KIRKLAND LAKE
THE RIGHT ENVIRONMENT

Asset Management Plan

Town of Kirkland Lake | 2021

This Asset Management Program was prepared by:

Empowering your organization through advanced asset management, budgeting & GIS solutions

Key Statistics

Replacement cost of asset portfolio
$349.4 million

Replacement cost of infrastructure per household
$80,300 (2021)

Percentage of assets in fair or better condition
52%

Percentage of assets with assessed condition data
1%

Annual capital infrastructure deficit
$4.7 million

Recommended timeframe for eliminating annual infrastructure deficit
20 Years

Target reinvestment rate
2.07%

Actual reinvestment rate
0.71%

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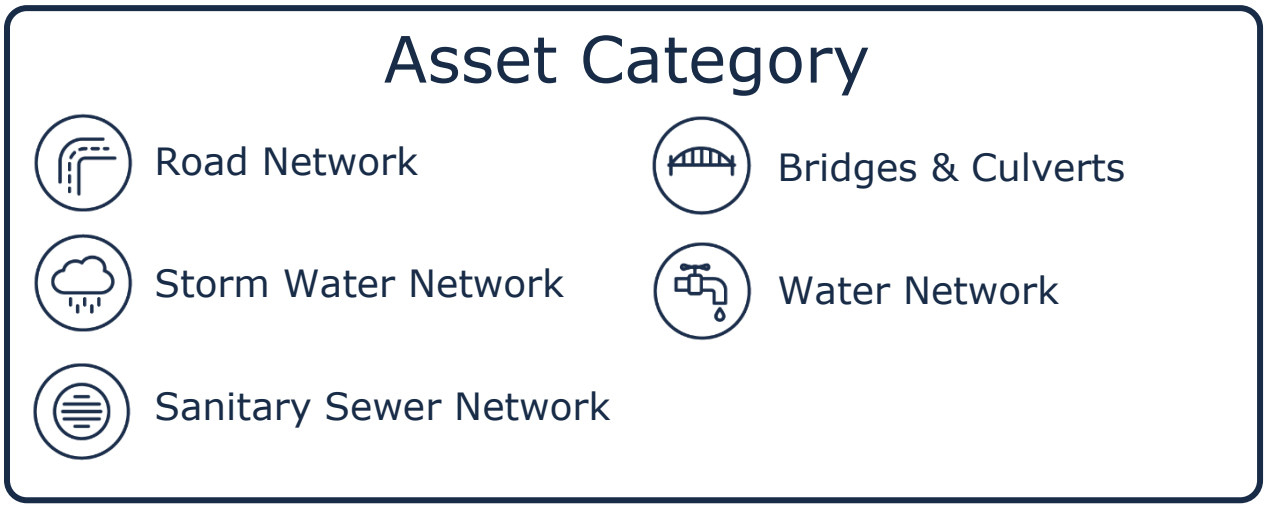
Executive Summary

Municipal infrastructure provides the foundation for the economic, social, and environmental health and growth of a community through the delivery of critical services. The goal of asset management is to deliver an adequate level of service in the most cost-effective manner. This involves the development and implementation of asset management strategies and long-term financial planning.

Scope

This AMP identifies the current practices and strategies that are in place to manage public infrastructure and makes recommendations where they can be further refined. Through the implementation of sound asset management strategies, the Town can ensure that public infrastructure is managed to support the sustainable delivery of municipal services.

This AMP include the following asset categories:



With the development of this AMP the Town has achieved compliance with O. Reg. 588/17 to the extent of the requirements that must be completed by July 1, 2022. There are additional requirements concerning proposed levels of service and growth that must be met by July 1, 2024 and 2025.

Findings

The overall replacement cost of the asset categories included in this AMP totals $349.4 million. 52% of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 1% of assets. For the remaining 99% of assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation in this AMP.

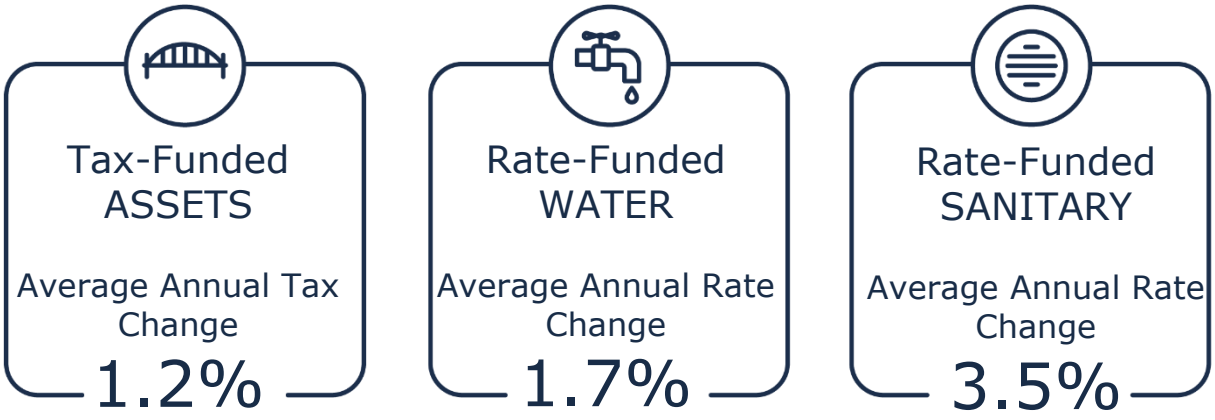
The development of a long-term, sustainable financial plan requires an analysis of whole lifecycle costs. This AMP uses a combination of proactive lifecycle strategies (paved roads) and replacement only strategies (all other assets) to determine the lowest cost option to maintain the current level of service.

To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the Town's average annual capital requirement totals $7.2 million. Based on a historical analysis of sustainable capital funding sources, the Town is committing approximately $2.5 million towards capital projects or reserves per year. As a result, there is currently an annual funding gap of $4.7 million.

It is important to note that this AMP represents a snapshot in time and is based on the best available processes, data, and information at the Town. Strategic asset management planning is an ongoing and dynamic process that requires continuous improvement and dedicated resources.

Recommendations

A financial strategy was developed to address the annual capital funding gap. The following graphics shows annual tax/rate change required to eliminate the Town's infrastructure deficit based on a 5-year plan for tax-funded assets, 15-year plan for water assets, and 20-year plan for sanitary assets:



Recommendations to guide continuous refinement of the Town's asset management program. These include:

- Review data to update and maintain a complete and accurate dataset
- Develop a condition assessment strategy with a regular schedule
- Review and update lifecycle management strategies
- Development and regularly review short- and long-term plans to meet capital requirements
- Measure current levels of service and identify sustainable proposed levels of service

1 Introduction & Context

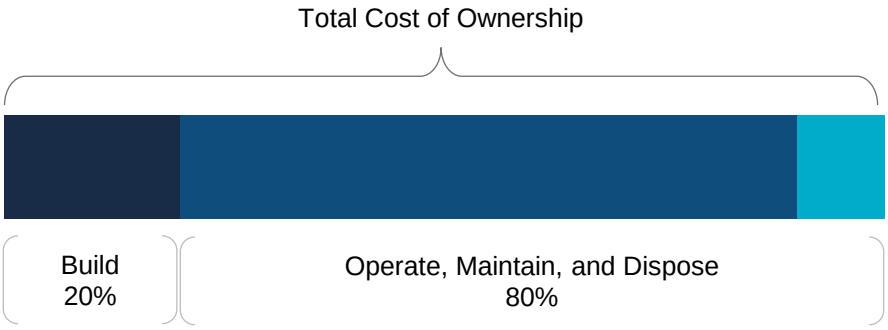
Key Insights

- The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers receive from the asset portfolio
- The Town's asset management policy provides clear direction to staff on their roles and responsibilities regarding asset management
- An asset management plan is a living document that should be updated regularly to inform long-term planning
- Ontario Regulation 588/17 outlines several key milestone and requirements for asset management plans in Ontario between July 1, 2022, and 2025

1.1 An Overview of Asset Management

Municipalities are responsible for managing and maintaining a broad portfolio of infrastructure assets to deliver services to the community. The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers receive from the asset portfolio.

The acquisition of capital assets accounts for only 10-20% of their total cost of ownership. The remaining 80-90% derives from operations and maintenance. This AMP focuses its analysis on the capital costs to maintain, rehabilitate and replace existing municipal infrastructure assets.



These costs can span decades, requiring planning and foresight to ensure financial responsibility is spread equitably across generations. An asset management plan is critical to this planning, and an essential element of broader asset management program. The industry-standard approach and sequence to developing a practical asset management program begins with a Strategic Plan, followed by an Asset Management Policy and an Asset Management Strategy, concluding with an Asset Management Plan.

This industry standard, defined by the Institute of Asset Management (IAM), emphasizes the alignment between the corporate strategic plan and various asset management documents. The strategic plan has a direct, and cascading impact on asset management planning and reporting.

1.1.1 Asset Management Policy

An asset management policy represents a statement of the principles guiding the Town's approach to asset management activities. It aligns with the organizational strategic plan and provides clear direction to municipal staff on their roles and responsibilities as part of the asset management program.

