2022

Asset Management Plan – Phase 1

Dymond
Haileybury
New Liskeard

City of • Ville de
Temiskaming Shores

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The Corporation of the

City of Temiskaming Shores

Executive Summary

The Asset Management Plan (Phase 1) document has been developed for the City's major infrastructure asset groups. This second phase of the Asset Management Plan will provide a framework for considering, prioritizing, and optimizing asset management efforts, and providing direction for effective management of its aging infrastructure to best achieve established goals and objectives for its entire asset portfolio.

This Plan seeks to formalize and present some of the major capital infrastructure needs, with an emphasis on the 10 year period from 2022 to 2032, and provide a framework for expanding and enhancing the Municipality's asset management system. Phase 2 of the plan will build on phase 1 and to include all remaining assets that will be completed by July 2024. And finally, phase 3 builds on phase 1 and 2 by adding the proposed levels of service and a strategy to fund the activities. This funding strategy will further identify the gap between municipal own source revenues and the need. This financial strategy will be completed by July 2025.

The focus of the Plan is primarily on major capital needs. Therefore, the estimated Service Life of assets was used as the primary indicator for measuring our current Levels of Service. Areas the Municipality will focus on to advance its Asset Management Capabilities and improve future updated versions of the Plan are highlighted throughout.

It should be noted that while phase 1 of the Plan focuses on its core assets, phase 2 will be focused on the City's entire asset portfolio. The City remains proactive and responsible in managing its infrastructure and forecasting its Capital Needs. Several Inspection Programs are currently in practice in the Municipality, including a CCTV program for Sanitary and Storm Sewer Systems, updating or Roads Needs Studies, and OSIM inspections of Temiskaming Shore's Bridge and Culvert inventory. The costs associated with these programs, however, have not been incorporated in this Plan.

This Plan is considered and 'living document" and will be updated and revised as additional information becomes available, as existing infrastructure is renewed and as changes in strategy are required. To ensure that the Plan remains visible, it will be referred to in regular reports to Council. Every five years, a full review of the City's Asset Management Planning process should be considered and major changes may be presented to Council more frequently, if required.

A major component of this Plan is related to non-infrastructure solutions intended to improve the City's Asset Management Capacity. This includes the development of a dedicated Asset Management System and a complete well-designed geographic information system (GIS) to support Municipal Asset Management efforts. Details for the non-infrastructure solutions are presented in Section 6.2. Alongside this task, the City shall integrate and align its data records between departments such that in the final Asset Management System, asset information will only need to be stored in one location and the data will be structured to enable effective management of the City's infrastructure. This will include refinement of the existing infrastructure data bases, such as that contained in the Public Sector Accounting Board (PSAB) reporting and Roads Needs Studies, utilizing the same segmentation and naming conventions for consistency.

Table of Contents

List of Tables

List of Figures

1. Introduction

1.1 About the City of Temiskaming Shores

The City of Temiskaming Shores is located on the shores of beautiful Lake Timiskaming in northeastern Ontario. The community is at the head of the Ottawa River waterway and offers all of the amenities and services found in larger centres. The community was founded in 2004 by the amalgamation of the former communities of Haileybury, New Liskeard and Dymond.

Temiskaming Shores is a community with endless opportunities for business development within a setting that offers a range of residential living environments and four-season recreation at the doorstep. Scenic landscapes, a healthy environment, an abundance of clean water, a rich heritage, a mature range of consumers, educational, social and health care services, and a multi-cultural population offer a quality living environment for this northern community. The provision of regional services in the areas of education, health and public administration to the 32,000 people living throughout the rest of Timiskaming District and northwestern Quebec fill out the City's economic impact.

1.2 City of Temiskaming Shores Mission & Values Statements

Mission Statement:

To ensure that the City of Temiskaming Shores is a dynamic leader providing incredible opportunities for all.

Statement of Values:

The Municipal Government of the Corporation of the City of Temiskaming Shores hereby adopts and embraces the following values as being integral to its good governance:

Responsibility, Teamwork, Promise-Keeping and Fairness

1.3 Asset Management Plan Purpose

Historically, the City of Temiskaming Shores has been proactively and responsibly managing its infrastructure portfolio. As the infrastructure ages and demands increase, so will the challenge of ensuring the needs of the community are effectively met with the limited resources available. This Asset Management Plan (Phase 1) will hopefully address this concern by providing a framework for considering, prioritizing, and optimizing asset management efforts, and providing direction for effective management of the Municipal infrastructure to best achieve established goals and objectives.

As an integrated Plan, this Asset Management Plan considers the lifecycle and needs of all infrastructure assets and classes within the Plan’s scope and provides a sustainable and holistic view of the asset portfolios described herein. The Plan not only focuses on managing

individual assets, but considers the condition and performance of complete asset systems through a systematic, risk-based decision-making process. The resulting Plan is intended to provide the optimal allocation of resources towards meeting prescribed goals, objectives, and levels of service.

The City currently manages a core asset portfolio of over $241 M worth of public physical capital assets (estimated replacement value, 2021 CAD). These assets provide the foundation upon which the City's economic growth, strength and quality of life are based. This first phase of the Asset Management Plan is an overview for managing its assets of all categories in the City's portfolio.

This Plan is being developed under Council Resolution No. 2019-063, dated May 21, 2019, at which time Council approved the submission of an Expression of Interest to obtain funding for the preparation of the comprehensive Asset Management Plan. Since that time staff have been refining inventories of assets groups and amending the Plan. The final draft of (phase 1) of the Plan will be presented to Council which is anticipated to be completed before July 1, 2022. Once approved, changes to the first phase of the Plan will be reported to and approved by Council, as required, to address changing circumstances, followed by phase 2 and 3.

1.3.1 Provincial Regulation (O. Reg. 588)

In many parts of Ontario, existing infrastructure is degrading faster than it is being repaired or replaces, putting services at risk. To help address this issue, the Province implemented the *Asset Management Planning for Municipal Infrastructure Regulation, O. Reg. 588/17,* and effective January 1, 2018.

The goal of this regulation is to help improve the way municipalities plan for their infrastructure. The regulation builds on the progress municipalities have made while bringing consistency and standardization to asset management plans to help spread best practices throughout the sector and enable the collection of comparable data.

1.4 Asset Management Plan Goals and Objectives

The City of Temiskaming Shores currently manages its infrastructure proactively and with fiscal responsibility. A variety of programmes have already been initiated to improve the quality of investment decisions made, and support the City's asset management efforts. This Plan seeks to formalize and present some of the major capital infrastructure needs, with an emphasis on the initial 10 year period from 2022 to 2032, and provide a framework for expanding and enhancing the City's asset management system.

1.5 Relationship with Other Documents

Funding for the preparation of this Asset Management Plan was provided, in part, by the Ministry of Infrastructure programs as well as from within the existing Municipal Budget documents. Our operation and maintenance practices are guided by the strategies presented herein but operate under the budgets established by Council.

The City utilizes a standard Geographic Information System (GIS), where information is available, as well as data held in the various spreadsheets and other forms. Some of the data available appears to overlap traditional segmentation of roads or piped infrastructure information. Assumptions were made to combine data where this overlap was evident. Information from some of the sources could not be combined due to the naming or segmentation creating ambiguity in the data.

1.6 Asset Management Plan Scope

The City's Asset Management System encompasses Asset Management Strategies and Policies, the management of all assets within the various categories from conception to end-of-life, performance and condition monitoring and assessment, risk management, financing strategies, future demand and improvement processes.

This Plan (phase 1) considers the following municipal own asset categories:

Water System:

- Approximately 105 kilometres of water distribution infrastructure.
- Approximately 3500 water service connections of various sizes.
- Approximately 1358 control and specialized valves.
- Approximately 451 hydrants.

Sanitary System:

- Approximately 97.1 kilometres of sanitary sewer collection and forcemain infrastructure.
- Approximately 3500 sanitary sewer connections.
- Approximately 1040 maintenance structures.
- Approximately 30 control and specialized valves.

Storm System:

- Approximately 63.8 kilometres of storm sewer collection infrastructure.
- Approximately 2046 catch basins and maintenance structures.
- Approximately 468 kilometres of drainage ditches.
- Approximately 7.7 kilometres of centerline culverts
- 1 storm water management system

Transportation System:

- Approximately 209.1 lane kilometres of paved roadway.
- Approximately 34 lane kilometres of surface treated roadway.
- Approximately 172.6 lane kilometres of gravel roadway.
- Approximately 40.4 kilometres of sidewalk.
- 10 bridge structures
- 6 large diameter culverts

Other Assets:

- 24 Environmental Facilities

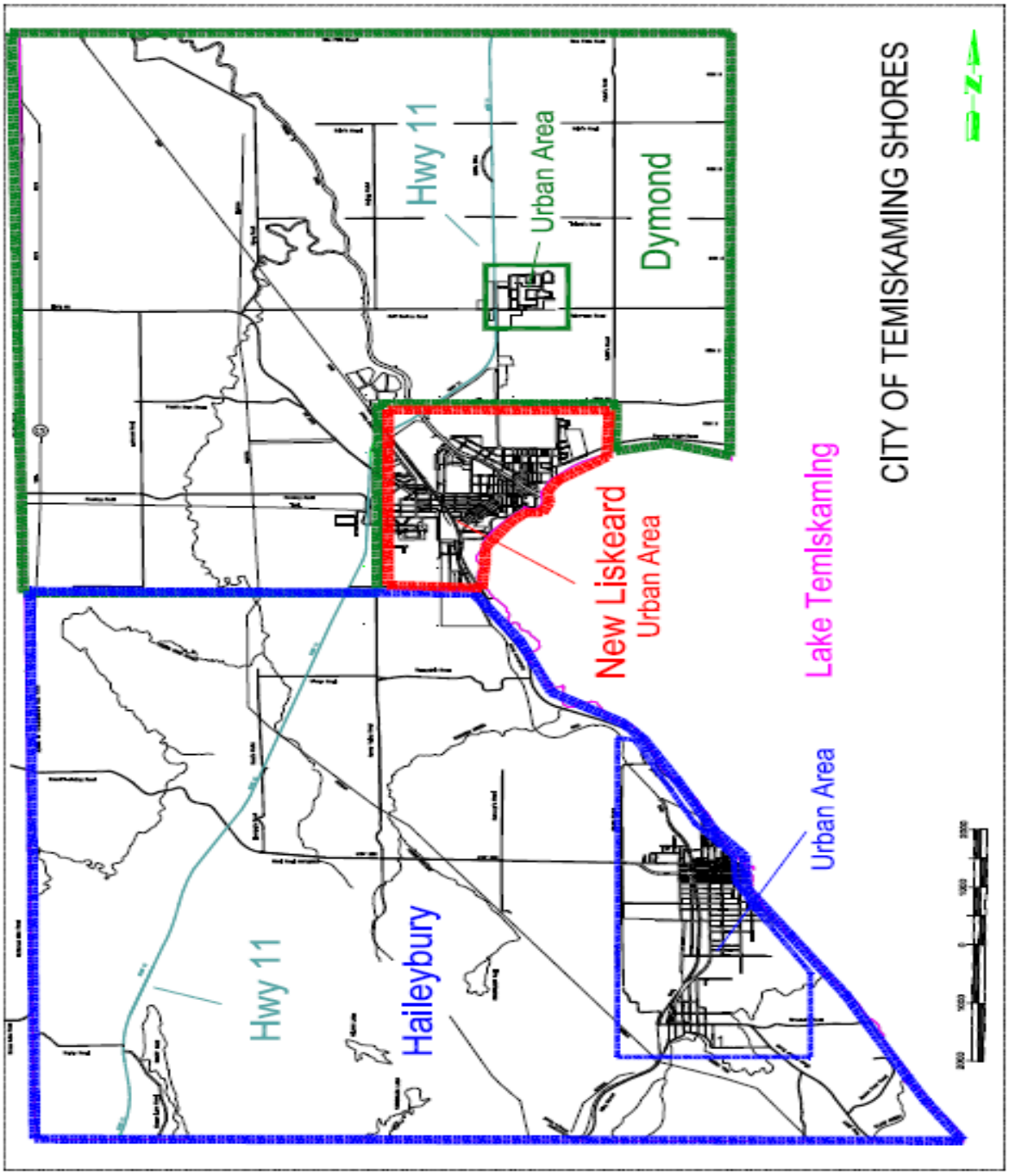


Figure 1.1: Overview Map of Temiskaming Shores

While the Planning process commenced in 2018, the City will conduct an annual review of the State of Infrastructure report. The evaluation and improvement process discussed in Section 1.8 also reflects the intent that this Plan be considered a “living document,” to be revised and updated as necessary.

1.7 Asset Management Plan Development Process

The City of Temiskaming Shores utilized existing staff and resources as well as contract support persons if necessary to facilitate the development of this Plan. The process for developing the Asset Management Plan, limitations of the current version of the Plan, and planned next steps are detailed below.

1.7.1 Municipal Goals and Objectives:

The first step in the Plan development process was to determine the desired outcomes, as well as plan the approach or approaches that were to be used to achieve them.

Known infrastructure inventories and all other available information were used within individual asset groups to identify and express priorities and needs associated with provision of those services. A plenary session involving staff, elected officials and other appropriate stakeholders was also used to identify and discuss these goals and objectives.

Limitations of this Plan

The City considers this to be the first phase of a larger, continual Asset Management Planning process that forms an important part of its overall Asset Management effort. As a result of the project timeline and data availability, other elements have now been included in this version of the Plan. The City will seek to incorporate the missing data in Phase 2 and 3 of the Plan, set to be completed by July 2025.

Next Steps

As the City moves forward with its Asset Management practices, the Plan will be adjusted to reflect a more accurate representation of asset needs. The City will re-visit the Goals and Objectives documented in this Plan as additional information becomes available, and at a minimum, review them upon repeating the Asset Management Planning process for the next Plan revision.

1.7.2 State of Infrastructure:

The second step in the Plan development process was to determine the current State of Infrastructure along with it levels of service. While the State of Infrastructure is independent of infrastructure needs, a thorough understanding of the present state of infrastructure was determined to be a key element required when considering the needs of the infrastructure portfolio and what levels of service are realistically achieved. There are a variety of ways to assess and report on the State of Infrastructure.

Individual asset performance and condition assessments are considered as the preferred measure for assessing the state of individual infrastructure assets, though asset age or maintenance data were also used as an indicator where the information was otherwise unavailable.

The City of Temiskaming Shores currently has several infrastructure condition monitoring and assessment programs in place, including;

- Sanitary and Storm Sewer CCTV program:

  A large portion of Sanitary and Storm Sewer systems have been inspected over a number of years and the condition of these sections have been documented to highlight areas that should be considered as priority for replacement or rehabilitation. Moving forward, the City has acquired a CCTV camera and consideration will be given to prioritizing the inspection of those areas that poise gaps in information.

- Road Needs Study:

  The most recent Roads Needs Study was updated in 2020 utilizing external consultants through municipal asset management programs, offered by the Federation of Canadian Municipalities (FCM). This study reviewed the road network, broke the various road sections down into individual segments, consistent in their characteristics and other infrastructure located within, and recorded the performance and condition details for each. This information has and will continue to be used to identify the capital and maintenance needs of the system, the timing for the required work and the road priority.

- OSIM Bridge Inspections:

  As legislated by the Province of Ontario, every bridge and large diameter culvert is inspected under the Ontario Structure Inspection Manual (OSIM) every two years. The most recent inspection was carried out by a qualified consultant in 2020 and is being repeated in 2022. From this inspection, a Bridge Condition Index was developed that assists in the scheduling of bridge maintenance and upkeep. Safety concerns are addressed immediately.

Limitations of this Plan

This initial version of the Plan is largely based on infrastructure asset age information collected through PSAB 3150 reporting records as well as all available information on the asset groups that was collected since 2015.

Additional limitations, that have been identified, are documented in Section 3 of the Plan, identified by Asset Category.

Next Steps

The City should consider revisions to the procurement policies to support and improve data management practices. Contract terms should specify the format of electronic deliverables and define minimum data requirements to support Asset Management efforts moving forward.

All reporting procedures should incorporate / include asset condition information, as it becomes available. This will assist in determining or establishing a more accurate representation of the State of Infrastructure.

1.7.3 Current Levels of Service:

Level of Service defines the performance required of the infrastructure. To measure a Level of Service, one or more corresponding Key Performance Indicator has to be identified. In order to minimize monitoring and analysis efforts, the Key Performance Indicators monitored should be limited to only those required to measure the current Levels of Service.

Limitations of this Plan

The current Levels of Service defined for the initial version of the Plan have been limited to those associated with the capital replacement of assets. An Estimated Service Life was established for each asset that corresponds with either the typical lifespan experienced in industry, or adjusted to better represent the Asset Management Strategy for the replacement or retention of the particular asset.

1.8 The Asset Management Plan as a "Living Document"

The process for developing and implementing this Plan was intended to follow the Deming cycle for quality control; Plan, Do, Check, Act. This process provides a framework for continual monitoring and improvement of the Plan, as well as for planned asset management strategies and activities. A variety of components are included in each step as outlined below.

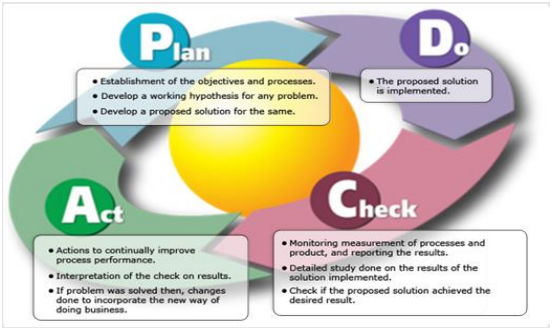


Figure1.2: Deming Cycle

Step 1: Plan

The following components are included in this step:

Review of Previous Plan

Prior to establishing or revising the Asset Management Plan, any previous Plans will be reviewed. This review will establish a historical context for the decisions made and an understanding of the future visions pursued, as well as providing a framework to measure asset performance against. By recognizing the "living" nature of the Plan documents, evaluation of changes made over time will also serve to identify best practices and unsuccessful strategies to avoid. Where the Plan continues to serve the City's needs, it may serve as a template to produce future Plans.

Audit Results and Auditor Recommendations

Results from any audits on the Asset Management Plan or System, as well as any associated auditor recommendations, will be considered in revising the active Plan and producing future Plans.

Management Review Results

As part of the third step of the Plan development process, a management review shall be conducted. While the results from this review are intended to be incorporated in the existing Plan as a process of continuing improvement, some issues may not be immediately actionable. Assessment of the management review results during the development process for subsequent Plans will provide the opportunity to re-assess and potentially implement recommendations that were previously not accepted.

The full Asset Management Planning process should be undertaken by the City every five years. The process should be initiated one year prior to the intended release of the updated or revised Plan. The City may consider retaining the services of an outside party, such as an independent consultant, to facilitate the review and revision of at least every second Plan in order to incorporate changes to industry good practice and capture the benefits of an external review.

Step 2: Do

The second step of the Plan development process is its implementation. The Plan will be implemented upon completion of the first step. Where necessary, significant changes may be implemented through a phased approach as documented in the Plan.

Step 3: Check

The Plan shall be considered a "living document," to be revised and refined as required. Prior to making adjustments, the efficacy and propriety of the Plan, strategies and activities must be assessed. This is performed through six approaches: monitoring, inspections and testing, performance documentation, audits, management reviews, and stakeholder engagement.

Monitoring

Asset management activities specified in the Plan will be monitored on an on-going basis. Overall activities in the Plan will be compared with performance measures and the results will be used to develop an improvement plan which will document specific tasks.

The State of Infrastructure report will also be reviewed and revised on an annual basis by the City.

It is anticipated that in the early stages of implementation this monitoring may lead to more frequent adjustments to the Plan.

Inspections and Testing

Assets will be inspected and tested as specified in the Plan. If subsequent inspections identify significant deterioration in condition or performance, corrective actions may be undertaken and inspection frequency may be increased until the desired outcome is achieved and confirmed.

Performance Documentation

A review of asset performance, with respect to design capacity in comparison to actual measured capacity, of specific assets may be carried out to ensure that the current and desired Levels of Service can be provided. This review may take the form of summary tables or charts displaying capacity in relation to levels of service. It may also include assessment of other studies or models used to evaluate asset performance, such as water system models or traffic demand studies.

Management Review

The Asset Management System, including applicable policies, procedures, and Plans, should undergo management review every (3) three years.

Audits

The Asset Management System, including applicable policies, procedures, and Plans, may undergo audit by an external consultant every (5) five years.

Step 4: Act

The final step in the Plan development is to act on the information gathered from the previous step. This step is implemented through continual plan evaluation and improvement efforts. The Plan will be evaluated and adjusted on an ongoing basis by Municipal staff and management during implementation. Formal Management evaluation and audited reviews will take place as described previously. The outcomes and recommendations of each review will be incorporated into improving future versions of the Plan.

2. Asset Management Policy

An Asset Management Policy may be defined as the "*principles and mandated requirements derived from, and consistent with, the organizational strategic plan, providing a framework for the development and implementation of the asset management strategy and the setting of the asset management objectives".*

Simply put, the asset management policy defines an organization's commitment to asset management and provides staff with a mandate and direction to implement the Plan strategy and activities in compliance with the overall organizational strategic plan. Creation of such policies is an essential requirement of Asset Management Systems and, at the very least, highly recommended by most recognized guidelines and standards, including InfraGuide and the International Infrastructure Management Manual (IIMM).

The City of Temiskaming Shores formally adopted a documented Municipal Asset Management Policy by Resolution No. 2019-063, dated May 21, 2019. This Policy signifies Councils commitment to effective Asset Management, and the establishment of Municipal priorities for our Asset Management programmes.

2.1 Policy Statements

Asset management is a broad strategic framework that encompasses many disciplines and involves the entire organization. The term asset management, as used in this document, is defined as *"The application of sound technical, social and economic principles that considers present and future needs of users, and the service from the asset."*

To guide the organization, the following policy statements have been developed for all three phases of the plan:

a) The City of Temiskaming Shores will maintain and manage infrastructure assets at defined levels to support public safety, community well-being and community goals.

b) The City of Temiskaming Shores will monitor standards and service levels to ensure that they meet/support community and Council goals and objectives.

c) The City of Temiskaming Shores will develop and maintain asset inventories of all of its infrastructures.

d) The City of Temiskaming Shores will establish infrastructure replacement strategies through the use of full life cycle costing principals.

e) The City of Temiskaming Shores will plan financially for the appropriate level of maintenance of assets to deliver service levels and extend the useful life of assets.

f) The City of Temiskaming Shores will plan for and provide stable long term funding to replace and/or renew and/or decommission infrastructure assets.

g) Where appropriate, the City of Temiskaming Shores will consider and incorporate asset management in its other corporate plans.

h) The City of Temiskaming Shores will report to citizens regularly on the status and performance of work related to the implementation of this asset management policy.

2.2 Background & Purpose of Asset Management Policy

Council has a mandate to provide a wide range of services. Council adopts policies that support their vision, goals and objectives and guide staff to effectively implement the policy for the delivery of those services.

Council vision and goals for infrastructure assets

Council's vision and goal for the community is a safe, livable, sustainable and economically vibrant community underpinned by well managed and maintained infrastructure assets. These assets include but are not limited to efficient transportation networks, safe and reliable water distribution networks, economical and reliable sewage collection systems, productive fleets, and accessible parks, recreation and civic facilities.

Though these assets age and deteriorate, by using sound asset management practices, Council and the community can be assured that the assets meet performance levels, are used to deliver the desired service in the long term and are managed for present and future users.

This policy is to articulate Council's commitment to asset management, and guides staff using the policy statements for all three phases of the plan. In doing so, this policy also outlines how it is to be intergraded within the organization in such a way that it is coordinated, cost effective and organizationally sustainable. This policy also demonstrates to the community that Council is exercising good stewardship, and is delivering affordable service while considering its legacy to future residents.

Staff will implement the policy through the development and use of asset management guidelines and best practices. Since the performance of asset management is organization specific, reflective of knowledge, technologies and available tools, and will evolve over time, the responsibility for developing guidelines and practices is delegated to staff.

2.3 Policy Principles, Guidelines and Integration

Principles

The key principles of the asset management policy are outlined in the following list.

The City shall:

- Make informed decisions by identifying all revenues and costs (including operation, maintenance, replacement and decommission) associated with infrastructure asset decisions, including additions and deletions. Trade-offs shall be articulated and evaluated, and the basis of the decision recorded.
- Integrate corporate, financial, business, technical and budgetary planning for infrastructure assets.

- Establish organizational accountability and responsibility for asset inventory, condition, use and performance.
- Consult with stakeholders where appropriate.
- Define and articulate service, maintenance and replacement levels and outcomes.
- Use available resources effectively.
- Manage assets to be sustainable.
- Minimize total life cycle costs of assets.
- Consider environmental and energy conservation goals.
- Consider social and sustainability goals.
- Minimize risks to users and risks associated with failure.
- Pursue best practices where available.
- Report the performance of its asset management program.

Guidelines and Practices

This policy shall be implemented by staff using accepted industry guidelines and best practices (such as those recommended by the Federation of Canadian Municipalities e.g., InfraGuide).

The City will also comply with required capital asset reporting requirements, and integrate the asset management program into operational plans throughout the organization.

Strategic Asset Management Plans may be developed for a specific class of assets, or be generic for all assets, and should outline long term goals, processes and steps toward how they will be achieved. The Asset Management Plans should be based on current inventories and condition (acquired or derived), projected or desired performance and remaining service life and consequences of losses ***(e.g., vulnerability assessments, Emergency Management Ontario Critical Infrastructure Consequence of Loss Assessment***). Operational plans should reflect these details. Replacement portfolios and associated financial plans should consider alternative scenarios and risks, as well as include public consultation.

Context and integration of Asset Management within the City

The context and integration of asset management throughout the organization's lines of business is typically formalized through references and linkages between corporate documents. Where possible and appropriate, Council and staff will consider this policy and integrate it in the development of corporate documents such as:

- Official plan
- Business plans
- Corporate strategic plan
- Corporate financial plan
- Capital budget plan

- Operational plans and budgets (including vehicle and fleet plans and budgets)
- Energy Conservation plans
- Neighborhood plans
- Community Improvement plans
- Annual reports
- Design criteria and specifications
- Infrastructure servicing, management and replacement plans, e.g., transportation plans
- Community social plans
- Parks and recreation plans
- Facility plans

2.4 Key Roles for Managing the Asset Management Policy

City policies are approved by Council. While staff, public and other agencies may provide input on the nature and text of the policy, Council retains the authority to approve, update, amend or rescind policies.

Role	Responsibility
Identification of issues, and development of policy updates	Council and staff
Establish levels of service	Council, staff and public
Exercise stewardship of assets, adopt policy and budgets	Council
Implementation of policy	City Manager and staff
Development of guidelines and practices	City Manager and staff
On-going review of policies	Council and staff

Implementation, review and reporting of Asset Management work

The implementation, review and reporting of this policy shall be integrated within the organization. Due to the importance of this policy, the organization's asset management program shall be reported annually to the community, and implementation of this policy reviewed by Council at the mid-point of its term.

Actions	Responsibility
Adopt Asset Management Policy	Council and City Manager
Monitor and review infrastructure standards and service levels at established intervals	Council and City Manager
Develop and maintain infrastructure strategies including development and service plans	Recreational Services, Community Growth and Planning, Public Works, Finance, other asset operation and maintenance

	departments, Finance
Develop and maintain asset inventories	Public Works, Finance, other asset operation and maintenance departments, Finance
Assess infrastructure condition and service levels	Public Works, and other asset operation and maintenance departments
Establish and monitor infrastructure replacement levels through the use of full life cycle costing principles	Public Works, Finance, and other asset operation and maintenance departments
Develop and maintain financial plans for the appropriate level of maintenance, rehabilitation, extension and decommission of assets	Public Works, Finance, and other asset operation and maintenance departments, Finance
Report to citizens on status of the community's infrastructure assets and asset management program. The channels may include annual citizen reports, business plans, etc.	Council, City Manager, Corporate Services

3. Infrastructure Data Collection

3.1 Water System Inventory

The water system infrastructure inventory data used for the analysis was gathered from several sources. The combination of the geographic information system (GIS) information collected for this asset as well as other available records and information were combined to provide a relatively accurate accounting. Limited global positioning (GPS) data was available for the hydrants, curb stops and water valves connected to the water infrastructure, however, the inventory of those appurtenances, linked to the water infrastructure piping, are also considered to be fairly accurate. Base information about the material, installation date, diameter and length were derived from available records and data related to the system. These records also provided information about the size of valves, hydrants and connections per pipe segment and the two data sets were linked via their street (location) information. Information on Water treatment and storage facilities were gathered separately.

3.2 Sanitary Sewer System Inventory

The sanitary sewer system infrastructure data used for the analysis was compiled from several sources. The combination of the geographic information system (GIS) information collected for this asset as well as other available records and information were combined to provide a relatively accurate accounting. Limited global positioning (GPS) data was available for the maintenance holes and cleanouts connected to the sanitary infrastructure, however, the inventory of those appurtenances, linked to the sanitary sewer infrastructure piping, are also considered to be fairly accurate. Base information about the material, installation date, diameter and length were derived from available records and data related to the system. These records also provided information about the number and location of maintenance holes and connections per pipe segment and the two data sets were linked via their street (location) information. Information on Wastewater treatment and pumping facilities were gathered separately.

3.3 Storm Sewer System Inventory

The storm sewer system infrastructure data used for the analysis was compiled from several sources. The combination of geographic information system (GIS) information collected for this asset as well as other available records and information were combined to provide a relatively accurate accounting. Limited global positioning (GPS) data was available for the maintenance holes and catch basins connected to the storm water infrastructure, however, the inventory of those appurtenances, linked to the storm sewer infrastructure piping are also considered to be fairly accurate. Base information about the material, installation date, diameter and length were derived from available records and data related to the system. These records also provided information about the number and location of maintenance holes and catch basins per pipe segment and the two data sets were linked via their street (location) information.

