assets

Fleet Asset Type	Number of Assets	Average Expected Useful Life
Front Line Fire Vehicle	9	20.0
Tandem Dump Trucks (50-55,000 lb G.V.W.)	10	8.0
Small Dumps (10-18,000 lb G.V.W.)	1	7.0
Single Axle Dump Trucks (30-39,000 lb G.V.W.)	2	7.0
Fire Utility Vehicle	2	14.0
Bombardiers & Trackless Units	4	8.8
Vans	6	6.4
Tractors/Loaders/Backhoes	14	11.5
Ice Resurfacer	3	15.0
Pickups	23	7.0
Bulldozers	1	15.0
Compactor	1	15.0
Trailers	1	15.0
Self-propelled rotary & reel mowers	7	7.0
Miscellaneous	2	15.5
Graders	2	15.0

The expected useful life varies by fleet asset type. Across all fleet assets, the average expected useful life is 11.7 years.

8.2 Condition – Fleet

The condition of the fleet assets was determined based on the odometer readings of each of the assets (where a higher odometer reading indicated a poorer condition), as well as an assumption based on the age and useful life used of each asset. The condition was determined on a scale of 1 to 5, for which a 1 describes an asset in Very Good condition and 5 in Very Poor condition. A summary of the conditions of the fleet assets by Municipal department is in **Table 8-5**.

Table 8-5: Condition Summary of Fleet Assets by Department

Department	Service Area	Very Good (1)	Good (2)	Fair (3)	Poor (4)	Very Poor (5)
Community Services	Fire	1	5	4	3	-
Community Services	Recreation	1	-	-	-	2
Community Services	Recreation - Parks	-	2	2	1	6

Department	Service Area	Very Good (1)	Good (2)	Fair (3)	Poor (4)	Very Poor (5)
Corporate Services	Administration	-	-	-	-	1
Corporate Services	Unassigned	3	-	-	-	-
Infrastructure & Development	Building & Planning	-	-	-	-	1
Infrastructure & Development	Public Works	5	14	5	8	14
Infrastructure & Development	Waste Management	1	-	-	-	2
Infrastructure & Development	Water & Wastewater	-	-	1	3	3
	TOTAL	**11**	**21**	**12**	**15**	**29**

Just over half of the assets are considered in Fair to Very Good condition, with the other half in Poor or Very Poor condition. The highest quantity of assets is within the Very Poor condition range. **Figure 8-2** shows the anticipated replacement value of the assets per condition rating. By replacement value, the highest proportions are within the Very Poor and Good ranges.

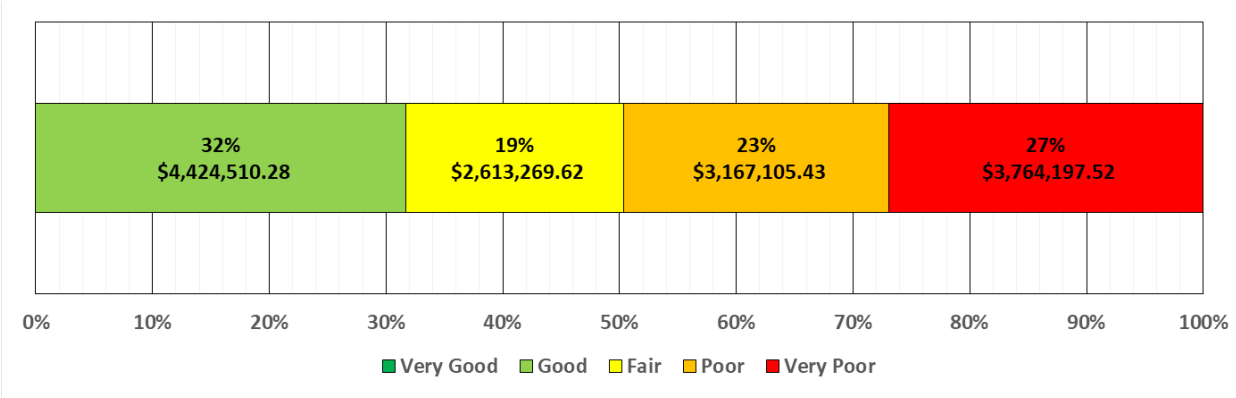


Figure 8-2: Replacement Value by Condition Rating for Fleet Assets

By replacement value over half of the network, 57%, is within a condition range of Fair to Very good. The remaining 43% of the network is within the Poor and Very Poor condition rating, which suggests that lifecycle activities such as maintenance or replacement may be required.

8.3 Current Levels of Service – Fleet

Levels of service for fleet assets are not defined in the regulation, O. Reg. 588/17 as fleet are not considered core assets. As such, level of services have been devised based on the content of the regulation, in consultation with the Municipality. **Table 8-65** through **Table 8-8** outline the Municipality's current community and technical levels of service for fleet.

Table 8-6: Community Levels of Service – Fleet

LOS Parameter	Community Levels of Service – Qualitative Description	Municipality of Kincardine Community LOS
Scope	Description, which may include maps of locations where fleet is stored	Storage facilities for fleet assets are located across the Municipality. The storage location is dependent on the type of equipment. A summary of storage locations and number of assets at each location is shown in **Table** 8-7: Locations of Fleet Asset Storage**8-6**.
Quality	Description of fleet condition (i.e., maintained in 'good' or better condition in order to provide reliability	Condition ratings were determined based on odometer readings and amount of expected useful life elapsed. Assets in 'good' or better condition include: • 17 assets (23%) considered Good condition • 8 assets (11%) considered Very Good condition

Table 8-7: Locations of Fleet Asset Storage

Address	Location Name	Number of Assets
127 Mahood Johnston Dr	Kincardine Fire Hall	8
15 McLaren St	Tiverton Fire Hall	4
796 Concession 7	Ward 2 Maintenance Facility	10
1240 Concession 6	Ward 3 Maintenance Facility / Community Centre	13
294 Bruce Ave	Kincardine Cemetery	5
140 Valentine Ave	Ward 1 Maintenance Facility	16
1475 Concession 5	MAC	6
437 Sideroad 15	KWMC	2
20 McLaren St	Tiverton Sports Centre	1
601 Durham St	Davidson Centre	3
133/135 Broadway St	Connaught Park / Lift Station	7
155 Durham St	KWTP	6
139 Valentine Ave	Kincardine Landfill	3

Table 8-8: Technical Levels of Service - Fleet

LOS Parameter	Technical Levels of Service – Technical Metric Description	Municipality of Kincardine Community LOS
Scope	Provide breakdown of number of fleet by department providing service compared to the size of the community (geography or population)	The number of fleet assets is provided in **Table 8-9** below, by department and as compared to the size of the community.
Quality	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).

Table 8-9: Fleet Assets by Department

Department	Number of Assets	Number of Vehicles per km^2	Number of Vehicles per Population
Administration	1	1 vehicle per 538 km^2	1 vehicle per 11,389 persons
Building & Planning	1	1 vehicle per 538 km^2	1 vehicle per 11,389 persons
Fire	13	1 vehicle per 41 km^2	1 vehicle per 876 persons
Public Works	46	1 vehicle per 12 km^2	1 vehicle per 248 persons
Public Works - Waste Management	3	1 vehicle per 179 km^2	1 vehicle per 3,796 persons

Department	Number of Assets	Number of Vehicles per km^2	Number of Vehicles per Population
Public Works - Water & Wastewater	7	1 vehicle per 77 km^2	1 vehicle per 1,627 persons
Recreation	3	1 vehicle per 179 km^2	1 vehicle per 3,796 persons
Recreation - Parks	11	1 vehicle per 49 km^2	1 vehicle per 1,035 persons

Note: Area of Municipality (538.02 km^2.) and population (11,389) sourced from census information.

8.4 Current Performance – Fleet

Asset performance measures were determined in consultation with the Municipality, which provide relevant metrics against which the Municipality can gauge the performance of their assets. The performance measures for fleet assets, and their current values are shown in **Table 8-10**.

Table 8-10: Current Performance Measures for Fleet

Asset Performances Measure	Current Value
Fleet maintenance expenses or annual operating cost to provide service ($/household)	Based on available information, the fleet operating and maintenance expenses in 2019 were as follows: • Public Works fleet: $895,963 • Water and wastewater vehicles: $33,942 Based on 5,632 households, this equates to approximately $165/household for annual operating and maintenance cost for fleet assets (public works and water/wastewater only)
Emergency services (distance travelled, fuel consumption, calls)	Based on 2019 records, the distance travelled by emergency services fleet was 34,102 km, 7,439 L of fuel consumed and 220 calls.
Maintenance expense per utilization ($/km or hour).	Not currently tracked, but it is recommended that the Municipality 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.

8.5 Risk Assessment – Fleet

The risk ratings for the municipal fleet followed the risk methodology and approach, presented in **Section 1.3**. The risk profile for municipal fleet is shown in **Figure 8-3**.

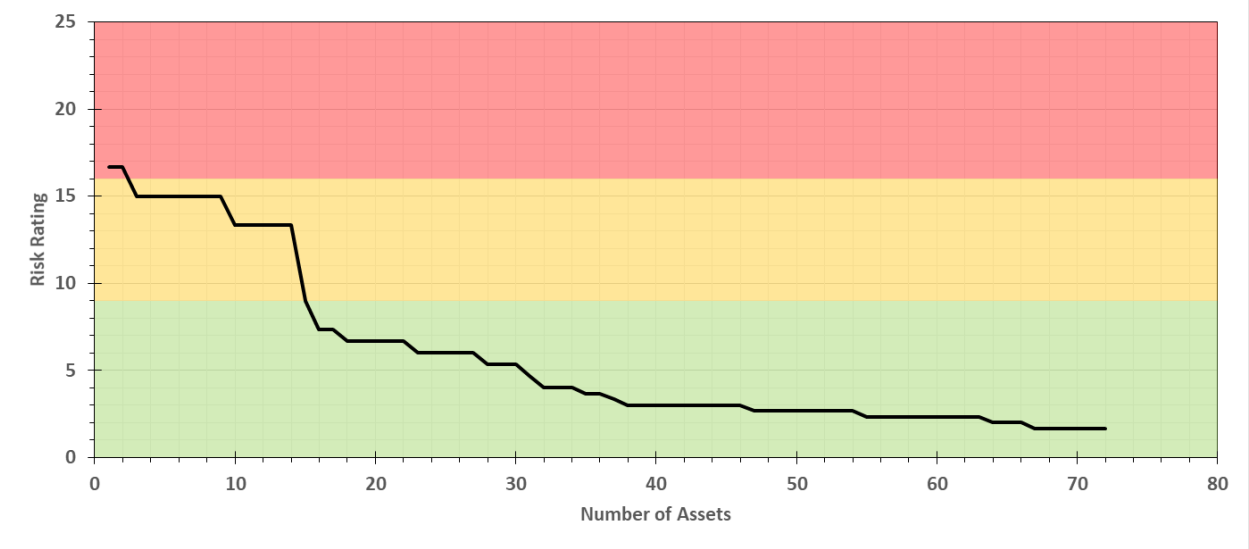


Figure 8-3: Fleet Risk Profile

Figure 8-3 shows two of the 88 municipal fleet assets were identified with the highest risk rating (value of 16.67) representing 5% of municipal fleet assets by replacement value. Risk scores between 16 and 25 are considered High risk and High priority. The replacement value of High risk fleet assets was estimated to be approximately $705,378 based on the inflation of historical cost information.

There were 12 fleet assets which fell in the Moderate risk category and represent 26% of fleet assets by replacement cost. All High and Moderate risk rated fleet assets were Front Line Fire Vehicles and Public Works Dump Trucks used in Winter Control activities. The remaining 74 fleet assets, 69% of the total fleet replacement value, were classified as Low risk.

It is important to highlight that the risk rating is used to inform the capital plan and the development of the capital plan takes into account other factors in addition to risk rating, such as scheduling, service demands, procurement methods, and availability of funding.

Other criteria used to prioritize work are:

- Changes in service demands or service agreements;
- Required technological improvements; and
- Safety requirements.

8.5.1 Performance

Performance of fleet assets was determined through consultation with municipal staff based on the current operational performance of the assets. Staff considered maintenance requirements and asset reliability to determine a performance score based on the methodology presented in **Section 1.3.1**. Assets where no performance issues were noted it was assumed the systems were Always Reliable.

8.5.2 Importance

Fleet asset importance was determined in consultation with the municipal staff, as described in **Section 1.3.3**. Fleet asset importance was classified by asset operation and the services delivered. Generally emergency service vehicles were applied a high importance rating. **Table 8-11** lists the general types of fleet assets categorized under High, Moderate and Low importance.

Table 8-11: Importance Rating – Fleet

Importance Rating	Fleet Asset
High (3)	• Front Line Fire Vehicles • Snowplows and Sanders
Moderate (2)	• Sidewalk Plows • Tractors/Loaders/Backhoes • Ice Resurfacers • Vans
Low (1)	• Pick-up Trucks • Construction Equipment • Yard Maintenance Equipment

8.6 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.

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 Municipality 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.

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.

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 – Fleet

The asset management strategy for the fleet 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.

The Municipality should review usage of 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 Municipality, due to the varied range of service the assets provide.

8.8 Proposed Levels of Service – Fleet

The current levels of service established in 2019 are to be maintained as the proposed levels of service through the year 2031, per resolution by Council. It is recommended that the Municipality continue to monitor levels of service being provided by fleet assets on an annual basis to monitor and adjust proposed levels of service accordingly in the future, recognizing that fleet assets comprise not only the fleet asset category but are part of service delivery associated with other asset categories, and therefore must be considered in monitoring of other areas of service delivery.

9.0 Equipment

9.1 State of Local Infrastructure

Equipment includes assets used across all departments within the Municipality. The Municipality owns 761 tracked assets. These have further been categorized into the following asset types:

- Speciality Equipment >$5,000
- Communication Equipment
- Street Furniture
- Decorative Street Clock
- Furniture Office
- Furniture Other
- Computers >$5,000
- Self-propelled rotary & reel mower
- Furniture Other >$5,000
- Bunker Gear
- SCBA – Pooled
- Health Equipment (Gym)
- Electronic Equipment
- Speciality Equipment
- Tractors/Loaders/Backhoes
- Miscellaneous

Many of the listed assets represent a pool of multiple components. Across the 788 tracked assets, there are 4,233 asset components.

9.1.1 Replacement Cost

The individual replacement costs for each of the equipment assets will vary, depending on the type of equipment, and the quantity of components tracked within that asset. For an understanding of future replacement costs of the equipment assets, we have taken the historical cost of each asset, and inflated it by a value of 3% annually since the acquisition date for an expected present day cost. A summary of the replacement costs by Municipal department is included in **Table 9-1**.

Table 9-1: Replacement Costs of Equipment Assets

Municipal Department	No. of Tracked Assets	No. of Components	Current Replacement Cost
Administration	12	12	$45,000
Building & Planning	27	117	$323,800
CAO & Human Resources	15	16	$581,000
Clerks	9	9	$92,200
Emergency Measures	54	72	$130,200
Fire	259	560	$2,094,300
Health Services	88	187	$532,900
Public Works	134	1566	$724,300
Public Works – Waste Management	3	3	$3,800

Municipal Department	No. of Tracked Assets	No. of Components	Current Replacement Cost
Public Works – Water & Wastewater	16	16	$176,500
Recreation	113	1526	$1,349,600
Recreation – Libraries & Cultural Services	4	88	$5,800
Recreation – Marina	2	2	$27,300
Recreation – Parks	36	43	$101,800
Tourism	3	3	$24,600
Treasury	13	13	$57,800
TOTAL	**788**	**4233**	**$6,270,900**

The expected replacement cost for all equipment assets is approximately $6,271,000.

9.1.2 Average Age

The age ranges from assets acquired in 2019 (3 years) to assets acquired in 1965 (57 years of age). A summary of the equipment asset types, quantity of assets and average are is included in **Table 9-2**. The average age considers the quantity of components within the assets.

Table 9-2: Average Age of Equipment Assets

Asset Type	No. of Tracked Assets	No. of Components	Average Age
Speciality Equipment > $5,000	102	1542	10.3
Computers > $5,000	3	3	12.7
Bunker Gear – Pooled	78	220	6.1
SCBA – Pooled	67	102	9.5
Communication Equipment – Pooled	158	174	17.1
Furniture Office – Pooled	94	94	16.4
Furniture Other – Pooled	132	1875	24.2
Health Equipment (Gym) - Pooled	36	36	16.6
Furniture Other > $5,000	1	1	12.0
Tractors/Loaders/Backhoes	2	2	4.5
Electronic Equipment – Pooled	2	2	6.0
Speciality Equipment – Pooled	3	16	4.7

Asset Type	No. of Tracked Assets	No. of Components	Average Age
Miscellaneous	1	1	29.0
Self-propelled rotary & reel mowers	1	1	10.0
Street Furniture – Pooled	98	105	15.9
Decorative Street Clock	2	2	16.0

The average age of the equipment assets is 13.2 years.

The distribution of age of assets by replacement value is shown in **Figure 9-1**. A low count of assets with a corresponding high replacement cost may be attributed to pooled assets, where a single asset identifier is used for a group of similar components (i.e., specialty equipment, furniture, etc.).