The Town approved Policy Number CORP2020-004, Capital Asset Management Policy, in June 2019, in accordance with Ontario Regulation 588/17. The purpose of the policy is to guide consistent use of asset management across the organization.

1.1.2 Asset Management Strategy

An asset management strategy outlines the translation of organizational objectives into asset management objectives and provides a strategic overview of the activities required to meet these objectives. It provides greater detail than the policy on how the Town plans to achieve asset management objectives through planned activities and decision-making criteria.

The Town's Asset Management Policy contains many of the key components of an asset management strategy and may be expanded on in future revisions or as part of a separate strategic document.

1.1.3 Asset Management Plan

The asset management plan (AMP) presents the outcomes of the Town's asset management program and identifies the resource requirements needed to achieve a defined level of service. The AMP typically includes the following content:

- State of Infrastructure
- Asset Management Strategies
- Levels of Service
- Financial Strategies

The AMP is a living document that should be updated regularly as additional asset and financial data becomes available. This will allow the Town to re-evaluate the state of infrastructure and identify how the organization's asset management and financial strategies are progressing.

1.2 Key Concepts in Asset Management

Effective asset management integrates several key components, including lifecycle management, risk management, and levels of service. These concepts are applied throughout this asset management plan and are described below in greater detail.

1.2.1 Lifecycle Management Strategies

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment. Asset deterioration has a negative effect on the ability of an asset to fulfill its intended function, and may be characterized by increased cost, risk and even service disruption.

To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

There are several field intervention activities that are available to extend the life of an asset. These activities can be generally placed into one of three categories: maintenance, rehabilitation and replacement. The following table provides a description of each type of activity and the general difference in cost.

Lifecycle Activity	Description	Example (Roads)	Cost
Maintenance	Activities that prevent defects or deteriorations from occurring	Crack Seal	$
Rehabilitation/ Renewal	Activities that rectify defects or deficiencies that are already present and may be affecting asset performance	Mill & Re-surface	$$
Replacement/ Reconstruction	Asset end-of-life activities that often involve the complete replacement of assets	Full Reconstruction	$$$

Depending on initial lifecycle management strategies, asset performance can be sustained through a combination of maintenance and rehabilitation, but at some point, replacement is required. Understanding what effect these activities will have on the lifecycle of an asset, and their cost, will enable staff to make better recommendations.

The Town's approach to lifecycle management is described within each asset category outlined in this AMP. Developing and implementing a proactive lifecycle strategy will help staff to determine which activities to perform on an asset and when they should be performed to maximize useful life at the lowest total cost of ownership.

1.2.2 Risk Management Strategies

Municipalities generally take a 'worst-first' approach to infrastructure spending. Rather than prioritizing assets based on their importance to service delivery, assets in the worst condition are fixed first, regardless of their criticality. However, not all assets are created equal. Some are more important than others, and their failure or disrepair poses more risk to the community than that of others. For example, a road with a high volume of traffic that provides access to critical services poses a higher risk than a low volume rural road. These high-value assets should receive funding before others.

By identifying the various impacts of asset failure and the likelihood that it will fail, risk management strategies can identify critical assets, and determine where maintenance efforts, and spending, should be focused.

This AMP includes a high-level evaluation of asset risk and criticality. Each asset has been assigned a probability of failure score and consequence of failure score based on available asset data. These risk scores can be used to prioritize maintenance, rehabilitation and replacement strategies for critical assets.

1.2.3 Levels of Service

A level of service (LOS) is a measure of what the Town is providing to the community and the nature and quality of that service. Within each asset category in this AMP, technical metrics and qualitative descriptions that measure both technical and community levels of service have been established and measured as data is available.

These measures include a combination of those that have been outlined in O. Reg. 588/17 in addition to performance measures identified by the Town as worth measuring and evaluating. The Town measures the level of service provided at two levels: Community Levels of Service, and Technical Levels of Service.

Community Levels of Service

Community levels of service are a simple, plain language description or measure of the service that the community receives. For core asset categories (roads, bridges and culverts, water, wastewater, stormwater) the Province, through O. Reg. 588/17, has provided qualitative descriptions that are required to be included in

this AMP. For non-core asset categories, the Town has determined the qualitative descriptions that will be used to determine the community level of service provided. These descriptions can be found in the Levels of Service subsection within each asset category.

Technical Levels of Service

Technical levels of service are a measure of key technical attributes of the service being provided to the community. These include mostly quantitative measures and tend to reflect the impact of the Town's asset management strategies on the physical condition of assets or the quality/capacity of the services they provide.

For core asset categories (roads, bridges and culverts, water, wastewater, stormwater) the Province, through O. Reg. 588/17, has provided technical metrics that are required to be included in this AMP.

Current and Proposed Levels of Service

This AMP focuses on measuring the current level of service provided to the community. Once current levels of service have been measured, the Town plans to establish proposed levels of service over a 10-year period, in accordance with O. Reg. 588/17.

Proposed levels of service should be realistic and achievable within the timeframe outlined by the Town. They should also be determined with consideration of a variety of community expectations, fiscal capacity, regulatory requirements, corporate goals and long-term sustainability. Once proposed levels of service have been established, and prior to July 2025, the Town must identify a lifecycle management and financial strategy which allows these targets to be achieved.

1.3 Ontario Regulation 588/17

As part of the *Infrastructure for Jobs and Prosperity Act, 2015*, the Ontario government introduced Regulation 588/17 - Asset Management Planning for Municipal Infrastructure (O. Reg 588/17). Along with creating better performing organizations, more liveable and sustainable communities, the regulation is a key, mandated driver of asset management planning and reporting. It places substantial emphasis on current and proposed levels of service and the lifecycle costs incurred in delivering them.

The diagram below outlines key reporting requirements under O. Reg 588/17 and the associated timelines.

2019

Strategic Asset Management Policy

2022

Asset Management Plan for Core Assets with the following components:

1. Current levels of service
2. Inventory analysis
3. Lifecycle activities to sustain LOS
4. Cost of lifecycle activities
5. Population and employment forecasts
6. Discussion of growth impacts

2024

Asset Management Plan for Core and Non-Core Assets (same components as 2022) and Asset Management Policy Update

2025

Asset Management Plan for All Assets with the following additional components:

1. Proposed levels of service for next 10 years
2. Updated inventory analysis
3. Lifecycle management strategy
4. Financial strategy and addressing shortfalls
5. Discussion of how growth assumptions impacted lifecycle and financial

1.3.1 O. Reg. 588/17 Compliance Review

The following table identifies the requirements outlined in Ontario Regulation 588/17 for municipalities to meet by July 1, 2022. Next to each requirement a page or section reference is included in addition to any necessary commentary.

Requirement	O. Reg. Section	AMP Section Reference	Status
Summary of assets in each category	S.5(2), 3(i)	4.1.1 - 5.2.1	Complete
Replacement cost of assets in each category	S.5(2), 3(ii)	4.1.1 - 5.2.1	Complete
Average age of assets in each category	S.5(2), 3(iii)	4.1.3 - 5.2.3	Complete
Condition of core assets in each category	S.5(2), 3(iv)	4.1.2 – 5.2.2	Complete
Description of municipality's approach to assessing the condition of assets in each category	S.5(2), 3(v)	4.1.2 – 5.2.2	Complete
Current levels of service in each category	S.5(2), 1(i-ii)	4.1.6 - 5.2.6	Complete for Core Assets Only
Current performance measures in each category	S.5(2), 2	4.1.6 - 5.2.6	Complete for Core Assets Only
Lifecycle activities needed to maintain current levels of service for 10 years	S.5(2), 4	4.1.4 - 5.2.4	Complete
Costs of providing lifecycle activities for 10 years	S.5(2), 4	Appendix B	Complete
Growth assumptions	S.5(2), 5(i-ii) S.5(2), 6(i-vi)	6.1-6.2	Complete

2 Scope and Methodology

Key Insights

- This asset management plan includes 5 asset categories and is divided between tax-funded and rate-funded categories
- The source and recency of replacement costs impacts the accuracy and reliability of asset portfolio valuation
- Accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life

2.1 Asset Categories Included in this AMP

This asset management plan for the Town of Kirkland Lake is produced in compliance with Ontario Regulation 588/17. The July 2022 deadline under the regulation—the first of three AMPs—requires analysis of only core assets (roads, bridges and culverts, water, wastewater, and stormwater).

The AMP summarizes the state of the infrastructure for the Town's asset portfolio, establishes current levels of service and the associated technical and customer oriented key performance indicators (KPIs), outlines lifecycle strategies for optimal asset management and performance, and provides financial strategies to reach sustainability for the asset categories listed below.