3.4 Roads Network Inventory

Data derived from a Roads Needs Survey, conducted in 2017 and 2020, was used in conjunction with the previously developed geographic information system (GIS) layer for the Municipality's roads. The information gathered in the Survey was reviewed, with respect to the road data, and it was determined that the road condition data contained more suitable information for use in an Asset Management Plan. It is recommended that all data sets should ideally be combined in the future to provide a more detailed source of information when combined with all other asset inventories.

3.5 Bridge Inventory

The bridge inventory was developed through the use of the most recent OSIM inspection data. Basic Bridge Condition Index values were calculated for each structure using the estimated cost of repair derived from the inspections along with the initial installation cost and the current bridge value. Bridges with a repair value either greater or close to the replacement value were considered to be in poor condition.

3.6 Miscellaneous Asset Inventories

Information for the following asset classes was acquired from various sources of data. This information assisted in providing a current and base cost for each asset.

- Sidewalks
- Centerline Culverts
- Environmental Facilities

4. State of Local Infrastructure

4.1 Introduction & Overview

The City of Temiskaming Shores infrastructure may be considered to be generally in “fair to good” condition. This is a result of the City being proactive in the management of its infrastructure. As the infrastructure continues to age, however, adequate funding will need to be made available to continue this trend and either replace or rehabilitate the assets as required.

4.1.1 Inventory Overview

The State of Local Infrastructure Report is a review of existing infrastructure data pertaining to infrastructure age and condition. The City’s public sector accounting board (PSAB) asset registry and staff knowledge of the various categories of infrastructure forms the basis for the assessment, with any available condition information taking priority in forecasting for both short and long-term needs.

This report was developed to advance the understanding of the state of the local infrastructure assets, and to improve transparency with respect to management of the infrastructure inventory. The report is the first element of an asset management plan whose purpose is to improve infrastructure-related decision-making processes.

The State of Local Infrastructure Report Card reviews the following infrastructure:

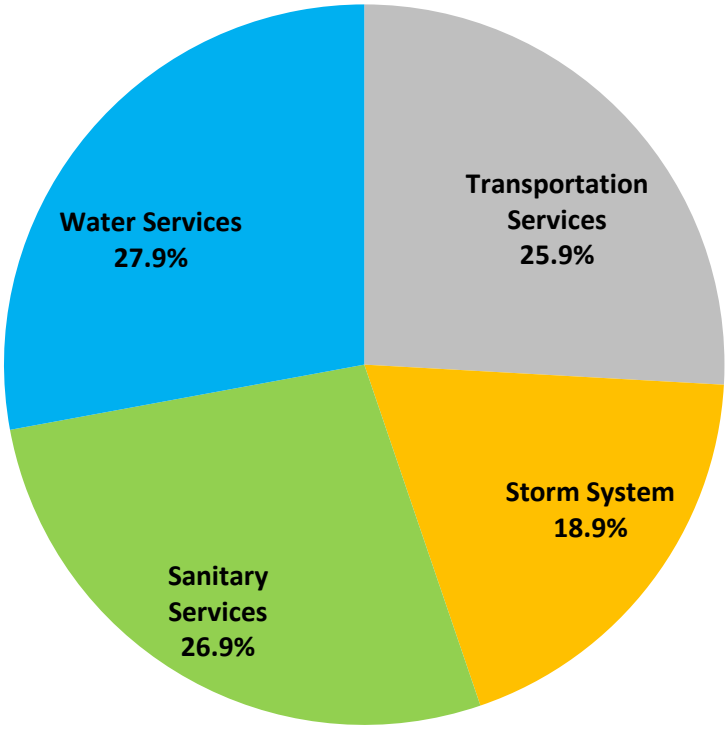
- Water Distribution and Treatment System
- Sanitary Collection and Treatment System
- Storm Collection and Management System
- Transportation Network
- Environmental Facilities

Table 4-1 summarizes the estimated replacement cost for the City’s infrastructure asset portfolio, derived on the basis of replacement costs, while Figure 4.1 illustrates each infrastructure asset division as a percentage of the total portfolio value. All values are estimated construction / replacement costs represented in 2021 Canadian Dollars (CAD).

Table 4-1: Total Replacement Cost per Asset Category

Asset Category	Replacement Cost
Water Services	$67,167,615.00
Sanitary Services	$65,791,060.00
Storm System	$45,466,765.00
Transportation Services	$62,329,560.00
	$240,755,000.00

Figure 4.1: Asset Replacement Cost by Asset Category (%)



4.1.2 Factors to Determine Infrastructure Condition

In order to prepare asset category risk profiles, and create capital needs forecasts, appropriate Condition Rating has been established for each category. The state of the infrastructure was assessed based on a variety of factors which include age, material (service life), number of repairs, sufficient capacity, etc.

Age and Material is the most significant assessment criterion. As an asset ages its condition deteriorates by a combination of many factors. The type of material significantly affects the rate at which deterioration occurs. The Estimated Service Life of a material can be adjusted to match industry good practices and reflect the typical life span of similar assets, to match local experience, or to match the asset management strategy of the infrastructure owner. In general, an asset's Estimated Service Life is heavily influenced by the demands placed on it, operation and maintenance practices, and legislative / regulatory and technological changes (e.g., technological obsolescence). For this Plan, the initial service lives were derived to reflect accepted industry asset performance as well as the City's asset management goals.

The number of repairs provides an accurate measure of operational decline due to deterioration. Therefore, areas that have a history of "breakage" are a significant burden on the operational budget.

Sufficient system capacity is also a violable factor when it comes to determining the condition of particular assets. For example, watermains that have large diameters are often transmission lines that supply significant quantities of water to large areas within the city. As such, problems with larger diameter pipes are considered to have high associated social and economic risks.

Table 4-2: Average Age per Category

Asset Category	Average Age (years)
Water Services	41
Sanitary Services	41
Storm System	40
Transportation Services	40

4.1.3 Useful Life Consumption

While age is not a precise indicator of an asset's health, in the absence of assessed condition assessment data. It can serve as a high-level, meaningful approximation and help guide replacement needs and facilitate strategic budgeting.

4.1.4 System Characteristic Overview

A basic character overview has been established for each asset category included in this Plan. Due to the nature of the individual asset categories, the overviews cannot be readily combined and summarized.

Beyond the risk of infrastructure failures, Temiskaming Shores faces a number of potential legislative / regulatory and potential reputational risks. One identified risk is that related to hazardous materials. A section of the water main inventory for instance, contains Asbestos Cement. A change in legislation requiring the removal of such materials could impose a cost of nearly $1.5M on the City for the Water system alone. To address these risks, the City may choose to accelerate the replacement of certain material or asset types.

4.1.5 Final Report Card Score

To rate the asset inventory using a report card, a scoring system modified from the Canadian Infrastructure Report Card was applied. The system is outlined in Table 4-3 and Table 4-4.

Table 4-3: Infrastructure Condition Score

Average Score	Rating	Definition of Rating
5	Very Good (A) 80-100%	*Fit for the Future* – The infrastructure in the system or network is generally in very good condition, new or recently rehabilitated. A few elements show general signs of deterioration that may require attention.
4	Good (B) 60-79%	*Adequate* – The infrastructure in the system or network is good condition; some elements show general signs of deterioration that require attention. A few elements may demonstrate signs of significant deficiencies.
3	Fair (C) 40-59%	*Requires Attention* – The infrastructure in the system or network is in fair condition; it shows general signs of deterioration and requires attention. Some elements demonstrate significant deficiencies.
2	Poor (D) 20-39%	*At Risk* – The infrastructure in the system or network is poor condition and mostly below acceptable standards, with many elements approaching the end of the expected service life. A large portion of the system demonstrates significant deterioration.
1	Very Poor (F) 0-19%	*Unfit for Service* – The infrastructure in the system or network is in unacceptable condition with wide spread signs of advanced deterioration. Many components or elements in the system demonstrate signs of imminent failure, which is / will affect service delivery.

Table 4-4: Financial Capacity Score

Average Score	Rating	Definition of Rating
5	Very Good (A)	The municipality is fully prepared for its short-, medium- and long-term replacement needs based on existing infrastructure portfolio.
4	Good (B)	The municipality is well prepared to fund its short-term and medium-term replacement needs but requires additional funding strategies in the long-term to begin to increase its reserves.
3	Fair (C)	The municipality is underprepared to fund its medium- to long-term infrastructure needs. The replacement of assets in the medium-term will likely be deferred to future years.
2	Poor (D)	The municipality is not well prepared to fund its replacement needs in the short-, medium- or long-term. Asset replacements will be deferred and levels of service may be reduced.
1	Very Poor (F)	The municipality is significantly underfunding its short-term, medium-term, and long-term infrastructure requirements based on existing funds allocation. Asset replacements will be deferred indefinitely. The municipality may have to divest some of its assets (e.g., bridge closures, facility closures) and levels of service will be reduced significantly.

Table 4-5 summarizes the condition scores determined for each asset category, and their corresponding Grade.

Figure 4.2: State of Infrastructure Assets (%)

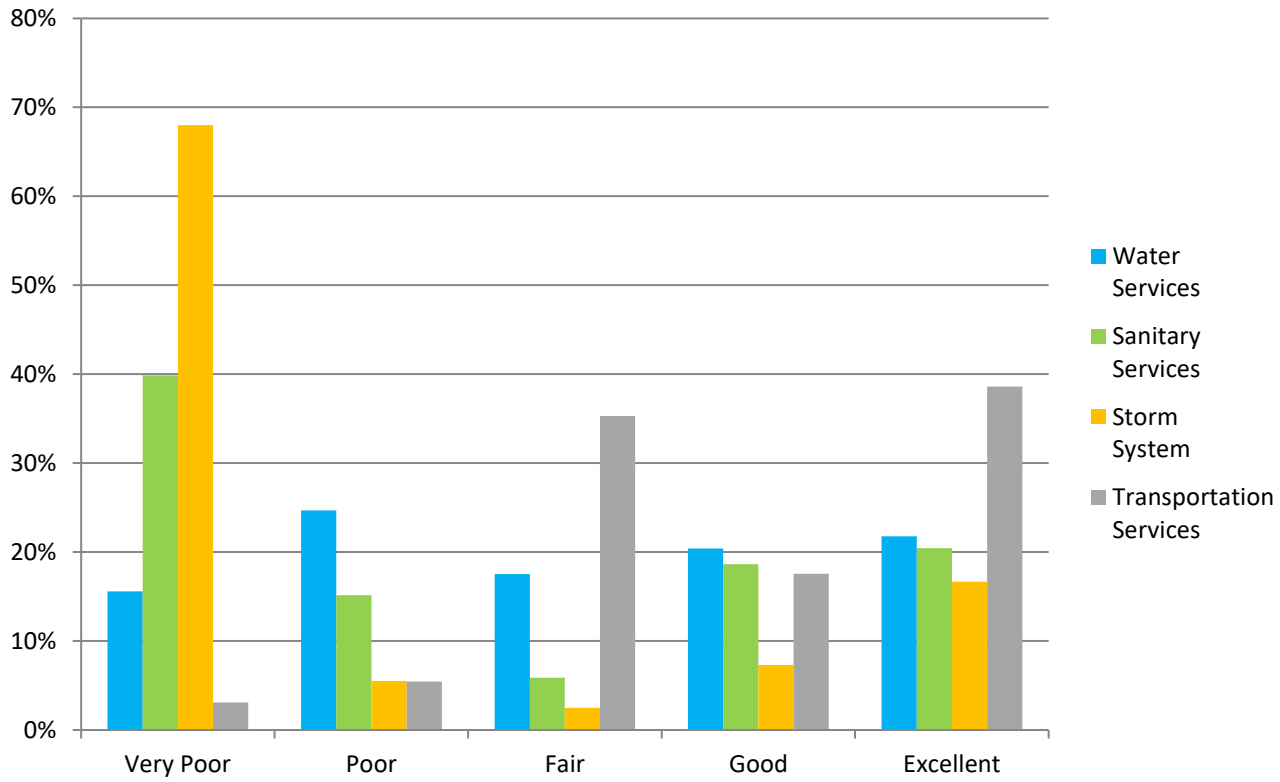
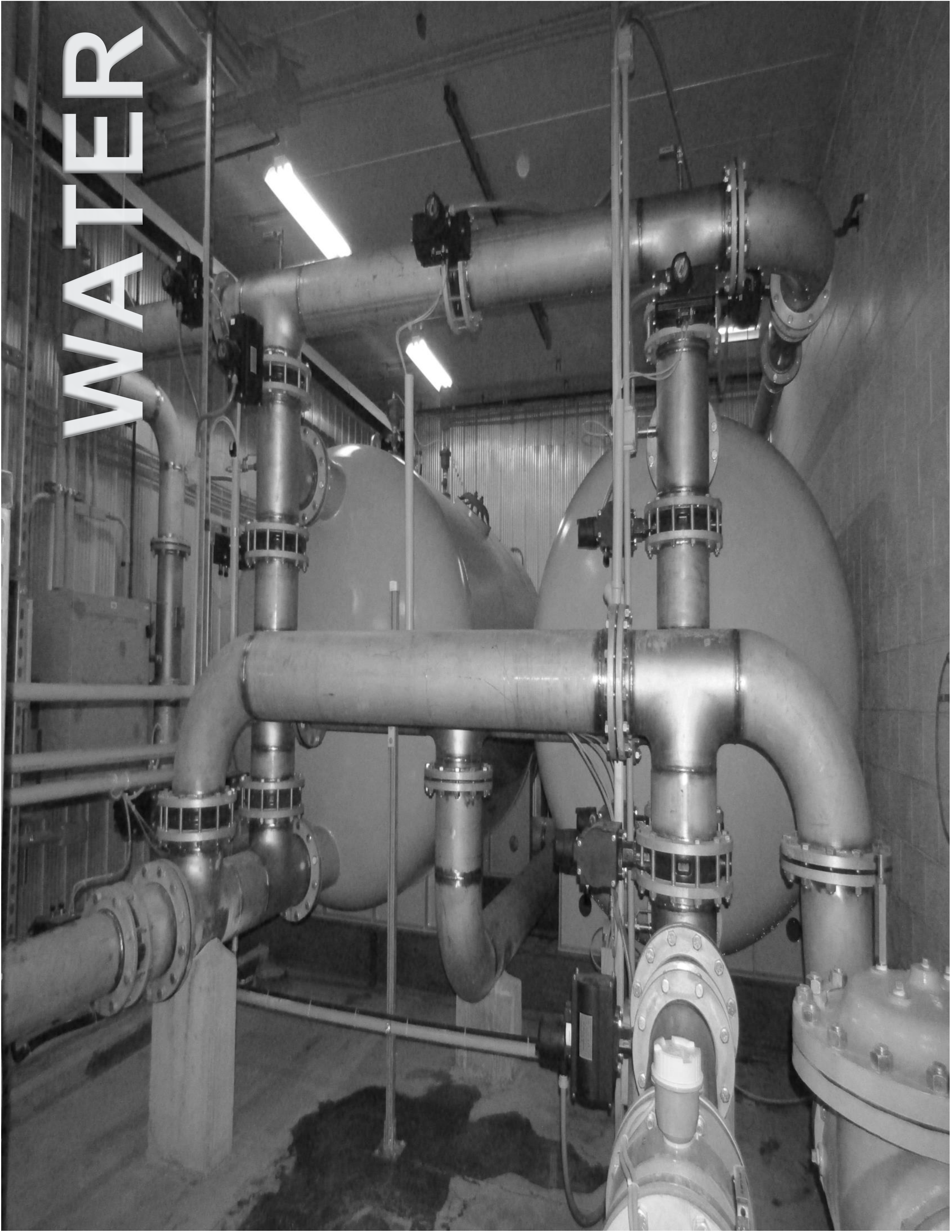


Table 4-5: Infrastructure Report Card Summary

Asset Category	Financial Capacity	Asset Condition	Overall Grade
Water Services	C	C+	C+
Sanitary Services	C	C	C
Storm System	D+	C-	D+
Roads	B-	C+	B-
Bridges & Large Dia. Culverts	D	B	C
Sidewalks	B-	A	B+
Enviro. Facilities	C+	B	B-

Final Grade: C+


WATER

4.2 Water Services

4.2.1 Inventory Overview

The water distribution infrastructure for Temiskaming Shores includes 105 km of piping, 1358 control and specialized valves, 451 hydrants. The average age of pipe in the system is 40 years old. The age distribution of the water infrastructure is shown in Figure 4.3 and Figure 4.4.

Table 4-6: Total Replacement Cost for Water Assets

Asset Type	Quantity	Useful Life (Years)	Replacement Cost
Watermains	105 km	60-100	$ 43,366,115.00
Control and Specialized Valves	1358 units	75	$ 2,744,500.00
Fire Hydrants	451 units	75	$ 3,157,000.00
Water Facilities	8 units	15-75	$ 17,900,000.00
		Total:	**$ 67,167,615.00**

Figure 4.3: Water Distribution Infrastructure by Age (%)

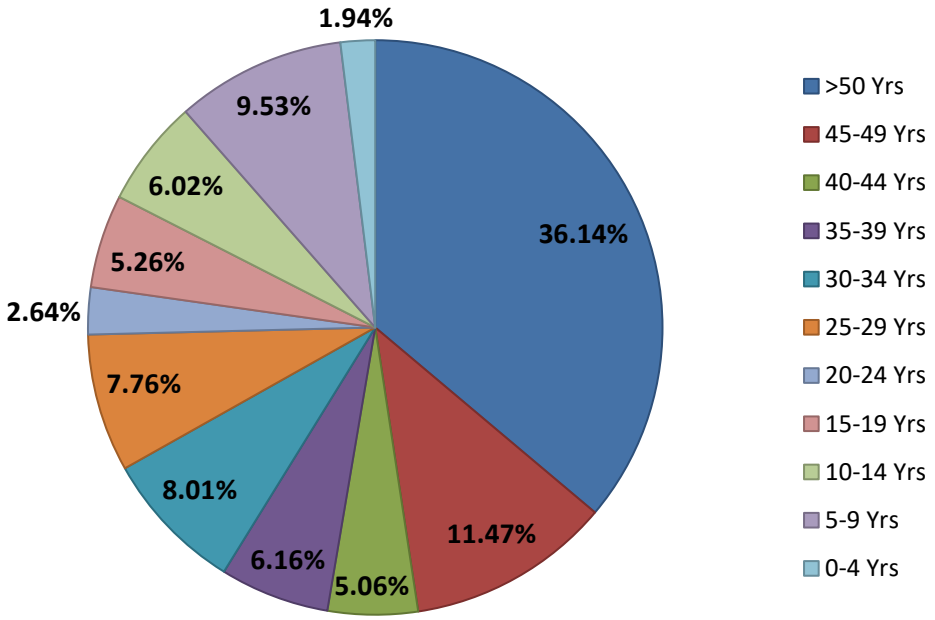
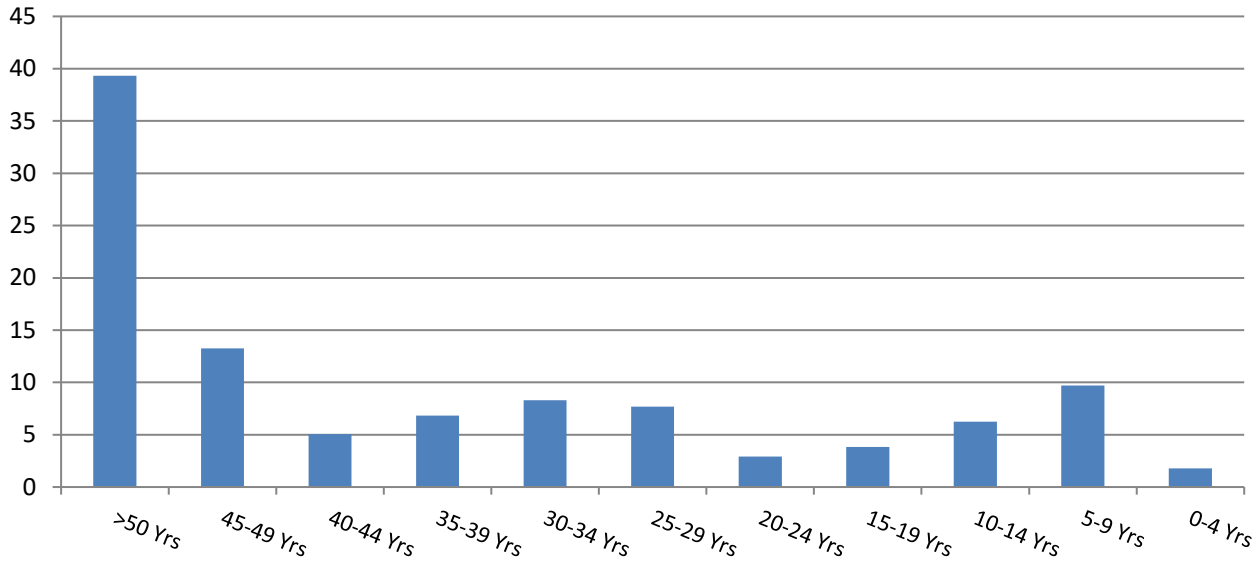


Figure 4.4: Length of Water Distribution Infrastructure by Age (Km)



The majority of water distribution pipes in Temiskaming Shores are 150 mm diameter Cast / Ductile Iron installed over 50+ years ago, as shown in Figures 4.5, 4.6 and 4.7.

Figure 4.5: Length of Water Distribution Infrastructure Material by Age (Km)

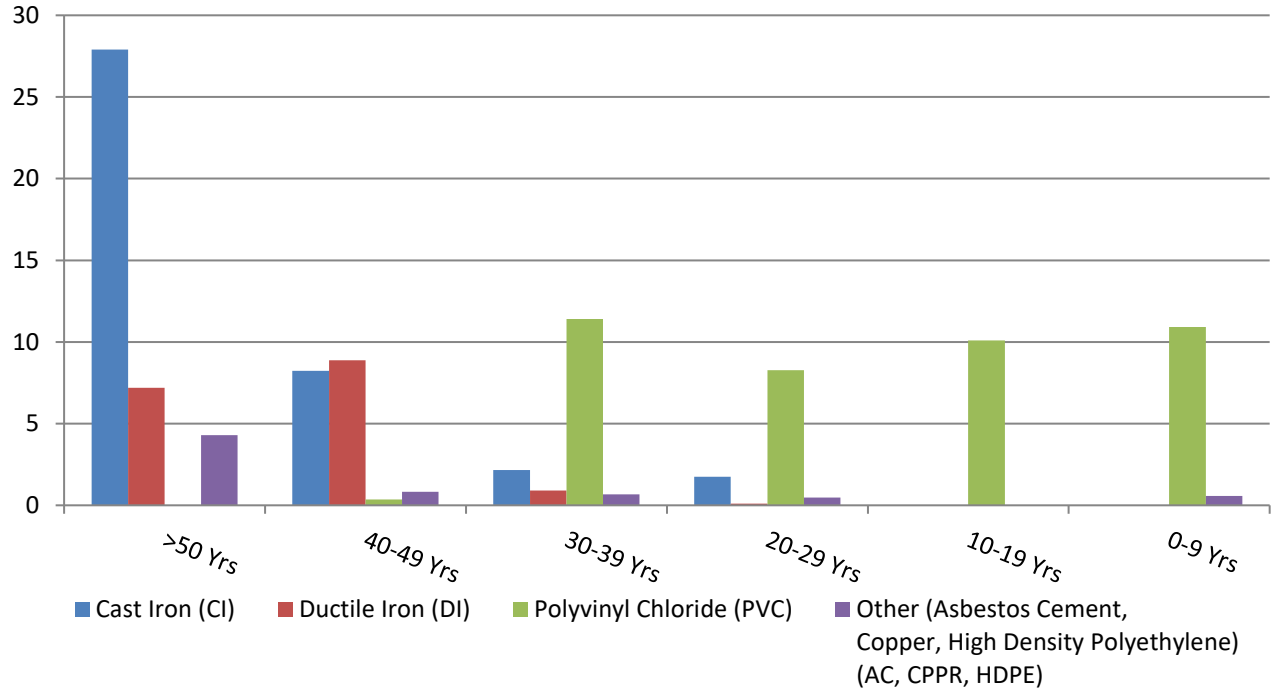


Figure 4.6: Water Distribution Infrastructure Material (%)

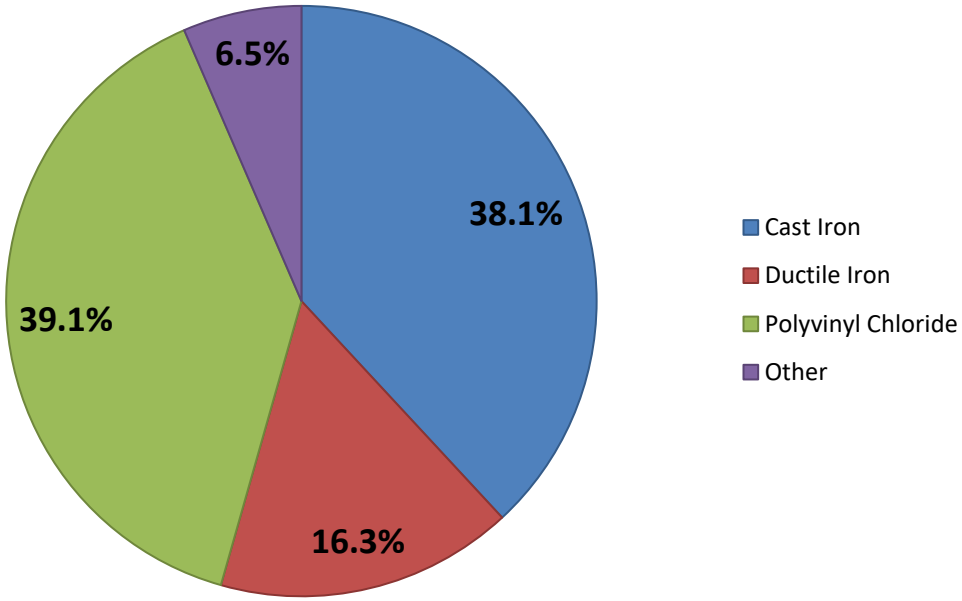
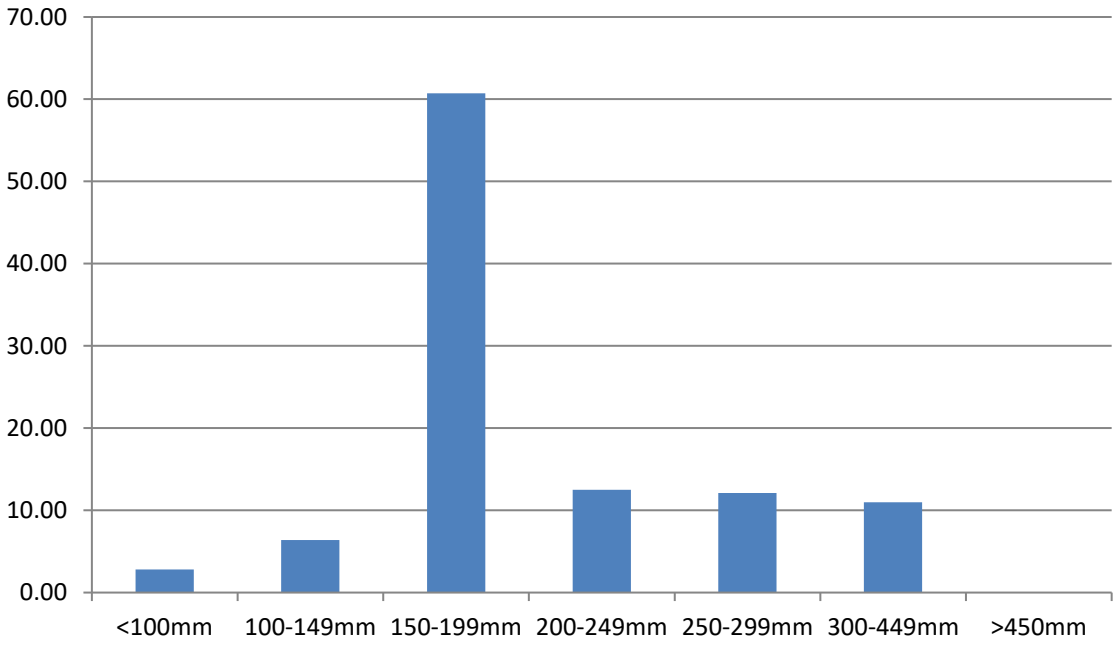


Figure 4.7: Water Distribution Infrastructure Diameter (Km)



4.2.2 Water Facilities

The City of Temiskaming Shores is responsible for 2 water treatment plants and 3 water reservoirs for servicing its residents. The average age of the City's water facilities is 51 years. However, a large percentage of these facilities have received significant maintenance and upgrades since that time. The City's water facilities are currently operated under contract by a private agency.

- The New Liskeard Water Treatment Plant is located at 305 McCamus Avenue and attains its raw water from two (2) drilled wells (raw water) and treated. Once completed, treated water is directed to a clear well where it's then pumped to the Water Reservoir located at 177104 Shepherdson Road. The New Liskeard system currently services about 4,800 residents. This location has an allowable limit of 8000 m^3/day with an average consumption of 2738m^3/day as of 2020.

  As of 2016, the New Liskeard Plant and Storage Facility, also directs water to the Dymond water reservoir located at 284 Raymond Street. The Dymond system services about 500 residents.

- The Haileybury Water Treatment Plant located at 1 Browning St. receives its water source directly from Lake Temiskaming and treated. Once completed, treated water is directed to a clear well where it's then pumped to the Water Reservoir located at 400 Niven St. S. The Haileybury systems services about 4,200 residents. This location has an allowable limit of 6820 m^3/day with an average consumption of 2511m^3/day as of 2020. The Haileybury Water Treatment Plant is also utilized as the Ontario Clean Water Agency (current contracted agency) Hub Office for this district.

4.2.3 Risk and Criticality Analytics

The risk and criticality calculation determines the overall risk of the water asset failures. Figure 4.8 and 4.9 provides a representation of the level of risk per kilometer and cost. Figure 4.10 represents the total risk of the water assets.