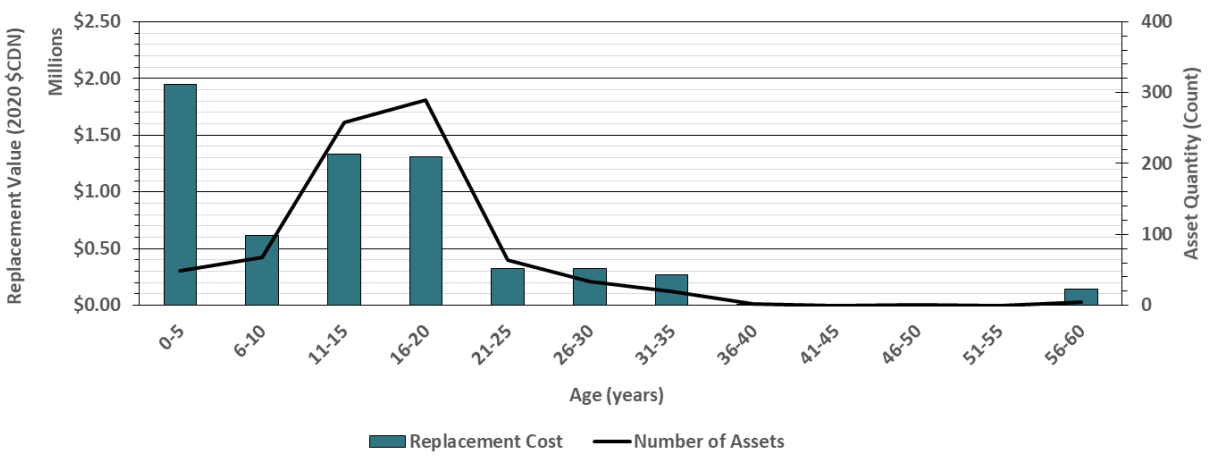


Figure 9-1: Age Distribution of Equipment Assets

9.1.3 Expected Useful Life

The expected useful life of the assets was provided by the Municipality, and is based on their tracking and useful life estimations. A summary of the expected useful life for equipment asset types is included in **Table 9-3**.

Table 9-3: Average Useful Life of Equipment Assets

Asset Type	No. of Tracked Assets	No. of Components	Average Expected Useful Life
Speciality Equipment > $5,000	103	1543	19.5

Asset Type	No. of Tracked Assets	No. of Components	Average Expected Useful Life
Computers > $5,000	3	3	3.3
Bunker Gear - Pooled	78	220	3.5
SCBA - Pooled	67	102	12.1
Communication Equipment - Pooled	158	174	10.2
Furniture Office - Pooled	94	94	9.6
Furniture Other - Pooled	132	1875	20.0
Health Equipment (Gym) - Pooled	36	36	15.0
Furniture Other >$5,000	1	1	10.0
Tractors/Loaders/Backhoes	6	6	3.7
Electronic Equipment - Pooled	2	2	10.0
Speciality Equipment - Pooled	3	16	17.5
Miscellaneous	1	1	10.0
Self-propelled rotary & reel mowers	1	1	7.0
Street Furniture - Pooled	98	105	19.0
Decorative Street Clock	2	2	10.0

The expected useful life varies by asset type and a variety of other factors unique to each individual asset. The average expected useful life is approximately 13.2 years.

9.2 Condition – Equipment

The condition of the equipment assets was determined based on the age and useful life used of each asset. The condition was determined on a scale of 1 to 5, for which a 1 describes an asset in Very Good condition and 5 in Very Poor condition.

Figure 9-2 summarizes the condition of equipment assets measured by the current by replacement value. Approximately 49% of assets were estimated to be in Poor to Very Poor condition based on the asset age and typical useful life. The actual condition of these assets should be evaluated by staff and replacement or maintenance requirements identified. The remainder of equipment assets, an estimated 51% of the current total category replacement value, were predicted to be in Fair to Very Good condition.

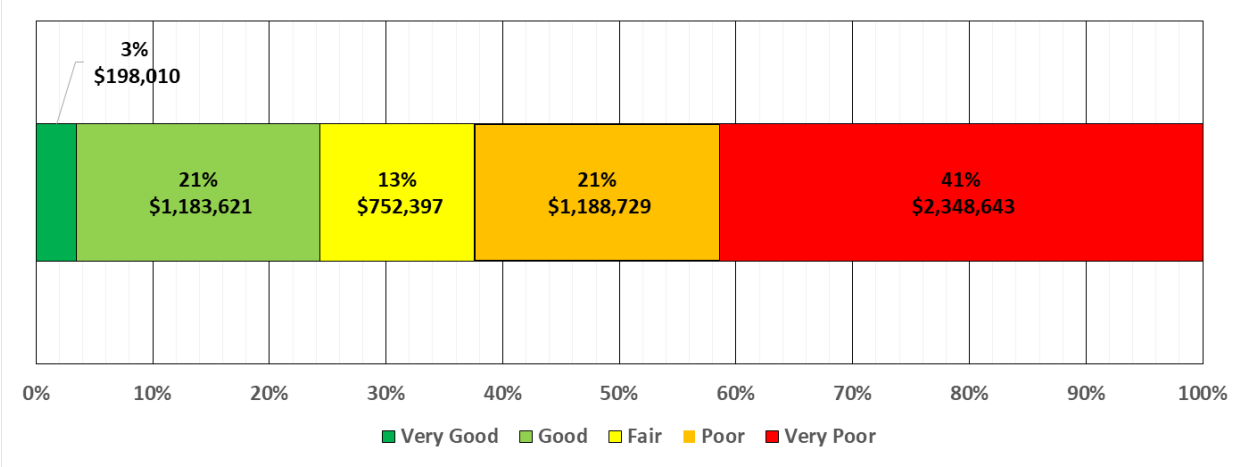


Figure 9-2: Equipment Condition and Replacement Costs

9.3 Current Levels of Service – Equipment

Levels of service for equipment assets are not defined in the regulation, O. Reg. 588/17 as equipment is not considered a core asset. With the variety in types of assets categorized as 'equipment' assets, it is not recommended to develop overarching levels of service for this category as the service being delivered by the assets is also greatly varied.

Through usage and replacement of these assets, the Municipality likely has informal level of service understanding for the assets. By formalizing the levels of service by asset type and monitoring, the Municipality can gain a greater understanding of the services provided by the assets, and their effectiveness. It is expected that the user group for each asset type can establish and monitor levels of service.

9.4 Current Performance – Equipment

Similar to levels of service, there are currently no formalized performance indicators for the equipment assets. The individual asset types within the equipment assets should have specific performance indicators formalized for consistent understanding and tracking of performance.

9.5 Risk Assessment – Equipment

The risk ratings for the municipal equipment followed the risk methodology and approach, presented in **Section 1.3**. The risk profile for municipal equipment is shown in **Figure 9-3**.

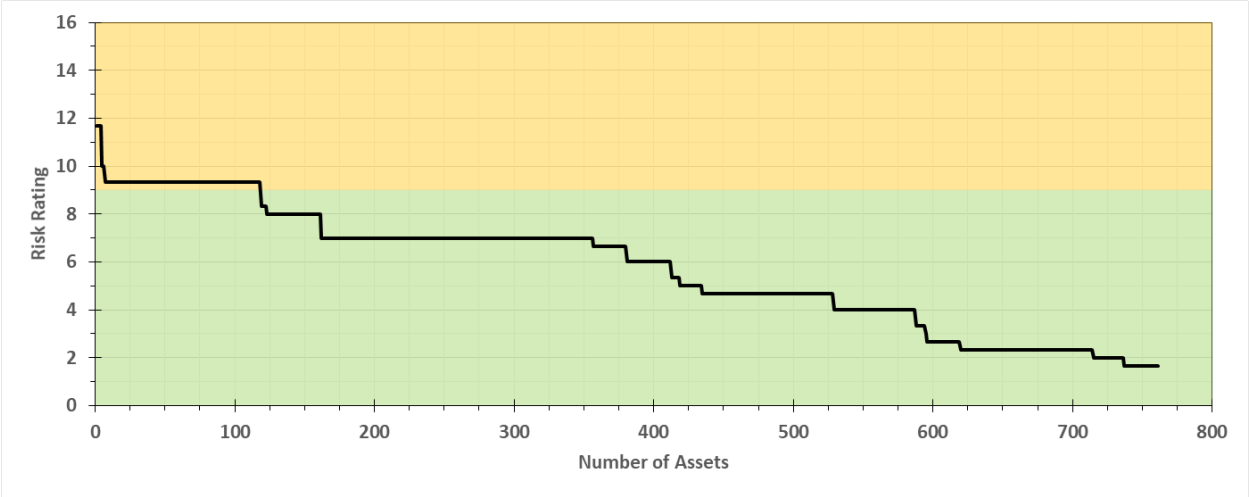


Figure 9-3: Equipment Risk Profile

Figure 9-3 shows most assets in the Equipment category have a Low risk rating with 84% of assets receiving a risk score below 9. There are 118 assets identified as Moderate Risk, with an estimated replacement value of $1,000,690. Moderate risk assets account for 16% of equipment assets, of which the majority (104 of 118) is Fire Department Equipment including Bunker Gear.

It is important to highlight that the risk rating is used to inform the capital plan and the development of the capital plan takes into account other factors in addition to risk rating, such as scheduling, service demands, procurement methods, and availability of funding.

Other criteria used to prioritize work are:

- Changes in service demands or service agreements;
- Required technological improvements; and
- Safety requirements.

9.5.1 Performance

Performance of equipment assets was determined through consultation with municipal staff and facility operators. For assets where no performance issues were noted it was assumed the systems were Always Reliable.

9.5.2 Importance

Equipment asset importance was determined in consultation with the municipal staff, as described in **Section 1.3.3**. For Equipment assets, high importance was assigned to equipment essential to the function of essential operations, data security and emergency services. Moderate importance was applied to assets used in day-to-day municipal operations and high public use settings. Low importance classified interior and exterior furniture. **Table** 9-4:

Importance Rating – Equipment provides additional details on the importance classification of equipment assets.

Table 9-4: Importance Rating – Equipment

Importance Rating	Equipment Asset
High (3)	• Fire Department equipment • Health Department equipment • Emergency communication equipment • Health Department and Municipal computer sever equipment
Moderate (2)	• Gym equipment • Food preparation appliances • Filing systems • Workstations • Office equipment
Low (1)	• Office furniture • Chairs • Tables • Park benches • Trash cans

9.6 Lifecycle Activities – Equipment

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

Acquisition

Acquisition of a new equipment 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 Municipality with an asset in Very Good condition, however the condition of a used asset could vary.

Maintenance

Maintenance activities will vary across the equipment 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.

Disposal

Disposal activities can include the removal from service through disposal, sale of asset or transfer of an asset to 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.

9.7 Asset Management Strategy – Equipment

The asset management strategy for the equipment 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.

The Municipality 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 Municipality, due to the varied range of service the assets provide.

9.8 Proposed Levels of Service – Equipment

The current levels of service established in 2019 are to be maintained as the proposed levels of service through the year 2031, per resolution by Council. It is recommended that the Municipality continue to monitor levels of service being provided by equipment assets on an annual basis to monitor and adjust proposed levels of service accordingly in the future.

10.0 Parks and Yard Improvements

The parks and yard improvements asset category includes assets identified as ‘yard improvements’. Many of the assets included in this category are tied to parks related services, therefore the parks distinction is added.

10.1 State of Local Infrastructure

Parks and yard improvement assets include a variety of asset types, including 535 assets which further contain additional components. A summary of the asset types, quantity, average condition, age and average expected useful life is included in **Table 10-1**: Parks and Yard Improvements Asset Summary.

Table 10-1: Parks and Yard Improvements Asset Summary

Asset Type	Count	Quantity	Units	Average Condition	Average Age	Average Useful Life	Current Replacement Cost
Baseball Diamond	9	38,198	Area (m2)	4.0	30.4	37.8	$ 1,878,800
Bike Park	1	21	Area (acres)	3.0	12.0	20.0	$ 151,500
Boardwalks	5	825	Length (m)	4.8	20.2	15.2	$ 574,500
Boat Ramps	2	160	Area (m2)	2.5	16.5	36.0	$ 78,100
Cemetery Roads - Pooled	10	889	Length (m)	2.6	21.1	40.8	$ 76,800
Columbaria	3	197	Count	1.3	8.3	33.3	$ 306,500
Decorative Signs > $5,000	9	38	Count	3.2	11.1	18.2	$ 330,200
Dock Systems	6	385		3.7	12.3	17.0	$ 388,200
Erosion & Flood Control Systems	4	4	Count	1.3	6.8	40.0	$ 357,700
Fencing > $5,000	21	7,820	Length (m)	3.7	19.6	21.0	$ 761,200
Fire Training Facility	1	1	Count	2.0	5.0	15.0	$ 20,800
Ground water & Leachate monitoring wells > $5,000	4	9	Count	1.3	10.8	50.0	$ 484,200
Guide Rails (Non Roads)	1	1	Count	1.0	10.0	60.0	$ 102,300
Headstone Foundations	1	1	Count	2.0	10.0	30.0	$ 12,400
Irrigation Systems	7	7	Count	4.6	21.9	14.7	$ 352,900
Landfills	4	2	Count	1.0	5.5	78.5	$ 1,355,600
Lawn bowling	1	875	Area (m2)	5.0	50.0	40.0	$ 129,200
Leachate Monitoring Wells - Pooled	39	39	Count	3.1	30.5	50.0	$ 80,400
Lighting Systems - Pooled	71	71	Count	3.4	20.5	29.9	$ 556,700
Lighting Systems >$5,000	61	63	Count	3.5	26.1	29.5	$ 1,619,600
Monitoring Wells - Pooled	40	60	Count	2.8	28.2	50.0	$ 83,200

Asset Type	Count	Quantity	Units	Average Condition	Average Age	Average Useful Life	Current Replacement Cost
Nominal	12	12	Length (km)	4.4	47.4	45.8	$ 122
Parking Lots	45	92,126	Count	3.1	26.9	50.7	$ 3,459,200
Pavement/walls	1	1	Count	3.0	15.0	25.0	$ 24,700
Pedestrian Bridges	14	14	Count	2.4	12.2	64.9	$ 766,000
Playground Equipment - Pooled	74	78	Count	4.9	18.5	15.1	$ 367,000
Playground Equipment > $5,000	23	23		4.3	15.3	15.0	$ 531,600
Retaining walls	8	37.7		1.5	10.4	60.6	$ 1,129,600
Retaining walls - marina (piers)	5	14.15	Count	1.6	14.6	56.3	$ 9,072,100
Retaining walls - modular block/gabion basket	4	39	Length (m)	3.0	25.0	40.0	$ 1,039,700
Road surface	1	0	Count	1.0	1.0	-	$-
Roads Base - Unpaved	12	4,602	Area (m2)	2.5	22.2	43.4	$ 396,900
Runways, Taxiways & Paved Access Roads	17	3,612	Count	2.1	9.8	29.1	$ 4,815,000
Signs (Non Road)	1	1		3.0	10.0	20.0	$ 15,700
Skate Park	2	876	Area (m2)	3.5	15.5	20.0	$ 134,600
Soccer & Rugby Fields	11	11	Length (m)	3.0	24.5	39.8	$ 3,053,500
Splash Pad	2	576	Length (m)	1.0	6.5	40.0	$ 668,900
Tennis Courts	1	1,600	Count	1.0	4.0	30.0	$ 114,900
Tracks	3	1,660	Length (m)	3.3	31.0	39.0	$ 254,000
Trail Systems	10	15	Length (m)	3.7	15.4	20.0	$ 524,700
Weigh scale	1	1	Length (m)	2.0	10.0	35.0	$ 244,800

The parks and yard improvement assets are used by departments across the Municipality, with the majority attributed to Recreation - Parks. A summary of the quantity of assets by department is shown in **Table 10-2**.

Table 10-2: Park and Yard Improvement Assets by Municipal Department

Municipal Department	No. of Assets
Building & Planning	3
CAO & Human Resources	10
Clerks	2
Fire	5
Health Services	5
Public Works	84
Public Works – Waste Management	94
Public Works – Water & Wastewater	7
Recreation	47
Recreation – Libraries & Cultural Services	4
Recreation – Marina	10
Recreation – Parks	269
Tourism	7
TOTAL	**547**

10.1.1 Replacement Cost

The individual replacement costs for the park and yard improvement varies, depending on the type of equipment. For an estimate of future replacement costs of the park and yard improvement assets, we have taken the historical cost of each asset, and inflated it by a value of 3% annually since the acquisition date for an expected present day cost. A summary of the replacement costs by Municipal department is included in **Table 10-3**.

Table 10-3: Replacement Costs of Park and Yard Improvement Assets

Municipal Department	No. of Assets	Replacement Cost (inflated historical costs)
Building & Planning	3	$169,300
CAO & Human Resources	10	$3,188,400
Clerks	2	$186,200
Fire	5	$215,200
Health Services	5	$149,500
Public Works	84	$7,139,000
Public Works – Waste Management	94	$2,885,300

Municipal Department	No. of Assets	Replacement Cost (inflated historical costs)
Public Works – Water & Wastewater	7	$148,700
Recreation	47	$2,490,900
Recreation – Libraries & Cultural Services	4	$258,900
Recreation – Marina	10	$9,452,800
Recreation – Parks	269	$10,215,800
Tourism	7	$229,700
TOTAL (rounded)	547	**$36,729,700**

The expected replacement cost for all parks and yard improvement assets is approximately $36,729,700.