Asset Category	Source of Funding
Road Network	Tax Levy
Bridges & Culverts	
Storm Water Network	
Water Network	User Rates
Sanitary Sewer Network	

2.2 Deriving Replacement Costs

There are a range of methods to determine the replacement cost of an asset, and some are more accurate and reliable than others. This AMP relies on two methodologies:

- **User-Defined Cost and Cost/Unit**: Based on costs provided by municipal staff which could include average costs from recent contracts; data from engineering reports and assessments; staff estimates based on knowledge and experience
- **Cost Inflation/CPI Tables**: Historical cost of the asset is inflated based on Consumer Price Index or Non-Residential Building Construction Price Index

User-defined costs based on reliable sources are a reasonably accurate and reliable way to determine asset replacement costs. Cost inflation is typically used in the absence of reliable replacement cost data. It is a reliable method for recently purchased and/or constructed assets where the total cost is reflective of the actual

costs that the Town incurred. As assets age, and new products and technologies become available, cost inflation becomes a less reliable method.

2.3 Estimated Useful Life and Service Life Remaining

The estimated useful life (EUL) of an asset is the period over which the Town expects the asset to be available for use and remain in service before requiring replacement or disposal. The EUL for each asset in this AMP was assigned according to the knowledge and expertise of municipal staff and supplemented by existing industry standards when necessary.

By using an asset's in-service data and its EUL, the Town can determine the service life remaining (SLR) for each asset. Using condition data and the asset's SLR, the Town can more accurately forecast when it will require replacement. The SLR is calculated as follows:

$$Service\ Life\ Remaining\ (SLR) = In\ Service\ Date + Estimated\ Useful\ Life(EUL) - Current\ Year$$

2.4 Reinvestment Rate

As assets age and deteriorate they require additional investment to maintain a state of good repair. The reinvestment of capital funds, through asset renewal or replacement, is necessary to sustain an adequate level of service. The reinvestment rate is a measurement of available or required funding relative to the total replacement cost.

By comparing the actual vs. target reinvestment rate the Town can determine the extent of any existing funding gap. The reinvestment rate is calculated as follows:

$$Target\ Reinvestment\ Rate = \frac{Annual\ Capital\ Requirement}{Total\ Replacement\ Cost}$$

$$Actual\ Reinvestment\ Rate = \frac{Annual\ Capital\ Funding}{Total\ Replacement\ Cost}$$

2.5 Deriving Asset Condition

An incomplete or limited understanding of asset condition can mislead long-term planning and decision-making. Accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life.

A condition assessment rating system provides a standardized descriptive framework that allows comparative benchmarking across the Town's asset portfolio. The table below outlines the condition rating system used in this AMP to determine asset condition. This rating system is aligned with the Canadian Core Public Infrastructure Survey which is used to develop the Canadian Infrastructure Report Card. When assessed condition data is not available, service life remaining is used to approximate asset condition.

Condition	Description	Criteria	Service Life Remaining (%)
Very Good	Fit for the future	Well maintained, good condition, new or recently rehabilitated	80-100
Good	Adequate for now	Acceptable, generally approaching mid-stage of expected service life	60-80
Fair	Requires attention	Signs of deterioration, some elements exhibit significant deficiencies	40-60
Poor	Increasing potential of affecting service	Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	20-40
Very Poor	Unfit for sustained service	Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable	0-20

The analysis in this AMP is based on assessed condition data only as available. In the absence of assessed condition data, asset age is used as a proxy to determine asset condition. Appendix E includes additional information on the role of asset condition data and provides basic guidelines for the development of a condition assessment program.

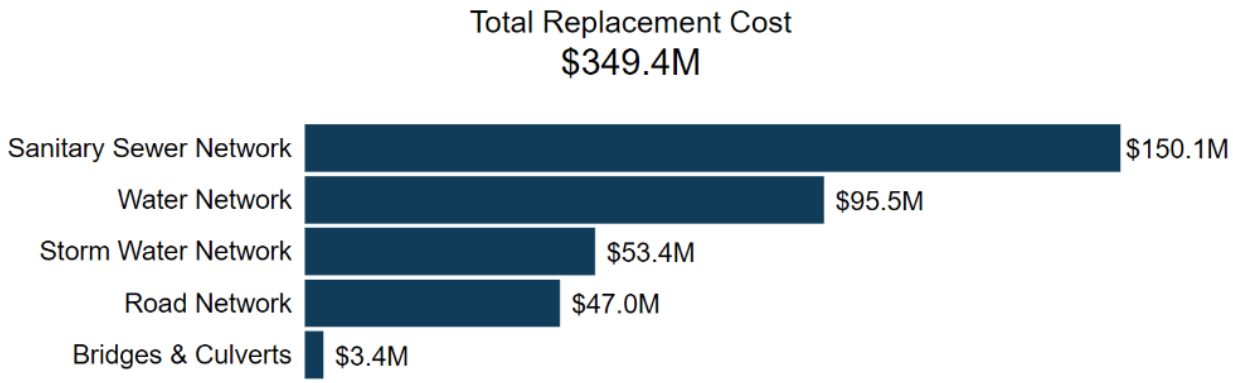
3 Portfolio Overview

Key Insights

- The total replacement cost of the Town's asset portfolio is $349.4 million
- The Town's target re-investment rate is 2.07%, and the actual re-investment rate is 0.71%, contributing to an expanding infrastructure deficit
- 52% of all assets are in fair or better condition
- 37% of assets are projected to require replacement in the next 10 years
- Average annual capital requirements total $7.2 million per year across all assets

3.1 Total Replacement Cost of Asset Portfolio

The asset categories analyzed in this AMP have a total replacement cost of $349 million based on inventory data from 2020. This total was determined based on a combination of user-defined costs and historical cost inflation. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today.

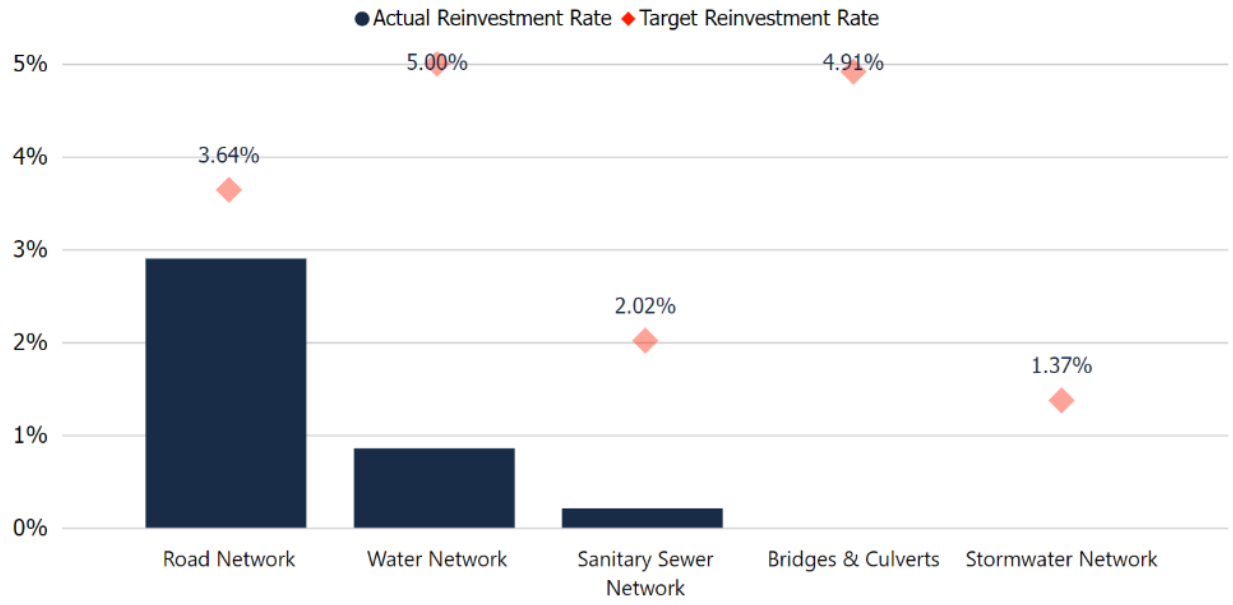


The following table identifies the methods employed to determine replacement costs across each asset category:

Asset Category	Replacement Cost Method	
	User-Defined	Notes
Road Network	90.6%	Roads, curbs, and streetlights are defined by unit costs
Bridges & Culverts	47.8%	User-defined replacement costs and unit costs for select bridges are from the Ontario Structural Inspection Manual (OSIM) report and unit costs are provided for the pedestrian bridges
Storm Water Network	87.7%	Unit costs are provided for most storm sewerlines and all manholes
Water Network	39.9%	Unit Costs are provided for most waterlines and all hydrants
Sanitary Sewer Network	54.3%	Unit costs are provided for most sanitary sewerlines and all manholes
Overall	**58.1%**	

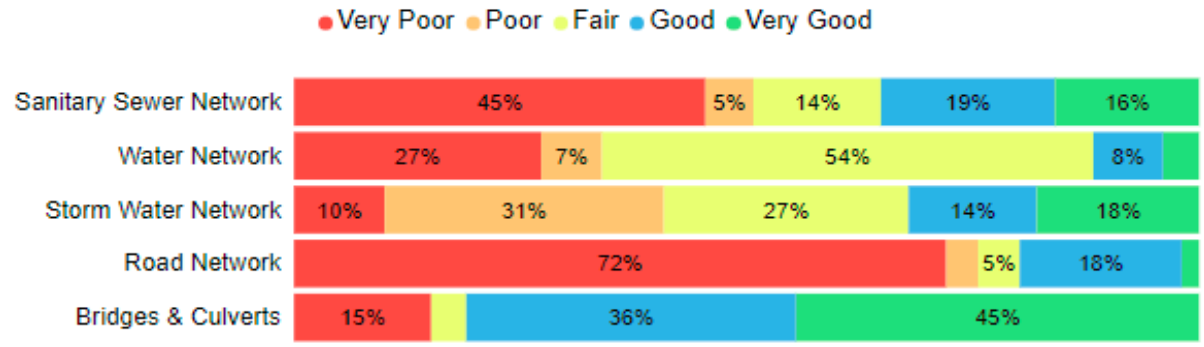
3.2 Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing target vs actual reinvestment rate. To meet the long-term replacement needs, the Town should be allocating approximately $7.2 million annually, for a target reinvestment rate of 2.07%. Actual annual spending on infrastructure totals approximately $2.5 million, for an actual reinvestment rate of 0.71%.