Note: The level of risk for all environmental facilities will remain in the high risk levels due to social and environmental impacts. Analyzing and determining the consequence and probability of failure of these facilities remains a difficult task for the municipality. However, these facilities are consistently monitored in order to allow the City to prioritize operational and capital projects based on the greatest risk of failure for each facility.

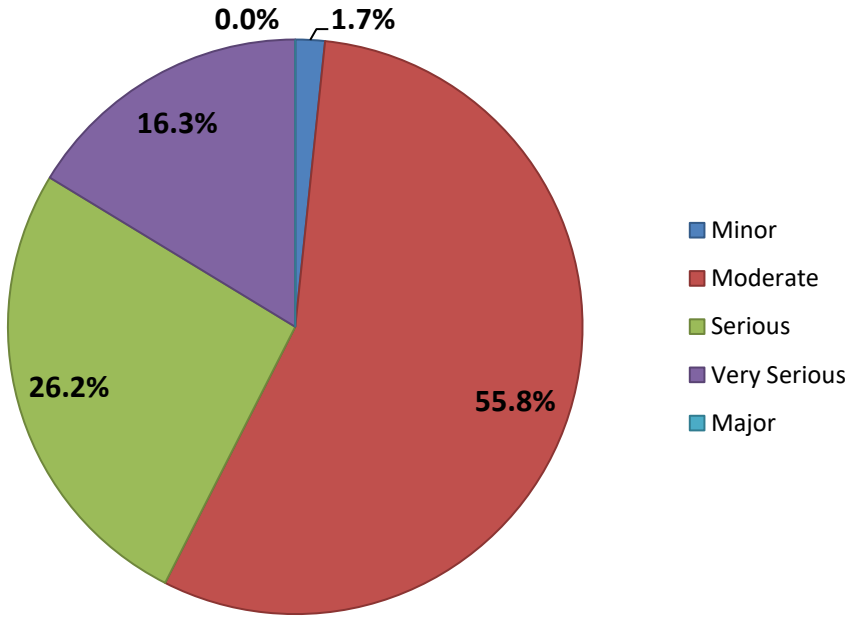
Figure 4.8: Level of Risk - Watermains (Km)

Consequence					
5	0.00	2.04	0.00	0.00	0.00
4	13.58	1.85	2.14	3.19	0.00
3	5.05	1.92	2.32	3.27	0.00
2	23.60	10.74	18.73	7.30	0.00
1	2.04	1.85	2.74	2.62	0.00
	1	2	3	4	5
	Probability				

Figure 4.9: Level of Risk - Watermains ($)

Consequence					
5	$ -	$ 1,120,350	$ -	$ -	$ -
4	$ 6,397,150	$ 842,600	$ 1,030,650	$ 1,513,450	$ -
3	$ 2,145,400	$ 816,850	$ 983,875	$ 1,386,200	$ -
2	$ 9,440,040	$ 4,297,200	$ 7,493,600	$ 2,921,200	$ -
1	$ 679,500	$ 587,225	$ 943,425	$ 767,400	$ -
	1	2	3	4	5
	Probability				

Figure 4.10: Total Risk of Water Assets (%)



4.2.4 Lifecycle Activities

Figure 4.11 provides a representation of the overall cost of the lifecycle activities that the City would need to undertake in order to maintain the current level of service for its water assets (10-year forecast). The City's current annual average requirements for water assets total $ 1,567,265 million.

Figure 4.11: Water Lifecycle Forecast Cost ($)

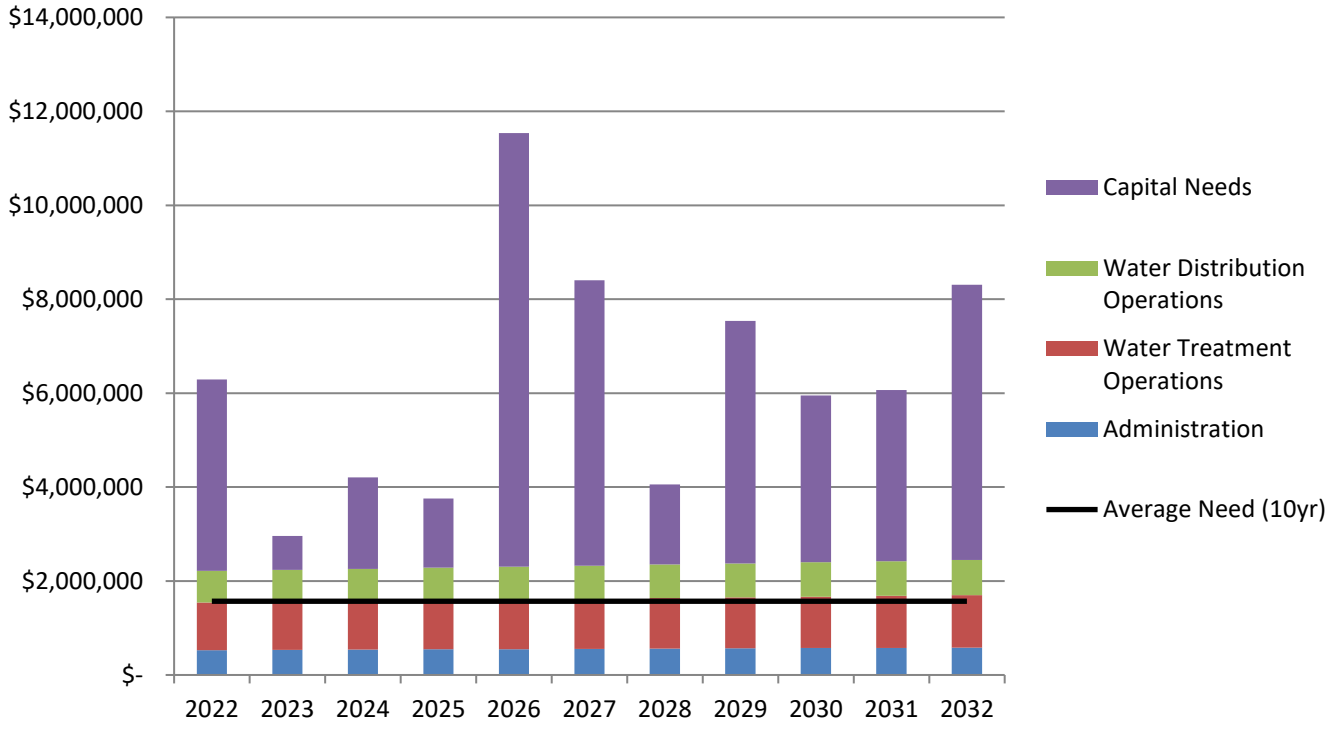
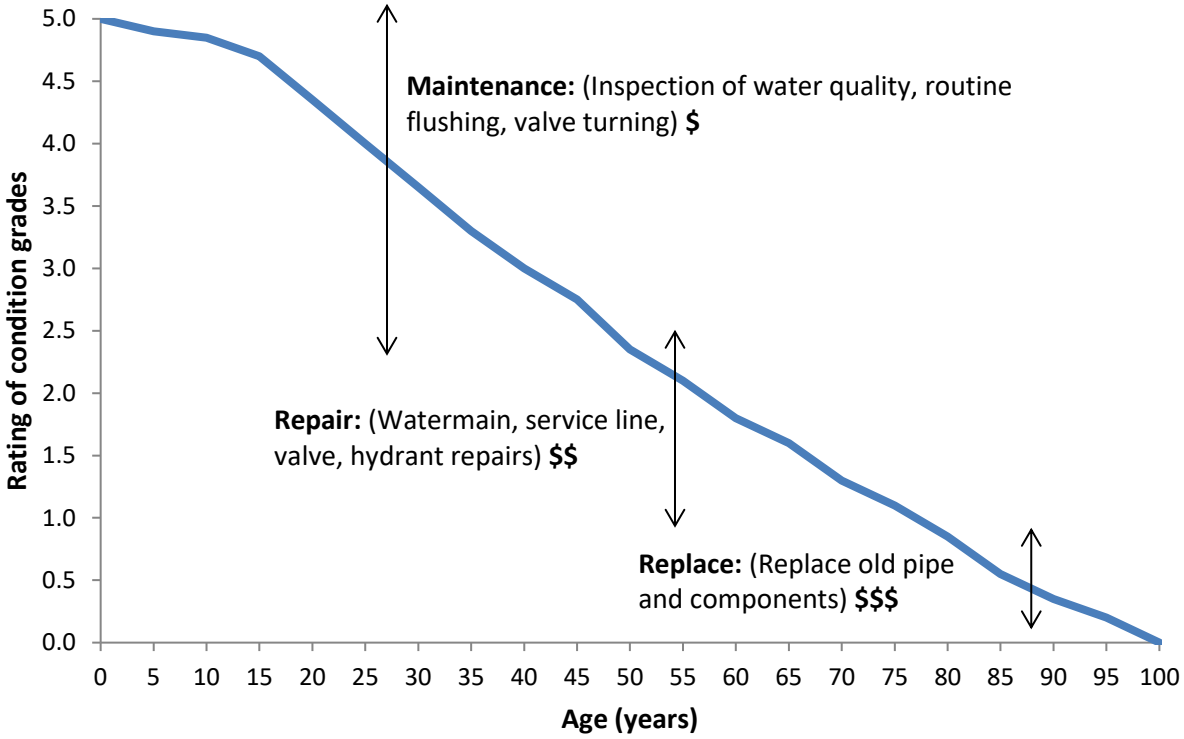


Figure 4.12 is intended to summarize the intervention strategies that are generally appropriate depending on the stage of deterioration/condition of the asset. The selection of the strategy is determined through the analysis in order to come up with the preferred intervention. It's also important to consider the approach in assessing the intervention method, in order to determine which decision can provide the most return on the investment from construction to disposal of the asset. It's also important to consider the varieties of factors that can cause the lifespan of the asset to vary from its expected service life. These factors can include but are not limited to:

- Quality of initial construction
- Appropriateness of the materials selected
- Loadings exerted on the pipe from traffic above or natural soil movement
- Soil conditions
- Chemistry of the flow within the pipe

Note: The following lifecycle deterioration rate and strategies example will be based on the current recommended and best construction practices and materials for each asset category. Watermains will be calculated using polyvinyl chloride (PVC) with a life expectancy of 100 years.

Figure 4.12: Water Lifecycle Intervention Strategies



Some operational lifecycle activity options for water assets include but are not limited to:

- Regulated watermain flushing and inspections programs
- Valve exercising programs to prevent improper functionality of the asset
- Watermain and service line repairs
- Fire hydrant repairs
- Fire hydrant winterizing
- Treatment monitoring
- Treatment facility repairs

The overall cost of these options may include wages/labour, materials, contracted/hired costs and other miscellaneous costs related to the lifecycle intervention such as consultation and design work for rehabilitation and replacement activities.

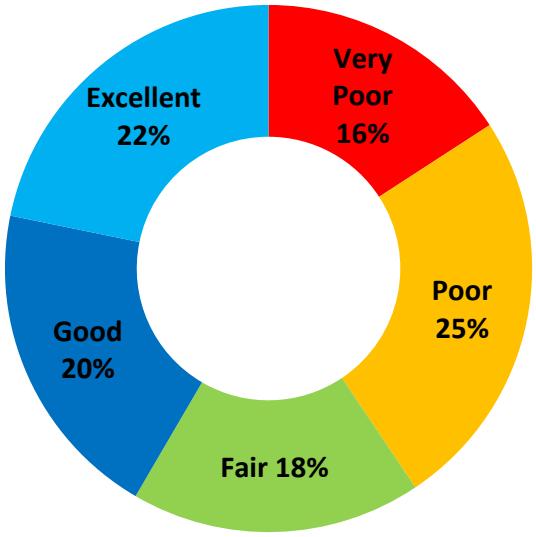
4.2.5 Condition Report Card

In 2019, the City of Temiskaming Shores experienced the highest total of 108 watermain and service line breaks. As the number of watermain breaks consistently increase over the years, it can directly attribute to the significant reconstruction and rehabilitation needs of the city.

Table 4-7 shows the average ratings and overall report card grade for the City's water system using a five point system. This initial report has considered age, material type and diameter (capacity) of pipe as well as perceived or reported physical condition in the assessment. These values may be adjusted as appropriate, as more information is gathered, or as the City upgrades the asset.

Figure 4.13: Water Condition Report Card (%)

Water Distribution System



Water Treatment and Storage Facilities

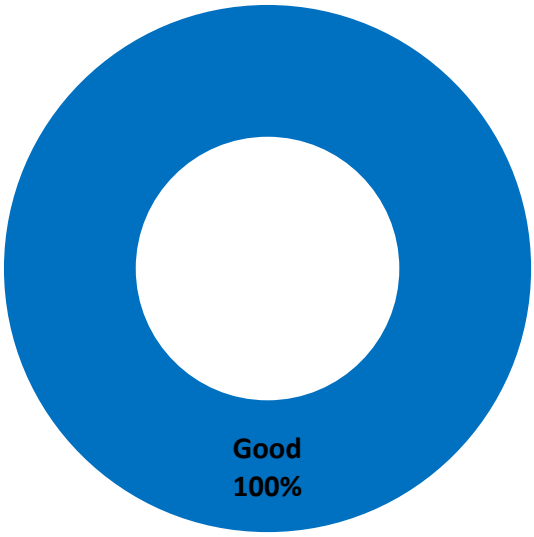


Table 4-7: Water Services Report Card

Infrastructure Condition Rating	Financial Rating	Overall Rating
3.08	2.5	**2.79**
Facility Condition Rating	Financial Rating	Overall Rating
3.89	2.8	**3.34**

SANITARY

4.3 Sanitary Services

4.3.1 Inventory Overview

The sanitary sewer system infrastructure for Temiskaming Shores includes approximately 97.1 km of piping, 1040 maintenance structures and 30 control and specialized valves. The average age of pipe in the system is 40.1 years old. The age distribution of the sanitary sewer system infrastructure is shown in Figure 4.14 and Figure 4.15.

Table 4-8: Total Replacement Cost for Sanitary Assets

Asset Type	Quantity	Useful Life (Years)	Replacement Cost
Sanitary Sewer	97.1 km	60-100	$ 39,377,775.00
Manholes	1040 units	50	$ 5,095,650.00
Control and Specialized Valves	30 units	15-20	$ 335,600.00
Wastewater Facilities	16 units	15-75	$ 20,982,035.00
		Total:	**$ 65,791,060.00**

Figure 4.14: Sanitary Collection Infrastructure by Age (%)

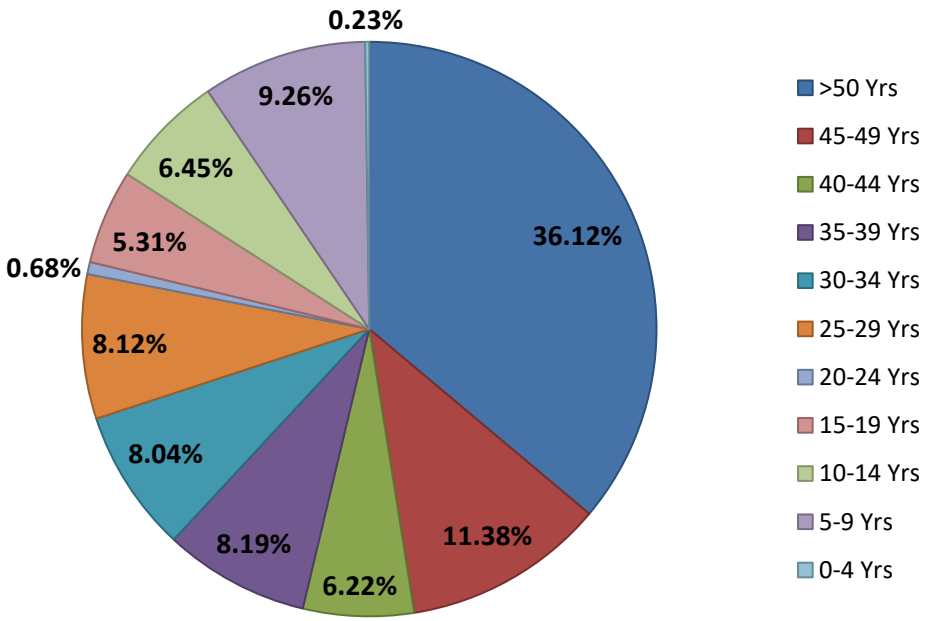
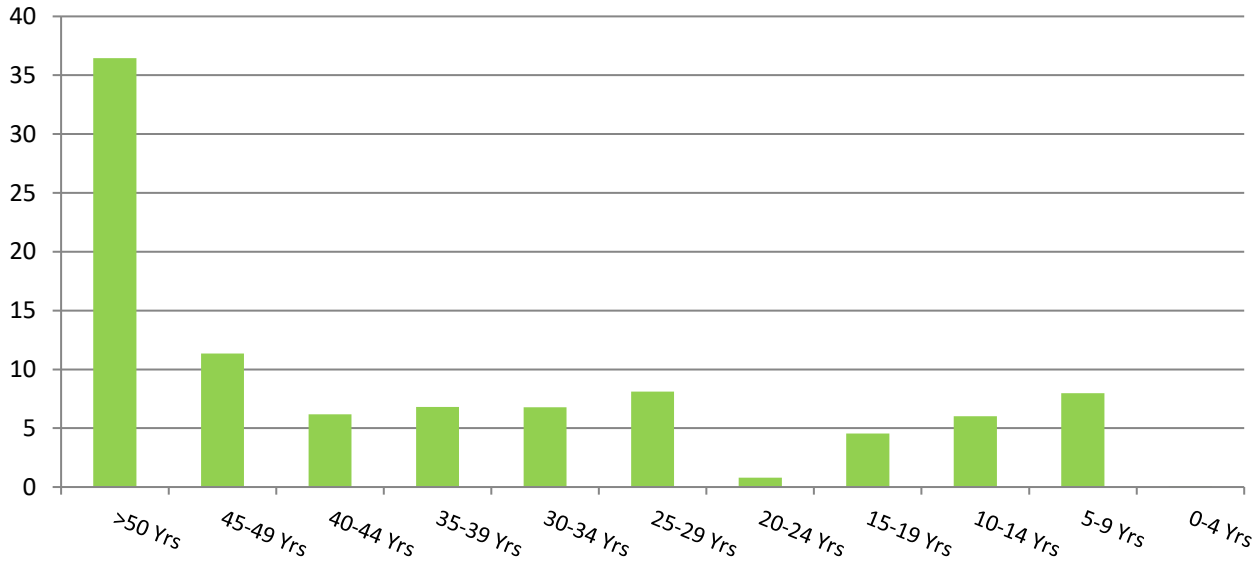


Figure 4.15: Length of Sanitary Collection Infrastructure by Age (Km)



The majority of sanitary sewer pipes are 200 mm diameter comprised of Vitrified Clay or Asbestos Cement material installed over 50+ years ago, as shown in Figures 4.16, 4.17 and 4.18.

Figure 4.16: Length of Sanitary Collection Infrastructure Material by Age (Km)

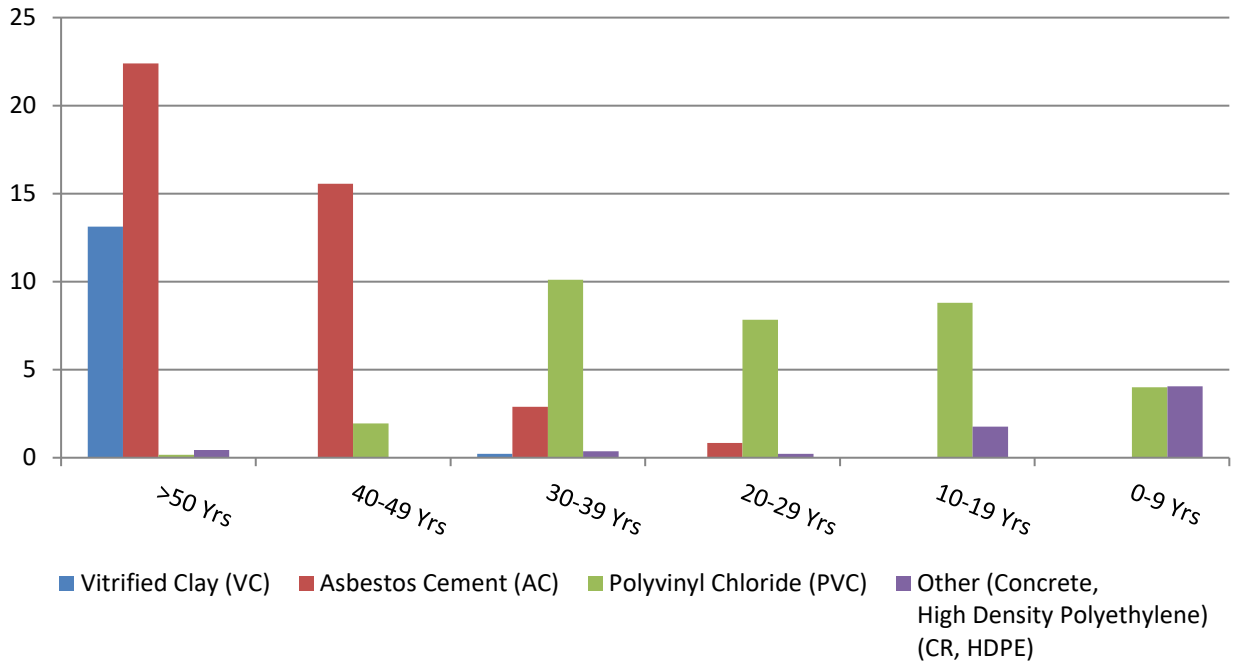


Figure 4.17: Sanitary Collection Infrastructure Material (%)

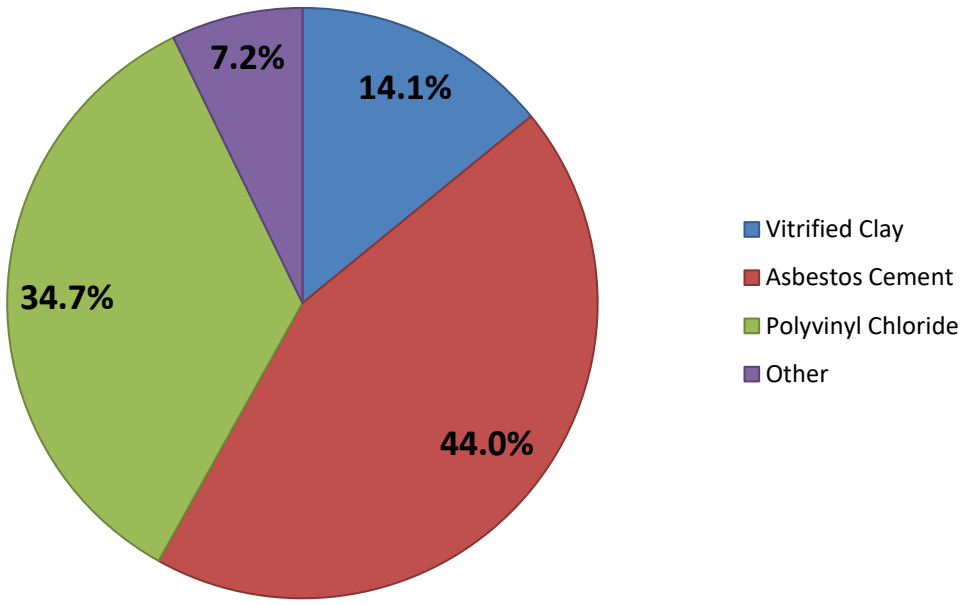
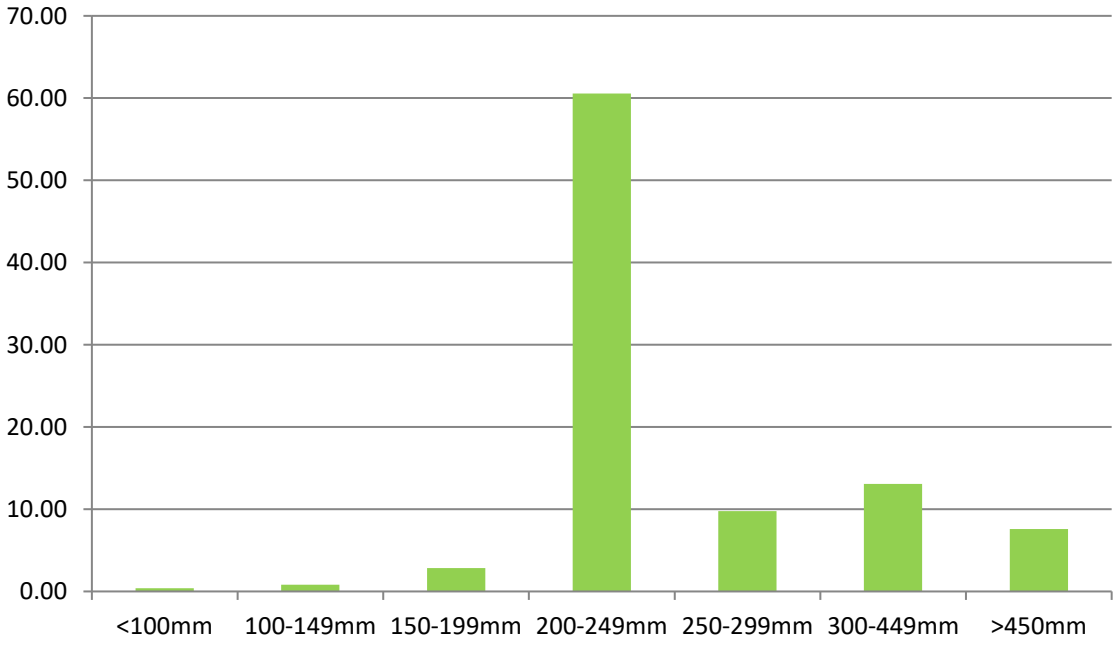


Figure 4.18: Sanitary Collection Infrastructure Diameter (Km)



4.3.2 Wastewater Facilities

The City of Temiskaming Shores provides a complex wastewater treatment system for its residents. There are 2 wastewater aerated lagoons and 1 mechanical sewage treatment plant. It's also responsible for 11 sanitary lift/pumping stations located throughout the municipality. The average age of the City's sanitary facilities is 33 years. However, a large percentage of these facilities have received significant maintenance and upgrades since that time. The City's wastewater facilities are currently operated under contract by a private agency.

- The New Liskeard Wastewater Lagoon located at 177304 Bedard Road, is a class 1 facility that provides sewage treatment for the former town of New Liskeard and Township of Dymond area. There are 7 pumping stations in the collection system that direct sanitary sewage to the lagoon. The New Liskeard lagoon has rated working capacity of 5500 m^3/day (average) and continuously discharges to the Wabi River which flows into Lake Timiskaming. This location is at 79.1% capacity and pumping capacity is sufficient as of 2020.
  Pumping Station Locations:
  - Cedar St.
  - Elm Ave.
  - Jaffray St. (Goodman)
  - Gray Rd.
  - Montgomery St.
  - Niven St. N.
  - Riverside Dr.

- The Haileybury Wastewater Treatment Plant is a class 2 extended aeration wastewater treatment plant located at 275 View Street. It serves a population of approximately 4200 residents within the former town of Haileybury and has an average rated working capacity of 2728 m^3/day (average). There are 2 pumping stations in the collection system that direct sanitary sewage to the plant. This location is at 75.8% capacity and pumping capacity is sufficient as of 2020.
  Pumping Station Locations:
  - Brewster St.
  - Farr Dr.

- The North Cobalt Wastewater Lagoon located at 543083 Proctors Road, is a class 2 facility that provides sewage treatment for the residence of South Haileybury (North Cobalt). There are 2 pumping stations in the collection system that direct sanitary sewage to the lagoon. The North Cobalt lagoon has a rated working capacity of 1200 m^3/day (average) and continuously discharges to the Farr Creek which flows into Lake Timiskaming. This location is at 45.8% capacity and pumping capacity is sufficient as of 2020.
  Pumping Station Locations:
  - Groom Dr.
  - Station St.

4.3.3 Risk and Criticality Analytics

The risk and criticality calculation determines the overall risk of the wastewater asset failures. Figure 4.19 and 4.20 provides a representation of the level of risk per kilometer and cost. Figure 4.21 represents the total risk of the wastewater assets.

Note: The level of risk for all environmental facilities will remain in the high risk levels due to social and environmental impacts. Analyzing and determining the consequence and probability of failure of these facilities remains a difficult task for the municipality. However, these facilities are consistently monitored in order to allow the City to prioritize operational and capital projects based on the greatest risk of failure for each facility.

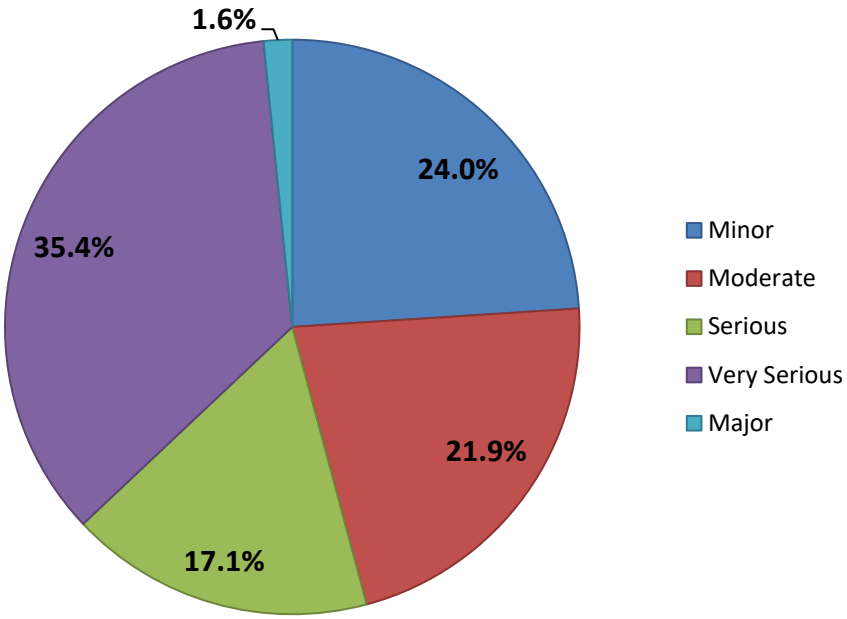
Figure 4.19: Level of Risk – Sewer mains (Km)

Consequence						
	5	7.56	1.66	0.12	1.69	0.00
	4	0.16	0.00	0.00	2.27	0.00
	3	4.84	0.26	0.52	1.60	0.00
	2	1.86	1.21	2.00	4.72	0.00
	1	22.75	2.46	11.78	27.64	0.00
		1	2	3	4	5
		Probability				

Figure 4.20: Level of Risk – Sewer mains ($)

Consequence						
	5	$ 4,087,500	$ 913,800	$ 65,500	$ 898,450	$ -
	4	$ 71,100	$ -	$ -	$ 1,019,700	$ -
	3	$ 2,176,650	$ 118,800	$ 233,100	$ 721,350	$ -
	2	$ 789,225	$ 515,100	$ 847,875	$ 2,006,425	$ -
	1	$ 8,495,200	$ 959,000	$ 4,692,600	$ 10,890,400	$ -
		1	2	3	4	5
		Probability				

Figure 4.21: Total Risk of Sanitary Assets (%)



4.3.4 Lifecycle Activities

Figure 4.22 provides a representation of the overall cost of the lifecycle activities that the City would need to undertake in order to maintain the current level of service for its wastewater assets (10-year forecast). The City's current average annual requirements for wastewater assets total $ 1,473,698 million.