10.1.2 Average Age

The age of the park and yard improvement assets ranges from 1 year (various assets) to 147 years (cemetery assets). The average age of the assets is 17.4 years.

A summary of the age distribution for the park and yard improvement assets is shown in **Figure 10-1.**

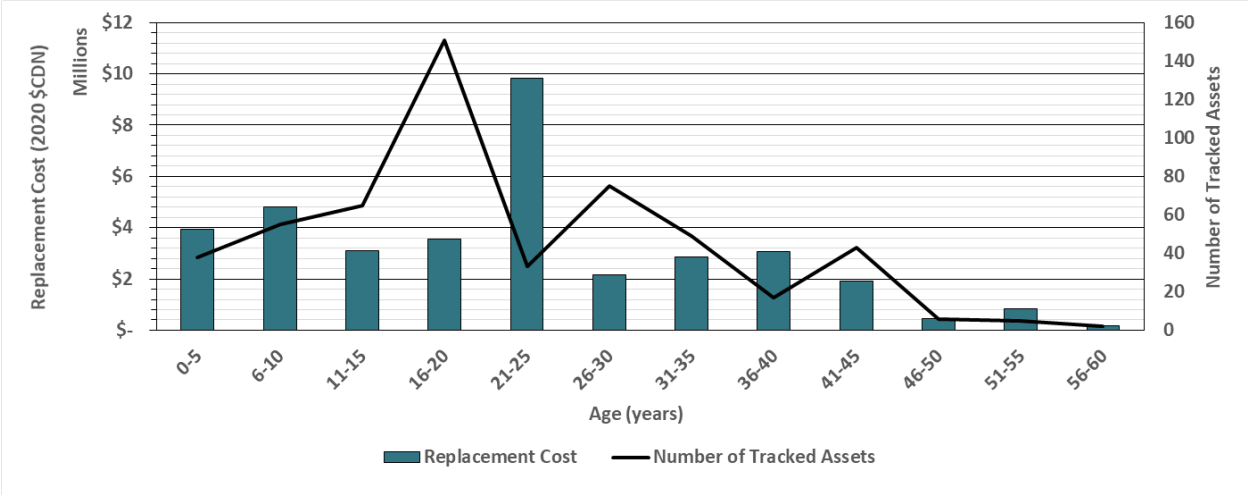


Figure 10-1: Age Distribution of Parks and Yard Improvements Assets

There are two assets with an age higher than 90 years. This includes the Kincardine Cemetery located at 294 Bruce Ave (aged at 147 years), and the Tiverton Cemetery located at 45 King St (aged at 96 years). The remainder of the assets have ages under 60 years.

10.1.3 Expected Useful Life

The expected useful life of the assets was provide by the Municipality, and is based on their tracking and useful life estimations. The useful lives were summarized across asset types.

10.2 Condition – Parks and Yard Improvements

Where available field condition data was used to provide condition scores for assets. A limited number of pedestrian bridges received comments on condition as part of the 2019 Bridge Inspection Report by BM Ross and Associates Ltd. This information was use to generally classify asset condition for those that received comment. It is recommended that all bridges that are classified as structures under OSIM receive full condition assessments during the next round of assessments.

Where no field condition data was available, the condition of the park and yard improvement assets was determined based on the age and useful life used of each asset. The condition was determined on a scale of 1 to 5, for which a 1 describes an asset in Very Good condition and 5 in Very Poor condition.

Figure 10-2 summarizes the distribution of all Parks and Yard Improvements asset condition by estimated replacement cost.

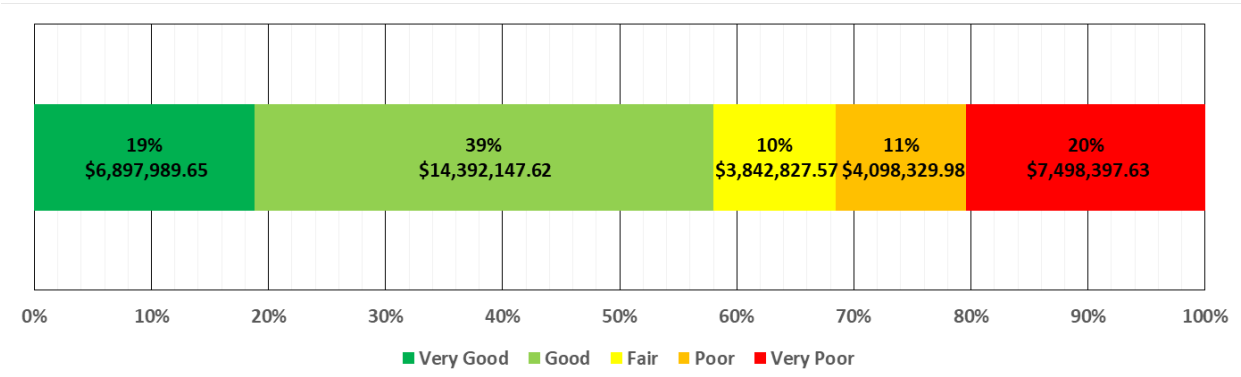


Figure 10-2: Parks and Yard Improvements Condition and Replacement Costs

10.3 Current Levels of Service − Parks and Yard Improvements

Levels of service for yard improvement assets are not defined in the regulation, O. Reg. 588/17 as yard improvements are not considered core assets. As such, level of services have been devised based on the content of the regulation, in consultation with the Municipality. **Table 10-4** and **Table 10-4** outline the Municipality's current community and technical levels of service for yard improvements.

The levels of service were determined from a parks perspective, as many of the yard improvements assets are part of parks service delivery. LOS descriptions were not determined for the other yard improvement assets.

Table 10-4: Community Levels of Service – Parks and Yard Improvements

LOS Parameter	Qualitative Description	Municipality of Kincardine Community LOS
Scope	Description, which may include maps of parks locations	The locations of parks facilities throughout the Municipality are shown in **Figures A-9** and **Figure A-10** in Appendix A.
Quality	Description of hours of operation and available services	• Splash pad – daily 10:00 a.m. – 8:00 p.m. (open for season once temperature above 20 deg. • Lights for soccer and baseball – off at 11:00 p.m. • Lights for tennis courts – off at 11:00 p.m. • Skate park – daily 9:00 a.m. to 9:00 p.m. (or dusk) Mat – end of October • Washrooms – open May to October (due to seasonal facility design and staffing) • Grass cutting – May 1 to October 31 (due to seasonal requirements and staffing) • Sports fields (April – end of October) • Ball diamonds (May – end of October) • Dog Park (open year round, but only if weather is good). Public Works doesn't necessarily have time to snow plow to the gate, but the dog park is maintained from April – October when Parks staff are working

Table 10-5: Technical Levels of Service – Parks and Yard Improvements

LOS Parameter	Qualitative Description	Municipality of Kincardine Community LOS
Scope	Number of parks facilities per population	There are 38 parks facilities located throughout the Municipality. Based on a total population of 11.389 people, this equates to 1 parks facility per 300 people.

LOS Parameter	Qualitative Description	Municipality of Kincardine Community LOS
Quality	Legal/regulatory/local standards	Legal/regulatory/local standards include: • Grass cutting guidelines • Playground equipment annual inspection by a certified safety inspector • Beach grooming (department standards – done before the beach season begins, and at various times throughout the beach season)

10.4 Current Performance – Yard Improvements

Asset performance measures were determined in consultation with the Municipality, which provide relevant metrics against which the Municipality can gauge the performance of their assets. The performance measures for yard improvements, and their current values are shown in **Table 10-6**.

The performance measures were determined from a parks perspective, as many of the yard improvements assets are part of parks service delivery. Performance measures were not determined for the other yard improvement assets.

Table 10-6: Current Performance Measures for Yard Improvements

Asset Performances Measure	Current Value
Usage rates of facilities (by number of patrons, hours of operation, etc.)	Not currently available due to staff capacity to provide information
Customer feedback (number of complaints and compliments)	Not currently tracked, but it is recommended that that Municipality track this in the future.

10.5 Risk Assessment – Parks and Yard Improvements

The risk ratings for Yard Improvements followed the risk methodology and approach, presented in **Section 1.3**. The risk profile for Yard Improvements is shown in **Figure 10-3**.

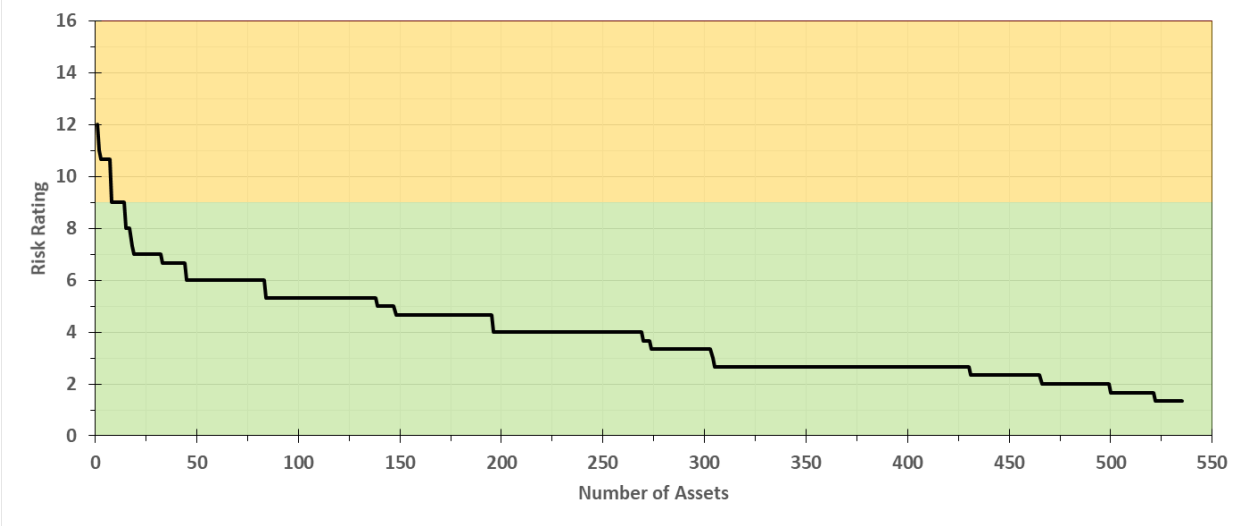


Figure 10-3: Yard Improvements Risk Profile

Figure 10-3 shows the majority, approximately 65%, of yard improvement and parks assets have Low risk rating. Assets with Low risk ratings have an estimated replacement value of $23,476,666. There are eight assets with evaluated risk ratings between 9 and 16, identified as Moderate risk, of which one has the highest risk rating of 14.7. Moderate risk assets account for the remaining 35% of asset value and have an estimated replacement cost of $12,837,000.

It is important to highlight that the risk rating is used to inform the capital plan and the development of the capital plan takes into account other factors in addition to risk rating, such as scheduling, service demands, procurement methods, and availability of funding.

Other criteria used to prioritize work are:

- Planned work or replacements;
- Community benefits;
- Project readiness;
- Changes in service demands;
- Required technological improvements; and
- Safety requirements.

10.5.1 Performance

Performance of yard improvement assets was determined through consultation with municipal staff and facility operators. For assets where no performance issues were noted it was assumed the systems were Always Reliable.

10.5.2 Importance

Parks and Yard Improvement asset importance was determined in consultation with the municipal staff, as described in **Section 1.3.3**. For Parks and Yard Improvement assets, high importance was assigned to Landfill expansions and municipal drain works. Moderate importance generally classified sports fields, pedestrian bridges, marina infrastructure, retaining walls and erosion control systems, airport runway and taxiways, lighting systems and fire training facility. Low importance assets were generally trail systems, minor residential park infrastructure and cemetery infrastructure.

10.6 Lifecycle Activities – Parks and Yard Improvements

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

Acquisition:

Acquisition of a new parks and yard improvement 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 Municipality with an asset in Very Good condition, however the condition of a used asset could vary.

Maintenance:

Maintenance activities will vary across the equipment 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.

Disposal:

Disposal activities can include the removal from service through disposal, sale of asset or transfer of an asset to 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.

10.7 Asset Management Strategy – Parks and Yard Improvements

The asset management strategy for the parks and yard improvements 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.

The Municipality should review usage of parks and yard improvements 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 Municipality, due to the varied range of service the assets provide.

10.8 Proposed Levels of Service – Parks and Yard Improvements

The current levels of service established in 2019 are to be maintained as the proposed levels of service through the year 2031, per resolution by Council. It is recommended that the Municipality continue to monitor levels of service being provided by parks and yard improvements assets on an annual basis to monitor and adjust proposed levels of service accordingly in the future.

11.0 Land

11.1 State of Local Infrastructure

The Municipality owns Land assets in conjunction with other assets described in the previous chapters. Land assets are typically considered passive assets as under normal circumstances they would not require replacement or renewal. Betterment, maintenance and remedial activities for Land assets have historically been identified and managed as part of Parks and Yard Improvements, Buildings, Water, Wastewater or Stormwater asset classes depending on the services delivered by the Land asset and the occupying assets. The Municipality owns approximately 10.4 km^2 of land as part of a number of delivered services, summarized in **Table 11-1.**

Table 11-1: Land Service Delivery Classifications and Area

Service Delivery Classification	Description	Number of Parcels	Area (acres)	Area (km^2)	% of Total Land Owned
Parks	Parks, monuments, trails, sports fields, beaches and other public recreation uses.	93	402.6	1.6	16%
Cemetery	Cemeteries and columbaria.	21	146.2	0.6	6%
Wastewater	Wastewater lift/pump stations, treatment facilities and lagoons.	11	84.4	0.3	3%
Vacant	Vacant lots.	19	20.4	0.1	1%
Waste Management	Existing, closed and future landfill sites.	13	345.7	1.4	13%
Water	Well, water tower, pump house and treatment plants sites.	12	26.7	0.1	1%
Buildings	Land for general municipal buildings.	85	249.8	1.0	10%
Road Allowance	Roads, road allowances and easements.	31	1,037.2	4.2	40%
Environmental Protection	Marine and environmental protection areas.	27	22.9	0.1	1%
Airport	Airport site, access and runway.	2	125.2	0.5	5%
Stormwater	Drainage ditches, municipal drains, ravines/creeks and stormwater ponds.	38	90.2	0.4	3%
Yard Improvements	Parking lots.	6	2.6	0.0	0%

Service Delivery Classification	Description	Number of Parcels	Area (acres)	Area (km^2)	% of Total Land Owned
Bruce Telecom	Bruce telecom building sites.	15	22.6	0.1	1%
TOTAL	**-**	**373**	**2,576.4**	**10.4**	**100%**

11.1.1 Replacement Cost

Given the complex natural of land valuation the replacement cost for Land assets will not be examined as part of the Asset Management Plan. As Land assets do not require replacement as it relates to other assets the quantification of land value is not a useful metric for consideration.

11.1.2 Average Age

The age of Land assets is not measured as this does not provide any useful information within the lens of asset management.

11.1.3 Expected Useful Life

There is no quantifiable expected useful life for land assets.

11.2 Condition – Land

The condition of land is included in the condition of assets which occupy the land. The condition of land is not quantifiable based on the asset age.

11.3 Current Levels of Service – Land

Specific levels of service for Land assets are not defined within the regulation.

Service delivery related to land is generally provided by the assets that occupy the land, while the land assets remain passive. As such, level of service metrics are not required for land assets, as they have previously been defined for the assets, and land components are negligible.

In general, the Municipality should seek to maintain land for the desired service delivery and community access, as applicable.

11.4 Current Performance – Land

Similar to levels of service, performance metrics will be defined for the assets that occupy the land, and are therefore not required for the land assets.

11.5 Risk Assessment – Land

Since Land assets are passive in nature there is no defined risk associated. The risk for utilization of the land is included in the risk assessment of assets occupying the land.

11.6 Lifecycle Activities – Land

In the lifecycle of Land assets, there are few activities that can be undertaken. The expected lifecycle activities to be used on the Land assets include acquisition, maintenance and Disposal.

Acquisition

Acquisition of a new Land 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.

Maintenance

Maintenance activities will vary across the assets due to the variability in type and usage of assets. Maintenance activities should include regular inspections for condition, and recording of maintenance activities undertaken. Typically maintenance and remedial activities are often associated or assigned to assets which occupy the land.

Disposal

Disposal activities can include the removal from service through the sale of asset or transfer of an asset to different department. Disposal activities should be conducted such that health and safety protocols are being followed. Land assets have an indefinite useful life and therefore the disposal will be governed by the required service delivery of the Land assets.

11.7 Asset Management Strategy – Land

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

Throughout the lifecycle of the assets, routine maintenance should be conducted as required based on the use and occupying asset demands. There is no quantifiable useful life for land assets, if assets are maintained as required and intended use appropriate environmental management process followed Land assets should have an indefinite lifespan.