3.3 Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 52% of assets in Kirkland Lake are in fair or better condition. This estimate relies on age-based condition data for 99% of the asset inventory.



This AMP relies on assessed condition data for 1% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

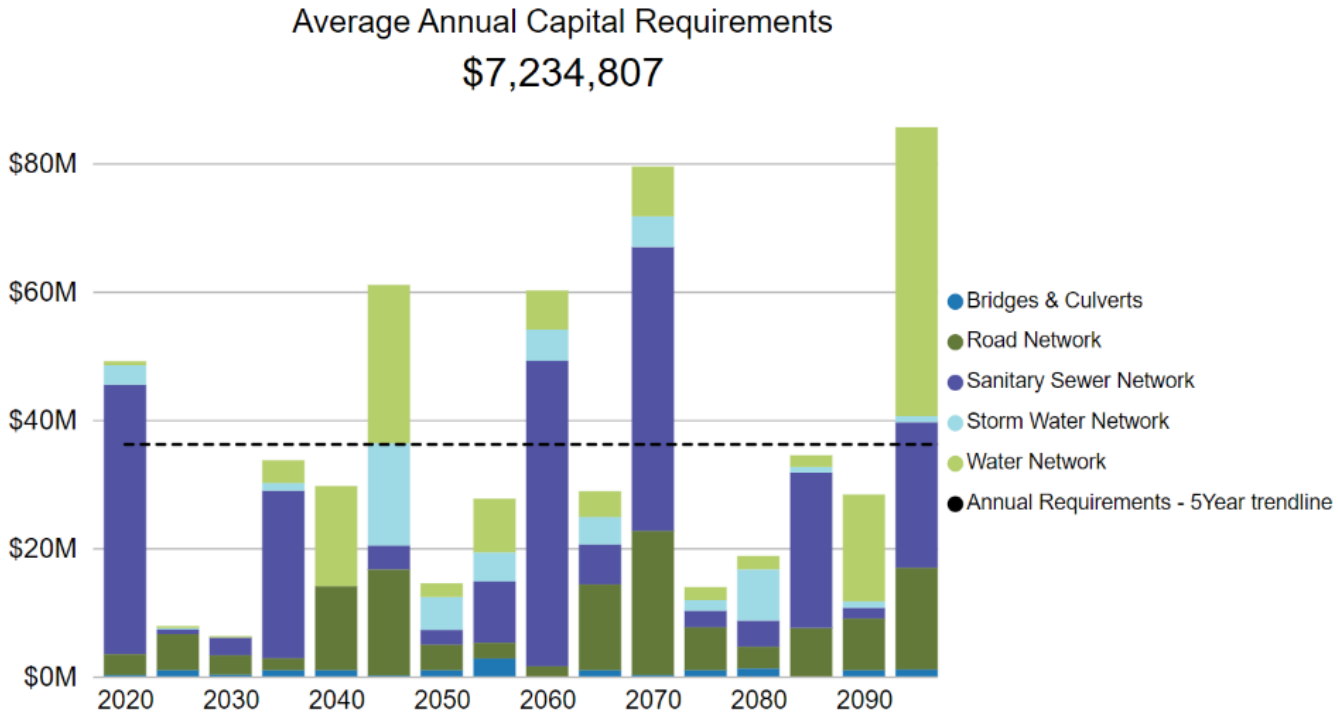
Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Road Network	Paved Roads	Age-Based	N/A
Bridges & Culverts	Bridges & Pedestrian Bridges	100%	2019 OSIM Report and Staff Estimate
	Culverts	Age-Based	N/A
Storm Water Network	All	Age-Based	N/A
Land Improvements	All	Age-Based	N/A
Water Network	All	Age-Based	N/A
Sanitary Sewer Network	All	Age-Based	N/A

3.4 Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 37% of the Town's assets will require replacement within the next 10 years. Capital requirements over the next 10 years are identified in Appendix B.

3.5 Forecasted Capital Requirements

The development of a long-term capital forecast should include both asset rehabilitation and replacement requirements. With the development of asset-specific lifecycle strategies that include the timing and cost of future capital events, the Town can produce an accurate long-term capital forecast. The following graph identifies capital requirements over the next 80 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



4 Analysis of Tax-funded Assets

Key Insights

- Tax-funded assets are valued at $103.8 million
- 44% of tax-funded assets are in fair or better condition
- The average annual capital requirement to sustain the current level of service for tax-funded assets is approximately $2.6 million
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

4.1 Road Network

The road network is a critical component of the provision of safe and efficient transportation services and represents a high value asset category in the Town's asset portfolio. It includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure including sidewalks, curbs, traffic signals, and streetlights.

The Town's roads and sidewalks are maintained by the Public Works department who is also responsible for winter maintenance such as ice control and snow removal operations.

The state of the infrastructure for the road network is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$47 million	Very Poor (19%)	Annual Requirement:	$1,710,000
		Funding Available:	$1,362,000
		Annual Deficit:	$348,000

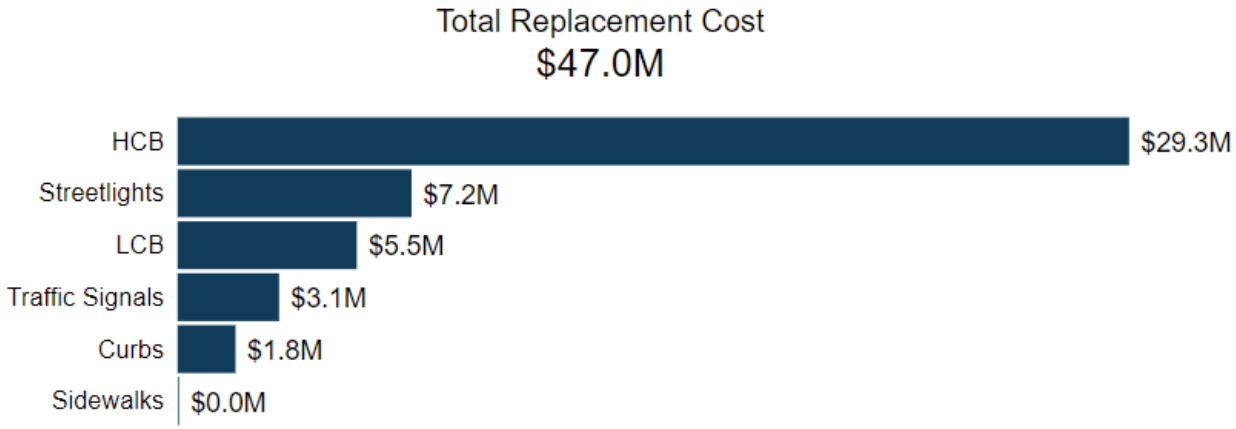
The following core values and level of service statements are a key driving force behind the Town's asset management planning:

Service Attribute	Level of Service Statement
Scope	The road network service is conveniently accessible to the whole community in sufficient capacity (meets traffic demands) and is available under all weather conditions.
Quality	The road network is in very poor condition but experiences minimal unplanned service interruptions and road closures.

4.1.1 Asset Inventory & Costs

The table below includes the quantity, total replacement cost and annual capital requirements of each asset segment in the Town's road network inventory.