Figure 4.22: Sanitary Lifecycle Cost ($)

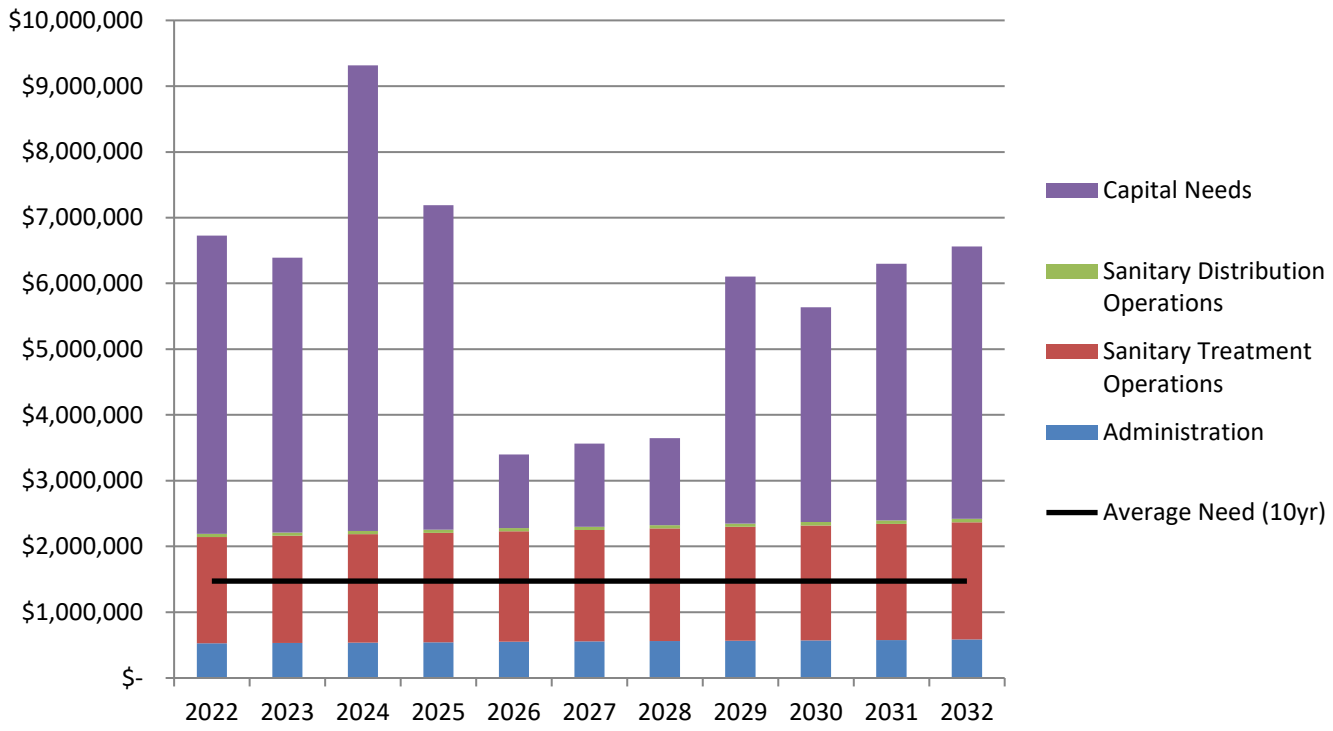
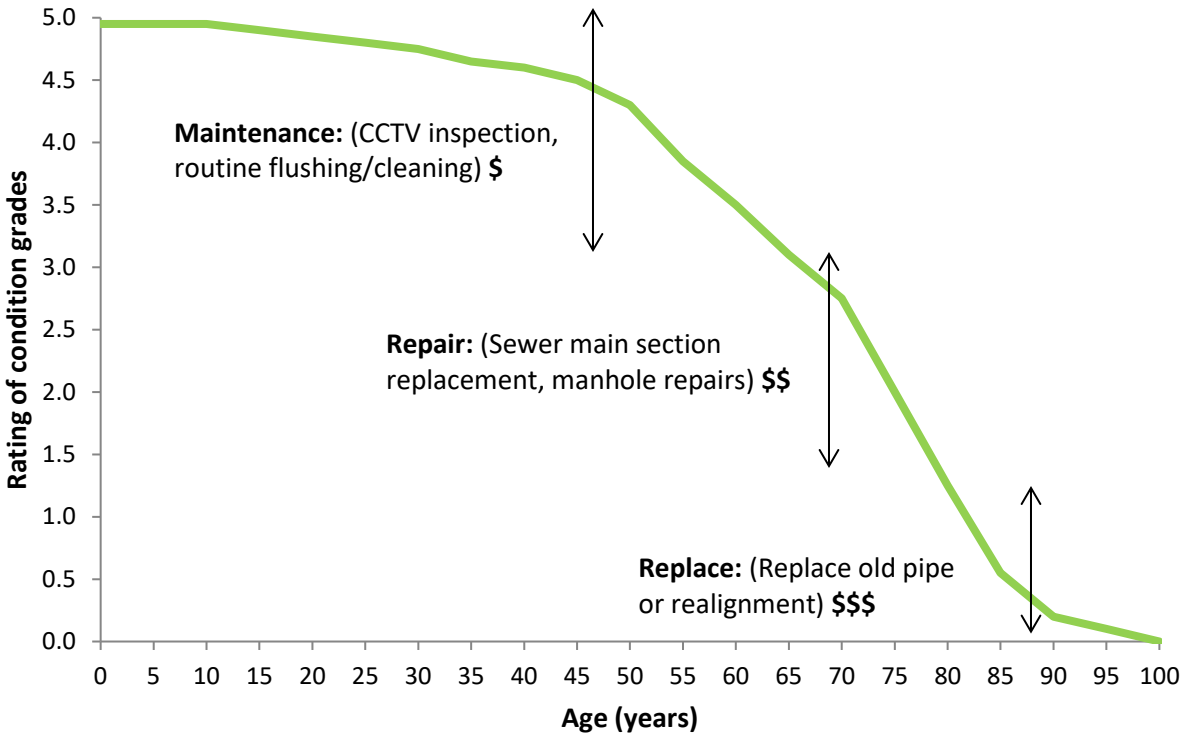


Figure 4.23 is intended to summarize the intervention strategies that are generally appropriate depending on the stage of deterioration/condition of the asset. The selection of the strategy is determined through the analysis in order to come up with the preferred intervention. It's also important to consider the approach in assessing the intervention method, in order to determine which decision can provide the most return on the investment value. It's also important to consider the varieties of factors that can cause the lifespan of the asset to vary from its expected service life. These factors can include but are not limited to:

- Quality of initial construction
- Appropriateness of the materials selected
- Loadings exerted on the pipe from traffic above or natural soil movement
- Soil conditions
- Chemistry of the flow within the pipe

Note: The following lifecycle deterioration rate and strategies example will be based on the current recommended and best construction practices and materials for each asset category. Sewer mains will be calculated using polyvinyl chloride (PVC) with a life expectancy of 100 years.

Figure 4.23: Sanitary Lifecycle intervention Strategies



Some operational lifecycle activity options for sanitary assets include but are not limited to:

- Sewer flushing and inspections programs
- Sewer main and manhole structure repairs
- Treatment monitoring
- Treatment facility repairs

The overall cost of these options may include wages/labour, materials, contracted/hired costs and other miscellaneous costs related to the lifecycle intervention such as consultation and design work for rehabilitation and replacement activities.

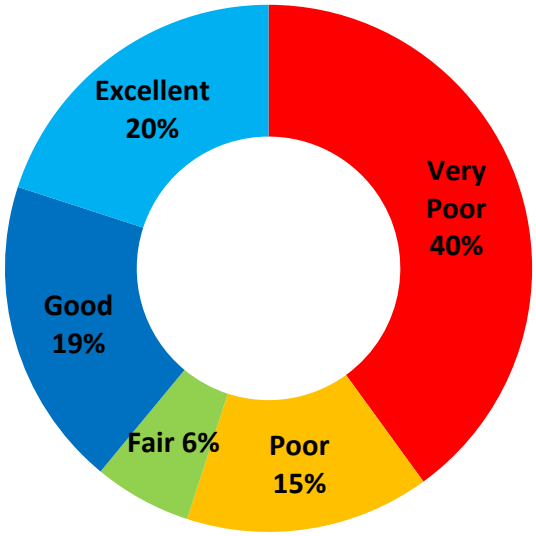
4.3.5 Condition Report Card

It's important to note that no areas of the city are being serviced by combined sewer systems.

Table 4-9 shows the average ratings and overall report card grade for the City's sanitary sewer system using a five point system. This initial report has considered age, material type and diameter (capacity) of pipe as well as perceived or reported physical condition in the assessment. These values may be adjusted as appropriate, as more information is gathered, or as the City upgrades the asset.

Figure 4.24: Sanitary Condition Report Card (%)

Sanitary Collection System



Sanitary Treatment and Pumping Facilities

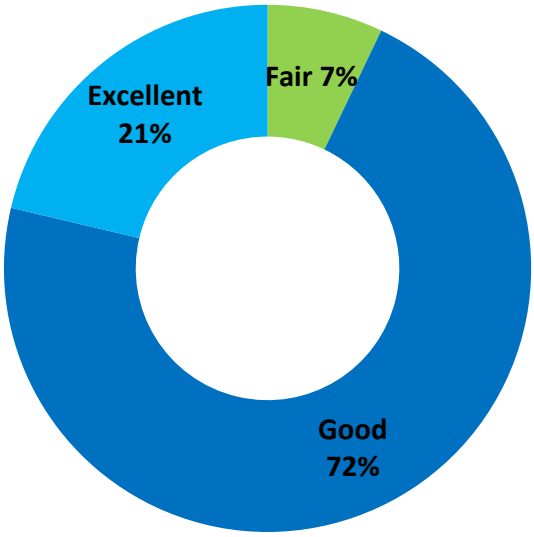


Table 4-9: Sanitary Services Report Card

Infrastructure Condition Rating	Financial Rating	Overall Rating
2.65	2.5	**2.58**
Facility Condition Rating	Financial Rating	Overall Rating
3.74	2.8	**3.27**


STORM

4.4 Storm System

4.4.1 Inventory Overview

The City of Temiskaming Shores has approximately 63.8 km of storm sewer piping and 2047 maintenance structures located within its infrastructure portfolio. The current average pipe age is 39.2 years. The age distribution of storm sewer infrastructure installation years is shown in Figure 4.25 and Figure 4.26.

Table 4-10: Total Replacement Cost for Storm Assets

Asset Type	Quantity	Useful Life (Years)	Replacement Cost
Storm Sewer	63.8 km	40-80	$ 33,820,300.00
Catchbasins	1891	50	$ 4,809,840.00
Manholes	156	50	$ 825,300.00
Culverts	7.7 km	40-80	$ 5,536,325.00
Ditches	468 units	10-15	
Ponds	1 unit	50	$ 475,000.00
		Total:	**$ 45,466,765.00**

Figure 4.25: Storm System Infrastructure by Age (%)

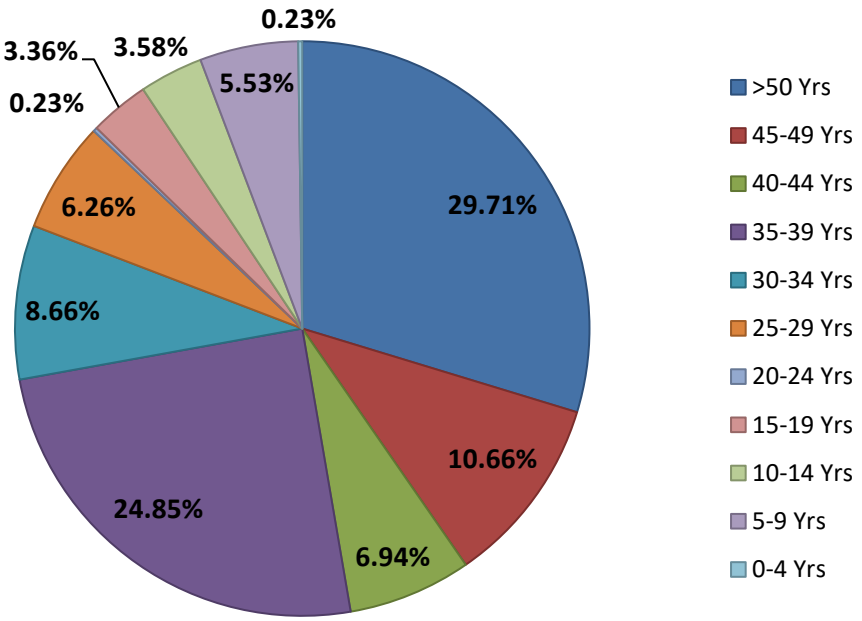
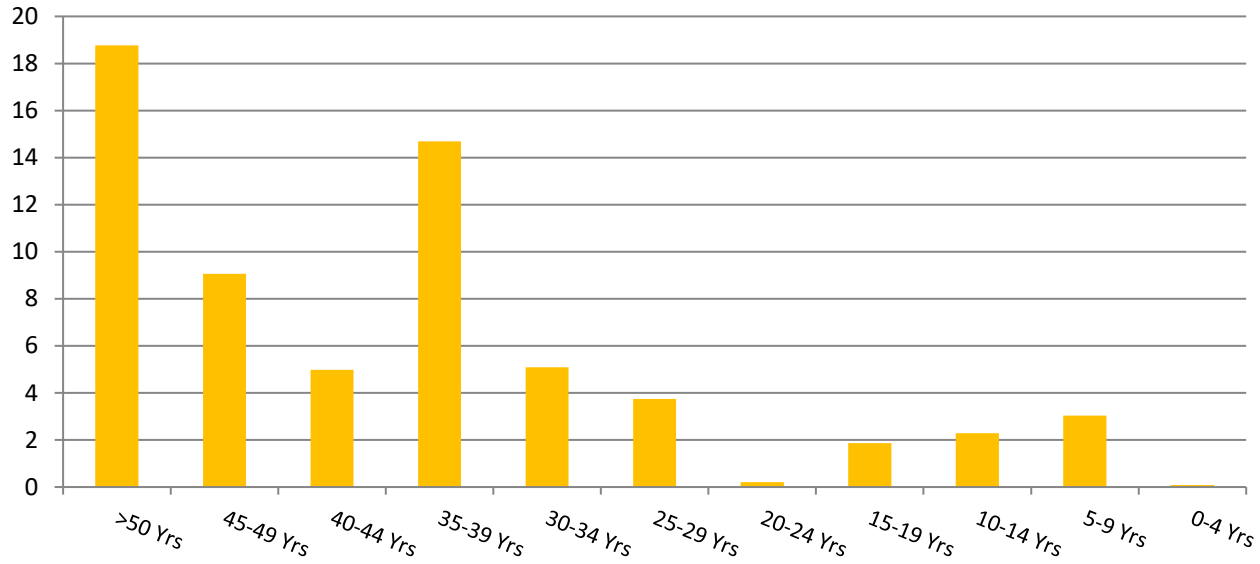


Figure 4.26: Length of Storm System Infrastructure by Age (Km)



The majority of storm sewer pipes are Corrugated Steel Pipe with a diameter of 300 to 450 mm and installed over 30+ years ago, as shown in Figure 4.27, 4.28 and 4.29.

Figure 4.27: Length of Storm System Infrastructure Material by Age (Km)

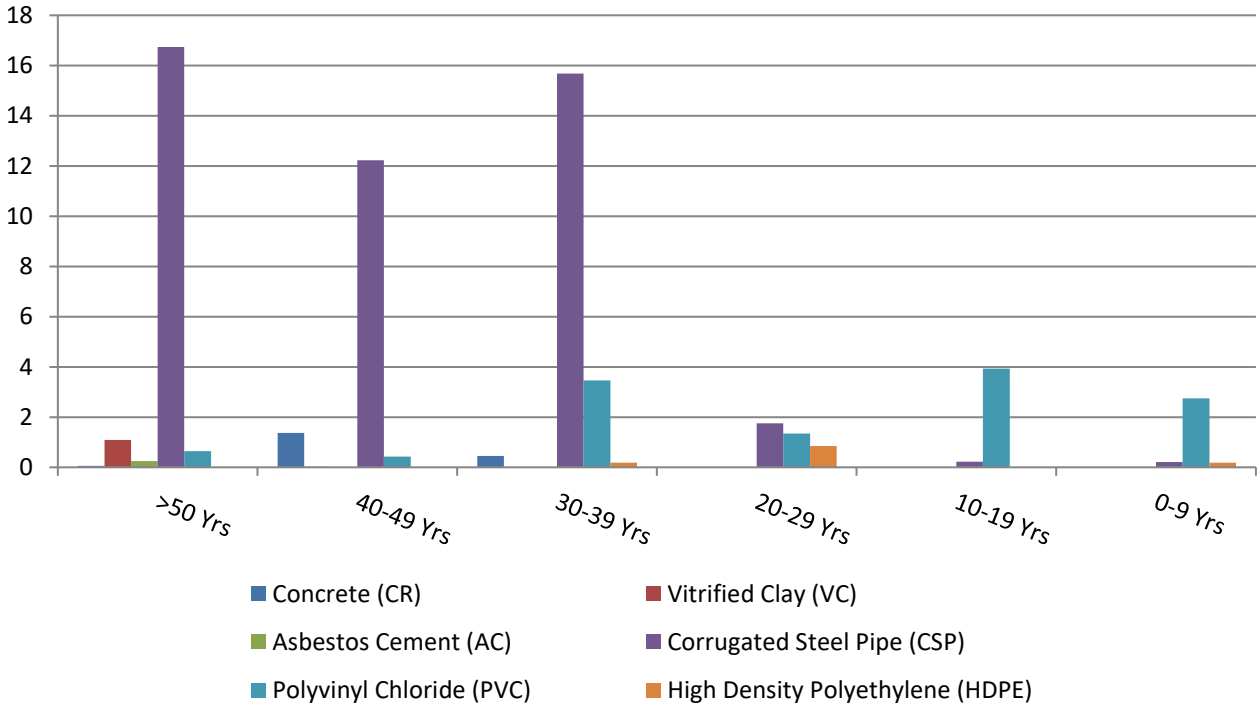


Figure 4.28: Storm System Infrastructure Material (%)

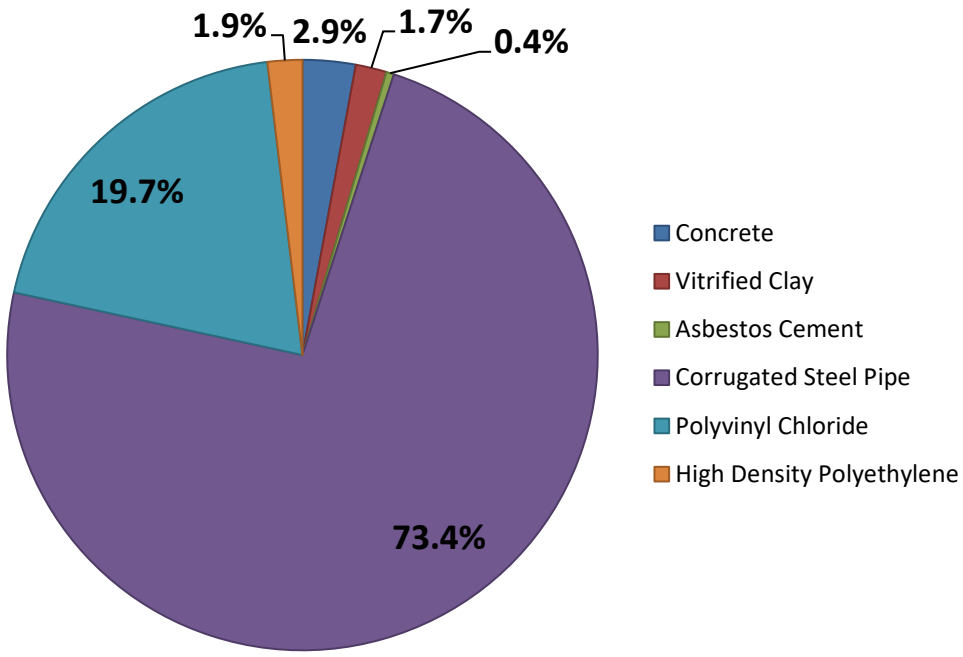
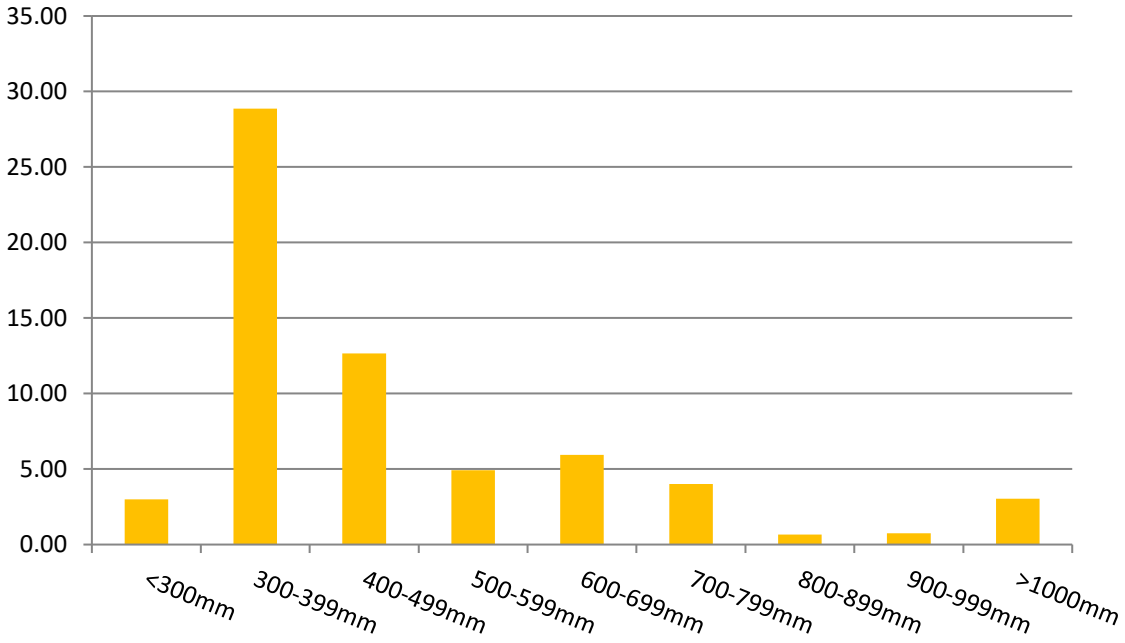


Figure 4.29: Storm System Infrastructure Diameter (Km)



4.4.2 Centerline Culverts Inventory Overview

The City of Temiskaming Shores has approximately 7.7 km of centerline culverts piping and 1 Storm Water Management System located within its infrastructure portfolio. The current average pipe age is 40.6 years. The age distribution of storm sewer infrastructure installation years is shown in Figure 4.30 and Figure 4.31.

Note: that the average age of centerline culverts was based on staff knowledge and remains inaccurate, due to a lack of data.

Figure 4.30: Centerline Culvert Infrastructure by Age (%)

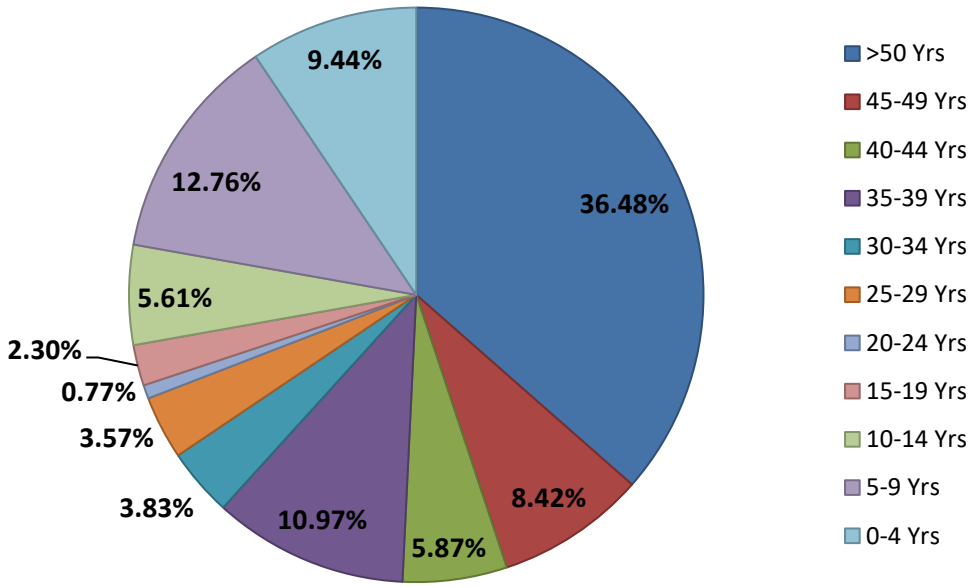
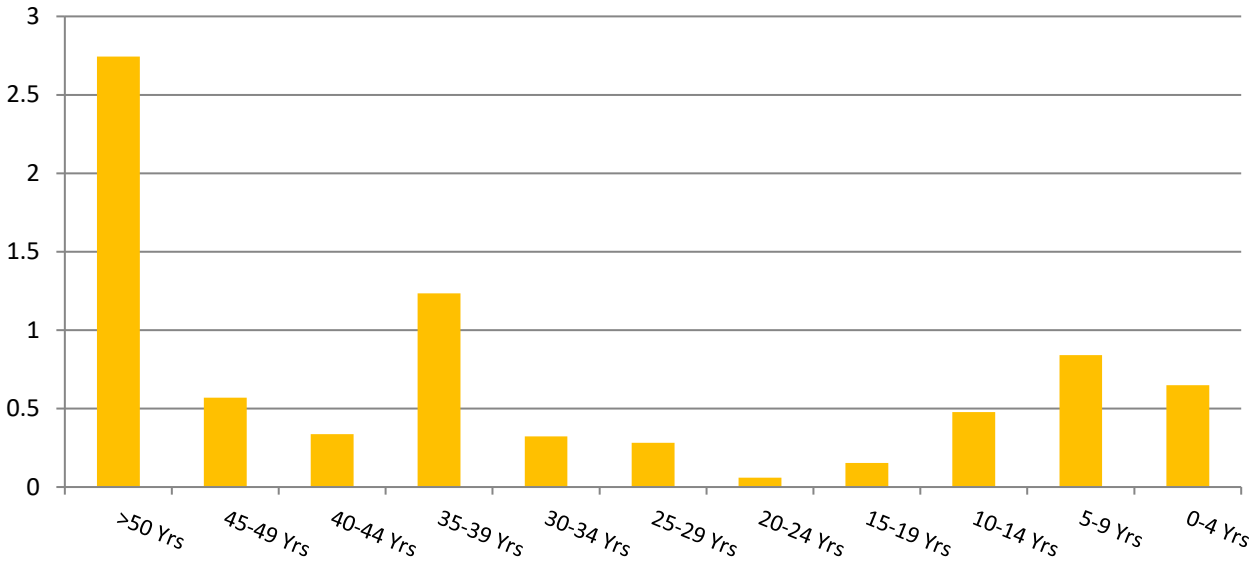


Figure 4.31: Length of Centerline Culvert Infrastructure by Age (Km)



The majority of the culverts are Corrugated Steel Pipe with a diameter of over 1000 mm and installed over 50+ years ago, as shown in Figure 4.32, 4.33 and 4.34.