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

12.0 Financing Strategy

12.1 Introduction

This chapter outlines the financing strategy that would sustainably fund the lifecycle management strategies presented in previous sections. This financing strategy focuses on examining how the Municipality can fund the lifecycle activities required to maintain its assets at the proposed levels of service. The strategy presented is a suggested approach which should be examined and re-evaluated during the annual budgeting processes to ensure the sustainability of the Municipality's financial position as it relates to its assets.

O. Reg. 588/17 requires a 10-year capital plan that forecasts the costs of implementing the lifecycle management strategy and the lifecycle activities identified in the asset management plan. The financing strategy in this asset management plan has been developed for a 20-year forecast period to enable the Municipality to evaluate the sustainability of its assets over a longer-term horizon.

Various financing options, including reserve funds, debt, and grants were considered during the process of developing the financing strategy and are described in more detail in **Section 12.3** below.

Further detail on the Financing Strategy is presented in the following tables in **Appendix D**:

- Table D-1: Capital Budget Forecast (Inflated $)
- Table D-2: Tax Supported Debenture Issuance
- Table D-3: Water Debenture Issuance
- Table D-4: Wastewater Debenture Issuance
- Table D-5: Tax Supported Capital Reserve Funds
- Table D-6: Water Capital Reserve Funds
- Table D-7: Wastewater Capital Reserve Funds
- Table D-8: Operating Budget Forecast (Inflated $)

12.2 Annual Costs

Table D-1 in Appendix D presents the capital budget forecast by asset class for the 2022-2041 forecast period. This expenditure forecast is based on the lifecycle activities identified in preceding sections of this plan and includes anticipated renewal/replacement activities required to achieve desired levels of service.

The capital expenditure forecast includes a capital inflation factor of 3.5% annually, which aligns closely with the historical 20-year annual average rate of inflation as witnessed in Statistics Canada's Building Construction Price Index.

12.3 Funding

Table D-8 in Appendix D summarizes the recommended strategy to finance the asset lifecycle costs identified in **Table D-1**. This funding forecast was based on the funding sources identified in the Municipality's 2022 budget.

The lifecycle costs required to sustain established level of service targets are being recovered through several methods:

- Ontario Community Infrastructure Fund (OCIF) formula-based funding is identified for years in which the funding amount is known (2022). The Ontario Government more than doubled the Town's OCIF grant in 2022 as part of a five year initiative to support small, rural, and northern communities that started in 2022. In the financial strategy, the 2022 level of OCIF funding is maintained for the five-year duration of the provincial initiative. It is then reduced back to the 2021 funding level for the remainder of the forecast period.
- Canada Community-Building Fund (CCBF) funding has been shown as a stable and long-term funding source for eligible capital projects. Annual funding estimates are based on the Municipality's 2022 funding level.
- Dividends that the Municipality receives annually from Bruce Telecom have been included in the forecast – with 50% of the dividend assumed to be available as a funding source for capital projects.
- The Municipality will be dependent upon maintaining healthy capital reserves/reserve funds in order to provide the remainder of the required lifecycle funding over the forecast period. This will require the Municipality to proactively increase amounts being transferred to these capital reserves during the annual budget process.
- Debt financing is shown as required in years where significant capital needs are identified. Specifically, the forecast includes a total of $40.8 million of debt financing for tax supported services over the forecast period. The associated annual carrying costs (principal and interest), together with carrying costs of existing debt, would result in the ratio of carrying costs to own-source revenues to peak at approximately 5.2% by 2032. This is well below the provincially mandated maximum annual repayment limit of 25% and also within the Municipality's self-imposed target of 10%, as set out in its Debt Management Policy (Policy No. GG.2.23).

12.3.1 Funding Shortfall and Full Lifecycle Funding

This financing strategy has been developed to be fully funded, and therefore no funding shortfall has been identified. However, this means that if identified grants are not received at expected amounts then shortfalls may present themselves. In such an event, the difference could be

made up through increases to the tax levy/user rates over-and-above those presented hereafter.

The annual lifecycle funding targets, by asset category, are presented in **Table 12-1** and compared to the current annual capital funding capacity.

Table 12-1: Contribution Towards Capital-related Needs and Lifecycle Target (2022$)

Asset Category	Annual Lifecycle Cost	Current Capital Funding Capacity
Bridges & Culverts	1,894,801	
Roads	5,632,000	
Stormwater Mains	1,356,249	
Buildings	2,634,049	
Fleet	1,264,144	
Equipment	514,695	
Parks & Yard Improvements	1,097,148	
Total Tax Supported	**14,393,087**	**6,738,138**
Watermains	1,700,629	
Buildings	1,199,015	
Fleet	52,999	
Equipment	7,531	
Yard Improvements	3,703	
Total Water	**2,963,876**	**1,504,426**
Sanitary Sewers	1,964,293	
Buildings	1,525,184	
Fleet	52,999	
Equipment	7,531	
Yard Improvements	3,703	
Total Wastewater	**3,553,710**	**1,488,690**
Grand Total	**20,910,673**	**9,731,254**

It is noted that this fully funded financing strategy phases-in annual contributions towards capital such that the Municipality reaches full lifecycle funding levels by 2032. The full lifecycle funding level for each asset class was established based on the lifecycle management strategies identified in preceding sections of this plan. Under this approach, an annual capital investment amount is calculated where funds are available for short-term needs while establishing a funding plan for long-term needs. Annual contributions in excess of capital costs in a given year would be transferred to a “capital replacement reserve fund” for future capital replacement needs. This approach provides for a stable funding base, eliminating variances in annual

funding requirements, particularly in years when capital replacement needs exceed typical capital levy funding.

The difference between the annual lifecycle funding target and current annual contribution is referred to as the lifecycle funding gap. The Municipality is currently underfunding its infrastructure by approximately $11.2 million annually. As noted earlier, the financial strategy has been designed to reach full lifecycle funding levels by 2032.

12.4 Other Potential Funding Sources

While debt, grants, and the tax levy have been projected to fully fund the lifecycle management strategy, other sources of funding could be utilized to lessen the tax levy and rate payer impacts. Specifically, the Municipality should consider reviewing existing user fees (e.g., parks & recreation fees, building permit fees, etc.) to ensure that they appropriately account for the lifecycle costs of capital assets utilized in the provision of the services. Furthermore, the Municipality could consider the use of stormwater fees to fund the capital needs associated with stormwater services.

12.5 Tax Levy Impact

While the annual funding requirement may fluctuate, it is important for the Municipality to implement a consistent, yet increasing, annual investment in capital so that the excess annual funds can accrue in capital reserve funds. **Table D-8** in Appendix D presents a summary of the impacts on the tax levy as a result of this financing strategy.

In order to fund the recommended asset lifecycle activities over the forecast period using the Municipality's own available funding sources (i.e., using taxation, CCBF funding, OCIF funding, and debentures), an increase in the Municipality's taxation levy would be required as follows:

- 6.7% increases annually from 2023 to 2032
- 2.8% increases annually for from 2033 to 2041

Consideration for cash-flow and positive reserve fund balances has been included in setting the capital reserve transfer amounts. A detailed schedule of all tax supported capital-related reserves can be viewed in **Table D-5** in Appendix D.

Layering on assessment increases resulting from new assessment growth, assumed to be 1.40% annually, the impacts on individual property tax bills resultant from the financial strategy are estimated as follows:

- 5.3% increases annually from 2023 to 2032

- 1.4% increases annually from 2033 to 2041

The taxation impacts identified above include inflationary adjustments to the operating costs and revenues identified in the Municipality's 2022 budget (i.e., general operating inflation of 2% annually). However, if other funding sources become available (as mentioned above), or if maintenance practices allow for the deferral of capital works, then the impact on the Municipality's taxation levy would potentially decrease.

Further detail on the Financing Strategy is presented in Appendix D.

12.6 Water & Wastewater User Fee Revenue Impact

Just as for tax supported services, it is important for the Municipality to implement a consistent, yet increasing, annual investment in water and wastewater capital so that the excess annual funds can accrue in capital reserve funds. **Table D-8** in Appendix D presents a summary of the impacts on water and wastewater rates as a result of this financing strategy.

In order to fund the recommended asset lifecycle activities over the forecast period using the Municipality's own available funding sources (i.e., using user rates, grant funding, and debentures), increases to the Municipality's annual water and wastewater revenues would be required as follows:

Water

- 6.9% increases annually from 2023 to 2032
- 3.0% increases annually from 2033 to 2041

Wastewater

- 8.8% increases annually from 2023 to 2032
- 3.2% increases annually from 2033 to 2041

The figures presented above represent annual water and wastewater revenue increases required to fully fund the lifecycle strategies identified. It is noted that these increased revenue needs will be partially offset by additional revenue generated from new customers connecting to the water and wastewater systems. Therefore, the net impact on customers' water and wastewater bills may be lower than percentage increases identified above. It is recommended that the Municipality undertakes a Water and Wastewater Rate Study update to determine the impacts to user rates that would result from adopting the lifecycle strategies and associated funding needs identified in this asset management plan.

Consideration for cash-flow and positive reserve fund balances has been included in setting the capital reserve transfer amounts. A detailed schedule of all water and wastewater capital-related reserves can be viewed in **Tables D-6** and **D-7** in Appendix D, respectively.

The revenue increases identified above include inflationary adjustments to the operating costs and revenues identified in the Municipality's 2022 budget (i.e., general operating inflation of 2% annually). However, if other funding sources become available (as mentioned above), or if maintenance practices allow for the deferral of capital works, then the impact on the Municipality's revenue requirements would potentially decrease.

Appendix A

MAPS: Identifying Where Services are Provided (Levels of Service)