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Curbs	22,304 m	$1,784,320	$35,686
HCB	47,006 m	$29,316,033	$980,098
LCB	9,001 m	$5,521,424	$280,284
Sidewalks	1	$6,632	$133
Streetlights	1030	$7,210,000	$288,400
Traffic Signals	8	$3,127,411	$125,096
Total		**$46,965,820**	**$1,709,697**



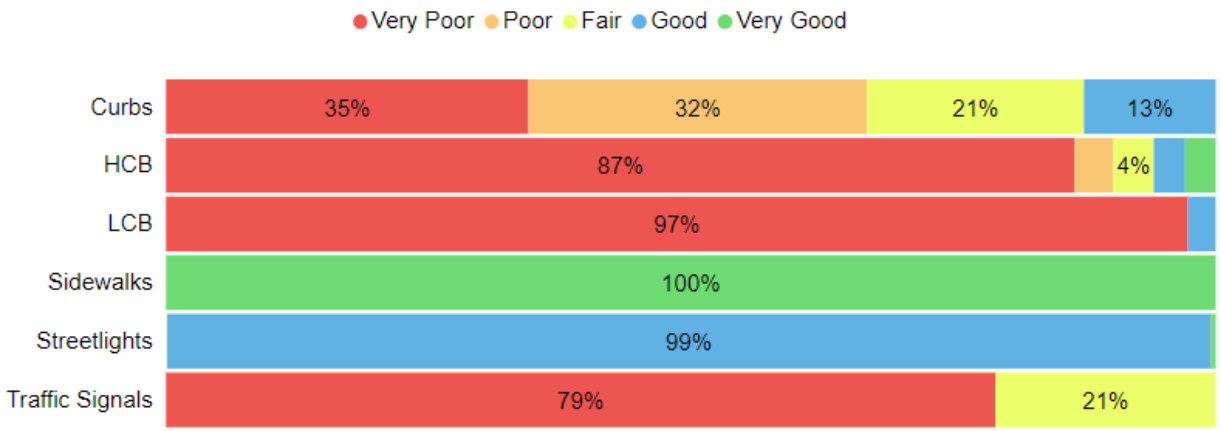
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

4.1.2 Asset Condition & Age

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Curbs	50	38.1	31% (Poor)
HCB	50	58.9	8% (Very Poor)
LCB	50	37.3	2% (Very Poor)
Sidewalks	50	2.5	95% (Very Good)
Streetlights	25	7.2	76% (Good)
Traffic Signals	25	29.0	9% (Very Poor)
Average		**50.8**	19% (Very Poor)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor.



To ensure that the Town's road network continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation, and replacement activities is required to increase the overall condition of the roads.

Each asset's estimated useful life should also be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Town's current approach:

- Municipal staff conduct ad-hoc visual condition assessments of roads, curbs, sidewalks and street appurtenances. Staff will take note of deficiencies to inform maintenance and rehabilitation activities.
- The Town conducted a StreetScan road assessment in the fall of 2021 to gather accurate condition on all municipal roads. The information from the assessment will be used to inform capital planning.

In this AMP the following rating criteria is used to determine the current condition of road segments and forecast future capital requirements:

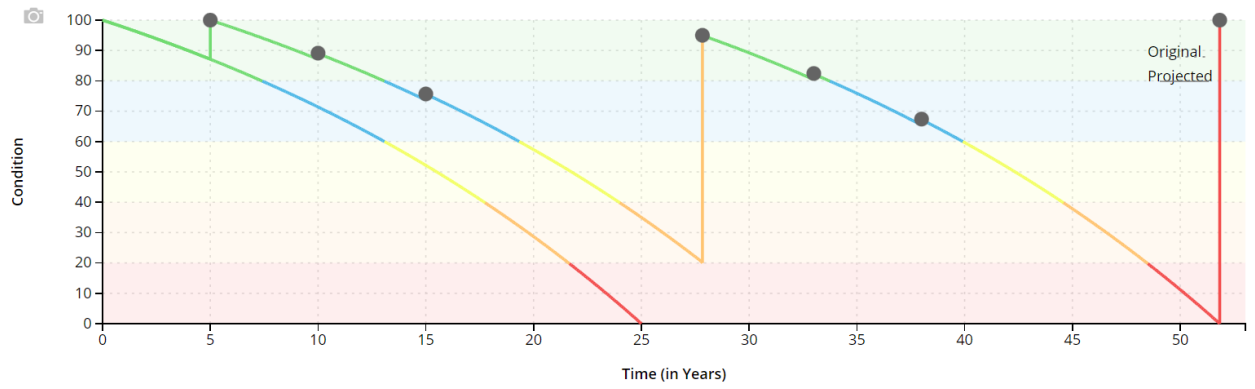
Condition	Rating
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

4.1.3 Lifecycle Management Strategy

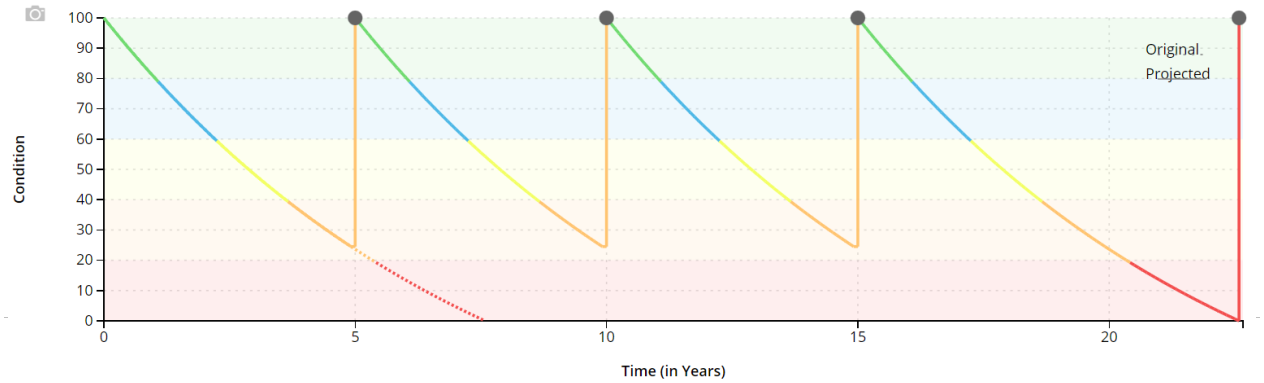
The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment.

The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of LCB and HCB roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost.

Paved Roads (HCB)		
Event Name	**Event Class**	**Event Trigger**
Crack Sealing	Maintenance	10, 15, 33, 38 Years
Slurry Seal	Maintenance	5 Years
Single Mill and Pave	Rehabilitation	20% Condition
Full Reconstruction	Replacement	End of Life (51 Years)



Paved Roads (LCB)		
Event Name	**Event Class**	**Event Trigger**
Single Surface Treatment	Rehabilitation	Every 5 Years only 3 Times
Full Reconstruction	Replacement	End of Life (22 Years)



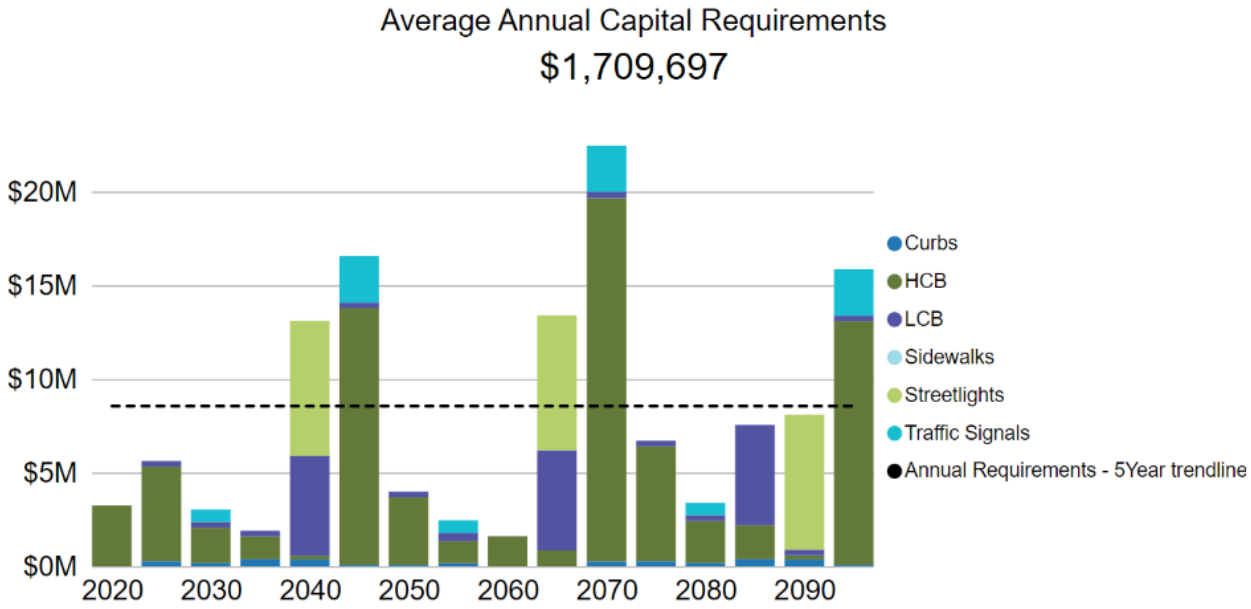
The following table outlines the Town's current lifecycle management strategies that are not defined by the above strategies.

Activity Type	Description of Current Strategy
Maintenance	Maintenance activities include winter maintenance such as snow removal and sand for ice removal on roads and sidewalks as needed. Gravel roads are graded on a monthly basis and new gravel is added as needed. Street and sidewalk sweeping takes place on an annual basis.
Renewal/ Replacement	Replacement activities are prioritized based on asset condition and health and safety risks.

Forecasted Capital Requirements

Based on the lifecycle strategies identified previously for HCB and LCB roads, and assuming the end-of-life replacement of all other assets in this category, the following graph forecasts capital requirements for the road network.

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 80 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

4.1.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix D for the criteria used to determine the risk rating of each asset.