Figure 4.32: Length of Centerline Culvert Infrastructure Material by Age (Km)

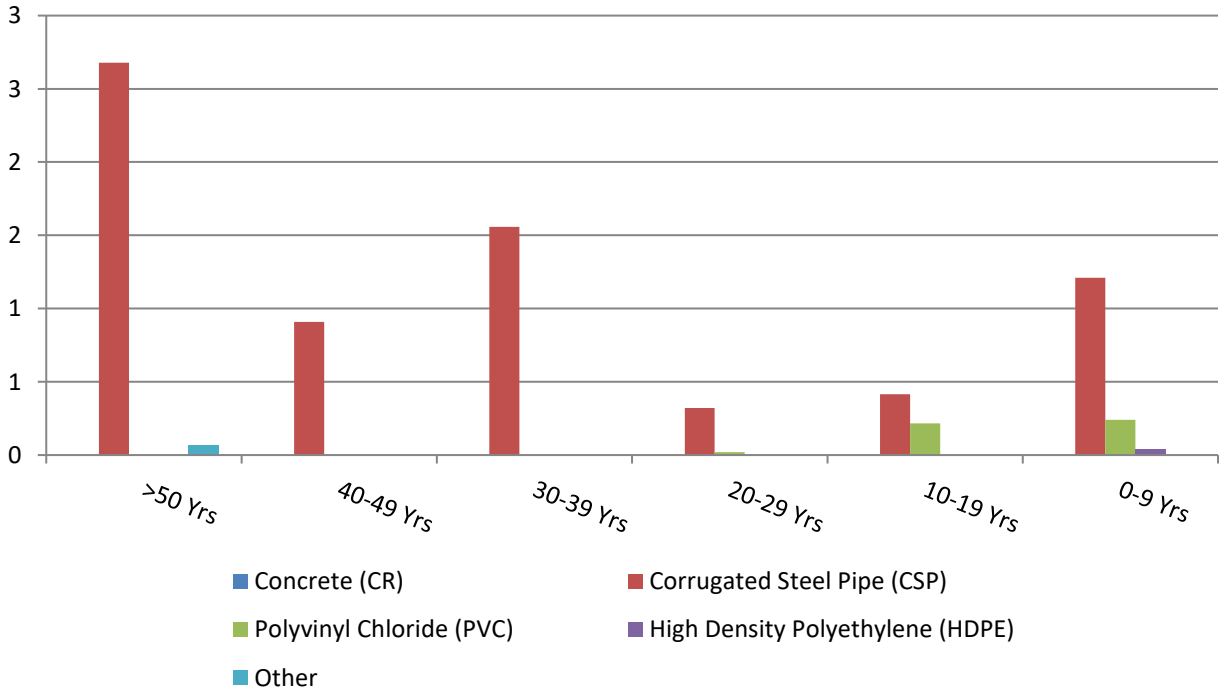


Figure 4.33: Centerline Culvert Infrastructure Material (%)

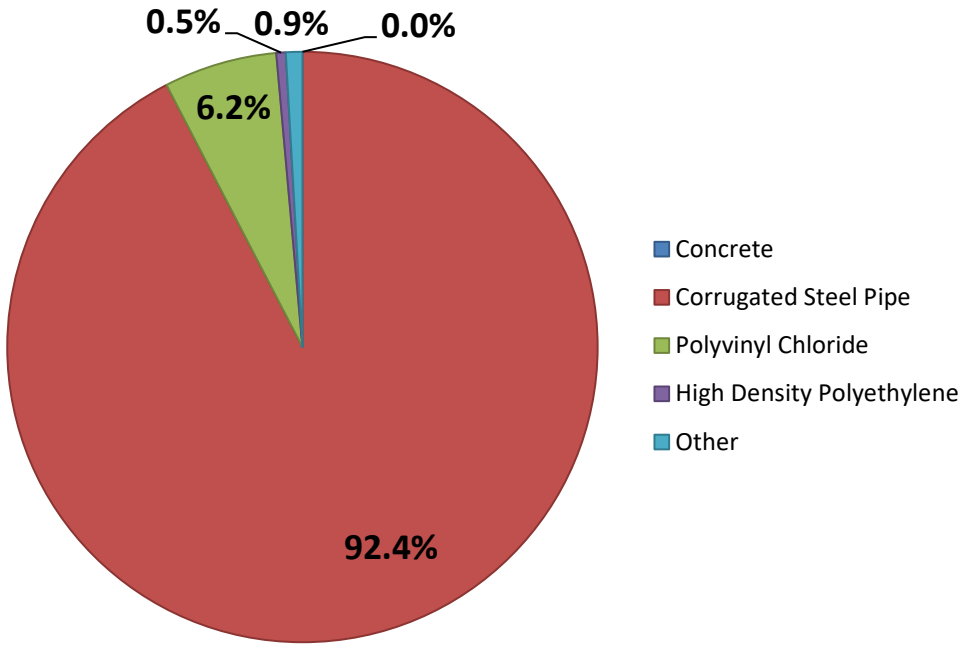
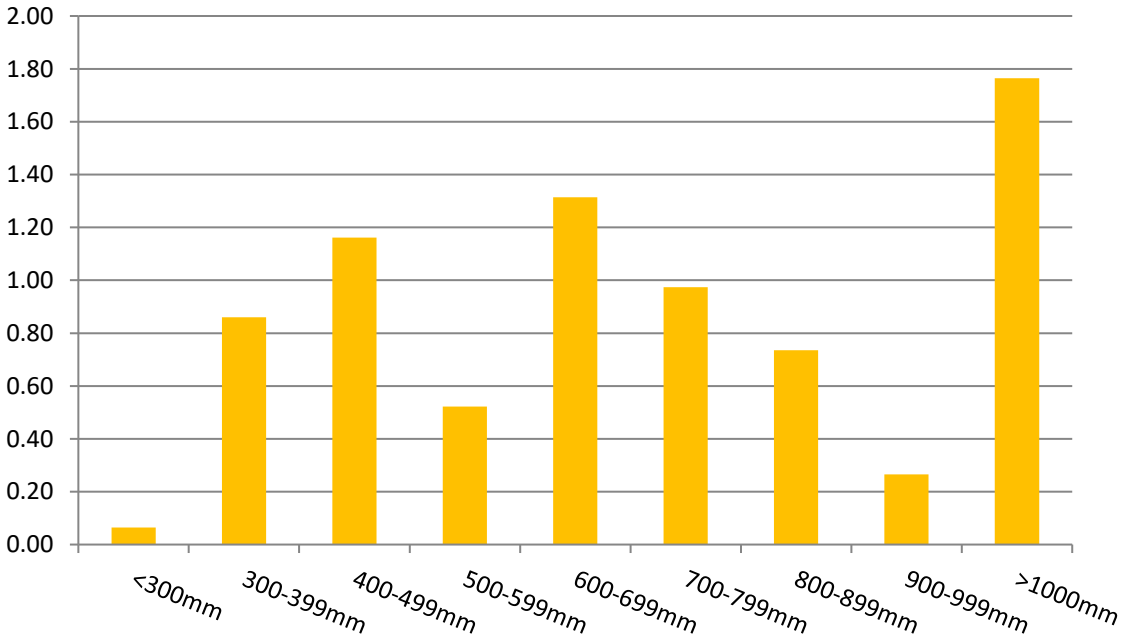


Figure 4.34: Centerline Culvert Infrastructure Diameter (Km)



4.4.3 Risk and Criticality Analytics

The risk and criticality calculation determines the overall risk of the storm asset failures. Figure 4.35 and 4.36 provides a representation of the level of risk per kilometer and cost. Figure 4.37 represents the total risk of the storm assets.

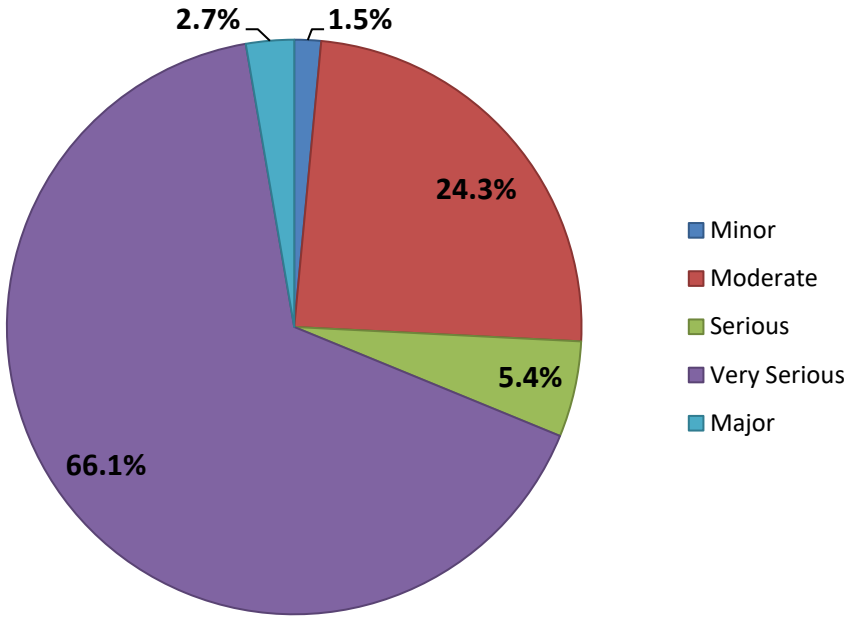
Figure 4.35: Level of Risk – Storm mains & Culverts (Km)

Consequence						
	5	0.59	1.19	0.17	2.51	0.00
	4	1.53	0.11	0.41	4.86	0.00
	3	3.16	0.11	0.62	6.57	0.00
	2	9.31	0.87	2.37	34.07	0.00
	1	0.98	0.00	0.10	1.98	0.00
		1	2	3	4	5
		Probability				

Figure 4.36: Level of Risk – Storm mains & Culverts ($)

Consequence						
	5	$ 586,000	$ 1,189,000	$ 166,000	$ 2,507,000	$ -
	4	$ 1,240,875	$ 95,550	$ 318,750	$ 3,879,450	$ -
	3	$ 2,029,175	$ 71,725	$ 392,725	$ 4,130,600	$ -
	2	$ 4,435,000	$ 419,975	$ 1,119,025	$ 16,117,100	$ -
	1	$ 195,200	$ -	$ 20,600	$ 395,000	$ -
		1	2	3	4	5
		Probability				

Figure 4.37: Total Risk of Storm Assets (%)



4.4.4 Lifecycle Activities

Figure 4.38 provides a representation of the overall cost of the lifecycle activities that the City would need to undertake in order to maintain the current level of service for its storm management assets (10-year forecast). The City's current average annual requirements for storm assets total $ 1,448,567 million.

Figure 4.38: Storm Management Lifecycle Cost ($)

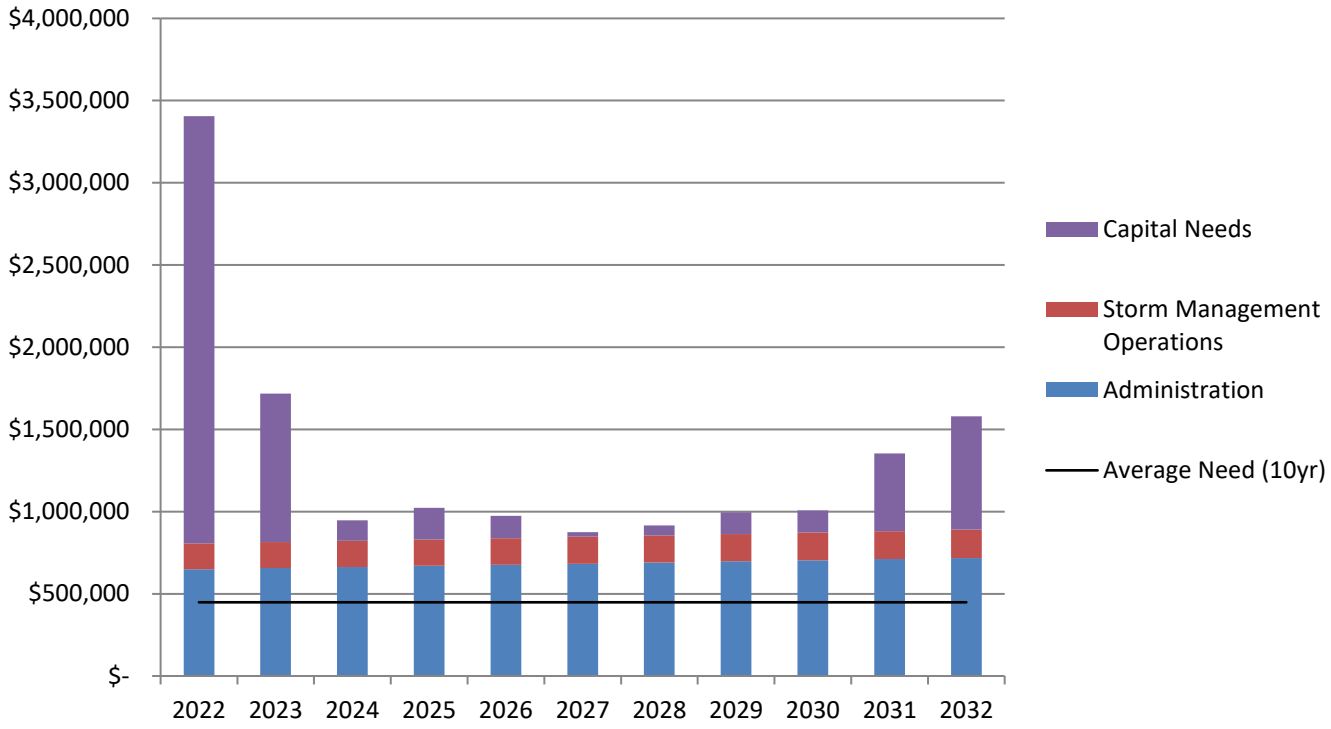
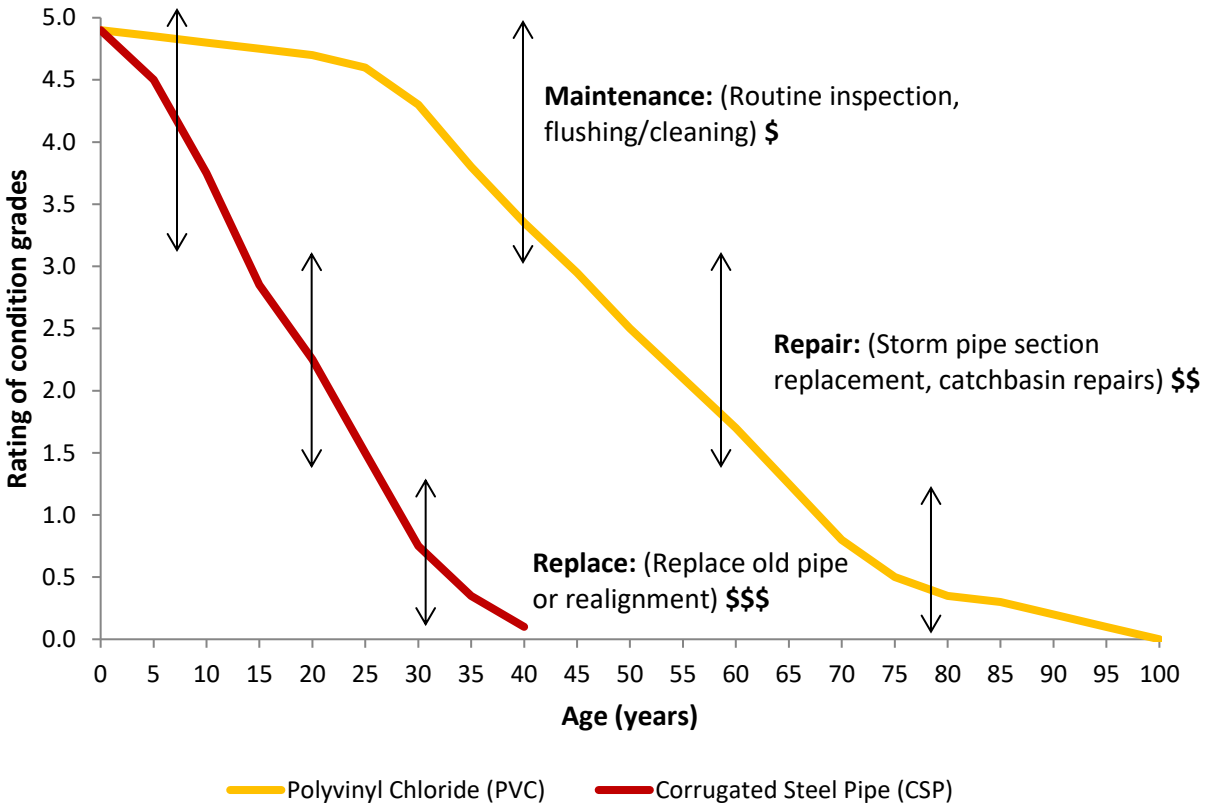


Figure 4.39 is intended to summarize the intervention strategies that are generally appropriate depending on the stage of deterioration/condition of the asset. The selection of the strategy is determined through the analysis in order to come up with the preferred intervention. It's also important to consider the approach in assessing the intervention method, in order to determine which decision can provide the most return on the investment value. It's also important to consider the varieties of factors that can cause the lifespan of the asset to vary from its expected service life. These factors can include but are not limited to:

- Quality of initial construction
- Appropriateness of the materials selected
- Loadings exerted on the pipe from traffic above or natural soil movement
- Soil conditions
- Chemistry of the flow within the pipe

Note: The following lifecycle deterioration rate and strategies example will be based on the current recommended and best construction practices and materials for each asset category. Storm mains will be calculated using polyvinyl chloride (PVC) with a life expectancy of 100 years and Culverts will be calculated using corrugated steel pipe (CSP) with a life expectancy of 40 years.

Figure 4.39: Storm and Culvert Lifecycle Intervention Strategies



Some operational lifecycle activity options for storm assets include but are not limited to:

- Storm flushing and inspections programs
- Storm pipe and structure repairs

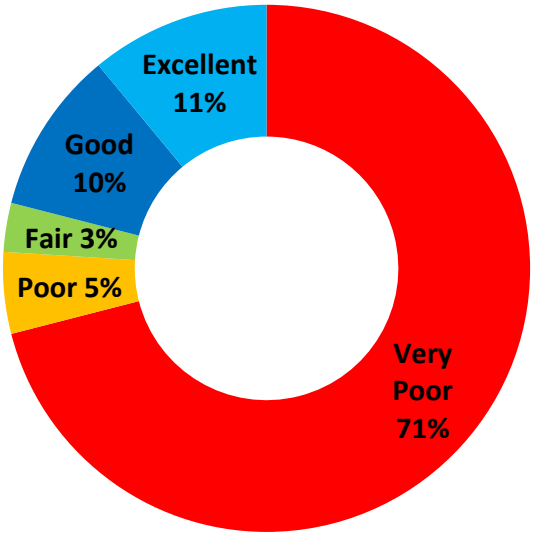
The overall cost of these options may include wages/labour, materials, contracted/hired costs and other miscellaneous costs related to the lifecycle intervention such as consultation and design work for rehabilitation and replacement activities.

4.4.5 Condition Report Card

Table 4-11 shows the average ratings and overall report card grade for the City's storm water system using a five point system. This initial report has considered age, material type and diameter of pipe as well as perceived or reported physical condition in the assessment. These values may be adjusted as appropriate, as more information is gathered, or as the City upgrades the asset.

Figure 4.40: Storm Condition Report Card (%)

Storm Collection System



Centerline and Entrance Culverts

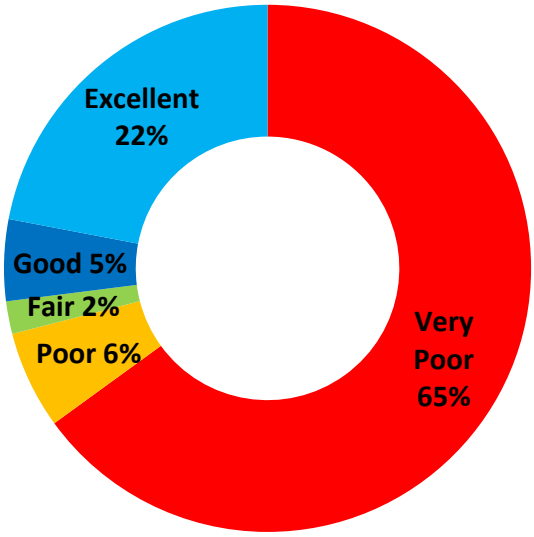
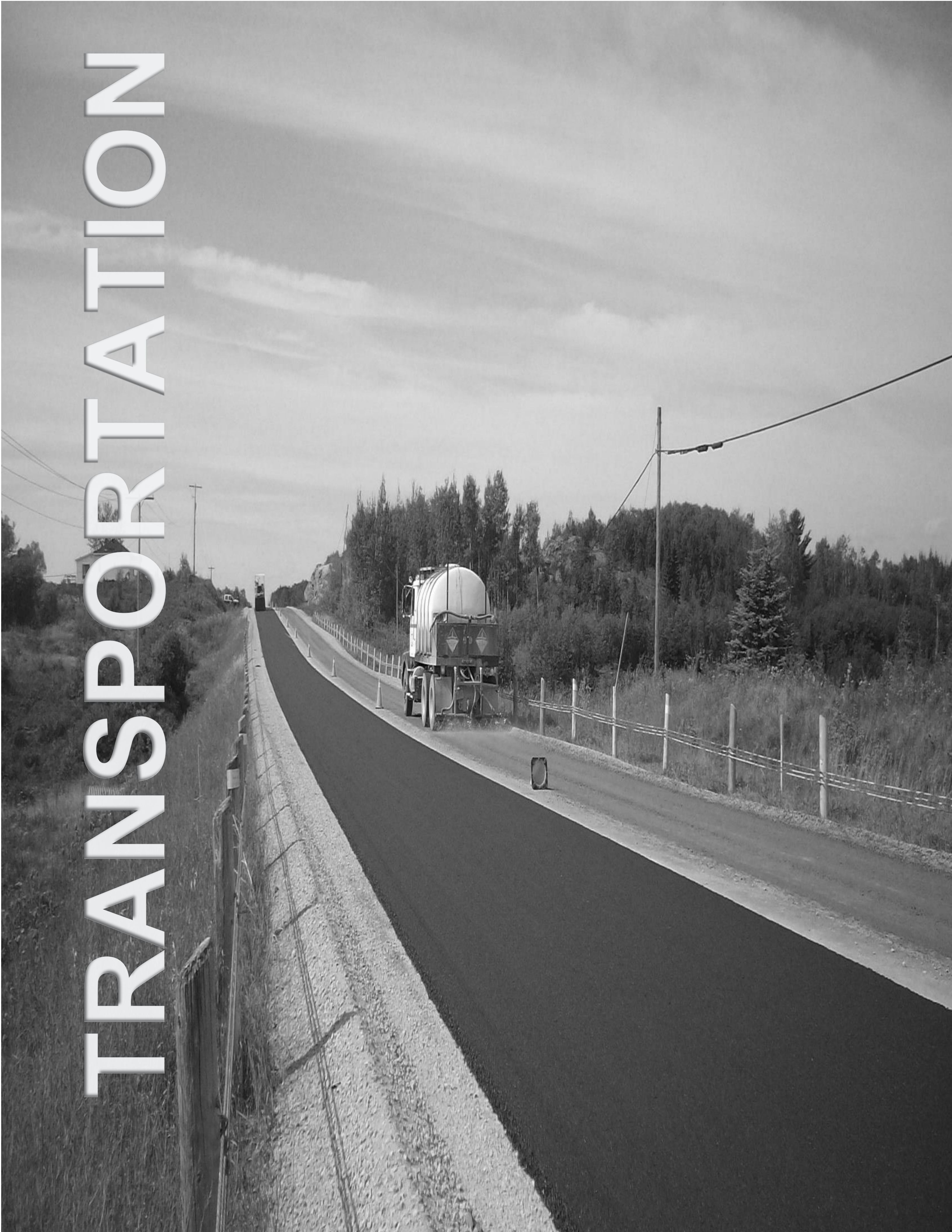


Table 4-11: Storm System Report Card

Storm Condition Rating	Financial Rating	Overall Rating
1.87	1.80	**1.84**
Culvert Condition Rating	Financial Rating	Overall Rating
2.12	1.80	**1.96**

TRANSPORTATION



4.5 Transportation Services

4.5.1 Inventory Overview

Table 4-12: Total Replacement Cost for Transportation Assets

Asset Type	Quantity	Useful Life (Years)	Replacement Cost
Paved Roads	209.1 lane km	30-100	$ 32,677,262.00
Surface Treated Roads	34 lane km	20-100	$ 1,300,240.00
Gravel Roads	172.6 lane km	10-50	$ 3,211,704.00
Sidewalks	40.4 km	60-80	$ 7,715,353.00
Bridges	10 units	40-70	$ 14,375,000.00
Large Dia. Culverts	6 units	40-70	$ 3,050,000.00
		Total:	**$ 62,329,559.00**

4.5.2 Road Inventory Overview

The City of Temiskaming Shores has approximately 200.5 km of roadways. This includes approximately 209.1 lane kilometres of asphalt surface roadway, 34 lane kilometres of surface treated roadway, and 172.6 lane kilometres of gravel surface roadways as identified through the 2020 Roads Review exercise. The surface type and classification of the roads, as recorded in the City's records, is shown in Figure 4.41 and Figure 4.42.

Note: The City completes a review of the Roads Condition Study every 3 years. The information gathered in the 2017 and 2020 reviews contained complete and accurate information about the road surface type and condition that was correlated with the staff and consultant information and used for the development of this Plan. Although layers in a pavement, surface treated and gravel road have different useful lives and age; only the average surface life and age has been utilized for this plan.

Figure 4.41: Road Network Surface Type (%)

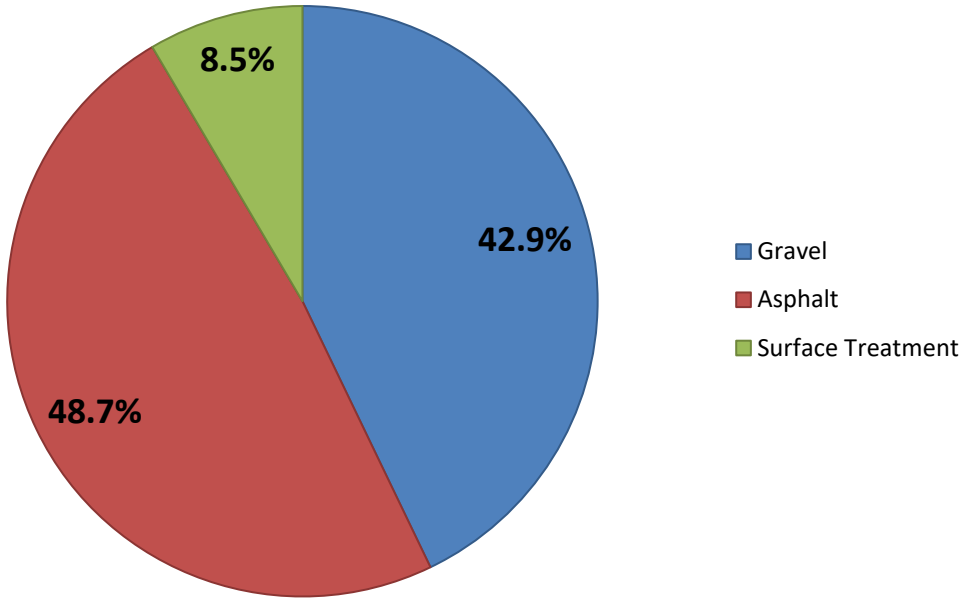
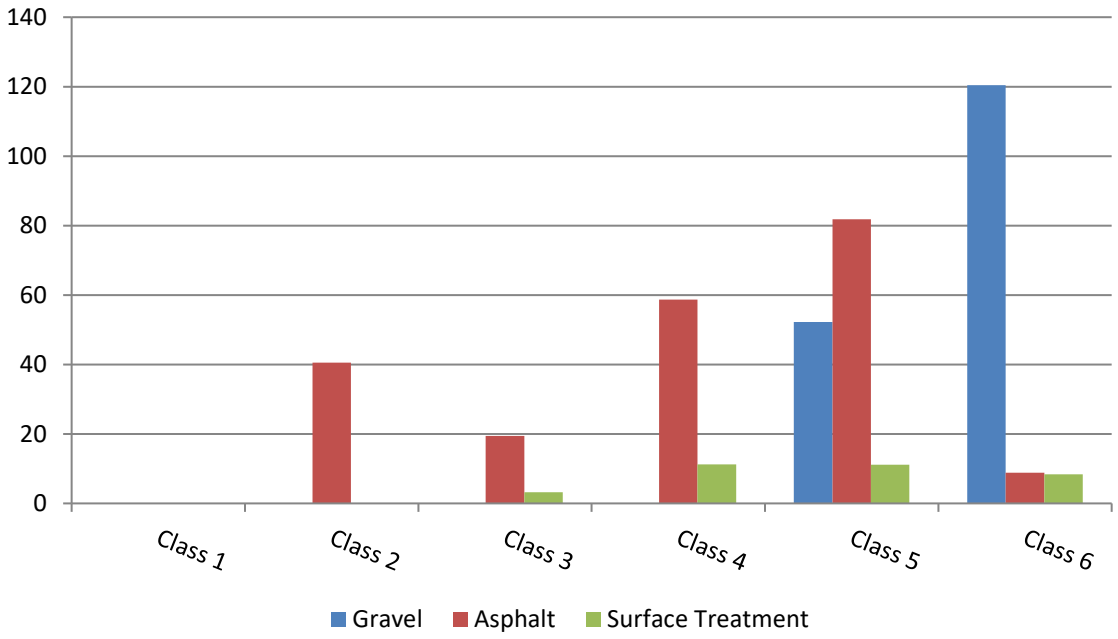
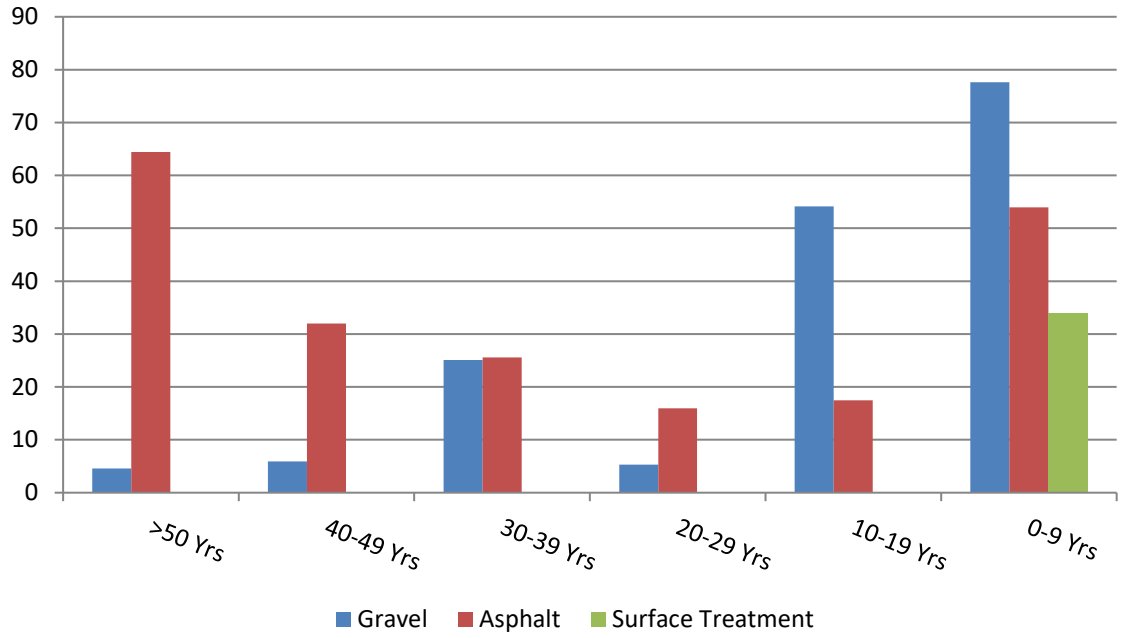


Figure 4.42: Road Network Classification and Material (Lane Km)



The age distribution of roadway network is illustrated in Figure 4.43. The majority of the roads have been constructed prior to 1963 or over 50 years ago. However, a large percentage of these roads have been resurfaced since that time.