Figure A-1: Scope of Road Network

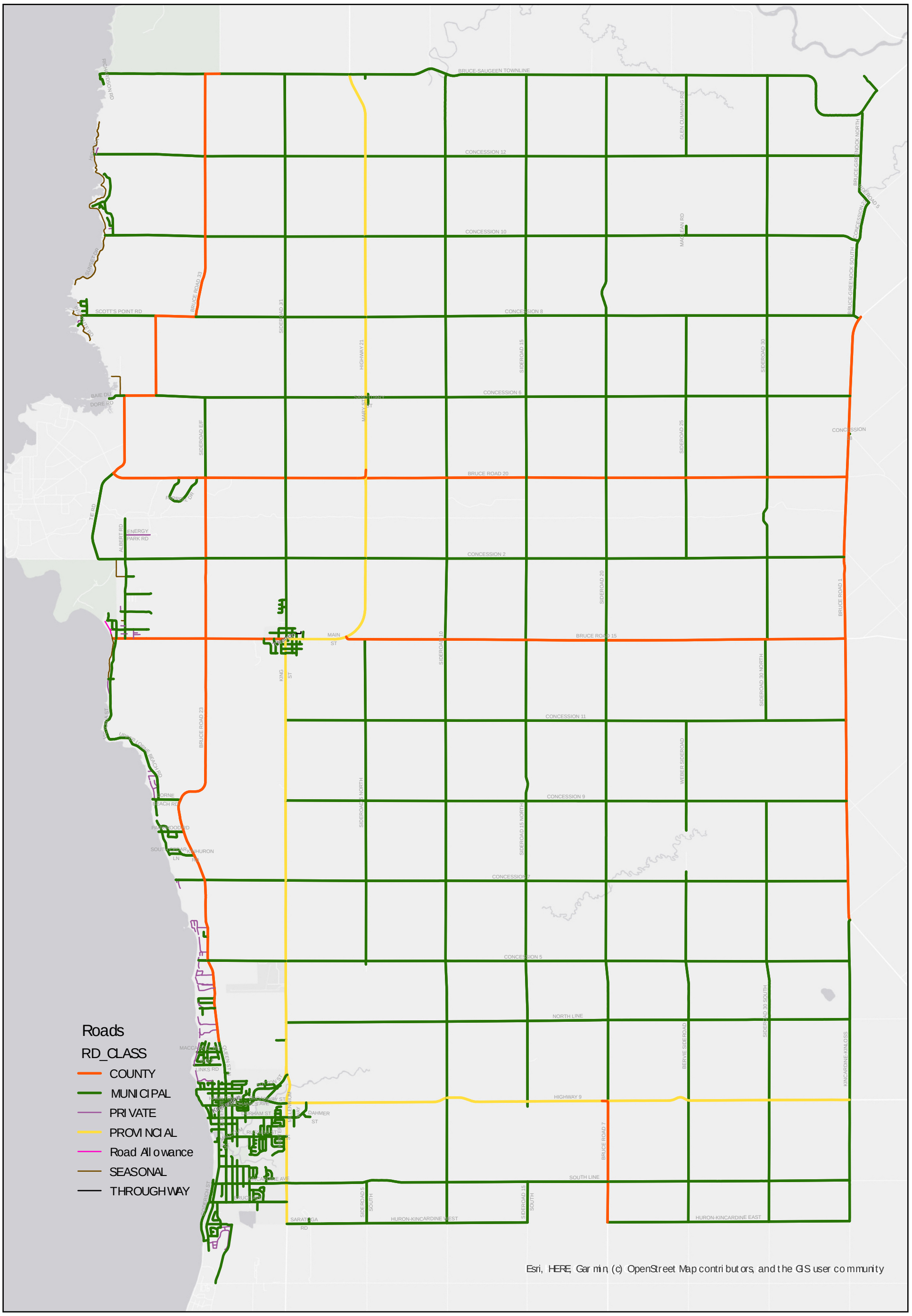


Figure A-2: Scope of Water Distribution System

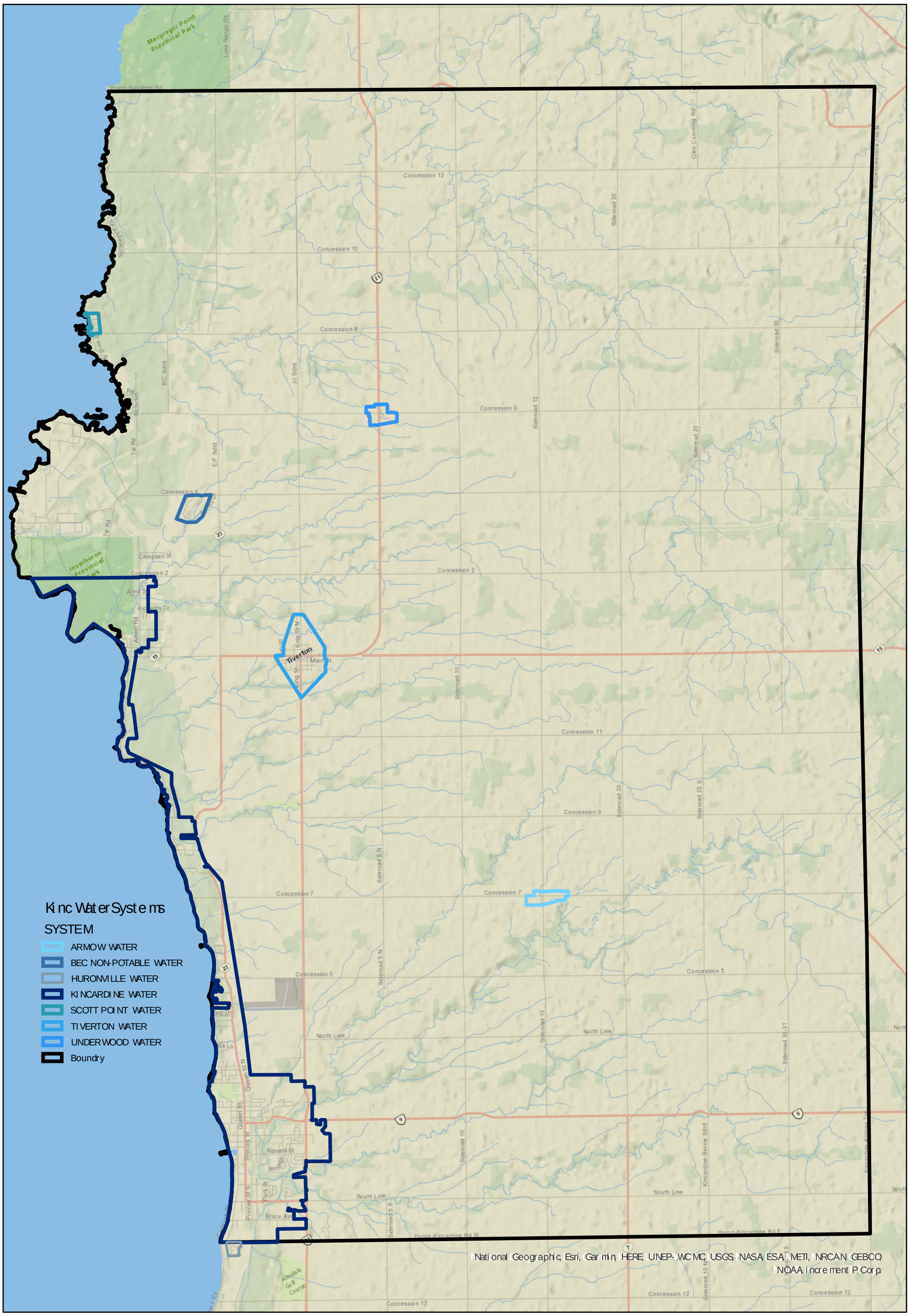


Figure A-3: Scope of Wastewater System

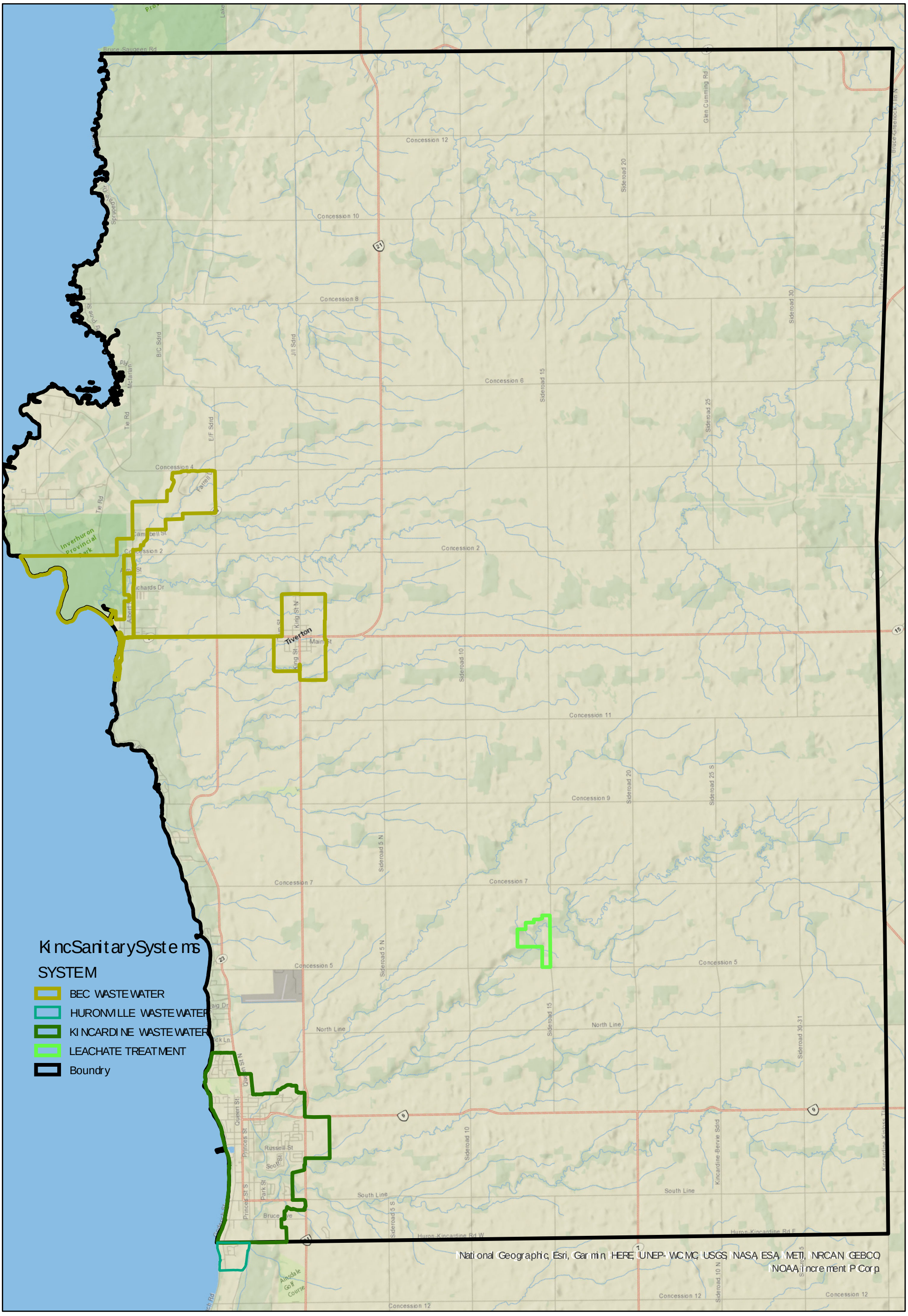


Figure A-4: Scope of Stormwater System

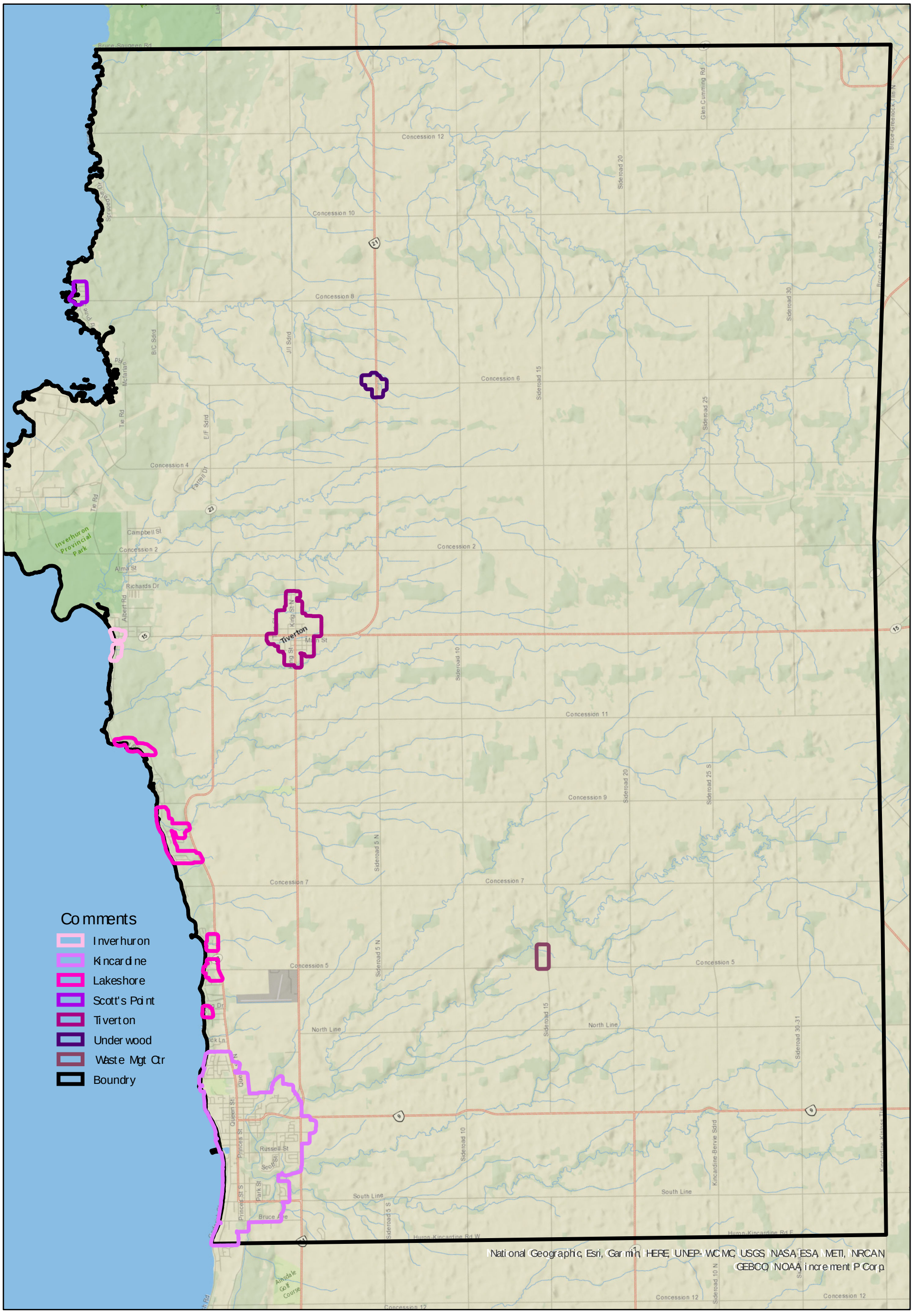


Figure A-5: Municipal Buildings and Facilities

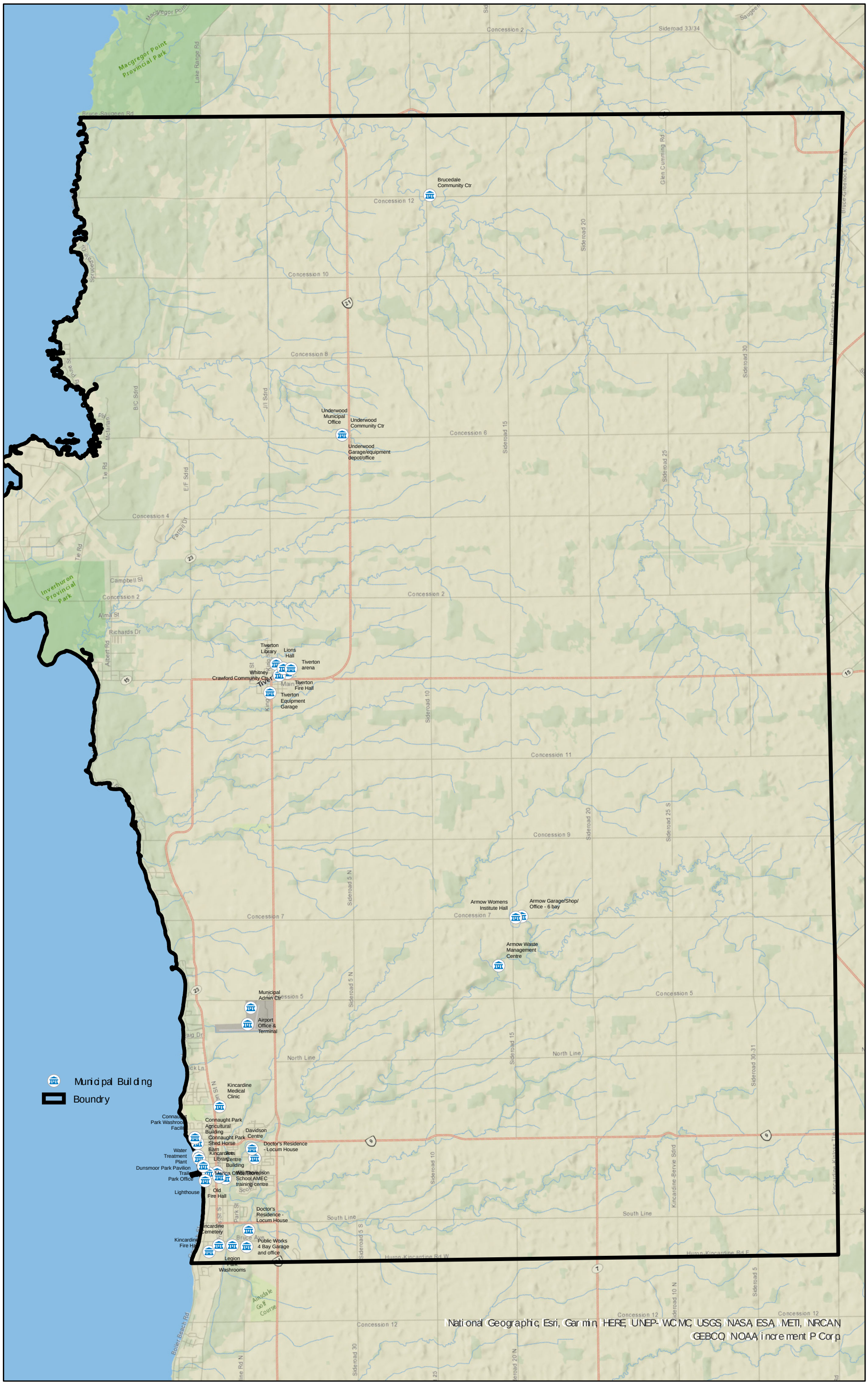


Figure A-6: Water and Wastewater Facilities

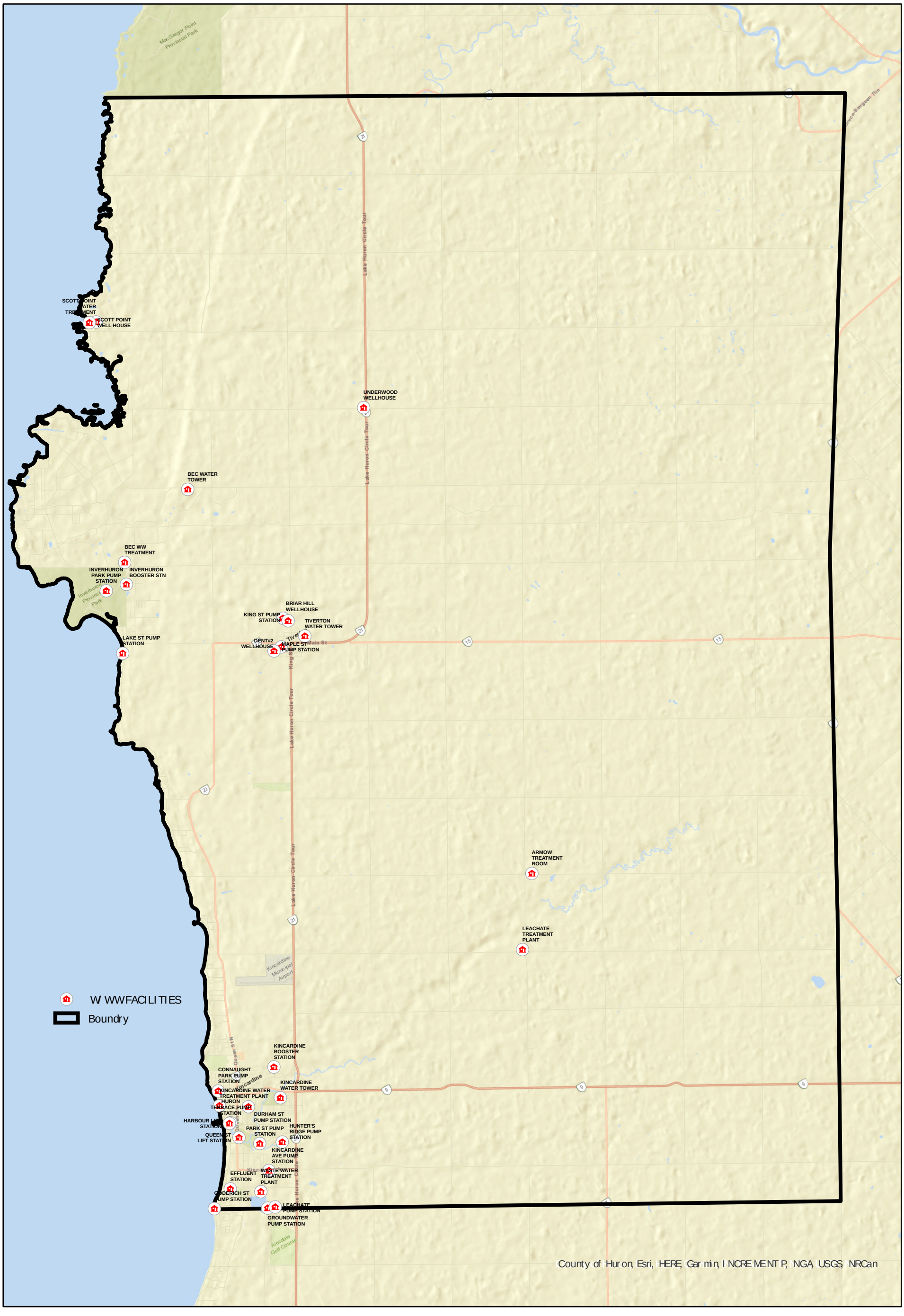


Figure A-7: Municipal and Water and Wastewater Buildings and Facilities - Kincardine

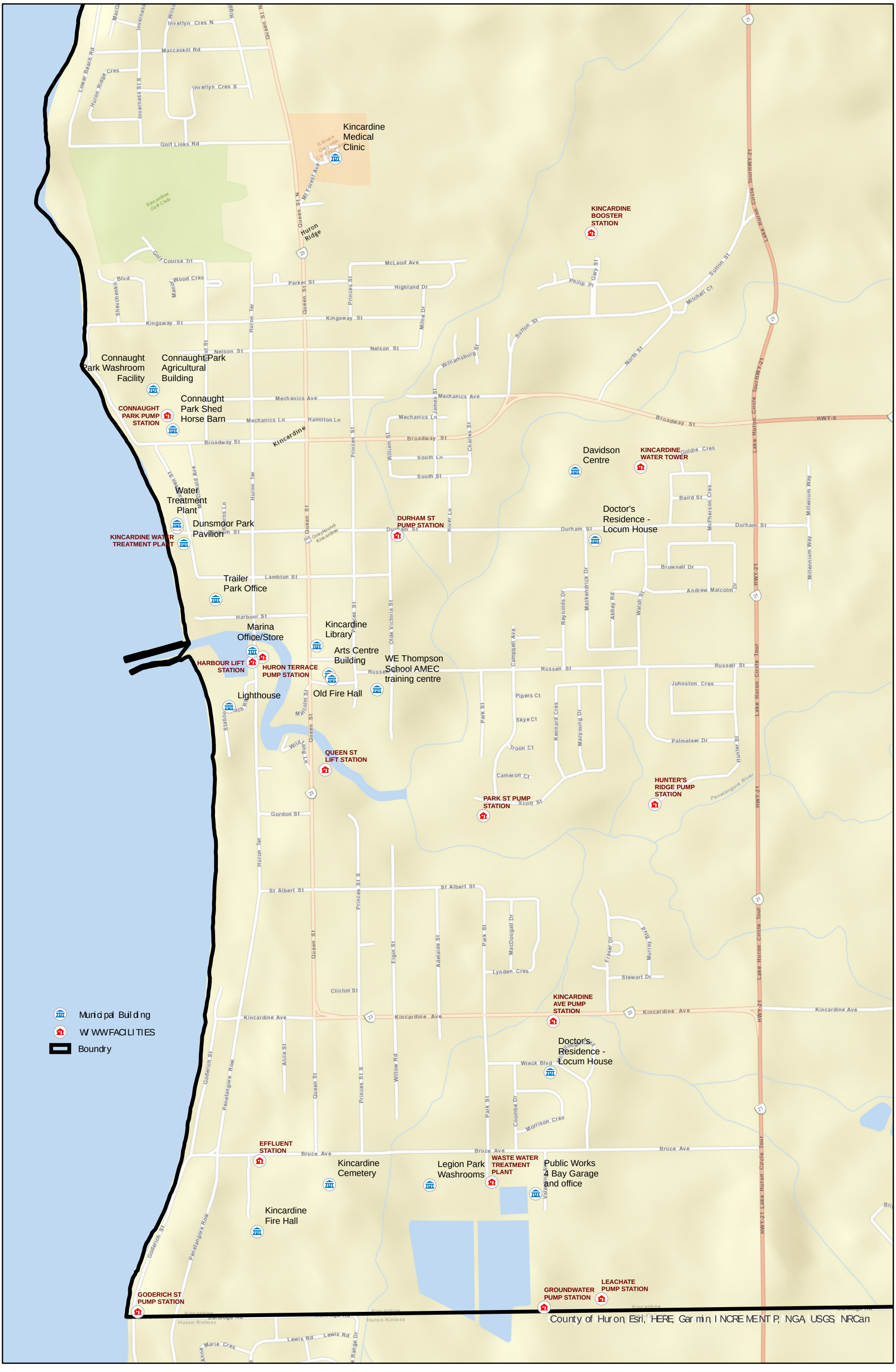


Figure A-8: Municipal and Water and Wastewater Buildings and Facilities - Tiverton