This is a high-level model developed for the purposes of this AMP and Town staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of the road network are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)

The identification of critical assets allows the Town to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Town is currently facing:

Aging Infrastructure & Capital Funding

In addition to an existing backlog, a large portion of the road network is reaching the end of its useful life. The Town does not have sufficient funding to address the backlog and aging roads. Staff plan to pivot from build/replace strategy towards the implementation of a proactive maintenance and capital rehabilitation strategy to extend the service life of structures at a lower cost. Furthermore, a long-term capital funding strategy can help prevent deferral of necessary capital works.

Community Expectations

Staff have difficulty meeting public expectations as it relates to road condition. Since the majority of taxes go towards funding the road network, users expect driving conditions to be improved. Staff will need to balance meeting expectations of users against prioritizing a critical backlog.

Organizational Knowledge

The Town has noted a concern related to organizational capacity and knowledge. Staff turnover has resulted in a loss of historical knowledge and an emphasis on training for new staff members. Operations and maintenance activities will be delivered more efficiently with time as staff gain more experience.

4.1.5 Levels of Service

The following tables identify the Town's current level of service for the road network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Town has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the road network.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Appendix C
Quality	Description or images that illustrate the different levels of road class pavement condition	Very Poor (0-20): Widespread signs of deterioration. Requires remedial work to bring road up to standard. Service is affected Poor (20-40): Large portions of road exhibiting deterioration with rutting, potholes, distortions, longitude, and lateral cracking. Road is mostly below standard. Fair (40-60): Some sections of road starting to deteriorate. Requires some remedial work and surface upgrade in near future. Good (60-80): Road is in overall good condition. Few sections are starting to show signs of minimal deterioration. Very Good (80-100): Road is well maintained and in excellent condition. Surface was newly or recently upgraded. No signs of deterioration or remedial work required.

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the road network.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	0
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	0.22
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	0.8
Quality	Average pavement condition index for paved roads in the municipality	HCB: 8% LCB: 2%
	Average surface condition for unpaved roads in the municipality (e.g. excellent, good, fair, poor)	Good
Performance	Capital reinvestment rate	2.9%

4.1.6 Recommendations

Asset Inventory

- Review the sidewalk, streetlights, and traffic signals in the inventory to determine whether all municipal assets within these asset segments have been accounted for.
- The sidewalk inventory includes 1 pooled asset that should be broken into discrete segments to allow for detailed planning and analysis. The streetlights and traffic signals also include several pooled assets that should be segmented.

Condition Assessment Strategies

- Upload condition assessment information from the 2021 StreetScan into Citywide to enable the delivery of effective lifecycle strategies and guide capital planning.
- Consider adopting an assessment schedule for all roads on a 5-year cycle.

Lifecycle Management Strategies

- Implement the identified lifecycle management strategies for HCB and LCB roads to realize potential cost avoidance and maintain a high quality of road pavement condition.
- Evaluate the efficacy of the Town’s lifecycle management strategies at regular intervals to determine the impact cost, condition and risk.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the Town believes to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

4.2 Bridges & Culverts

Bridges and culverts represent a critical portion of the transportation services provided to the community. The Department of Public Works is responsible for the maintenance of all bridges and culverts located across municipal roads with the goal of keeping structures in an adequate state of repair and minimizing service disruptions.

The state of the infrastructure for bridges and culverts is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$3.5 million	Good (60%)	Annual Requirement:	$169,000
		Funding Available:	$0
		Annual Deficit:	$169,000

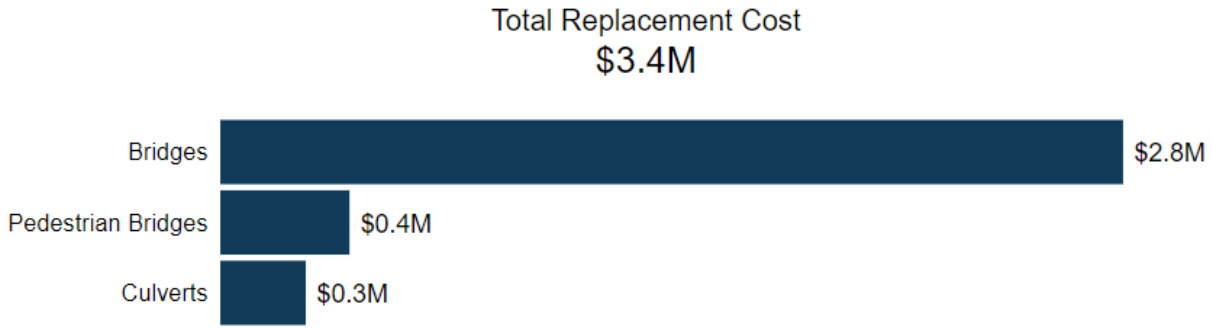
The following core values and level of service statements are a key driving force behind the Town's asset management planning:

Service Attribute	Level of Service Statement
Scope	Bridges and culverts are accessible to the community in sufficient capacity (meets traffic demands) and are available under all weather conditions. Only 1 of the structural bridges in the Town a lane restriction.
Quality	The bridges and culverts are in good condition with minimal unplanned service interruptions and closures.

4.2.1 Asset Inventory & Costs

The table below includes the quantity, total replacement cost and annual capital requirements of each asset segment in the Town's bridges and culverts inventory.

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Bridges	3	$2,786,200	$156,229
Culverts	5	$263,905	$5,278
Pedestrian Bridges	2	$398,750	$7,975
Total		**$3,448,855**	**$169,483**



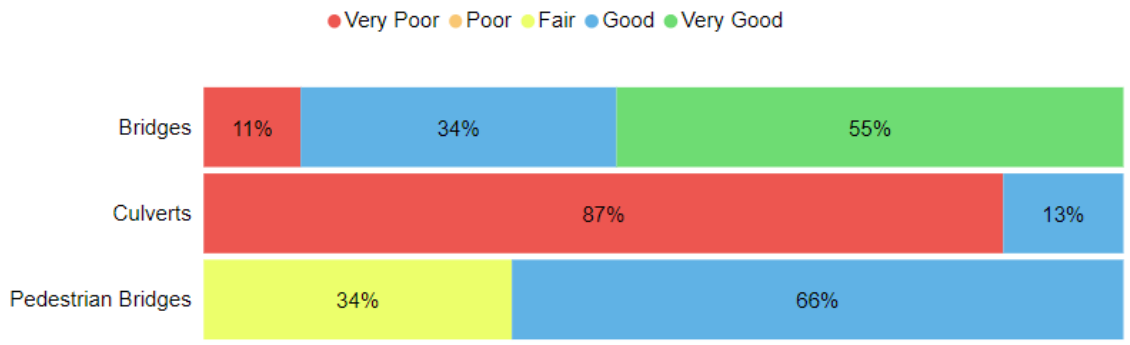
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

4.2.2 Asset Condition & Age

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Bridges	8 - 50	40.5	64% (Good)
Culverts	50	43.4	10% (Very Poor)
Pedestrian Bridges	50	50.0	65% (Good)
Average		43.8	60% (Good)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



To ensure that the Town's Bridges & Culverts continue to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation, and replacement activities is required to increase the overall condition of the bridges and culverts.

Each asset's Estimated Useful Life should also be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Town's current approach:

- Condition assessments of all bridges and culverts with a span greater than or equal to 3 meters are completed every 2 years in accordance with the Ontario Structure Inspection Manual (OSIM).
- Municipal staff conduct ad-hoc visual condition assessments on bridges, culverts, and pedestrian bridges. Staff will take note of deficiencies to inform maintenance and capital planning.

In this AMP, the following rating criteria is used to determine the current condition of bridges and culverts and forecast future capital requirements:

Condition	Rating
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

4.2.3 Lifecycle Management Strategy

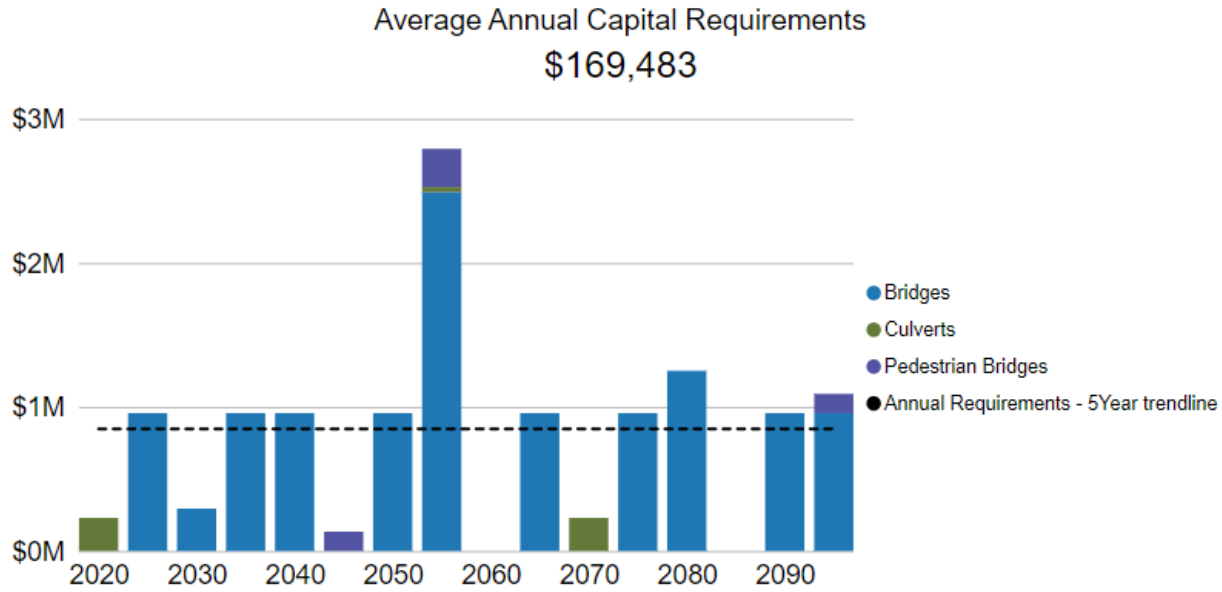
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following table outlines the Town's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance, Rehabilitation and Replacement	All lifecycle activities are driven by the results of mandated structural inspections competed according to the Ontario Structure Inspection Manual (OSIM)
Inspection	The most recent inspection report was completed in 2019 by Keystone Bridge Management Corporation

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 80 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

4.2.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix D for the criteria used to determine the risk rating of each asset.