Figure 4.43: Road Network Material by Age (Lane Km)

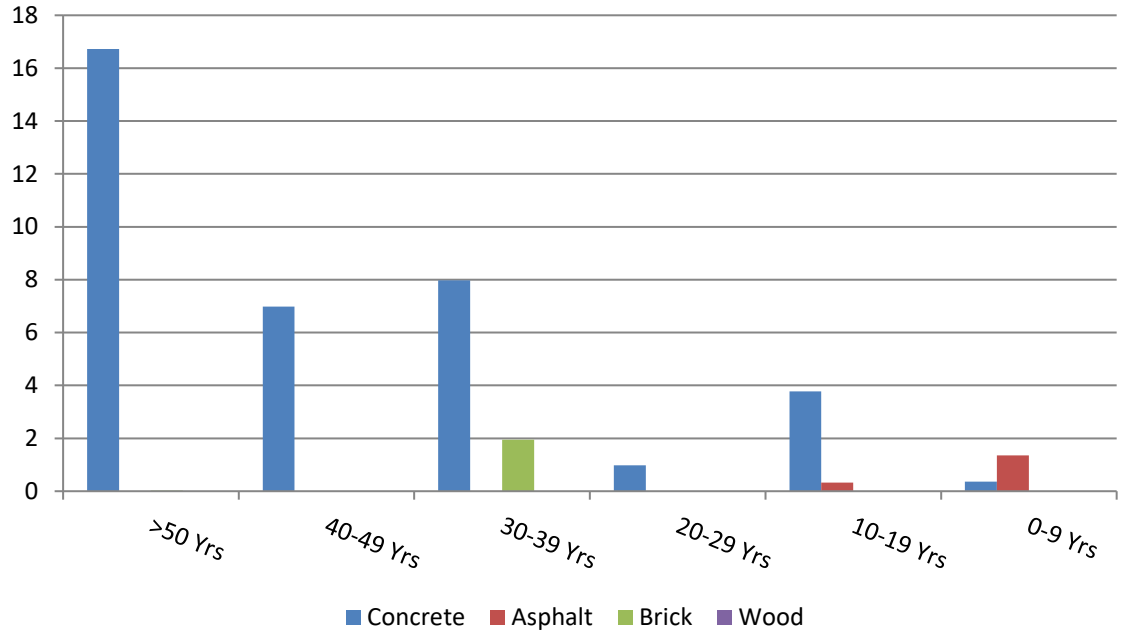


4.5.3 Sidewalk Inventory Overview

The City of Temiskaming Shores has approximately 40.4 km of sidewalks. The walkway type and age, as recorded in the City's records, is shown in Figure 4.44.

Note: The City completes a review of the Sidewalk Condition Study every 3 years. The information gathered in the 2018 and 2021 contained complete and accurate information about the sidewalk surface type and condition that was correlated with the staff and consultant information and used for the development of this Plan.

Figure 4.44: Walkway Network Material by Age (Km)



4.5.4 Bridge and Large Dia. Culvert Inventory Overview

There are 16 bridges and large diameter culverts in the City of Temiskaming Shores. The average life expectancy of bridges built prior to 1970 is assumed to be 60 years, and bridges built after 1970 is assumed to be 75 years. Multi-plate culverts average life expectancy is assumed to be 40 years. The average age of City's bridges and culverts is 33.4 years. Figure 4.45 shows the age distribution for the City's bridges and large diameter culvert installations.

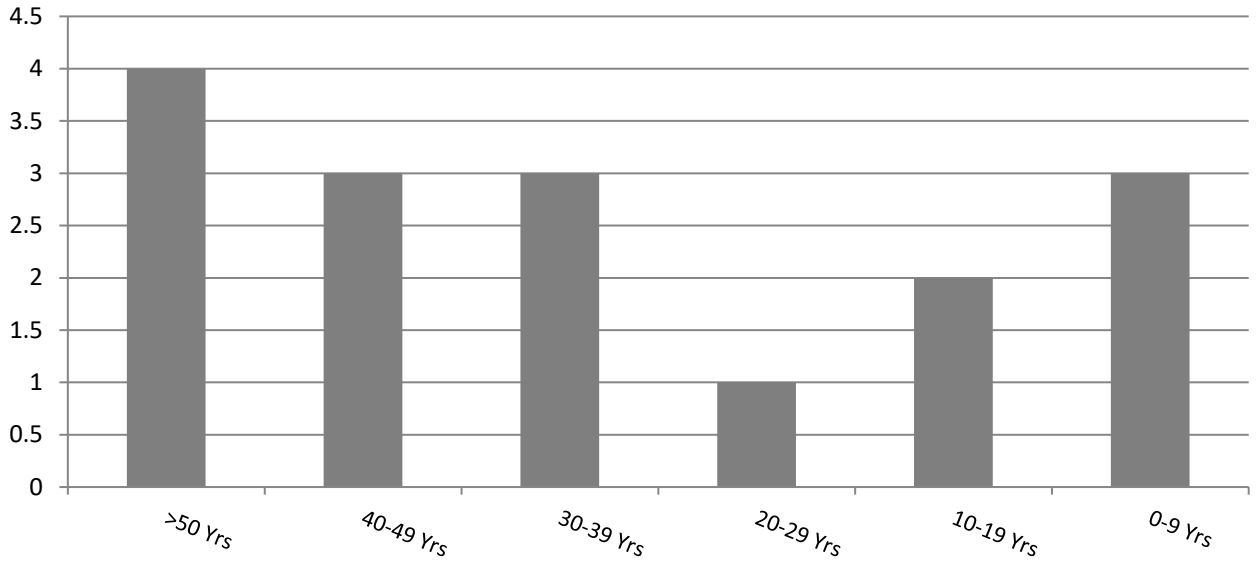
Note: that the City of Temiskaming Shores and the Township of Harley are both responsible for Capital investments for two bridges on Uno Park Road. The Township of Harley is also responsible for conducting the OSIM Bridge Inspection report on the same two bridges.

The OSIM Bridge Inspection report contains a summary of findings, recommendations, and prioritization of rehabilitative maintenance for each bridge and large culvert structure in the City of Temiskaming Shores. Therefore, rehabilitative maintenance has also been considered in the overall rating of the structures. Culverts larger than 3m in diameter will be considered "large diameter structures".

A breakdown of the bridge and culvert structures is as follows:

- 1 Concrete Box Culvert
- 3 Single Cell Multi-plate Culverts
- 1 Double Cell Multi-plate Culvert
- 1 Multi-plate Arch CSP
- 3 Bailey Bridge
- 3 CPCI Concrete Girder
- 2 Fixed Steel Girder
- 1 Steel I-Girder
- 1 Steel I-Girder (pedestrian bridge)

Figure 4.45: Bridges and Large Dia. Culverts by Age



4.5.1 Risk and Criticality Analytics

The risk and criticality calculation determines the overall risk of the transportation asset failures. Figure 4.46, 4.47, 4.48 and 4.49 provides a representation of the level of risk per kilometer, structure and cost. Figure 4.50 and 4.51 represents the total risk of the transportation assets.

Figure 4.46: Level of Risk – Roads (Km)

Consequence						
	5	6.81	5.12	1.31	0.10	0.00
	4	3.73	4.13	2.95	0.21	0.00
	3	10.01	12.32	5.42	7.23	0.00
	2	11.61	48.69	8.33	3.97	0.00
	1	4.17	61.44	1.81	0.91	0.00
		1	2	3	4	5
		Probability				

Figure 4.47: Level of Risk – Roads ($)

Consequence						
	5	$ 4,925,441	$ 4,169,066	$ 1,051,522	$ 88,920	$ -
	4	$ 795,440	$ 1,007,457	$ 785,879	$ 52,096	$ -
	3	$ 2,788,793	$ 2,749,036	$ 1,087,955	$ 1,754,004	$ -
	2	$ 2,698,145	$ 6,660,388	$ 2,046,174	$ 1,000,708	$ -
	1	$ 536,873	$ 2,628,672	$ 191,100	$ 197,662	$ -
		1	2	3	4	5
		Probability				

Figure 4.48: Level of Risk – Bridges & Large Dia. Culverts (each)

Consequence						
	5	3.00	6.00	0.00	0.00	0.00
	4	0.00	2.00	0.00	0.00	0.00
	3	0.00	2.00	1.00	0.00	0.00
	2	1.00	1.00	0.00	0.00	0.00
	1	0.00	0.00	0.00	0.00	0.00
		1	2	3	4	5
		Probability				

Figure 4.49: Level of Risk – Bridges & Large Dia. Culverts ($)

Consequence						
	5	$ 5,300,000	$ 9,500,000	$ -	$ -	$ -
	4	$ -	$ 1,200,000	$ -	$ -	$ -
	3	$ -	$ 650,000	$ 450,000	$ -	$ -
	2	$ 125,000	$ 200,000	$ -	$ -	$ -
	1	$ -	$ -	$ -	$ -	$ -
		1	2	3	4	5
		Probability				

Figure 4.50: Total Risk of Roads (%)

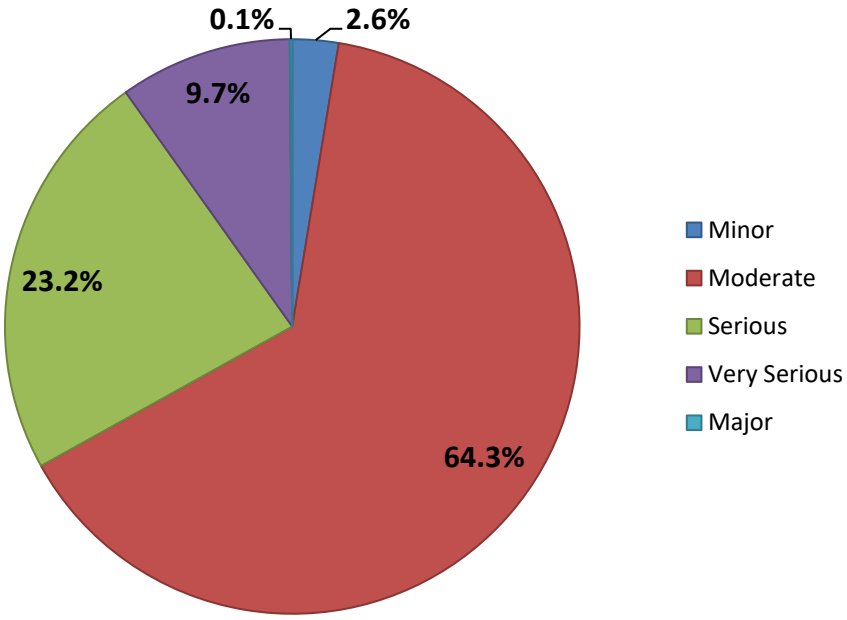
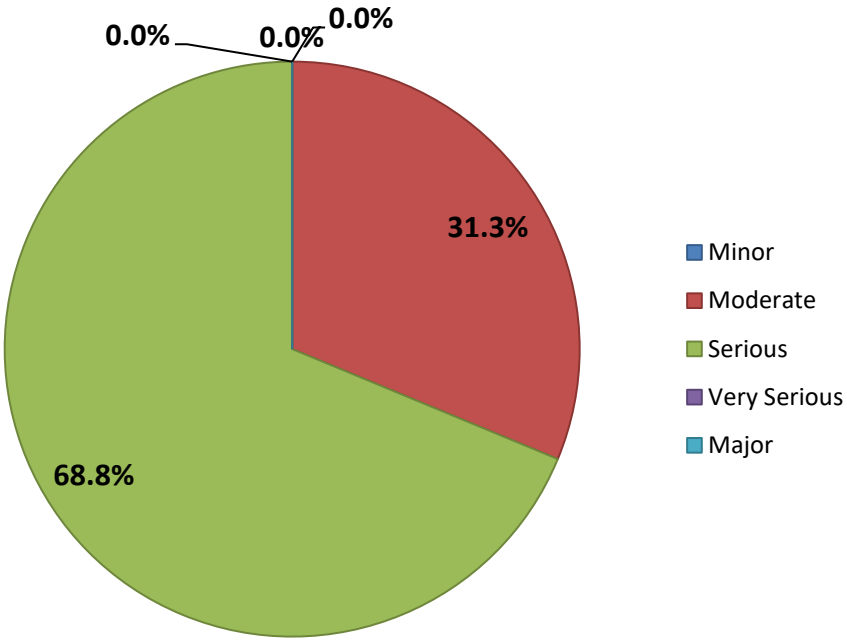


Figure 4.51: Total Risk of Bridges and Large Dia. Culverts (%)



4.5.2 Lifecycle Activities

Figure 4.52 provides a representation of the overall cost of the lifecycle activities that the City would need to undertake in order to maintain the current level of service for its transportation assets (10-year forecast). The City's average annual requirements for transportation assets total $ 3,102,823 million.

Figure 4.52: Transportation Lifecycle Cost ($)

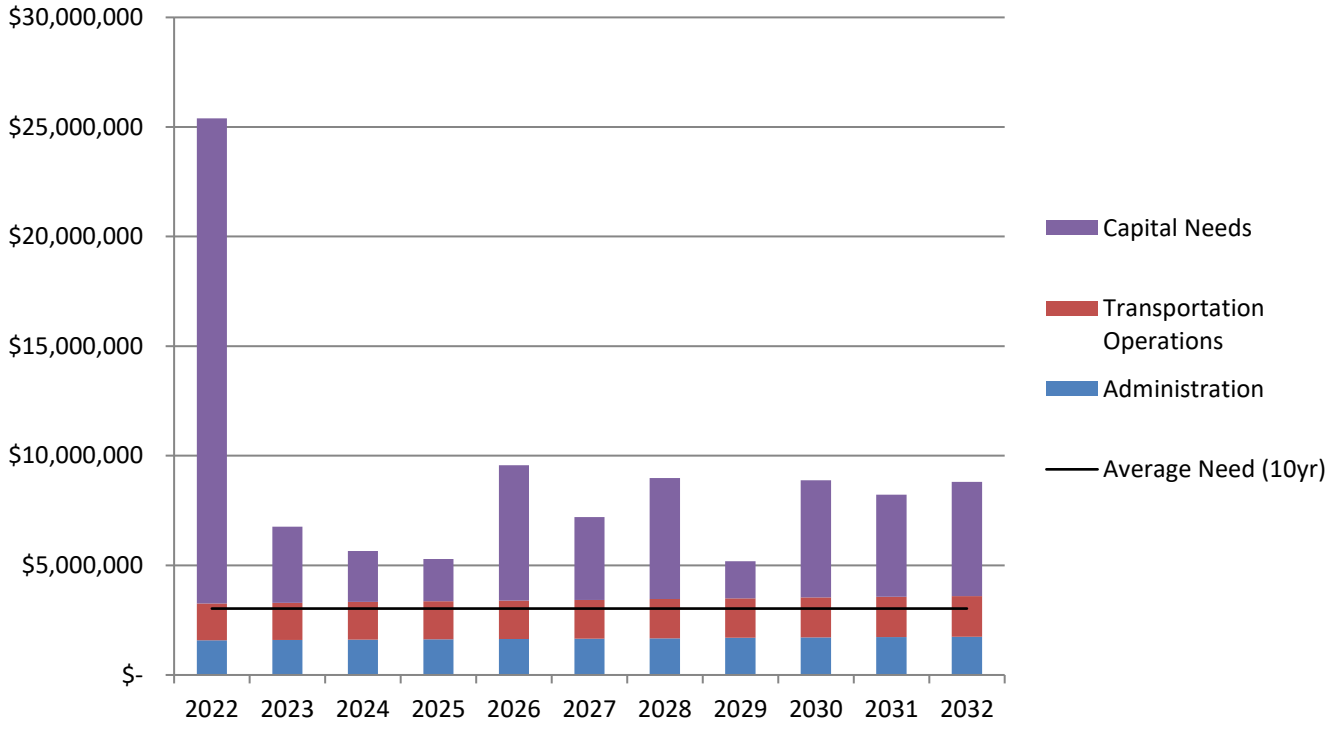
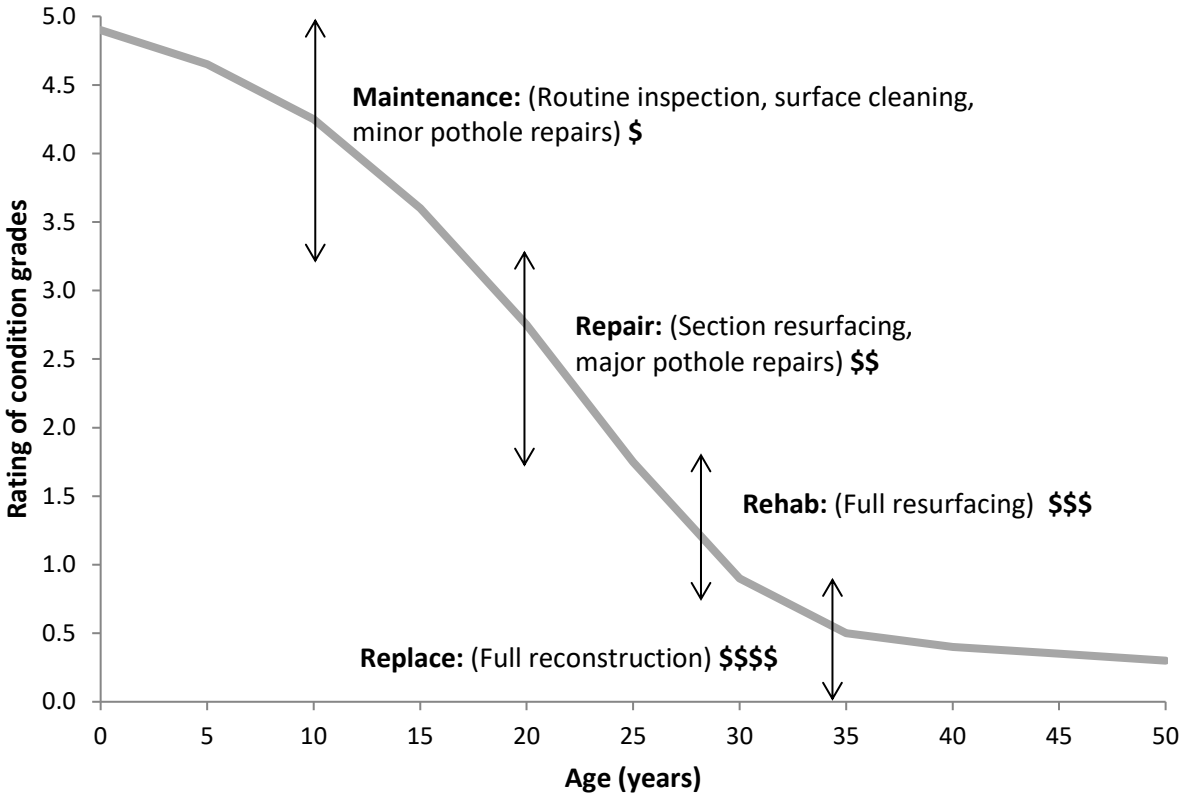


Figure 4.53 and 4.54 is intended to summarize the intervention strategies that are generally appropriate depending on the stage of deterioration/condition of the asset. The selection of the strategy is determined through the analysis in order to come up with the preferred intervention. It's also important to consider the approach in assessing the intervention method, in order to determine which decision can provide the most return on the investment value. It's also important to consider the varieties of factors that can cause the lifespan of the asset to vary from its expected service life. These factors can include but are not limited to:

- Quality of initial construction
- Appropriateness of the materials selected
- Loadings exerted from traffic or natural soil movement
- Surrounding soil conditions

Figure 4.53: Roads (pavement) Lifecycle Intervention Strategies

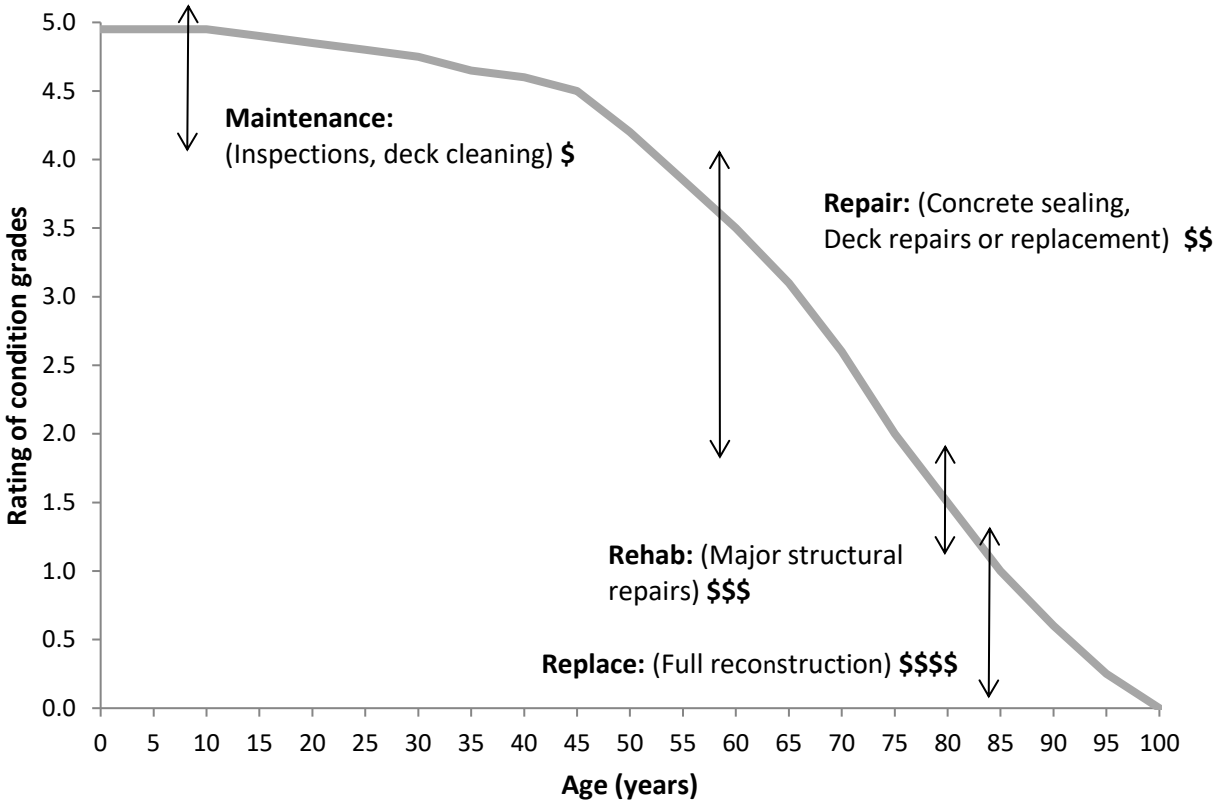


Some operational lifecycle activity options for road assets include but are not limited to:

- Hard top maintenance such as pavement patching and shoulder/curb repairs
- Pavement markings
- Loose top maintenance such as grading, dust control and adding gravel
- Winter control such as snow plowing and removal, sanding/salting and road patrolling

The overall cost of these options may include wages/labour, materials, contracted/hired costs and other miscellaneous costs related to the lifecycle intervention such as consultation and design work for rehabilitation and replacement activities.

Figure 4.54: Bridges and Large Dia. Culverts Lifecycle Intervention Strategies



Some operational lifecycle activity options for bridge assets include but are not limited to:

- Regulated bi-annual inspections programs
- Deck cleaning
- Structural maintenance such as concrete sealing
- Structural repairs such as deck resurfacing

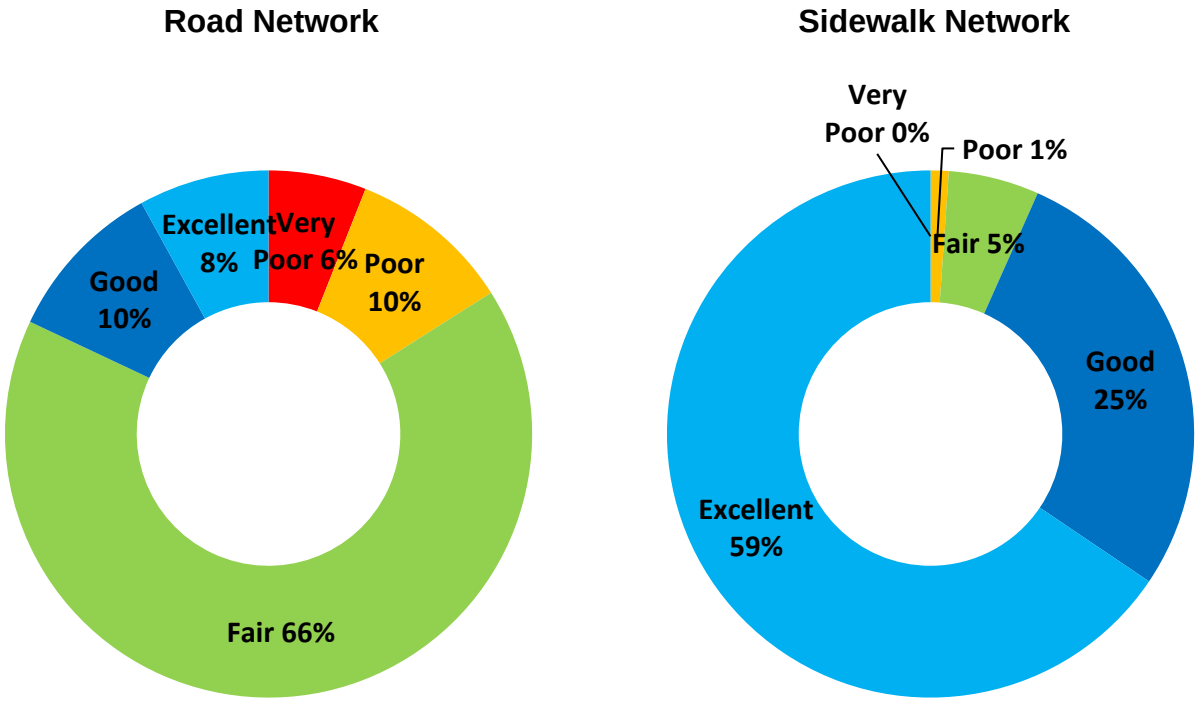
The overall cost of these options may include wages/labour, materials, contracted/hired costs and other miscellaneous costs related to the lifecycle intervention such as consultation and design work for rehabilitation and replacement activities.

4.5.3 Condition Report Card

It's worth noting that the city also has to take infrastructure condition into account before moving forward with road resurfacing projects. A full reconstruction of the road might be preferred in order to maximise to durability and life expectancy of the assets in question.

Table 4-13 presents the average ratings and overall report card grade for the City's Transportation network using a five point system. This initial report has considered estimated age, surface and sub-surface material type, network capacity and perceived or reported physical condition in the assessment. These values may be adjusted as appropriate, as more information is gathered, or as the City upgrades the asset.

Figure 4.55: Transportation Condition Report Card (%)



Bridges and Large Dia. Culverts

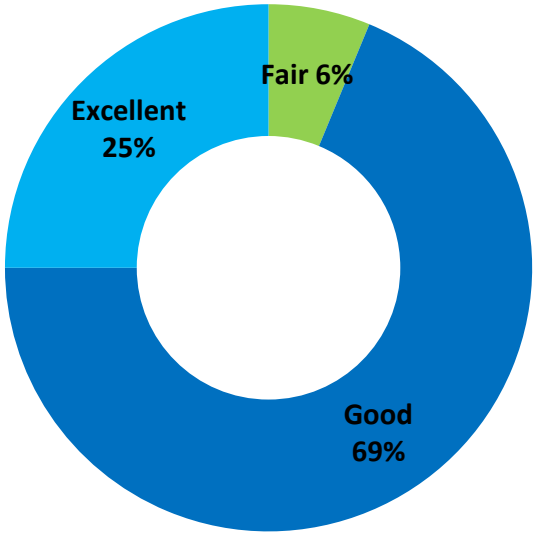


Table 4-13: Transportation Services Report Card

Road Condition Rating	Financial Rating	Overall Rating
3.00	3.4	**3.20**
Sidewalk Condition Rating	Financial Rating	Overall Rating
4.62	3.4	**4.01**
Bridge Condition Rating	Financial Rating	Overall Rating
3.73	1.5	**2.62**

5. Current Levels of Service

5.1 Introduction

The levels of service are high level indicators, comprised of many factors that, as listed below, establish defined quality thresholds at which municipal services should be supplied to the community. They support the organization's strategic goals and are based on customer expectations, statutory requirements, standards, and the financial capacity of a municipality to deliver those levels of service.

Levels of Service are used:

- to inform customers of the proposed type and level of service to be offered;
- to identify the costs and benefits of the services offered;
- to assess suitability, affordability and equity of the services offered;
- as a measure of the effectiveness of the asset management plan
- as a focus for the AM strategies developed to deliver the required level of service

In order for a municipality to establish a current level of service, it will be important to review the key factors involved in the delivery of that service, and the interactions between those factors. In addition, it will be important to establish some key performance metrics and track them over an annual cycle to gain a better understanding of the current level of service supplied.