Figure A-9: Parks Facilities Locations

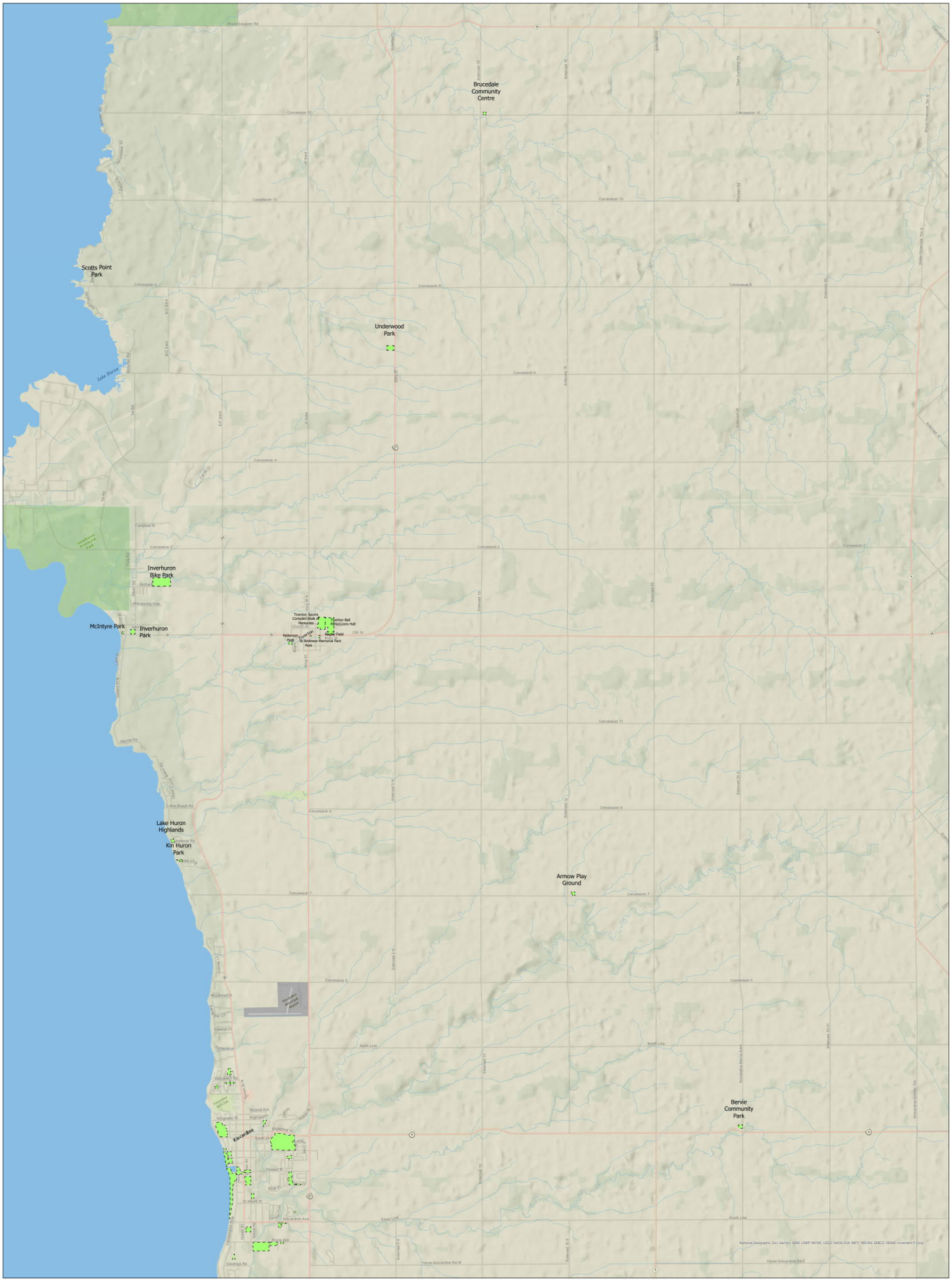
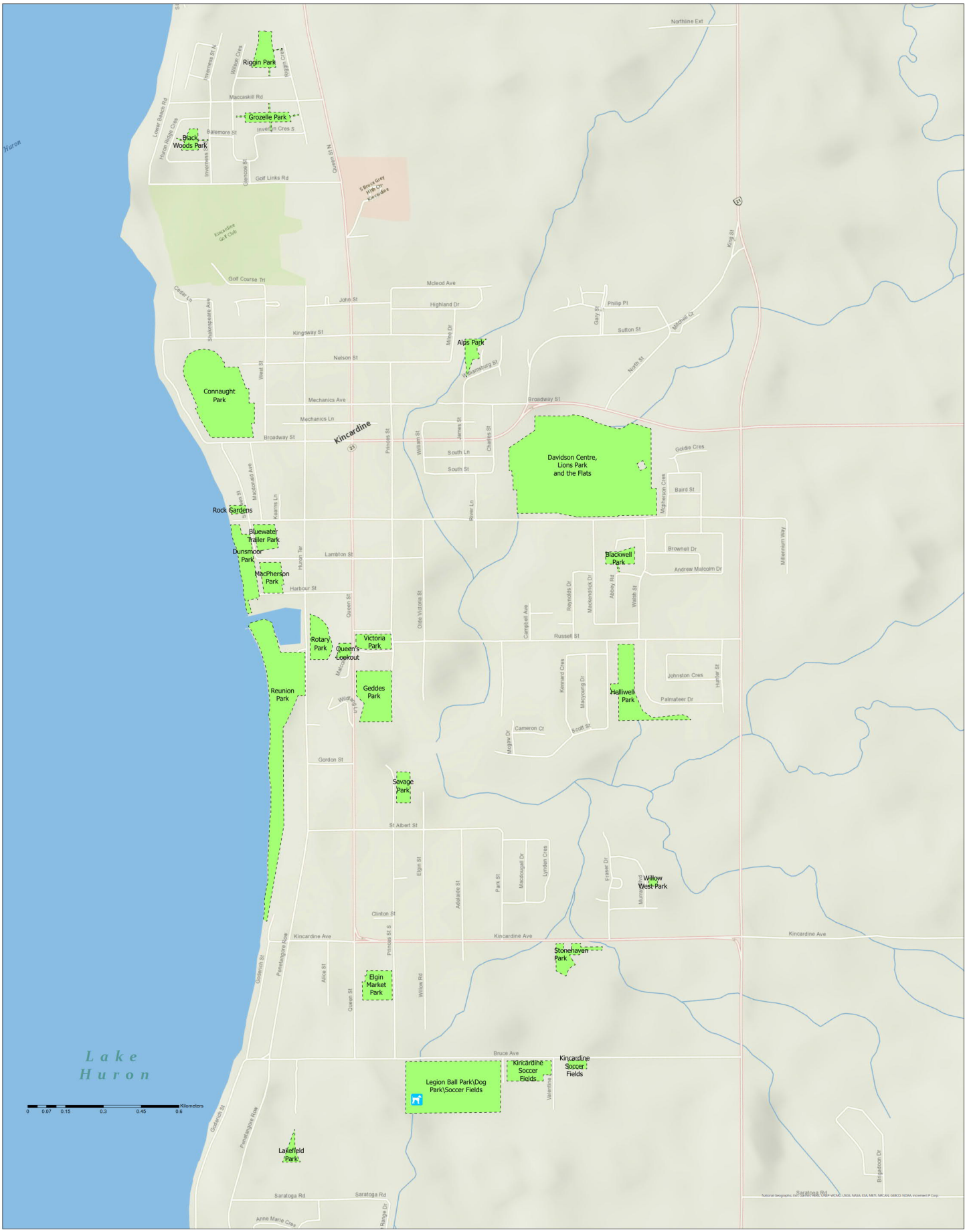


Figure A-10: Parks Facilities Locations - Kincardine



Appendix B
TABLES: Risk and Roads

Table B-1: Municipality of Kincardine - Consequence of Failure Table

Based on input discussed at Risk Workshop on October 4, 2019

	CONSEQUENCE DEFINITIONS				
RATINGS	Public Health & Safety (Injury)	Loss of Service	Financial Loss ($)	Environmental Damage	Stakeholder (Reputation)
HIGH	Multiple fatalities	Service not delivered for weeks and no alternate	Financial loss greater than $1M	Significant delay in recovery; Fines could be imposed	Angry taxpayers, longer than 2 years, political concern
	Fatality	Service not delivered for weeks with alternate	Financial loss $500,000 to $1 M	Slow response time and/or delay in recovery	Negative feedback, up to 18 months
MODERATE	Critical Injuries	Service not delivered for days with alternate	Financial loss of $200,000 to $500,000	Does not meet regulatory requirements	Negative feedback, up to 12 months
	Injuries	Service not delivered for hours, impact more	Financial loss of $40,000 to $200,000	Short impact on the environment	Ongoing complaints, up to 6 months, media involvement
LOW	Stress	Service not delivered for hours or impact few	Financial loss less than $40,000	Normal difficulties	Frustrated, but issue a complaint

Table B-2: Climate Change Vulnerability

CLIMATE CHANGE SCENARIOS / ASSETS		Mean Annual Temperature			Number of Hot Days (> 25 C)			Heavy Snow Events			Heavy Rain Events			Extreme Weather Events			Occurrence and Magnitude of		
		Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
Roads	Roads	✓			✓			✓				✓			✓			✓	
		Softening Asphalt			Softening Asphalt			Increased wear from snow removal			Flooding			Road Blocks (Fallen hydrolines) / Wind / Fallen trees					
Stormwater	Storm	✓			✓				✓			✓			✓			✓	
								Blockages for drainage			Capacity constraints						Capacity		
Sanitary	Wastewater Distribution	✓			✓			✓			✓				✓		✓		
														Freezing					
	Collection	✓																	
	Treatment											✓							
Water	Distribution	✓			✓			✓			✓				✓		✓		
		No effect			No effect			Shoveling hydrants						Freezing					
	WTP	✓			✓			✓			✓				✓		✓		
		Adjusting to temp			Adjusting to temp			Roof Vent						Intake Freezes					
Bridges & Culverts	Bridges/ Culverts	✓			✓					✓			✓		✓				✓
		N/A			N/A			Weight Load			Flooding			Depends on the type of weather, clean up culverts			Closure/repairs		
Fleet	Vehicles	✓			✓				✓			✓			✓			✓	
		Increase heat/wear			Increased heat/wear			more accidents			Inability to travel on flooded			More accidents			inability to travel on flooded		

Table B-3: Road Replacement Cost Details (2016 Roads Management Study, BM Ross)

Roadside Environment	Surface Type	Road Replacement Method	Road Base: Unit Price per m	Road Surface: Unit Price per m
Urban	Earth	Not calculated		
	Gravel	Rural Full Reconstruction - Gravel Surface (increase factor 1.27)	$597	NA
	HCB1	Urban Full Reconstruction - Base Course of Asphalt	$429	$561
	HCB2	Urban Full Reconstruction - Base Course of Asphalt + Urban Paving (40mm HL-4)	$429	$726
	Unit Paver	Not calculated		
Semi-Urban	Gravel	Rural Full Reconstruction - Gravel Surface	$470	NA
	HCB1	Semi-Urban Full Reconstruction - Base Course of Asphalt	$385	$171
	HCB2	Semi-Urban Full Reconstruction - Base Course of Asphalt + Semi-Urban Hot Mix Resurfacing	$385	$306
	LCB	Rural Full Reconstruction - Gravel Surface + Surface Treatment - Double surface	$470	$60
Cottage	Earth	Not calculated		
	Gravel	Rural Full Reconstruction - Gravel Surface	$470	NA
	HCB2	Semi-Urban Full Reconstruction - Base Course of Asphalt + Semi-Urban Hot Mix Resurfacing	$385	$306
	LCB	Rural Full Reconstruction - Gravel Surface + Surface Treatment - Double surface	$470	$60
Rural	Earth	Not calculated		
	Gravel	Rural Full Reconstruction - Gravel Surface	$470	NA
	HCB2	Rural Full Reconstruction - Base Course Asphalt + Rural Hot Mix Resurfacing (40mm HL-4)	$378	$382
	LCB	Rural Full Reconstruction - Gravel Surface + Surface Treatment - Double surface	$470	$60

Table B-4: Benchmark Improvement Costs (2016 Roads Management Study, BM Ross)

Improvement		
1.	Rural Hot Mix Resurfacing (32mm HL-2, incl. tack coat)	$105/m
2.	Rural Hot Mix Resurfacing (50mm HL-4, incl. tack coat)	$150/m
3.	Rural Full Depth Pulverize and Pave (50mm HL-4)	$180/m
4.	Urban Full Reconstruction – (90mm asphalt restoration)	$910/m
5.	Urban Full Depth Removal and Pave (90mm asphalt restoration)	$500/m
6.	Urban Full Depth Pulverize and Pave (90mm HL-4)	$430/m
7.	Urban Paving (40mm HL-4)	$175/m
8.	Return to Gravel	$105/m
Specific Maintenance		
1.	Ditching Improvements (Full length, both sides)	$6.50/m
2.	Edge Widening (1m ±, each side)	$170/m
3.	Install Subdrain (Full length, both sides)	$20/m
Spot Maintenance		
1.	Ditching Spot Location (upto 200m)	$1,800
2.	Paving Patch (Full width, < 60m)	$17,000
3.	Gravel Road Spot Repair (< 60m)	$18,000
4.	Paved Road Spot Repair (< 60m)	$26,000

Appendix C

Building and Facilities Performance Measures

Appendix C – Building and Facilities Performance Measures

Department	Building Type(s)	Name	Number of staff	**Water usage** Provided for 2018 or 2019	**Energy Usage** Provided for 2018 or 2019	Available Parking Spaces	Available Accessible Parking Spaces
Public Works	Water Treatment Plant	Kincardine Water Treatment Plant	10 full time and 1 contract seasonal	1533 m^3	856,000.0 kWh	7 staff parking (east side of building) 3 fleet parking (rear of building) Other fleet are parked around the building but not in designated parking spots (dead end rd)	0
Public Works	Well	Briar Hill Well Tiverton	Staff from Water Treatment Plant look after facility	No water usage on site-treatment facilities only	66,769.3 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Well	Dent Well Tiverton	Staff from Water Treatment Plant look after facility	No water usage on site-treatment facilities only	32,171.0 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Well	Armow Well	Staff from Water Treatment Plant look after facility	No water usage on site-treatment facilities only	Included in Armow Public Works data	Armow Well is located at Public Works Shop with larger parking lot	0 Not required as no public entering buildings
Public Works	Well Pumphouse	Scott Point Well & Treatment	Staff from Water Treatment Plant look after facility	No water usage on site-treatment facilities only	36,771.8 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Well	Underwood Well	Staff from Water Treatment Plant look after facility	No water usage on site-treatment facilities only	12,692.8 kWh	Underwood Well is located at Public Works Shop with larger parking lot	0 Not required as no public entering buildings
Public Works	Water Tower	Kincardine Water Tower	Staff from Water Treatment Plant look after facility	None	Unknown	At least 1	0 Not required as no public entering buildings
Public Works	Water Tower	Tiverton Water Tower	Staff from Water Treatment Plant look after facility	None	29,495.2 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Water Tower	BEC Non-potable Water Tower	Staff from Water Treatment Plant look after facility	None	12,569.9 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Chlorine Station	Inverhuron Booster Station	Staff from Water Treatment Plant look after facility	None	9,311.4 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Pumping Station	Kincardine Booster Station	Staff from Water Treatment Plant look after facility	None	Unknown Not in service in 2018 (new)	At least 1	0 Not required as no public entering buildings