Within this Asset Management Plan, key factors affecting level of service will be outlined below and some key performance indicators for each asset type will be outlined for further review. This will provide a framework and starting point from which the City can determine future desired levels of service for each infrastructure class.

The City of Temiskaming Shores target Levels of Service have been linked to Council's vision, goals and objectives for infrastructure assets as presented in Section 2, *Asset Management Policy,* of this Plan and include the key factors listed below.

5.2 Key Factors that Influence Level of Service

- Strategic and Corporate Goals
- Legislative and Regulatory Requirements
- Expected Asset Performance
- Community Expectations
- Availability of Finances

5.2.1 Strategic and Corporate Goals

Infrastructure levels of service can be influenced by strategic and corporate goals. Strategic plans spell out where an organization wants to go, how it's going to get there, and helps decide how and where to allocate resources, ensuring alignment to the strategic priorities and objectives. It will help identify priorities and guide how municipal tax dollars and revenues are spent into the future. The level of importance that a community's vision is dependent upon infrastructure, will ultimately affect the levels of service provided or those levels that it ultimately aspires to deliver.

5.2.2 Legislative and Regulatory Requirements

Infrastructure levels of service are directly influenced by many legislative and regulatory requirements. For instance, the Safe Drinking Water Act, the Minimum Maintenance Standards for municipal highways, Ontario Building Code, and the Accessibility for Ontarians with Disabilities Act are all legislative requirements that prevent levels of service from declining below a certain standard.

5.2.3 Expected Asset Performance

A level of service will be affected by current asset condition, and performance and limitations in regards to safety, capacity, and the ability to meet regulatory and environmental requirements. In addition, the design life of the asset, the maintenance items required, the rehabilitation or replacement schedule of the asset, and the total costs, are all critical factors that will affect the level of service that can be provided.

5.2.4 Community Expectations

Levels of services are directly related to the expectations that the general public has from the infrastructure. For example, the public will have a qualitative opinion on what an acceptable road looks like, and a quantitative one on how long it should take to travel between two locations. Infrastructure costs are projected to increase dramatically in the future, therefore it is essential that the public is not only consulted, but also be educated, and ultimately make choices with respect to the service levels that they wish to pay for.

5.2.5 Availability of Finances

Availability of finances will ultimately control all aspects of a desired level of service. Ideally, these funds must be sufficient to achieve corporate goals, meet legislative requirements, address the asset's life cycle needs, and meet community expectations. Levels of service will be dictated by availability of funds or elected officials' ability to increase funds, or the community's willingness to pay.

5.3 Key Performance Indicators

Performance measures or key performance indicators (KPI) that track levels of service should be specific, measurable, achievable, relevant, and time bound (SMART). Many good performance measures can be established and tracked through software products. In this way, through automation, results can be reviewed on an annual basis and adjustments can be made to the overall asset management plan, including the desired level of service targets.

In establishing measures, a good rule of thumb to remember is that maintenance activities ensure the performance of an asset and prevent premature aging, whereas rehab activities extend the life of an asset. Replacement activities, by definition, renew the life of an asset. In addition, these activities are constrained by resource availability (in particular, finances) and strategic plan objectives. Therefore, performance measures should not just be established for operating and maintenance activities, but also for the strategic, financial, and tactical levels of the asset management program. This will assist all levels of program delivery to review their performance as part of the overall level of service provided.

This is a very similar approach to the “balanced score card” methodology, in which financial and nonfinancial measures are established and reviewed to determine whether current performance meets expectations. The “balanced score card”, by design, links day to day operations activities to tactical and strategic priorities in order to achieve an overall goal, or in this case, a desired level of service.

The structure of accountability and level of indicator with this type of process is represented in the following diagram, modified from the InfraGuide’s best practice document, “Developing Indicators and Benchmarks” published in April 2003.

Level of Indicator Municipal Structure

Strategic	Council & City Manager
Tactical	Department Directors and Managers
Operational	Departmental Divisions

As a note, a caution should be raised over developing too many performance indicators that may result in data overload and lack of clarity. It is better to develop a select few that focus in on the targets of the asset management plan.

Outlined below for each infrastructure class is a suggested service description, suggested service scope, and suggested performance indicators. These should be reviewed and updated in each update of the Asset Management Plan.

Core Values

Accessibility – Services are available and accessible for customers who require them.

Reliability – Services are provided with minimal service disruption and are available to customers in line with needs and expectations.

Safety – Services are delivered such that they minimize health, safety and security risks.

Regulatory – Services meet regulatory requirements of all levels of government.

Affordability – Services are suitable for the intended function (fit for purpose).

Sustainability – Services are designed to be used efficiently and long-term plans are in place to ensure that they are available to all customers into the future.

5.3.1 Water Service Delivery

- To provide clean and safe drinking water through a distribution network of water mains and pumps.

5.3.2 Sanitary Service Delivery

- To provide removal of waste water through a collection network of sanitary sewer mains.

5.3.3 Storm Service Delivery

- To provide removal of storm water through a collection network of storm sewer mains and catch basins.

5.3.4 Transportation Service Delivery

- To provide the ability of movement of people and goods.
- To provide access to residential, commercial, and industrial properties and other community amenities.
- To provide and encourage recreational use, such as walking, cycling, or special events such as parades.

5.3.5 Performance Indicators

Strategic Indicators	▪ Percentage of total reinvestment compared to asset replacement value ▪ Completion of strategic plan objectives
Financial Indicators	▪ Annual revenues compared to annual expenditures ▪ Annual replacement value depreciation compared to annual expenditures ▪ Total cost of borrowing compared to total cost of service ▪ Revenue required to maintain annual network growth
Tactical Indicators	▪ Percentage of network in need of rehabilitated / reconstructed ▪ Value of rehabilitated or reconstructed projects ▪ Overall condition index as a percentage of desired condition index ▪ Annual adjustment in condition indexes ▪ Annual percentage of network growth ▪ Percentage of assets where the condition is rated poor or critical ▪ Percentage of network replacement value spent on operations and maintenance
Operational Indicators	▪ Percentage of network inspected within last year ▪ Operating and maintenance costs for various assets as needed ▪ Number of notices and advisories issued ▪ Number of customer requests received annually ▪ Percentage of customer requests responded to within 24 hours

5.3.6 Performance Measures Analysis

Service	Description	Performance Measures	2019	2020	2021
Water	The City's drinking water system provides all of its drinking water to the communities of North Cobalt, Haileybury, New Liskeard, Dymond and also can provides fire protection within these communities. See appendix B for the City's water distribution map.	Percentage of properties connected to the municipal water system.	**59.7%**	**59.7%**	**59.8%**
		Percentage of properties where fire flow is available.	**49.8%**	**50.0%**	**50.1%**
	A boil water advisory is a public health advisory issued by governmental or other health authorities to consumers when a community's drinking water is or could be contaminated by pathogens. Advisories are typically lifted within 24 to 48 hours, once the laboratory results have confirmed that the water is free from contamination and safe to drink.	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.	**2 / 3585**	**0 / 3588**	**0 / 3590**
		The number of connection-days per year due to water main breaks/repairs compared to the total number of properties connected to the municipal water system.	**108 / 3585**	**68 / 3588**	**81 / 3590**

Service	Description	Performance Measures	2019	2020	2021
Sanitary	The City's sanitary system provides the collection and disposal of wastewater to the communities of North Cobalt, Haileybury, New Liskeard, Dymond. See appendix B for the City's wastewater collection system map.	Percentage of properties connected to the municipal wastewater system.	**58.8%**	**58.9%**	**58.9%**
	A combined sewer system collects rainwater runoff, domestic sewage and industrial wastewater into one pipe. The City **does not** have this type of system within it's sanitary and storm network.	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.	**-**	**-**	**-**
	Sewer overflows can occur in almost every sanitary system even though systems are intended to collect and contain all the sewage that flows into them. The main cause for overflows occur when too much rainfall or snowmelt infiltrates the sanitary system or by blockages. Some excess water can also inflow through roof drains connected to sewers and broken or badly connected service lines and mains. This excess in flow can surpasse the systems capacity resulting in overflows. Large objects can also infiltrate the system causing blockages resulting in overflows.	The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system. (Sewer Mains only)	**0 / 3537**	**1 / 3540**	**1 / 3541**
	The City currently has some controled preventative measures to avoid and minimize the risk of overflows within the sanitary system. This has been achieved by the implementation of a proper operation inspection and maintenance program, upsizing the pipe diameter or treatment plant if needed when a reconstruction occurs and by emergency bypassing at lift stations and treatment plants to surrounding rivers and lakes. Emergency bypassing/overflow is an event where raw sewage can bypasse all treatment processes with the exception partial disinfection before being discharged to the environment. This method can prevent damages to treatment plants and to the collection system. However, this method should and is only considered as a last measure of protection.	The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.	**8 / 3537**	**12 / 3540**	**11 / 3541**

Service	Description	Performance Measures	2019	2020	2021
Storm	The City's storm management system provides the collection and disposal of surface water to the communities of North Cobalt, Haileybury, New Likseard, Dymond. See appendix B for the City's storm collection system map.	Percentage of properties in municipality resilient to a 100-year storm.	***Pending study**		
		Percentage of the municipal stormwater management system resilient to a 5-year storm.	***Pending study**		

Service	Description	Performance Measures	2019	2020	2021
Roads	The City's road network provides the means of transportation to the communities of North Cobalt, Haileybury, New Liskeard, Dymond. See appendix B for the City's road network and classes.	Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality.	**Arterial = 63.7 Lkm Collector = 70 Lkm Local = 282.8 Lkm**	**Total Land = 178.1 km²**	
	Refer to section 4.5.3 for condition rating Refer to section 6.3.3 for condition analysis strategies	For paved roads in the municipality, the average pavement condition index value.	**68**	**65**	**66**
		For unpaved roads in the municipality, the average surface condition (e.g. excellent, good, fair or poor).	**Fair**	**Good**	**Good**

Service	Description	Performance Measures	2019	2020	2021
Bridges	The City has many different types of bridges that can support many traffic types. The majority of the City's bridges can support heavy transport vehicles, motor vehicles, pedestrians and cyclists.	Percentage of bridges in the municipality with loading or dimensional restrictions.	**10%**	**10%**	**10%**
	Refer to section 4.5.3 for condition rating Refer to section 6.3.3 for condition analysis strategies	For bridges in the municipality, the average bridge condition index value.	**63.5**	**62.1**	**61.4**
		For structural culverts in the municipality, the average bridge condition index value.	**71.2**	**71.6**	**71**

5.4 Data Collection

To appropriately record, track and monitor Levels of Service, the City will continue with or initiate programmes to collect the following types of information in addition to using discrete asset identifiers:

5.4.1 Water System

1. Date of break or water quality incident
2. Location of break or water quality incident
3. Cause of break or water quality incident
4. Estimated water loss
5. Pipe characteristics (diameter, material, installation year)
6. Time taken to respond to the incident
7. Time taken to return water mains back to service

5.4.2 Sanitary System

1. Date of blockage
2. Location of blockage
3. Cause of blockage
4. Pipe characteristics (diameter, material, installation year)
5. Time taken to respond to the incident
6. Time taken to return sewer back to service
7. CCTV inspection or pipe condition rating

5.4.3 Storm System

1. Date of blockage or "*flooding on road"* incident
2. Location of blockage / flood (road and location on road)
3. Rainfall depth for discrete events
4. Time taken to respond to the incident
5. Time taken to return road back to service
6. Pipe characteristics (diameter, material, installation year)
7. CCTV inspection or pipe condition rating

5.4.4 Road Network

1. Road name inclusive of location (from/to)

2. Physical road characteristics (surface material, installation year)
3. Provincial road classification
4. Maintenance performed on the road (task and the date most recently resurfaced)
5. Pavement condition survey resulting in a Pavement Condition Index (PCI)
6. Average Annual Daily Traffic (AADT) if measured or reported
7. Annual operating costs for hard surface roads

5.4.5 Bridges

1. Bridge Name, Location & Provincial Bridge File Number
2. Bridge Characteristics (construction type, material, installation year)
3. Maintenance conducted on bridge (task and the date most recently repaired)
4. Bridge Condition Index (BCI) as per OSIM inspection
5. Average Annual Daily Traffic (AADT) report as per OSIM inspection
6. Detour route based on OSIM inspection
7. Bi-annual appraisal reports

5.4.6 Environmental Facilities

1. Building Name, Location and Intended use.
2. Building Characteristics (construction type, material, contents and age)
3. Maintenance conducted on buildings (task and the date most recently repaired)
4. Annual operating costs
5. Structural condition inspection and reports

6. Asset Management Strategy

6.1 Introduction

6.1.1 Approach

An Asset Management Strategy can be broken down into six types of planned actions:

Non-infrastructure solutions

- Actions or policies that impact the total lifecycle cost or lifespan of individual assets or asset networks.

Operations & maintenance activities

- Standard Operating Procedures and regularly scheduled inspections and maintenance.

Renewal / rehabilitation activities

- Significant repairs that improve assets' condition and extend the useful lifespan.

Replacement activities

- Activities at the end of assets' useful lifespan. Assets can be replaced with similar infrastructure, alternative infrastructure or non-infrastructure solutions to meet or adjust the service needs.

Disposal activities

- Activities related with the removal and safe disposal of assets upon completion of the service life, the replacement, or when otherwise no longer needed by the City.

Expansion activities

- Activities required to extend service, meet growth demands, or increase the levels of service provided.

In addition to the planned actions, the Asset Management Strategy addresses the procurement methods, and provides an overview of risks associated with the Strategy.

6.1.2 Asset Replacement Strategy Overview

The Asset Management Strategy considers the estimated unit replacement cost to forecast the capital investment required on five-year intervals in the 25 year time horizon between 2022 and 2047. Replacement costs were calculated using 2019 dollars with an inflation rate of 3

percent. Where the per unit replacement cost estimate was less than the replacement cost cited in the public sector accounting board (PSAB) 3150 registry, the greater value was used.

For the initial 10 year period, infrastructure replacement has been optimized between the road network, water system, sanitary sewer system, and storm water system. Since the road network requires the most frequent capital interventions, it was used as the basis for driving the strategy. If the buried infrastructure was within 10 years of its estimated Service Life when the road was scheduled to be rehabilitated or replaced, the capital replacement of the buried asset would be accelerated to correspond with the road intervention. The objective of this coordination of effort is to minimize disruptions to the public, while reducing overall costs by bundling activities.

To forecast the cost for replacing assets, a variety of assumptions were made as outlined in the following sections. The estimated unit costs were compared with recent, local construction costs and compared with the replacement cost estimates recorded in the City's PSAB registry. The larger total replacement cost has been applied. This decision was made assuming that the greater value would provide a greater tolerance for errors in the estimates. Moving forward, the City will track infrastructure investments to improve the accuracy and reliability of unit replacement cost estimates as well as enable the inclusion of non-capital (operations and maintenance) expenditures in the Plan.

6.1.2.1 Water System

The following assumptions were made in estimating the per unit replacement cost:

- The replacement cost estimate includes:
  - ✓ Excavation, supply and installation of pipe, fire hydrants and valves; and
  - ✓ Excavation, supply and installation of water services to property line (15 m or 50 foot lot frontage is assumed as an overall City average, therefore 12 services are installed per 100 m).
- The replacement cost does not include removal of retired assets or provision of a temporary water main.

Table 6-1 below shows the cost to replace each asset category in the City of Temiskaming Shores.

Table 6-1: Replacement Cost for Water Infrastructure

Asset Component	Replacement Cost per Metre (2021)
Water Mains 150mm	$ 400
Water Mains 200mm	$ 425
Water Mains 250mm	$ 450
Water Mains 300mm	$ 500
Water Mains 450mm	$ 550

Water Valves	$ 1100 - $5100
Hydrants	$ 7000
Specialized Valves	CPI
Water Facilities	CPI

*Note – Pipe diameters less than 150 mm will be replaced with 150 mm water mains. Estimated cost for replacement includes all pipe, appurtenances and service connections. Pipe diameters greater than 300 are assumed to be transmission lines from source/plant to reservoir with no service connections. CPI (refer to the construction price index)

6.1.2.2 Sanitary Sewer System

The following assumptions were made in estimating the per unit replacement cost:

- The replacement cost estimate includes:
  - ✓ Excavation, supply and installation of pipe and maintenance hole structures; and
  - ✓ Excavation, supply and installation of sanitary sewer services to property line (15 m or 50 foot lot frontage is assumed as an overall City average, therefore 12 services are installed per 100 m).
- The replacement cost does not include removal of retired assets or diversion of existing flows.
- Sanitary Sewer depth of 2.8 to 3.0 m.

Table 6-2 below shows the cost to replace each asset category in the City of Temiskaming Shores.

Table 6-2: Replacement Cost Sanitary Infrastructure

Asset Component	Replacement Cost per Metre (2021)
Sanitary Mains 200mm	$ 400
Sanitary Mains 250mm	$ 425
Sanitary Mains 300mm	$ 450
Sanitary Mains 375mm	$ 500
Sanitary Mains 450mm	$ 550
Sanitary Mains 525mm	$ 600
Manholes	$ 1750
Specialized Valves	CPI
Wastewater Facilities	CPI

*Note – Pipe diameters less than 200 mm will be replaced with 200 mm sanitary sewer mains. Estimated cost for replacement includes all pipe, appurtenances and service connections. Pipe diameters greater than 450 are assumed to be truck mains with minimal service connections. CPI (refer to the construction price index)

6.1.2.3 Storm Water System

The following assumptions were made in estimating the per unit replacement cost:

- The replacement cost estimate includes:
  - ✓ Excavation, supply and installation of pipe, catch basin, maintenance hole structures and culverts.
- The replacement cost does not include removal of retired assets.
- Storm Sewer depth of 2.5 to 3.5 m.

Table 6-3 below shows the cost to replace each asset category in the City of Temiskaming Shores.

Table 6-3: Replacement Cost Storm Infrastructure

Asset Component	Replacement Cost per Metre (2021)
Storm Mains 300mm	$ 425
Storm Mains 350mm	$ 500
Storm Mains 450mm	$ 575
Storm Mains 600mm	$ 650
Storm Mains 750mm	$ 750
Storm Mains 800mm	$ 825
Storm Mains 900mm	$ 900
Storm Mains 1000mm and greater	$ 1000
Catch Basins	$ 1200

*Note – Pipe diameters less than 300 mm will be replaced with 300 mm storm sewer mains. Estimated cost for replacement includes all pipe, appurtenances and service connections where required.

6.1.2.4 Roads Network

The capital forecast for the Road Network assumed that the short-term needs (investments for the first 10 years) would follow the interventions identified in the review of the Roads Needs Study. The long-term forecast was developed utilizing the public sector accounting board (PSAB) records being integrated with the results from the Roads Needs Study. There is some degree of risk for duplication of costs; however, this is considered a minor risk in that the accuracy of such a forecast typically decreases as the time horizon increases.

The following assumptions were made in estimating the per unit replacement cost for the long-term forecast:

Asphalt Surface

- The replacement cost estimates assumes that all existing asphalt areas will be replaced with asphalt.
- Asphalt depth is assumed at 90 mm for Class 2 and 50mm for Class 3 to 6.
- Price does not include asphalt removal.

- Price is for supply, haul, place and compaction of asphalt only.

Surface Treatment

- The replacement cost estimates assume that all existing surface treatment areas will be replaced with surface treatment.
- Surface treatment application is assumed to be double prime treatment at first application followed by a third application after year three.
- Surface treatment of existing gravel surface roadways will be carried out at a rate of no less than 3.0 kilometres per year.
- Price does not include pulverizing or grading of existing surface.
- Price is for supply, haul, place and compaction of Class 2 aggregate and emulsion.

Gravel

- The replacement cost estimates assume that all remaining gravel surfaces areas will be resurfaced every ten (10) years.
- Granular application is assumed to be 75 mm in depth.
- Price does not include pulverizing or grading of existing surface.
- Price does not include re-grading of roadside ditches prior to placement of granular material.
- Price is for supply, haul, place and compaction of Granular “A” aggregate.
- Roadway stabilization, in advance of surface treatment to be considered.

Sidewalks

- The replacement cost estimates assumes that all existing sidewalks will be replaced with the same surface type.
- Price does not include sidewalk removal.

Bridges and Large Diameter Culverts

- The replacement cost estimates are based on the city’s initial construction cost with the addition of the inflation rates.

Table 6-4 below shows the cost to replace each asset category in the City of Temiskaming Shores.

Table 6-4: Replacement Cost Transportation Infrastructure

Asset Component	Replacement Cost per Square Metre (2019)
Asphalt 90mm	$ 71.25
Asphalt 50mm	$ 32.35
Surface Treatment	$ 10
Gravel	$ 5
Sidewalk – (Concrete or Brick)	$ 130
Bridges & Large Dia. Culverts	CPI

*Note - CPI (refer to the construction price index)

6.1.2.5 Other Asset Groups

The following assumptions were made in estimating the per unit replacement cost:

- The estimated “Building and Facilities” replacement cost estimates are based on the city’s initial construction cost of the structure with the addition of the inflation rates and the approximate value of contents.
- The estimated replacement cost based on the initial purchase of each unit.

6.2 Non-Infrastructure Solution

6.2.1 Data Collection Strategies

Data Collection Preparation

A meeting should be arranged shortly prior to, or as part of collection projects, in order to determine what information is to be updated or augmented, what information is currently available and what the condition is of that information. To facilitate this, an initial data review should be conducted of available data related to the collection exercise. Sources of information should include but not be limited to:

- Infrastructure master plans
- Water & sewer models
- Engineering as-built or record drawings
- Planning studies
- Paper maps
- AutoCAD drawings or GIS files/databases
- Inspection reports
- Imagery

These data-sources should be integrated into a single source appropriate for the data collection exercise. It is generally good practice to house this information in a database. If field staff are performing the data collection using a digital collector (GPS, tablet etc.), where possible, the database should be loaded onto this device so that updates can be made directly. The data schema and populated database should be reviewed prior to commencement of collection and be returned for review and quality assurance and control after collection. A data gap analysis will then be performed that will assess the level of effort required to complete the inventory and identify any assumptions to be made. It is important to note that the completeness and accuracy of the inventory is based on the available existing information, staff knowledge and the visibility of above ground assets. If possible and acceptable, some data may be synthesized based on existing data, but must be flagged as such in the database. Only after all available data-sources have been exhausted should field collection be considered.

Field Data Collection

After all pertinent and available information has been compiled, verified and audited (with appropriate reporting), a field data collection task may be necessary to determine additional or still missing information. A meeting will be held to determine the level of detail required and final use of the information. This will include confirmation and sign-off of the proposed data-model, as well as a detailed list of assets to be collected and what information about those assets is to be collected (overall schema). Sign-off will also be obtained if any special access

is required on-site as well as any safety equipment required. All tools to be used in the data collection will be presented to the client at this time.

The field crew supervisor will ensure that all field members are aware of their duties and responsibilities. It is vital that appropriately trained field staff be used, particularly if inspections requiring sign-off are required. Inspection forms will be pre-populated if possible. Each field crew member will be responsible for the entirety of their work. If possible, a small pilot area should be completed and submitted for comment.

Once all field data has been collected, it will be compiled within the agreed upon schema and quality assurance and control, standardization and normalization. Once this is complete, the database will be reviewed at a follow up meeting to discuss the results and further requirements.

6.2.2 Data Management Strategies

Information that is collected by the Municipality represents a significant investment of staff time and resources. Proper information and data management processes and procedures are vital to an organisation's ability actively and effectively make use of available resources to provide an appropriate level of service to their customers as well as prepare required reports for auditing and financial purposes such as the public sector accounting board (PSAB) 3150 reporting. It is therefore critical that this information be regularly maintained to ensure the integrity of the information and allow for improved decision making and management of the Municipality's assets. The ability to rely on information is expected to become even more crucial as future Provincial and Federal funding programs become contingent on the accuracy of collected data.

While the City of Temiskaming Shores has a wealth of information available, the development of this Plan has highlighted the need for a more robust and streamlined data management strategy. At its core, a proper data management strategy can be broken down into four primary questions:

- What data should I be collecting and why?
- How should I store this information once collected?
- How often should I review my collected data and how should I maintain it?
- Are there any software / hardware applications available to me that will not only allow me to collect, store and maintain this information but also allow me to use this information to answer questions?

To effectively manage the infrastructure data, the Municipality will adopt a Data Management Policy in line with the following policy statement:

> *It should become the policy of the Municipality to manage their data effectively and efficiently. This should be done through the use of appropriate computerized applications and databases and the collection and storage only of information that has an immediate use and / or answers an immediate business need as required of the Municipality.*

This data will be maintained on a regular schedule for each individual dataset by general agreement or Government mandate.

Metadata defining what data has been collected is available and describing the data in terms of what it represents and how current it is will also be provided.

Once an appropriate data model has been determined and agreed upon, the City will create a schedule to determine who will be responsible for each primary data set, how often this information will be reviewed and how often new collections will be done. This information should be recorded as part of the asset information as metadata so that users know how current the information is.

It should be noted that some information may be acquired from other Agency sources such as the Canadian GeoBase (http://geobase.ca). This is a free data source that includes the National Road Network which is maintained by the Federal and Provincial governments. Sources such as this may be used to reduce the time required to maintain key datasets.

6.2.3 Information Storage Strategy

How information is stored is as important if not more so than the information itself. The reason for this is that information storage often dictates not only how easily or quickly information may be accessed and used, but also how it is used in terms of formatting etc.

It is recommended that the City adopt a relational database model for the storage of collected information. Ideally, the City would be able to house all information within a single database structure. Practically though, certain key systems such as finance and taxation are required to be contained within their own systems. This does not preclude however the ability to link information between applications.

The primary advantages of storing information using a database model are that agreed upon data standards are enforced and the duplication of information is reduced or eliminated ensuring that staff use the same information. Examples of this would include street name lists, address lists, assessment role numbers, etc.

6.2.4 Software / Hardware Strategy

Software and hardware are often seen and promoted as “solutions.” However, they should really be viewed as tools to assist in providing core functions required by City staff.

Databases

As discussed above, database technology is strongly recommended to assist in the storage and retrieval of information. Common applications such as MS Excel can link to a database to retrieve information and provide statistical and empirical evidence and graphs. Databases also excel as interacting with each other such that information can be passed from one system to another relatively easily. Lastly, databases often act as what is termed a “back end” to front facing applications such as finance and taxation systems, asset and customer management systems, maintenance management systems and geographic information systems (GIS).

As discussed above, it is recommended that the City consider a detailed review of enterprise database applications such as Microsoft SQL Server, Oracle, MySQL, PostgreSQL or similar products.

Asset Management

Asset management has become a major concern in recent years for several reasons. Municipalities are aware that much of their above and below ground infrastructure is on the decline. Financial responsibilities have required municipalities to make due with less. Provincial and Federal funding is now being linked to a municipality's ability to show evidence of need (PSAB 3150 reporting).

Asset Management applications take the information that is collected and provided about an asset and assist with the decision making process to allow staff to determine what course of action to take regarding an asset and when.

Maintenance Management

A maintenance management system can assist with the tracking of work performed against specific assets. The detail to which activity is tracked may vary to include costing and time / resources require or may be more general that an activity was performed. This information may be aggregated at regular intervals to assist with establishing a base line for how well an asset is performing.

6.2.5 Neighbouring Municipalities

Municipalities working together can present significant opportunities and benefits. The City of Temiskaming Shores currently works with the surrounding Townships for the maintenance, operational and capital costs associated with the boundary roads.

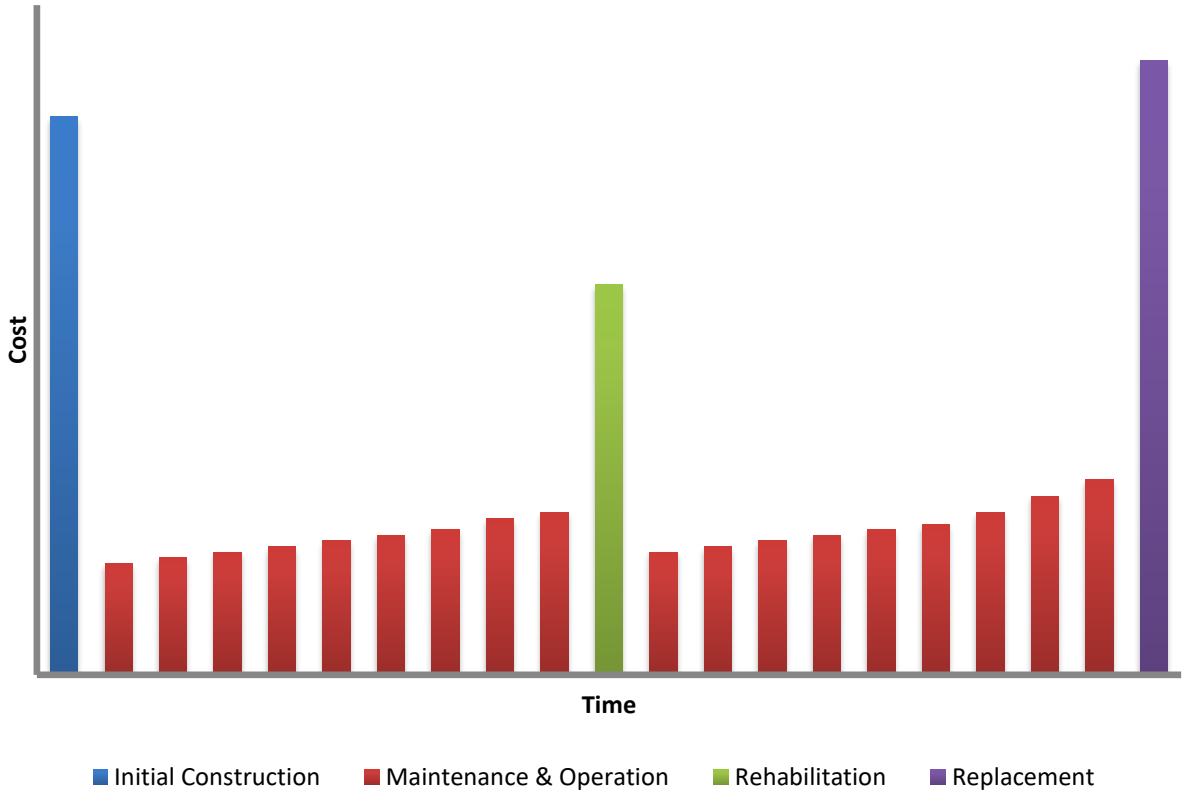
- Township of Hudson – 50% cost for Pipeline Rd
- Township of Harley – 50% cost for Uno Park Rd + 50% cost for 2 bridges
- Township of Harris – 50% cost for Sale Barn Rd

6.3 Lifecycle Management

Lifecycle cost is the is the total cost of an asset throughout its life including planning, design, construction, operation, maintenance, renewal, replacement and disposal costs.