Appendix C – Building and Facilities Performance Measures

Department	Building Type(s)	Name	Number of staff	**Water usage** Provided for 2018 or 2019	**Energy Usage** Provided for 2018 or 2019	Available Parking Spaces	Available Accessible Parking Spaces
Public Works	Wastewater Treatment Plant	BEC Wastewater Treatment Plant	Staff from Water Treatment Plant look after facility	On private well - not metered	704,614.7 kWh	Large parking lot	0 Not required as no public entering buildings
Public Works	Wastewater Treatment Plant	Kincardine Wastewater Treatment Plant	Staff from Water Treatment Plant look after facility	924 m^3	243,157.0 kWh	Large parking lot	0 Not required as no public entering buildings
Public Works	Wastewater Treatment Plant	Kincardine Effluent Station	Staff from Water Treatment Plant look after facility	1 m^3	167,635.0 kWh	1	0 Not required as no public entering buildings
Public Works	Pumping Station	Connaught Park Wastewater Pumping Station	Staff from Water Treatment Plant look after facility	0 m^3	40,896.0 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Pumping Station	Durham St Wastewater Pumping Station	Staff from Water Treatment Plant look after facility	3 m^3	25,575.0 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Pumping Station	Goderich St Wastewater Pumping Station	Staff from Water Treatment Plant look after facility	0 m^3	44,146.0 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Pumping Station	Huron Terrace Wastewater Pumping Station	Staff from Water Treatment Plant look after facility	0 m^3	216,480.0 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Pumping Station	Kincardine Ave Wastewater Pumping Station	Staff from Water Treatment Plant look after facility	1 m^3	31,382.0 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Pumping Station	Park St Wastewater Pumping Station	Staff from Water Treatment Plant look after facility	3 m^3	50,818.0 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Pumping Station	Maple Street Wastewater Pumping Station	Staff from Water Treatment Plant look after facility	1 m^3	23,182.5 kwh	At least 1	0 Not required as no public entering buildings
Public Works	Pumping Station	King St Wastewater Pumping Station	Staff from Water Treatment Plant look after facility	4 m^3	13,030.3 kWh	At least 1	0 Not required as no public entering buildings

Appendix C – Building and Facilities Performance Measures

Department	Building Type(s)	Name	Number of staff	**Water usage** Provided for 2018 or 2019	**Energy Usage** Provided for 2018 or 2019	Available Parking Spaces	Available Accessible Parking Spaces
Public Works	Lift Station	Harbour St Wastewater Lift Station (no building)	Staff from Water Treatment Plant look after facility	None	44,580.0 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Lift Station	Hunter's Ridge Wastewater Lift Station (no building)	Staff from Water Treatment Plant look after facility	None	Unknown	At least 1	0 Not required as no public entering buildings
Public Works	Lift Station	Queen St Wastewater Lift Station (no building)	Staff from Water Treatment Plant look after facility	None	Unknown	At least 1	0 Not required as no public entering buildings
Public Works	Lift Station	Lake Street Wastewater Lift Station (no building)	Staff from Water Treatment Plant look after facility	None	7,331.5 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Lift Station	Inverhuron Park Wastewater Lift Station (no building)	Staff from Water Treatment Plant look after facility	None	Unknown	At least 1	0 Not required as no public entering buildings
Public Works	Groundwater Pump Station	Kincardine Groundwater Wastewater Lift Station (no building)	Staff from Water Treatment Plant look after facility	None	1,165.0 kWh	At least 1	0 Not required as no public entering buildings
Public Works	Groundwater Pump Station	Kincardine Leachate Wastewater Lift Station (no building)	Staff from Water Treatment Plant look after facility	None	Included in Kincardine Groundwater Wastewater Lift Station data	At least 1	0 Not required as no public entering buildings
Public Works	Leachate Treatment Facility	Leachate Treatment Plant	Staff from Water Treatment Plant look after facility	Not metered - on private well with landfill	Included in Kincardine Landfill data	1	0 Not required as no public entering buildings
Public Works	Works Garage Sand Shed	Armow Public Works Garage	5	81 m^3	45,428.6 kWh	Large parking lot	0 Not required as no public entering buildings
Public Works	Works Garage	Tiverton Public Works Garage	6	76 m^3	4,633.9 kWh	Large parking lot	0 Not required as no public entering buildings
Public Works	Works Garage Sand Dome	Underwood Public Works Garage	Unknown	74 m^3	37,085.1 kWh	Large parking lot	0 Not required as no public entering buildings

Appendix C – Building and Facilities Performance Measures

Department	Building Type(s)	Name	Number of staff	**Water usage** Provided for 2018 or 2019	**Energy Usage** Provided for 2018 or 2019	Available Parking Spaces	**Available Accessible Parking Spaces**
Public Works	Works Garages Sand Dome Salt Shed	Kincardine Public Works Garage	10	145 m^3	43,846.0 kWh	Large parking lot	0 Not required as no public entering buildings
Public Works	Cemetery Building	Cemetery Workshop	4 Summer students	Unknown	Unknown	Unknown	0 Not required as no public entering buildings
Public Works	Office Building	Landfill and Landfill Buildings	3 Full time	Unknown	Unknown	Unknown	Unknown
Public Works	Cemetery Building	Cemetery and Cemetery Chapel	2 Full time 2 Students	2,011m^3	Unknown	Unknown	Unknown
Public Works	Airport	Airport Office, Terminal and Hangar	0	Unknown	Unknown	Unknown	Unknown
Recreation	Pavilion	Parks Picnic Shelters • Dunsmoor Park Picnic Shelter • Dunsmoor Park Bandstand • Lions Park Picnic Shelter • Reunion Station Boardwalk Gazebo • Rotary Park Picnic Shelter • Tiverton Ball Park Gazebo (North) • Tiverton Ball Park Gazebo (South) • Tiverton Picnic Shelter • Victoria Park Gazebo	10-11 Parks staff that work each summer across Municipality	Data for facilities unknown	Data for facilities unknown	Street Parking	Unknown
Recreation	Washroom	Washroom Facilities (Parks) • Boardwalk Washroom • Dunsmoor Park Washroom • Reunion Station Washroom • Rotary Park Washroom	10-11 Parks staff that work each summer across Municipality	Data for facilities unknown	Data for facilities unknown	Street Parking for most Washroom Facilities	Unknown
Recreation	Washroom	Tiverton Ball Park and Buildings	10-11 Parks staff that work each summer across Municipality	185 m^3	Unknown	Gravel Parking, no defined spaces	2
Recreation	Shed/Storage Building Pavilion Washroom	Connaught House and Pavilion	0	580 m^3	Unknown	Asphalt surface but no lines to define parking spaces	Unknown
Recreation	Office Building Pavilion Washroom Fish Cleaning Building	Marina Office/Store and Buildings	0	262 m^3	Data for facilities unknown	Gravel parking by office, no defined parking spaces	Unknown
Recreation	Office Building Washroom	Trailer Park Office and Washrooms	0	Washroom: 633 m^3 Other facilities: 606 m^3	Unknown	Gravel parking by trailer park, no defined parking spaces	Unknown
Recreation	Library	Kincardine Library	N/A (County Staff)	590 m^3	141,600.0 kWh	None – Street Parking only	1 out front Street Parking

Appendix C – Building and Facilities Performance Measures

Department	Building Type(s)	Name	Number of staff	**Water usage** Provided for 2018 or 2019	**Energy Usage** Provided for 2018 or 2019	Available Parking Spaces	Available Accessible Parking Spaces
Recreation	Library	Tiverton Library	N/A (County Staff)	13 m^3	15,841.6 kWh	None – Street Parking only	1 out front Street Parking
Recreation	Community Centre	Whitney Crawford Community Centre	0	119 m^3	Unknown	55	2
Recreation	Community Centre	Dunsmoor Park Pavilion – Dance Hall	0	Unknown	Unknown	25	4
Recreation	Arts Centre	Arts Centre and Old Fire Hall	0.5	1,705 m^3	62,967.0 kWh	Street Parking	Unknown
Recreation	Community Centre	Brucedale Community Centre	0	Unknown	Unknown	Sideroad Parking	Unknown
Recreation	Community Centre	Underwood Community Centre	Custodian	263 m^3	Included in Underwood Municipal Office data	58	1
Recreation	Community Centre	Armow Woman's Institute Hall	None	Unknown	4,197.7 kWh	20	As needed, not marked
Recreation	Community Centre	Lions Hall	0	36 m^3	Unknown	No defined parking spaces	0
Recreation	Recreation Centre	Davidson Centre	50-60 (full, part-time and casual) Additional 30 staff in the summer months for day-camp and summer swim lessons	10,216 m^3	1,692,000.0 kWh	300 Davidson Centre Splash Pad Washrooms: 25	10 2 at the Davidson Centre Splash Pad/Washroom
Recreation	Recreation Centre	Tiverton Sports Centre	4	5,516 m^3	453,566.9 kWh	120	2
Administrative	Municipal Office	Municipal Administration Centre	26-30	Unknown	359,773.8 kWh	110	2
Administrative	Municipal Office	Underwood Municipal Office	1 Part Time	Included in Underwood Community Centre data	64,562.8 kWh	10	1
Fire	Fire Station	Kincardine Fire Hall	5 Full-time 23 Volunteers – on-call	264 m^3 in 2018 177 m^3 in 2019	82,785.0 kWh	1 Accessible 2 Visitor 26 Firefighter	1
Fire	Fire Station	Tiverton Fire Hall	1 Office staff 23 Volunteers - on call	15 m^3 in 2018 11 m^3 in 2019	22,324.1 kWh	1 Accessible 13 Firefighter	1
Health Service	Medical Clinic	Kincardine Community Medical Clinic	N/A	298 m^3	Unknown	35 (228 at hospital)	6
Bruce Telecom	Works Garage	Kincardine Work Centre	N/A	N/A	N/A	N/A	N/A
Bruce Telecom	Works Garage	Port Elgin Work Centre	N/A	N/A	N/A	N/A	N/A
Bruce Telecom	Store	Kincardine Store	N/A	N/A	N/A	N/A	N/A
Bruce Telecom	Store	Port Elgin Store	N/A	N/A	N/A	N/A	N/A
Bruce Telecom	Office Building	Administrative Building	N/A	N/A	N/A	N/A	N/A
Bruce Telecom	Switching Station	Switching Stations	N/A	N/A	N/A	N/A	N/A

Appendix D
Financing Strategy Tables

Table D-1: Capital Budget Forecast (Inflated $)

Table D-1 Capital Budget Forecast (Inflated $)

Description	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Capital Expenditures																				
Tax Supported																				
Bridges & Culverts	2,088,000	2,161,100	628,000	649,900	672,700	696,200	720,600	4,287,700	4,271,500	859,200	-	1,488,200	2,949,200	-	-	-	2,471,200	5,895,000	-	-
Roads	3,899,900	4,031,400	4,175,100	4,321,700	4,469,000	4,629,000	4,790,800	4,951,700	5,130,000	5,314,300	5,496,800	5,692,900	5,892,600	6,093,700	6,310,400	6,533,800	6,760,600	6,997,800	7,243,700	7,495,000
Stormwater Mains	216,400	-	-	-	369,500	52,700	-	-	124,400	-	-	215,100	-	110,900	471,000	526,200	469,900	-	396,200	617,500
Buildings	-	1,472,300	2,525,600	8,820,100	1,117,500	32,872,200	4,296,400	2,198,400	2,543,400	10,231,900	98,500	11,300	8,108,400	15,838,200	174,400	3,898,200	254,400	7,308,000	-	-
Fleet	930,900	1,150,100	1,334,600	1,137,800	1,237,000	1,404,800	1,854,500	3,510,200	3,758,200	3,325,700	539,400	1,062,500	1,186,700	1,756,500	530,000	2,965,300	382,000	1,901,600	-	688,200
Equipment	346,200	710,300	677,300	405,800	986,300	601,300	519,000	506,000	373,200	1,070,600	1,618,800	204,700	104,000	117,400	308,300	1,843,100	372,300	250,400	158,100	1,357,300
Parks & Yard Improvements	15,600	-	-	136,800	-	-	-	-	-	-	-	-	-	-	-	26,200	-	-	-	-
Total Tax Supported	**7,497,000**	**9,525,200**	**9,340,600**	**15,472,100**	**8,852,000**	**40,256,200**	**12,181,300**	**15,454,000**	**16,200,700**	**20,801,700**	**7,753,500**	**8,674,700**	**18,240,900**	**23,916,700**	**7,794,100**	**15,792,800**	**10,710,400**	**22,352,800**	**7,798,000**	**10,158,000**
Water																				
Mains	27,300	-	-	-	-	-	-	-	-	2,562,500	386,500	274,300	2,896,600	2,997,800	3,102,700	3,210,800	3,105,000	425,200	-	3,685,300
Buildings	-	-	67,500	5,308,800	1,685,800	932,200	1,938,600	7,190,000	14,800	1,417,100	-	-	-	669,600	-	3,535,700	-	1,608,900	-	-
Fleet	384,000	-	24,600	-	-	-	-	122,700	378,600	31,300	-	-	-	-	-	-	-	-	-	-
Equipment	23,200	-	-	10,100	900	17,100	7,000	13,400	32,300	-	45,500	-	-	-	16,700	6,800	9,800	-	-	-
Yard Improvements	460,100	391,600	859,700	578,100	580,200	540,200	684,500	577,200	2,257,900	925,400	159,100	98,700	-	600,900	445,200	3,106,200	134,400	592,600	422,900	179,200
Total Water	**894,600**	**391,600**	**951,800**	**5,897,000**	**2,266,900**	**1,489,500**	**2,630,100**	**7,903,300**	**2,683,600**	**4,936,300**	**591,100**	**373,000**	**2,896,600**	**4,268,300**	**3,564,600**	**9,859,500**	**3,249,200**	**2,626,700**	**422,900**	**3,864,500**
Wastewater																				
Mains	-	-	-	-	-	-	-	289,900	-	1,289,400	-	6,700	-	-	165,200	-	-	-	442,000	39,700
Buildings	251,400	-	2,408,900	1,725,600	843,100	3,278,500	3,667,500	3,865,200	-	-	-	3,837,600	147,300	-	4,853,300	701,200	115,000	235,800	421,100	-
Fleet	384,000	-	24,600	-	-	-	-	122,700	378,600	31,300	-	-	-	-	-	-	-	-	-	-
Equipment	23,200	-	-	10,100	900	17,100	7,000	13,400	32,300	-	45,500	-	-	-	16,700	6,800	9,800	-	-	-
Yard Improvements	460,100	391,600	859,700	578,100	580,200	540,200	684,500	577,200	2,257,900	925,400	159,100	98,700	-	600,900	445,200	3,106,200	134,400	592,600	422,900	179,200
Total Wastewater	**1,118,700**	**391,600**	**3,293,200**	**2,313,800**	**1,424,200**	**3,835,800**	**4,359,000**	**4,868,400**	**2,668,800**	**2,246,100**	**204,600**	**3,943,000**	**147,300**	**600,900**	**5,480,400**	**3,814,200**	**259,200**	**828,400**	**1,286,000**	**218,900**
Total Expenditures	**9,510,300**	**10,308,400**	**13,585,600**	**23,682,900**	**12,543,100**	**45,581,500**	**19,170,400**	**28,225,700**	**21,553,100**	**27,984,100**	**8,549,200**	**12,990,700**	**21,284,800**	**28,785,900**	**16,839,100**	**29,466,500**	**14,218,800**	**25,807,900**	**9,506,900**	**14,241,400**
Capital Funding																				
Tax Supported																				
Grants - Gas Tax	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204	361,204
Grants - OCIF	1,284,741	1,284,741	1,284,741	1,284,741	1,284,741	584,570	584,570	584,570	584,570	584,570	584,570	584,570	584,570	584,570	584,570	584,570	584,570	584,570	584,570	584,570
Bruce Telecom Dividend	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Debenture Issuance	-	-	-	4,594,143	-	26,529,473	919,756	2,578,623	1,704,078	4,480,943	-	-	-	-	-	-	-	-	-	-
Transfer from Capital R.F.s	5,601,055	7,629,255	7,444,655	8,982,012	6,956,055	12,530,953	10,065,770	11,679,603	13,300,848	15,124,983	6,557,726	7,478,926	17,045,126	22,720,926	6,598,326	14,597,026	9,514,626	21,157,026	6,602,226	8,962,226
Total Tax Supported	**7,497,000**	**9,525,200**	**9,340,600**	**15,472,100**	**8,852,000**	**40,256,200**	**12,181,300**	**15,454,000**	**16,200,700**	**20,801,700**	**7,753,500**	**8,674,700**	**18,240,900**	**23,916,700**	**7,794,100**	**15,792,800**	**10,710,400**	**22,352,800**	**7,798,000**	**10,158,000**
Water																				
Grants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debenture Issuance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transfer from Capital R.F.s	894,600	391,600	951,800	5,897,000	2,266,900	1,489,500	2,630,100	7,903,300	2,683,600	4,936,300	591,100	373,000	2,896,600	4,268,300	3,564,600	9,859,500	3,249,200	2,626,700	422,900	3,864,500
Total Water	**894,600**	**391,600**	**951,800**	**5,897,000**	**2,266,900**	**1,489,500**	**2,630,100**	**7,903,300**	**2,683,600**	**4,936,300**	**591,100**	**373,000**	**2,896,600**	**4,268,300**	**3,564,600**	**9,859,500**	**3,249,200**	**2,626,700**	**422,900**	**3,864,500**
Wastewater																				
Grants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debenture Issuance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transfer from Capital R.F.s	1,118,700	391,600	3,293,200	2,313,800	1,424,200	3,835,800	4,359,000	4,868,400	2,668,800	2,246,100	204,600	3,943,000	147,300	600,900	5,480,400	3,814,200	259,200	828,400	1,286,000	218,900
Total Wastewater	**1,118,700**	**391,600**	**3,293,200**	**2,313,800**	**1,424,200**	**3,835,800**	**4,359,000**	**4,868,400**	**2,668,800**	**2,246,100**	**204,600**	**3,943,000**	**147,300**	**600,900**	**5,480,400**	**3,814,200**	**259,200**	**828,400**	**1,286,000**	**218,900**
Total Funding	**9,510,300**	**10,308,400**	**13,585,600**	**23,682,900**	**12,543,100**	**45,581,500**	**19,170,400**	**28,225,700**	**21,553,100**	**27,984,100**	**8,549,200**	**12,990,700**	**21,284,800**	**28,785,900**	**16,839,100**	**29,466,500**	**14,218,800**	**25,807,900**	**9,506,900**	**14,241,400**

Table D-2: Tax Supported Debenture Issuance

Table D-2 Tax Supported Debenture Issuance

Year of Issuance	Principal	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2025	4,594,143	-	-	-	-	338,045	338,045	338,045	338,045	338,045	338,045	338,045	338,045	338,045	338,045	338,045	338,045	338,045	338,045	338,045	338,045
2026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2027	26,529,473	-	-	-	-	-	-	1,952,085	1,952,085	1,952,085	1,952,085	1,952,085	1,952,085	1,952,085	1,952,085	1,952,085	1,952,085	1,952,085	1,952,085	1,952,085	1,952,085
2028	919,756	-	-	-	-	-	-	-	67,677	67,677	67,677	67,677	67,677	67,677	67,677	67,677	67,677	67,677	67,677	67,677	67,677
2029	2,578,623	-	-	-	-	-	-	-	-	189,740	189,740	189,740	189,740	189,740	189,740	189,740	189,740	189,740	189,740	189,740	189,740
2030	1,704,078	-	-	-	-	-	-	-	-	-	125,389	125,389	125,389	125,389	125,389	125,389	125,389	125,389	125,389	125,389	125,389
2031	4,480,943	-	-	-	-	-	-	-	-	-	-	329,716	329,716	329,716	329,716	329,716	329,716	329,716	329,716	329,716	329,716
2032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2033	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2034	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2036	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2038	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2039	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2041	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**40,807,017**	**-**	**-**	**-**	**-**	**338,045**	**338,045**	**2,290,130**	**2,357,807**	**2,547,547**	**2,672,936**	**3,002,652**	**3,002,652**	**3,002,652**	**3,002,652**	**3,002,652**	**3,002,652**	**3,002,652**	**3,002,652**	**3,002,652**	**3,002,652**

Table D-3: Water Debenture Issuance

Table D-3 Water Debenture Issuance

Year of Issuance	Principal	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2027	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2031	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2033	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2034	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2036	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2038	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2039	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2041	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Table D-4: Wastewater Debenture Issuance

Table D-4 Wastewater Debenture Issuance

Year of Issuance	Principal	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2027	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2031	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2033	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2034	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2036	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2038	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2039	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2041	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Table D-5: Tax Supported Capital Reserve Funds

Table D-5 Tax Supported Capital Reserve Funds

Description	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Opening Balance	7,146,764	5,762,766	3,388,474	2,335,694	1,010,000	3,083,822	1,010,000	1,010,000	1,010,000	1,010,000	1,010,000	11,448,337	21,778,352	23,292,631	19,858,320	33,469,226	39,961,139	52,503,605	54,294,916	71,717,612
Transfer from Operating	4,160,000	5,221,414	6,368,749	7,646,318	8,999,344	10,447,131	10,055,770	11,669,603	13,290,848	15,114,983	16,882,713	17,593,314	18,328,785	19,089,998	19,877,854	20,693,284	21,537,254	22,410,764	23,314,846	24,418,077
Transfer to Capital	5,601,055	7,629,255	7,444,655	8,982,012	6,956,055	12,530,953	10,065,770	11,679,603	13,300,848	15,124,983	6,557,726	7,478,926	17,045,126	22,720,926	6,598,326	14,597,026	9,514,626	21,157,026	6,602,226	8,962,226
Closing Balance	5,705,709	3,354,925	2,312,568	1,000,000	3,053,289	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	11,334,987	21,562,725	23,062,011	19,661,703	33,137,848	39,565,484	51,983,767	53,757,343	71,007,537	87,173,463
Interest	57,057	33,549	23,126	10,000	30,533	10,000	10,000	10,000	10,000	10,000	113,350	215,627	230,620	196,617	331,378	395,655	519,838	537,573	710,075	871,735

Table D-6: Water Capital Reserve Funds

Table D-6 Water Capital Reserve Funds

Description	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Opening Balance	9,282,300	9,991,047	11,404,106	12,469,548	8,770,808	8,938,409	10,148,032	10,492,375	5,809,828	6,670,324	5,606,252	9,287,952	13,374,543	15,106,130	15,627,934	17,029,554	12,256,936	14,288,528	17,150,834	22,455,635
Transfer from Operating	1,504,426	1,691,747	1,893,781	2,111,420	2,346,002	2,598,647	2,870,558	3,163,230	3,478,053	3,816,721	4,180,840	4,327,170	4,478,621	4,635,372	4,797,610	4,965,527	5,139,320	5,319,196	5,505,368	5,698,056
Transfer to Capital	894,600	391,600	951,800	5,897,000	2,266,900	1,489,500	2,630,100	7,903,300	2,683,600	4,936,300	591,100	373,000	2,896,600	4,268,300	3,564,600	9,859,500	3,249,200	2,626,700	422,900	3,864,500
Closing Balance	9,892,126	11,291,194	12,346,087	8,683,968	8,849,910	10,047,556	10,388,490	5,752,305	6,604,281	5,550,745	9,195,992	13,242,122	14,956,564	15,473,202	16,860,945	12,135,580	14,147,057	16,981,024	22,233,302	24,289,192
Interest	98,921	112,912	123,461	86,840	88,499	100,476	103,885	57,523	66,043	55,507	91,960	132,421	149,566	154,732	168,609	121,356	141,471	169,810	222,333	242,892

Table D-7: Wastewater Capital Reserve Funds

Table D-7 Wastewater Capital Reserve Funds

Description	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Opening Balance	4,020,406	4,574,690	6,088,950	4,928,937	5,010,778	6,281,327	5,445,550	4,419,520	3,247,694	4,700,039	7,046,728	11,973,537	13,351,033	18,759,368	23,953,477	24,467,702	26,873,277	33,103,922	39,039,811	44,798,336
Transfer from Operating	1,488,690	1,706,573	1,945,386	2,207,029	2,493,558	2,807,107	3,150,212	3,525,419	3,935,610	4,384,019	4,873,858	5,049,308	5,230,899	5,418,846	5,613,370	5,814,703	6,023,083	6,238,756	6,461,977	6,693,011
Transfer from Tax Supported	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000
Transfer to Capital	1,118,700	391,600	3,293,200	2,313,800	1,424,200	3,835,800	4,359,000	4,868,400	2,668,800	2,246,100	204,600	3,943,000	147,300	600,900	5,480,400	3,814,200	259,200	828,400	1,286,000	218,900
Closing Balance	4,529,396	6,028,663	4,880,136	4,961,166	6,219,136	5,391,634	4,375,762	3,215,539	4,653,504	6,976,958	11,854,987	13,218,845	18,573,632	23,716,314	24,225,448	26,607,205	32,776,160	38,653,278	44,354,788	51,411,447
Interest	45,294	60,287	48,801	49,612	62,191	53,916	43,758	32,155	46,535	69,770	118,550	132,188	185,736	237,163	242,254	266,072	327,762	386,533	443,548	514,114

Table D-8: Operating Budget Forecast (Inflated $)

Table D-8 Operating Budget Forecast (Inflated $)

Description	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Expenditures																				
Operating Expenditures																				
Tax Supported																				
Council and CAO	691,332	705,200	719,300	733,700	748,400	763,300	778,600	794,200	810,100	826,300	842,800	859,600	876,800	894,400	912,300	930,500	949,100	968,100	987,500	1,007,200
Corporate Services	5,411,265	5,519,500	5,629,900	5,742,500	5,857,300	5,974,500	6,094,000	6,215,900	6,340,200	6,467,000	6,596,300	6,728,200	6,862,800	7,000,100	7,140,100	7,282,900	7,428,500	7,577,100	7,728,600	7,883,200
Community Services	7,125,953	7,268,500	7,413,900	7,562,100	7,713,400	7,867,700	8,025,000	8,185,500	8,349,200	8,516,200	8,686,500	8,860,300	9,037,500	9,218,200	9,402,600	9,590,600	9,782,400	9,978,100	10,177,700	10,381,200
Infrastructure & Development	8,464,521	8,633,800	8,806,500	8,982,600	9,162,300	9,345,500	9,532,400	9,723,100	9,917,500	10,115,900	10,318,200	10,524,600	10,735,000	10,949,700	11,168,700	11,392,100	11,620,000	11,852,400	12,089,400	12,331,200
Strategic Initiatives	1,134,498	1,157,200	1,180,300	1,204,000	1,228,000	1,252,600	1,277,600	1,303,200	1,329,300	1,355,800	1,383,000	1,410,600	1,438,800	1,467,600	1,497,000	1,526,900	1,557,400	1,588,600	1,620,400	1,652,800
Water	1,673,826	1,707,300	1,741,400	1,776,300	1,811,800	1,848,000	1,885,000	1,922,700	1,961,200	2,000,400	2,040,400	2,081,200	2,122,800	2,165,300	2,208,600	2,252,700	2,297,800	2,343,800	2,390,600	2,438,400
Wastewater	1,273,810	1,299,300	1,325,300	1,351,800	1,378,800	1,406,400	1,434,500	1,463,200	1,492,500	1,522,300	1,552,800	1,583,800	1,615,500	1,647,800	1,680,800	1,714,400	1,748,700	1,783,700	1,819,300	1,855,700
Capital-related Expenditures																				
Tax Supported																				
Transfers to Capital Res./R.F.s	4,160,000	5,221,414	6,368,749	7,646,318	8,999,344	10,447,131	10,055,770	11,669,603	13,290,848	15,114,983	16,882,713	17,593,314	18,328,785	19,089,998	19,877,854	20,693,284	21,537,254	22,410,764	23,314,846	24,418,077
Existing Debenture Repayments	543,193	546,897	550,703	516,488	167,506	167,506	167,506	167,506	167,506	167,506	167,506	167,506	167,506	167,506	167,506	167,506	167,506	167,506	167,506	-
New Debenture Repayments	-	-	-	-	338,045	338,045	2,290,130	2,357,807	2,547,547	2,672,936	3,002,652	3,002,652	3,002,652	3,002,652	3,002,652	3,002,652	3,002,652	3,002,652	3,002,652	3,002,652
Transfer to WW Capital R.F.	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000	139,000
Transfer to Capital (B.T. Dividend)	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Water																				
Transfers to Capital Res./R.F.s	1,504,426	1,691,747	1,893,781	2,111,420	2,346,002	2,598,647	2,870,558	3,163,230	3,478,053	3,816,721	4,180,840	4,327,170	4,478,621	4,635,372	4,797,610	4,965,527	5,139,320	5,319,196	5,505,368	5,698,056
Existing Debenture Repayments	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Debenture Repayments	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wastewater																				
Transfers to Capital Res./R.F.s	1,488,690	1,706,573	1,945,386	2,207,029	2,493,558	2,807,107	3,150,212	3,525,419	3,935,610	4,384,019	4,873,858	5,049,308	5,230,899	5,418,846	5,613,370	5,814,703	6,023,083	6,238,756	6,461,977	6,693,011
Existing Debenture Repayments	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Debenture Repayments	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Expenditures	**33,860,513**	**35,846,431**	**37,964,219**	**40,223,255**	**42,633,454**	**45,205,436**	**47,950,276**	**50,880,366**	**54,008,563**	**57,349,065**	**60,916,569**	**62,577,249**	**64,286,663**	**66,046,474**	**67,858,092**	**69,722,772**	**71,642,715**	**73,619,674**	**75,654,849**	**77,750,496**
Revenues																				
Tax Supported																				
Council and CAO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Corporate Services	2,959,668	3,018,900	3,079,200	3,140,800	3,203,600	3,267,700	3,333,100	3,399,700	3,467,700	3,537,100	3,607,800	3,680,000	3,753,600	3,828,600	3,905,200	3,983,300	4,063,000	4,144,200	4,227,100	4,311,700
Community Services	2,235,047	2,279,700	2,325,300	2,371,800	2,419,300	2,467,700	2,517,000	2,567,400	2,618,700	2,671,100	2,724,500	2,779,000	2,834,600	2,891,300	2,949,100	3,008,100	3,068,200	3,129,600	3,192,200	3,256,000
Infrastructure & Development	2,121,639	2,164,100	2,207,400	2,251,500	2,296,500	2,342,500	2,389,300	2,437,100	2,485,800	2,535,600	2,586,300	2,638,000	2,690,800	2,744,600	2,799,500	2,855,400	2,912,600	2,970,800	3,030,200	3,090,800
Strategic Initiatives	221,525	226,000	230,500	235,100	239,800	244,600	249,500	254,500	259,600	264,700	270,000	275,400	280,900	286,600	292,300	298,100	304,100	310,200	316,400	322,700
Taxation	20,381,882																			
Water	3,178,252																			
Wastewater	2,762,500																			
Total Revenues	**33,860,513**	**7,688,700**	**7,842,400**	**7,999,200**	**8,159,200**	**8,322,500**	**8,488,900**	**8,658,700**	**8,831,800**	**9,008,500**	**9,188,600**	**9,372,400**	**9,559,900**	**9,751,100**	**9,946,100**	**10,144,900**	**10,347,900**	**10,554,800**	**10,765,900**	**10,981,200**
Tax Supported																				
Tax Revenues Required		21,752,811	23,215,952	24,777,507	26,444,095	28,222,781	30,121,106	32,147,116	34,309,400	36,617,124	39,080,071	40,163,371	41,278,943	42,428,056	43,611,611	44,830,542	46,085,912	47,379,421	48,711,704	50,084,129
Prior Year Tax Levy		20,381,882	21,752,811	23,215,952	24,777,507	26,444,095	28,222,781	30,121,106	32,147,116	34,309,400	36,617,124	39,080,071	40,163,371	41,278,943	42,428,056	43,611,611	44,830,542	46,085,912	47,379,421	48,711,704
Add: Tax Revenues from Incremental Assessment		285,346	304,539	325,023	346,885	370,217	395,119	421,695	450,060	480,332	512,640	547,121	562,287	577,905	593,993	610,563	627,628	645,203	663,312	681,964
Tax Revenues at 0% Tax Rate Increase		20,667,228	22,057,350	23,540,975	25,124,392	26,814,312	28,617,900	30,542,802	32,597,176	34,789,732	37,129,764	39,627,192	40,725,658	41,856,848	43,022,048	44,222,174	45,458,169	46,731,115	48,042,733	49,393,668
Additional Increase in Tax Levy		1,085,583	1,158,601	1,236,531	1,319,703	1,408,469	1,503,206	1,604,315	1,712,224	1,827,392	1,950,307	536,179	553,284	571,208	589,563	608,368	627,743	648,307	668,970	690,461
Total Tax Revenues		21,752,811	23,215,952	24,777,507	26,444,095	28,222,781	30,121,106	32,147,116	34,309,400	36,617,124	39,080,071	40,163,371	41,278,943	42,428,056	43,611,611	44,830,542	46,085,912	47,379,421	48,711,704	50,084,129
Impact of Additional Increase in Tax Levy on Tax Bills		5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Water and Wastewater																				
Required Revenues																				
Water Revenues		3,399,047	3,635,181	3,887,720	4,157,802	4,446,647	4,755,558	5,085,930	5,439,253	5,817,121	6,221,240	6,408,370	6,601,421	6,800,672	7,006,210	7,218,227	7,437,120	7,662,996	7,895,968	8,136,456
Wastewater Revenues		3,005,873	3,270,686	3,558,829	3,872,358	4,213,507	4,584,712	4,988,619	5,428,110	5,906,319	6,426,658	6,633,108	6,846,399	7,066,646	7,294,170	7,529,103	7,771,783	8,022,456	8,281,277	8,548,711
Annual % Increase Required																				
Water Revenues		6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Wastewater Revenues		8.8%	8.8%	8.8%	8.8%	8.8%	8.8%	8.8%	8.8%	8.8%	8.8%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%