Figure 6.1, illustrates how costs typically accumulate over an asset's life.

Figure 6.1: Accumulation of Costs Over an Asset's Life



6.3.1 Maintenance and Operation Activities

The City realizes the benefits of lower-cost treatment methods such as preventive maintenance and light rehabilitation activities. However, more costly treatments such as heavier rehabilitation and full reconstruction may become necessary.

Allowing the assets to deteriorate further, triggers the need for heavier rehabilitation strategies. Although heavy rehabilitation and full reconstruction is typically less cost-effective than maintenance and light rehabilitation in the short term, it's still preferable to apply this type of strategy to lower the maintenance cost in the long term.

The City of Temiskaming Shores currently has several infrastructure condition monitoring, assessment programs and maintenance programs in place, including:

Water System Maintenance and Programs

The entire water system is inspected under on an annual basis. Each year, of the pipes are flushed and inspected. Defects or underperformance of the system are recorded and coded to correspond with Safe Drinking Water Act standards. Once complete, this will form the benchmark for comparing asset condition.

Sanitary and Storm Sewer Maintenance and Programs

The entire Sanitary and Storm Sewer systems are inspected under a seven year program. Each year, a selection of the pipes are flushed and inspected. Defects are recorded and coded to correspond with Pipeline Assessment Certification Program standards. Once complete, this will form the benchmark for comparing asset condition. Moving forward, it is recommended that consideration be given to prioritizing the inspection according to the expected deterioration of the system.

Transportation Maintenance and Programs

The City abides by the Ministry's minimum maintenance standards, which specifies the frequency that roads and sidewalks need to be patrolled and how issues, including pothole, winter maintenance, etc., are addressed based on the road classification.

The Roads Needs Study is completed every 3 years utilizing internal and external forces. The last Roads Needs Study review was completed in 2020. The study reviews the road network, broken down into sections consistent in their characteristics, and records a variety of performance and condition details for each. This information is used to identify the capital and maintenance needs of the system, the timing for the interventions, and the road priority.

The Province of Ontario legislates that every bridge be inspected under the Ontario Structure Inspection Manual (OSIM) every 2 years. From this inspection, a Bridge Condition Index (BCI) is developed that helps to schedule bridge maintenance and upkeep. Safety concerns are to be addressed immediately. The last OSIM Inspection was carried out in 2020.

The costs associated with the operations and maintenance of these activities, have been included in the overall operational cost of each asset category.

6.3.2 Rehabilitation and Replacement Activities

As the City increases the availability of condition data, the Plan will be revised to reflect this information. By monitoring condition data over time, the City will improve their ability to forecast deterioration and identify trends.

Understanding that the information driving the replacement activities is based on asset age, where appropriate, the City will augment the Plan with asset inspections to determine if renewal / rehabilitation are possible prior to replacement of the assets.

Priority projects identified within the City's Renewal/Rehabilitation Activities are shown in following section.

6.3.3 Calculating Asset Condition

The condition calculation determines the overall condition of asset failure. The analytic can become a documented approach to determining capital priorities. A municipality could than

compare priorities across asset types and categories. The City will be introducing some condition assessments based on analytics, to supplement professional judgement.

Table 6-5: Condition Ratings

Age Based Rating		
Condition	**Useful Life Remaining**	**Final Score**
Failed	0% - 19%	1
Poor	20% - 39%	2
Fair	40% - 59%	3
Good	60% - 79%	4
Excellent	80% - 100%	5

Condition Index Rating			
Condition	**Score Range**	**Final Score**	**Intervention Strategy (Roads)**
Failed	0 - 39	1	Reconstruction
Poor	40 - 57	2	Rehabilitation
Fair	58 - 74	3	Resurface
Good	75 - 85	4	Preventative Maintenance
Excellent	86 - 100	5	Corrective Maintenance

Excellent to Good
(Uno Park Rd Bridge)

Fair
(Armstrong St Bridge)

Poor to Failure
(Firstbrooke Line Rd Bridge)

Excellent to Good
(Wilson Rd Culvert)

Fair
(McLean Rd Culvert)

Poor to Failure
(River Rd Culvert)

Excellent to Good
(Georgina Ave)

Fair
(Dawson Point Rd)

Poor to Failed
(Albert St)

6.4 Risk Management

The City's overall Asset Management Strategy is founded on available data, anticipated service levels, growth expectations and other assumptions. Assumptions in these items introduce some unavoidable risk that the overall strategy may change over time as the City gathers and develops more complete data and processes.

Recognizing these uncertainties, the City is developing strategies to address each source of risk so that the Asset Management Strategy can evolve over time. Risk mitigation strategies for each of the following are discussed below:

- Data quality
- Levels of Service
- Growth – expected vs. actual
- Assumptions

Data quality

The data provided and collected for the report for various aspects were given only reflecting a very high level of the asset components, and did not accurately reflect the service life's of the necessary components of the assets (i.e. a water treatment plant was assessed at a facility level and did not have age, conditional, performance, or maintenance data for any of the facilities components (i.e. SCADA system, pumps, etc.). Given the high level of the data, significant risk exists in the component asset life reaching the end of their respective service lives before the facility has reached the end of the facility life. This introduces significant difficulty to establish a yearly budget that accurately would reflect the required asset replacement / rehabilitation cost required.

Strategy to address:

It is suggested an inspection program of assets be established to utilize the new workflow structure and build the existing database. With a newly built database, the report should be reviewed and see if the new data produces significant changes to the asset management strategy.

Levels of Service

The levels of service present a risk, since no previous levels of service were established for the city. The Levels of Service therefore have never been measured in previous years and the expectation of each level of service has not been established. Adjustment is expected in the early years of levels of service to better reflect the level of commitment from the city, but risk exists if a level of service is set at a higher expectation then what is possible at the current levels of funding.

Strategy to address:

It is suggested that to address this source of risk, the targets established in the first year of utilizing the Levels of Service should be reviewed along with the cost to provide the levels of service. If the cost of the level of service is too high to maintain the target should be adjusted or alternative strategies to accomplish the level of strategy should be investigated.

Growth Levels

Growth forecasts are not guaranteed, and while effort has to be made to ensure that services are provided if the growth is met, growth can be greater or lesser then the expected forecast. This can potentially create a surplus or deficit of funding available.

Between the 2016 Census and the 2021 Census the City of Temiskaming Shores experienced negative population growth of -2.9%. Between the 2016 and 2021 Census the City of Temiskaming Shores also experience some changes in the age-composition of its population. Therefore, an increase or decrease to the population or to the average age of residents may result in changing service needs and demands.

Strategy to address:

It is suggested that the growth of the City should be reviewed on a yearly basis to determine if the forecast is accurate, and if possible the budgets should be adjusted accordingly. The City should consider conducting a review / study of current and future housing demands every 2 to 3 years.

Assumptions

Assumptions have been made in the report to fill data gaps and have been noted where undertaken. As with any assumption, risk exists in that the assumption made not account for a large enough percentage of the assets and could potentially results in unexpected costs if not corrected (i.e. year of installation assumed, when the asset is past its expected service life, and due to the degradation of the asset, effecting surrounding assets).

Strategy to address:

It is suggested that an inspection program be developed utilizing the information provided herein to eliminate the largest assumptions. The new findings should then be used to adjust the report findings, correcting the asset management strategy if required

6.4.1 Calculating Asset Risk

The risk or criticality calculation determines the overall risk of asset failure. The risk/criticality analytic can become a documented approach to determining capital priorities. A municipality could than compare priorities across asset types and categories. The City will be introducing some risk/criticality assessments based on analytics, to supplement professional judgement.

The City's risk/criticality formula is provided below:

Asset Risk/Criticality = Probability of Failure (PoF) + Consequence of Failure (CoF)

The assessment of PoF will be dependent upon the condition and age of the asset, whereas CoF will be assessed based on analytics established by the municipality. The City will use weighted averages for its PoF and CoF using a scale out of 5 points each as the PoF was determined to be more important to the calculation.

The City's risk/criticality weighted average example is provided below:

(80% x PoF Rating) + (20% x CoF Rating) = Risk Rating (100%)

Table 6-6: Probability and Consequence of Failure Ratings

Asset	Condition / Age	Condition Qualitative	PoF Rating	PoF Qualitative	Weighting
Asset 1	5	Excellent	1	Rare	80%
Asset 2	4	Good	2	Unlikely	80%
Asset 3	3	Fair	3	Possible	80%
Asset 4	2	Poor	4	Likely	80%
Asset 5	1	Very Poor	5	Almost Certain	80%

Consequence of Failure Rating (Water)

Asset	Detail	Value	CoF Rating	CoF Qualitative	Weighting
Asset 1	Pipe Diameter	Less than 100mm	1	Minor	20%
Asset 2		100 to 150mm	2	Moderate	20%
Asset 3		150 to 200mm	3	Serious	20%
Asset 4		200 to 300mm	4	Very Serious	20%
Asset 5		300mm and Over	5	Major	20%

Consequence of Failure Rating (Sanitary)

Asset	Detail	Value	CoF Rating	CoF Qualitative	Weighting
Asset 1	Pipe Diameter	Less than 200mm	1	Minor	20%
Asset 2		200 to 250mm	2	Moderate	20%
Asset 3		250 to 300mm	3	Serious	20%
Asset 4		300 to 350mm	4	Very Serious	20%
Asset 5		350mm and Over	5	Major	20%

Consequence of Failure Rating (Storm and Culverts)

Asset	Detail	Value	CoF Rating	CoF Qualitative	Weighting
Asset 1	Pipe Diameter	Less than 250mm	1	Minor	20%
Asset 2		250 to 500mm	2	Moderate	20%
Asset 3		500 to 700mm	3	Serious	20%
Asset 4		700 to 1000mm	4	Very Serious	20%
Asset 5		1000mm and Over	5	Major	20%

Consequence of Failure Rating (Roads)

Asset	Detail	Value	CoF Rating	CoF Qualitative	Weighting
Asset 1	Road Classification	Class 6	1	Minor	20%
Asset 2		Class 5	2	Moderate	20%
Asset 3		Class 4	3	Serious	20%
Asset 4		Class 3	4	Very Serious	20%
Asset 5		Class 2 and 1	5	Major	20%

Consequence of Failure Rating (Bridges and Large Dia. Culverts)

Asset	Detail	Value	CoF Rating	CoF Qualitative	Weighting
Asset 1	Replacement Value	Up to $100k	1	Minor	20%
Asset 2		$101k to $300k	2	Moderate	20%
Asset 3		$301k to $500k	3	Serious	20%
Asset 4		$501k to $700k	4	Very Serious	20%
Asset 5		$701k and Over	5	Major	20%

Consequence of Failure Rating (Buildings and Facilities)

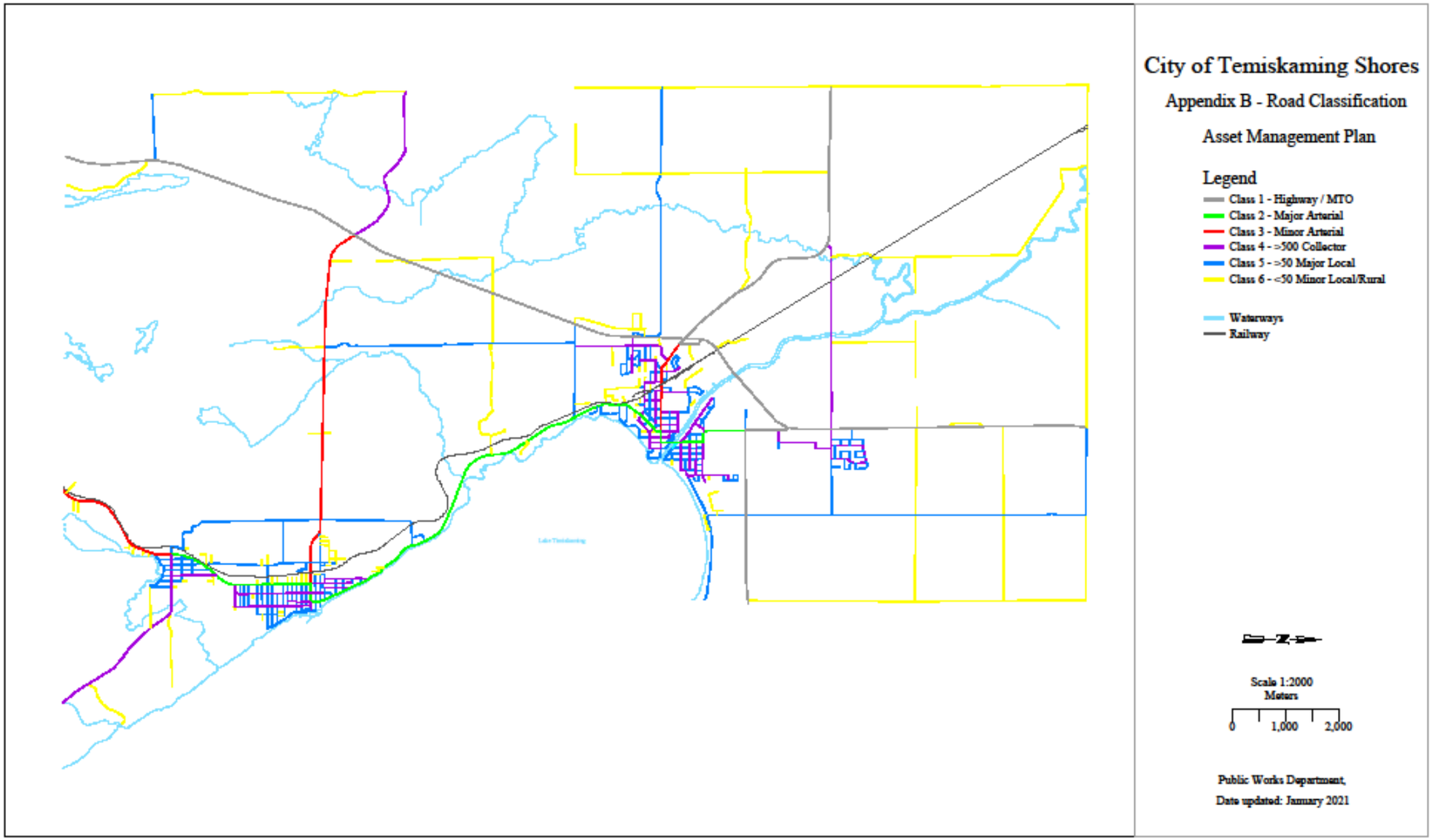
Asset	Detail	Value	CoF Rating	CoF Qualitative	Weighting
Asset 1	Replacement Value	Up to $50k	1	Minor	20%
Asset 2		$51k to $100k	2	Moderate	20%
Asset 3		$101k to $300k	3	Serious	20%
Asset 4		$301k to $1M	4	Very Serious	20%
Asset 5		$1M and Over	5	Major	20%

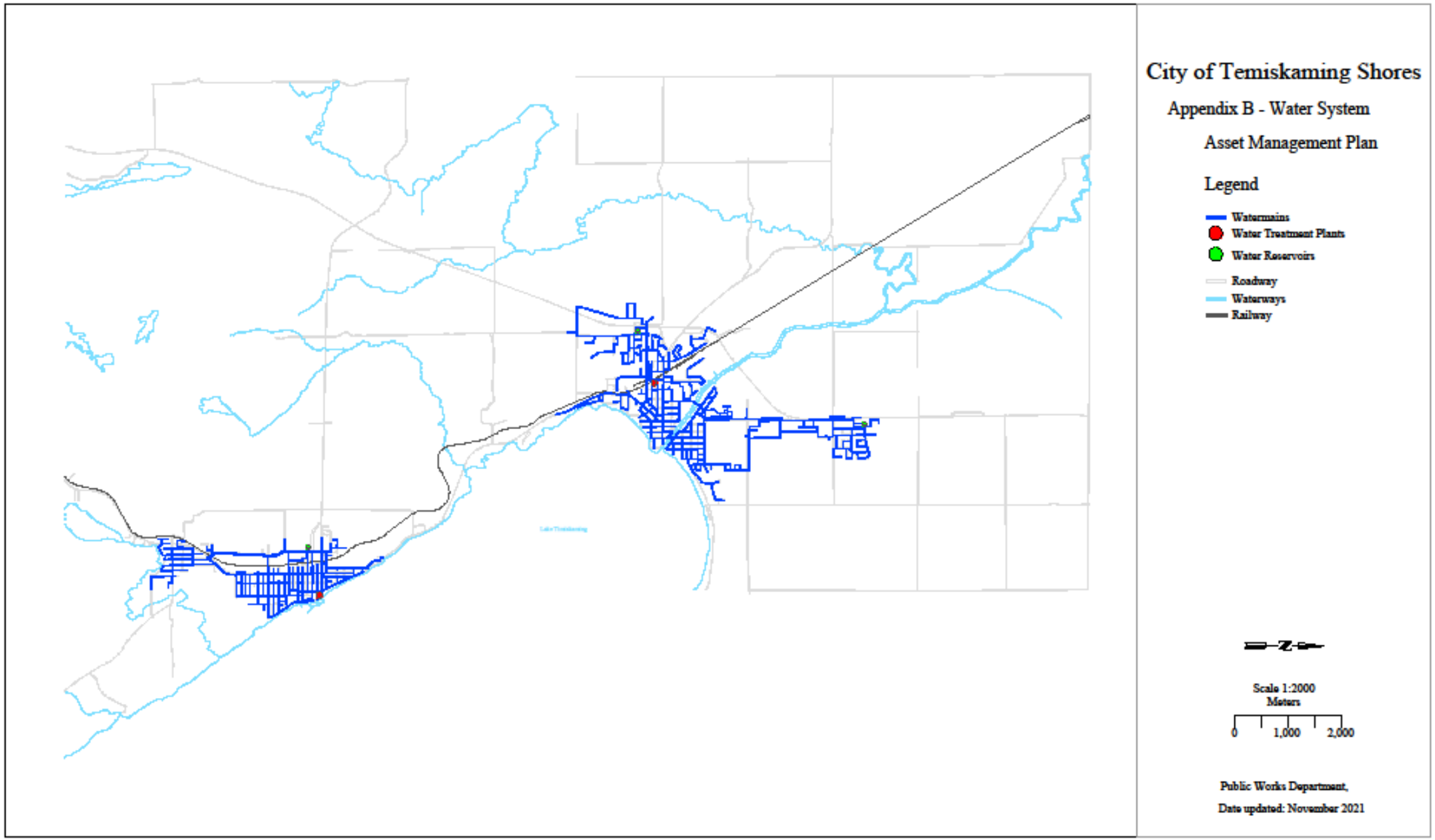
Appendix A

Appendix A Glossary of Terms

Term	Definition
Capital Cost	The total cost needed to bring a project to a commercially operable status.
Core Infrastructure Assets	1. water asset that relates to the collection, production, treatment, storage, supply or distribution of water, 2. wastewater (sanitary) asset that relates to the collection, transmission, treatment or disposal of wastewater, including any wastewater asset that can from time to time manages stormwater, 3. stormwater management asset that relates to the collection, transmission, treatment, retention, infiltration, control or disposal of stormwater,
Lane Kilometers	A kilometer-long segment of roadway that is a single lane in width.
Level of Service	What people experience from the municipality's infrastructure. For example, bridges without load restrictions can offer a relatively higher level of service compared to bridges that do not allow heavy freight vehicles.
Lifecycle Activities	Activities undertaken with respect to a municipal infrastructure asset over its service life, including constructing, maintaining, renewing, operating and decommissioning, and all engineering and design work associated with those activities.
Operational Cost	The cost of resources used by an organization just to maintain its existence.
Service Life	The total period during which a municipal infrastructure asset is in use or is available to be used.
Risk Analysis	A technique used to identify and assess factors that may jeopardize the success of a project.
Provincial Road Classifications	1. Class 1 roads (highway), is merely a high speed road connecting 2 or more cities. Normally, highways are under provincial or federal control. 2. Class 2 and 3 roads (arterial) are usually constructed to move traffic from one end of the city to the other. (average daily traffic counts dictate the class, that modifies the maintenance standards) 3. Class 4 roads (collector) have the function to collect traffic from local streets and discharge them onto other collector or arterial roads. 4. Class 5 and 6 roads (local) serve primarily to provide access to the traffic emanating from the properties and discharge them onto collectors. Class 6 roads can also be found with a gravel surface. (average daily traffic counts dictate the class, that modifies the maintenance standards)

Appendix B


City of Temiskaming Shores
Appendix B - Road Classification
Asset Management Plan
Legend
Class 1 - Highway / MTO
Class 2 - Major Arterial
Class 3 - Minor Arterial
Class 4 - >500 Collector
Class 5 - >50 Major Local
Class 6 - <50 Minor Local/Rural
Waterways
Railway
N
Scale 1:2000
Meters
0
1,000
2,000
Public Works Department,
Date updated: January 2021


City of Temiskaming Shores
Appendix B - Water System
Asset Management Plan
Legend
Watermains
Water Treatment Plants
Water Reservoirs
Roadway
Waterways
Railway
N
Scale 1:2000
Meters
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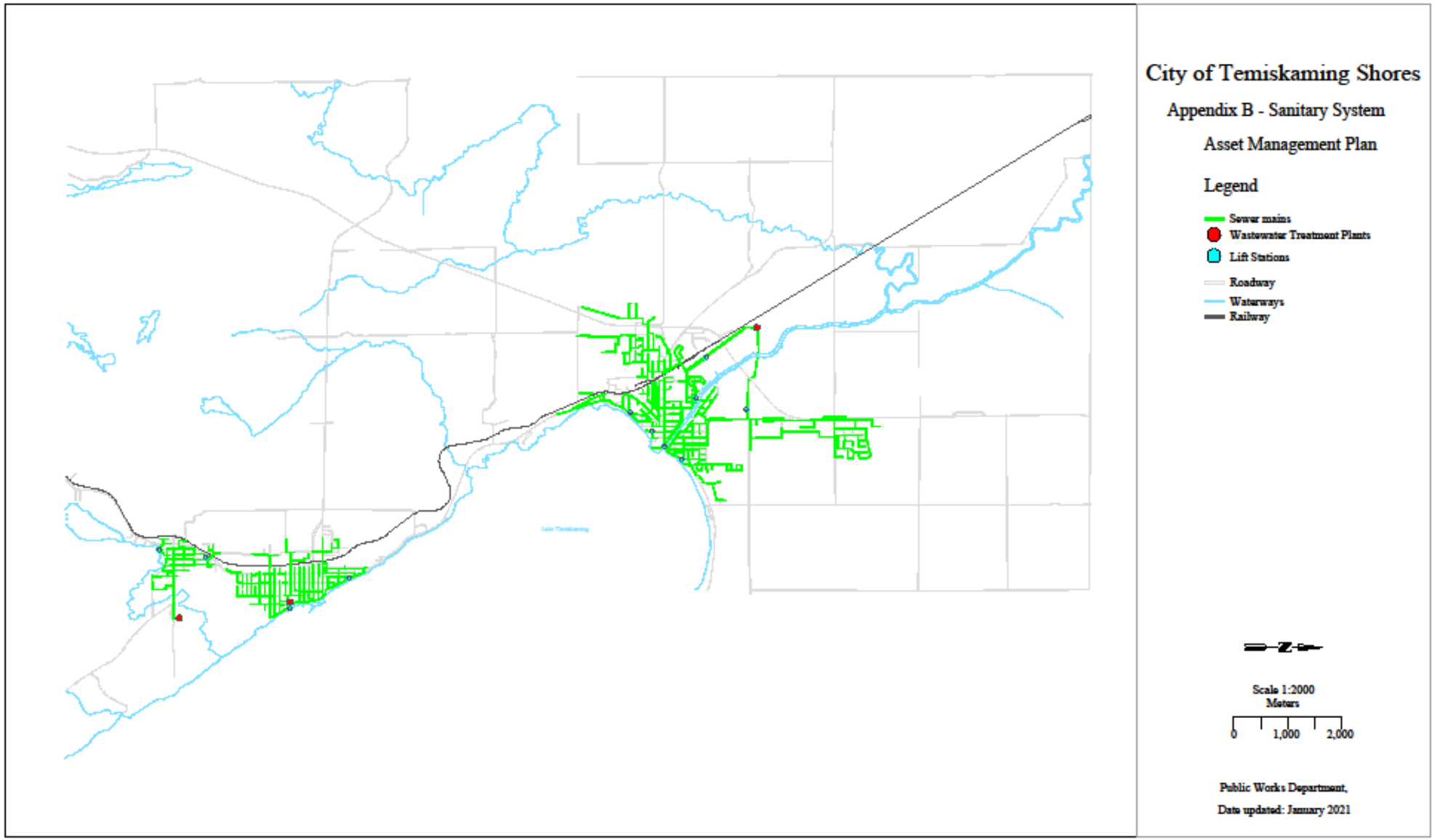
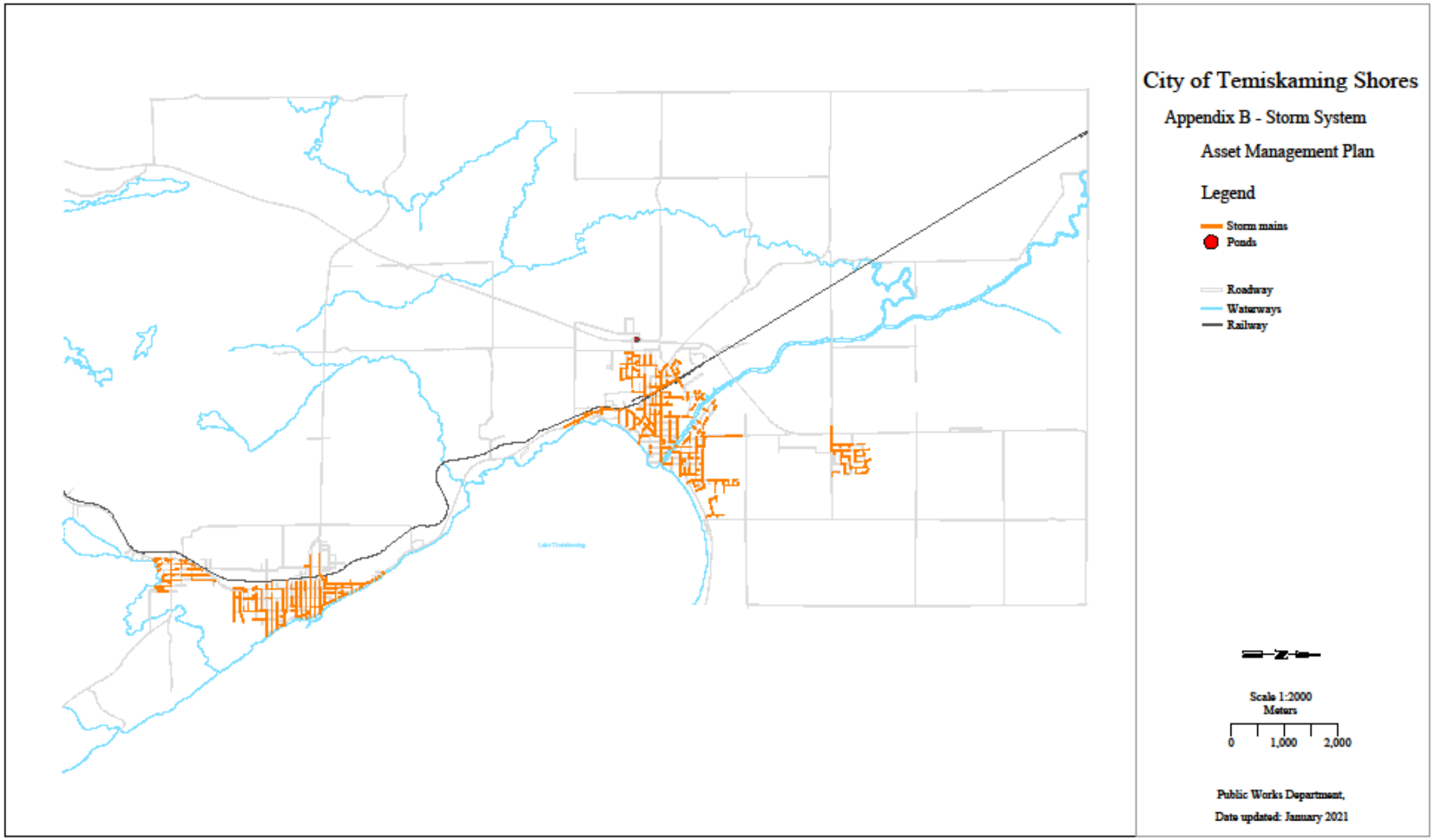
2,000
Public Works Department,
Date updated: November 2021


City of Temiskaming Shores
Appendix B - Sanitary System
Asset Management Plan
Legend
Sewer mains
Wastewater Treatment Plants
Lift Stations
Roadway
Waterways
Railway
Scale 1:2000
Meters
0
1,000
2,000
Public Works Department,
Date updated: January 2021


City of Temiskaming Shores
Appendix B - Storm System
Asset Management Plan
Legend
Storm mains
Ponds
Roadway
Waterways
Railway
Scale 1:2000
Meters
0
1,000
2,000
Public Works Department,
Date updated: January 2021