This is a high-level model developed for the purposes of this AMP and Town staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of bridges and culverts are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)

The identification of critical assets allows the Town to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Town is currently facing:

Aging Infrastructure & Capital Funding

In addition to an existing backlog, a large portion of the bridges and culverts are reaching the end of its useful life. The Town does not have sufficient funding to address the backlog and aging assets. Major capital rehabilitation and replacement projects are often entirely dependant on the availability of grant funding opportunities. When grants are not available, rehabilitation and replacement projects may be deferred. An annual capital funding strategy could reduce dependency on grant funding and help prevent deferral of capital works.

Community Expectations & Regulatory Requirements

Staff have difficulty meeting public expectations as it relates to bridge accessibility. The Town has considered decommissioning some bridges in the interest of saving money and remaining compliant with regulatory requirements, however, the public is not susceptible to these options as it may impact the connectivity of the transportation system. Staff continue to prioritize regulatory compliance and are seeking to consult with the public to find an economically efficient solution.

4.2.5 Levels of Service

The following tables identify the Town's current level of service for bridges and culverts. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Town has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by bridges and culverts.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	Bridges and structural culverts are a key component of the municipal transportation network. None of the Town's structures have loading or dimensional restrictions meaning that most types of vehicles, including heavy transport, motor vehicles, emergency vehicles and cyclists can cross them without restriction.
Quality	Description or images of the condition of bridges and culverts and how this would affect use of the bridges and culverts	See Appendix C

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by bridges and culverts.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of bridges in the Town with loading or dimensional restrictions	33%
Quality	Average bridge condition index value for bridges in the Town	64%
	Average bridge condition index value for culverts in the Town	10%
	Average bridge condition index value for pedestrian bridges in the Town	65%
Performance	Capital re-investment rate	0%

4.2.6 Recommendations

Data Review/Validation

- Continue to review and validate inventory data, assessed condition data and replacement costs for all bridges and structural culverts upon the completion of OSIM inspections every 2 years.

Condition Assessment

- Consider a condition assessment program for culverts, as these structures are not covered in the OSIM inspection process. More accurate culvert information will help the Town prioritize capital work related to bridges and culverts.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Consider the risks associated with proactive closure of old structures to reduce future maintenance requirements.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Lifecycle Management Strategies

- This AMP only includes capital costs associated with the reconstruction of bridges and culverts. The Town should work towards identifying projected capital rehabilitation and renewal costs for bridges and culverts and integrating these costs into long-term planning.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the Town believe to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

4.3 Storm Water Network

The Town is responsible for owning and maintaining a storm water network of 65 km of storm sewerlines and numerous catch basins and manholes.

Staff are working towards improving the accuracy and reliability of their storm water network inventory to assist with long-term asset management planning.

The state of the infrastructure for the storm water network is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$53.4 million	Fair (48%)	Annual Requirement:	$733,000
		Funding Available:	$0
		Annual Deficit:	$733,000

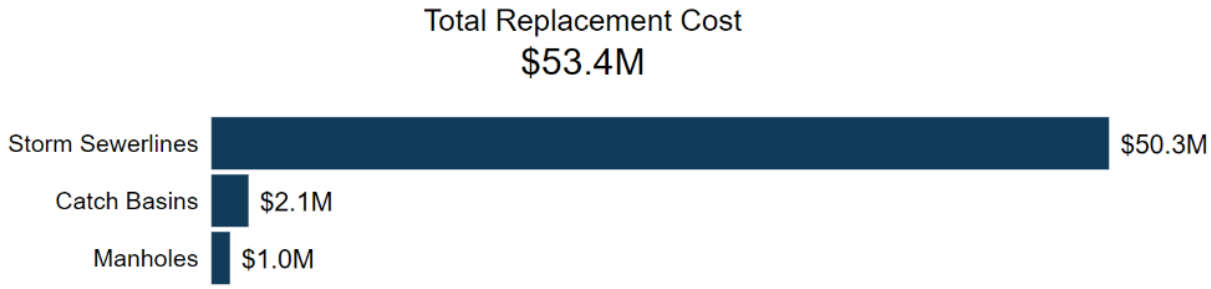
The following core values and level of service statements are a key driving force behind the Town's asset management planning:

Service Attribute	Level of Service Statement
Scope	The storm water network service is conveniently accessible to the whole community in sufficient capacity and is available under all weather conditions.
Quality	The storm water network is in fair condition with minimal unplanned service interruptions and flooding.

4.3.1 Asset Inventory & Costs

The table below includes the quantity, total replacement cost and annual capital requirements of each asset segment in the Town's storm water network inventory.

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Catch Basins	765	$2,077,039	$41,541
Manholes	261	$1,044,000	$20,880
Storm Sewerlines	64,984 m	$50,295,776	$670,610
Total		**$53,416,815**	**$733,031**



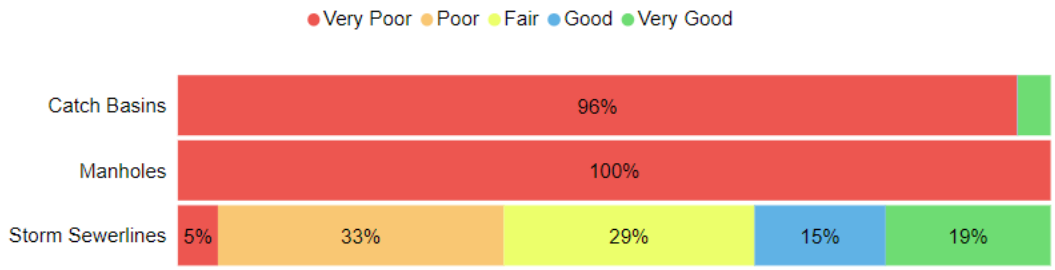
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

4.3.2 Asset Condition & Age

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Catch Basins	50	29.5	3% (Very Poor)
Manholes	50	50.0	0% (Very Poor)
Storm Sewerlines	75	37.3	51% (Fair)
Average		**37.3**	48% (Fair)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor.



To ensure that the Town's storm water network continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the storm water network.

Each asset's estimated useful life should also be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Town's current approach:

- There are no formal condition assessment programs in place for the storm water network
- Ah-hoc visual assessments are conducted on manholes and catch basins and deficiencies are noted to inform capital planning.

In this AMP the following rating criteria is used to determine the current condition of road segments and forecast future capital requirements:

Condition	Rating
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

4.3.3 Lifecycle Management Strategy

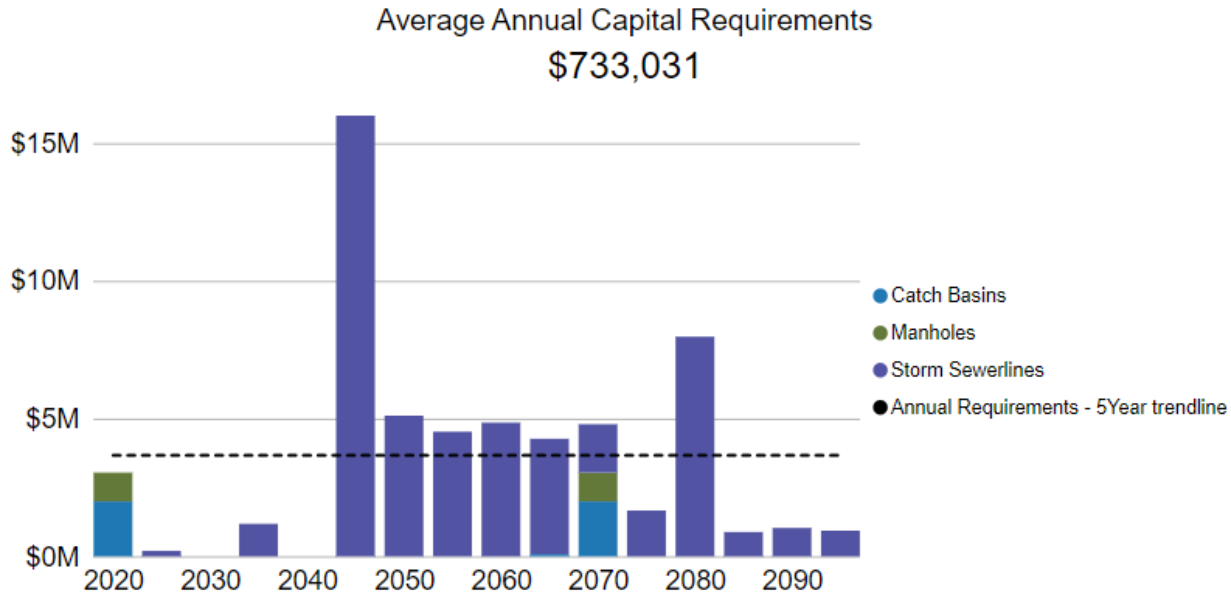
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following table outlines the Town's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Primary activities include catch basin cleaning and storm main flushing, but only a small percentage of the entire network is completed per year.
	CCTV inspections and storm sewerline cleaning is completed as budget becomes available and this information is used to drive forward rehabilitation and replacement plans.
Rehabilitation	Trenchless re-lining has the potential to reduce total lifecycle costs but would require a formal condition assessment program to determine viability.
Replacement	Without the availability of up-to-date condition assessment information replacement activities are mostly reactive in nature.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 80 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements. Approximately one third of storm sewerlines were installed between 1971 and 1975, creating a capital renewal spike in 2045-2050. This spike may be flattened as staff distribute the work over time.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

4.3.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix D for the criteria used to determine the risk rating of each asset.

This is a high-level model developed for the purposes of this AMP and Town staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of the storm water network are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost

The identification of critical assets allows the Town to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Town is currently facing:

Infrastructure Design

Staff have identified a number of pipes that are undersized, resulting in occasional backups and flooding. The Town does not have sufficient funding to address the aging assets and pipe upgrades that are needed. An annual capital funding strategy could reduce dependency on grant funding and help prevent deferral of capital works.

Extreme Weather

The Town experiences backups and flooding during extreme events and the months of Spring. The storm system does not have sufficient capacity to withstand a surge of stormwater, which can contribute to an increased deterioration/failure of the storm assets. Staff have identified problem areas and are planning to install large pipes to manage the waterflow.

4.3.5 Levels of Service

The following tables identify the Town's current level of service for the storm water network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Town has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the storm water network.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include map, of the user groups or areas of the municipality that are protected from flooding, including the extent of protection provided by the municipal stormwater system	See Appendix C

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the storm water network.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties in municipality resilient to a 100-year storm	50%[1]
	% of the municipal stormwater management system resilient to a 5-year storm	85%[2]
Performance	Capital reinvestment rate	0%

[1] This is based on the observations of municipal staff.
[2] This is based on the observations of municipal staff.

4.3.6 Recommendations

Asset Inventory

- Review the catch basins and manholes in the inventory to determine whether all municipal assets within these asset segments have been accounted for.
- The manholes include 1 pooled asset that should be further segmented to allow for improved location markers and lifecycle strategies. The catch basins also include several pooled assets that should be segmented.

Condition Assessment Strategies

- The development of a comprehensive inventory should be accompanied by a system-wide assessment of the condition of all assets in the storm water network through CCTV inspections.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Lifecycle Management Strategies

- Document and review lifecycle management strategies for the storm water network on a regular basis to achieve the lowest total cost of ownership while maintaining adequate service levels.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the Town has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

5 Analysis of Rate-funded Assets

Key Insights

- Rate-funded assets are valued at $245.6 million
- 56% of rate-funded assets are in fair or better condition
- The average annual capital requirement to sustain the current level of service for rate-funded assets is approximately $1.1 million
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

5.1 Water Network

The water services provided by the Town are managed and operated by OCWA (Ontario Clean Water Agency) and municipal staff. The Town is responsible for almost 104 km of waterlines and OCWA manages the water treatment plant and pump stations.

The state of the infrastructure for the water network is summarized in the following table:

Replacement Cost	Condition	Financial Capacity	
$95.5 million	Poor (38%)	Annual Requirement:	$1,596,000
		Funding Available:	$818,000
		Annual Deficit:	$778,000

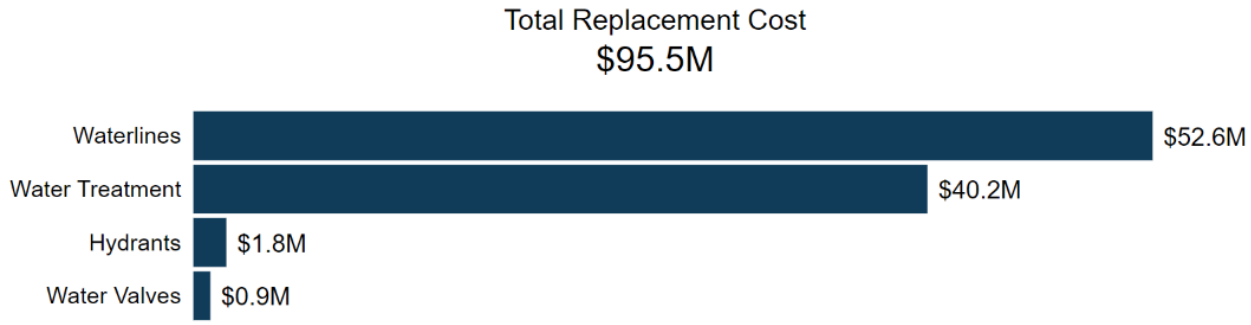
The following core values and level of service statements are a key driving force behind the Town's asset management planning:

Service Attribute	Level of Service Statement
Scope	The Municipal water is conveniently accessible to 82% of the community in sufficient capacity (does not exceed maximum use). The Municipal fire flow system is accessible to 24% of the community in sufficient capacity.
Quality/Reliability	The water network is in poor condition but with minimal unplanned service interruptions due to main breaks and boil water advisories.

5.1.1 Asset Inventory & Costs

The table below includes the quantity, replacement cost method, and annual capital requirements of each asset segment in the Town's water network inventory.

Asset Segment	Quantity (Component)	Replacement Cost	Annual Capital Requirement
Hydrants	201	$1,809,000	$36,180
Water Treatment	20[3]	$40,222,123	$840,280
Water Valves	1,636	$935,889	$18,718
Waterlines	103,564 m	$52,555,380	$700,738
Total		**$95,522,392**	**$1,595,916**



Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

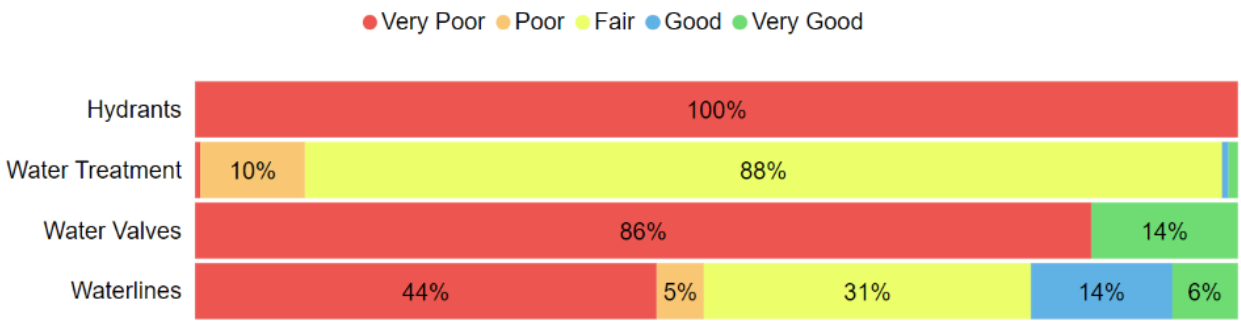
[3] The water treatment system contains 20 components, which include the water treatment plant, chlorine booster station, a high lift pump station, and associated wells, pumps and equipment.

5.1.2 Asset Condition & Age

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost. While the treatment system is in fair condition, the majority of the linear distribution system is nearing the end of its service life.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Hydrants	50	70.0	0% (Very Poor)
Water Treatment	10 - 50	13.1	47% (Fair)
Water Valves	50	36.4	13% (Very Poor)
Waterlines	75	54.3	33% (Poor)
Average		**53.4**	38% (Poor)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



To ensure that the Town's water network continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the water network.

Each asset's Estimated Useful Life should also be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Town's current approach:

- There are no formal condition assessment programs in place for the linear water network, assets are assessed as needed.
- The water treatment plant is assessed by OCWA staff in accordance with Drinking Water Quality Management Standard (DWQMS).
- Fire hydrants are assessed in accordance with the National Fire Protection Association (NFPA) procedures.
- Staff primarily rely on the age and material of water mains to determine the projected condition of water mains.

In this AMP the following rating criteria is used to determine the current condition of water network assets and forecast future capital requirements:

Condition	Rating
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

5.1.3 Lifecycle Management Strategy

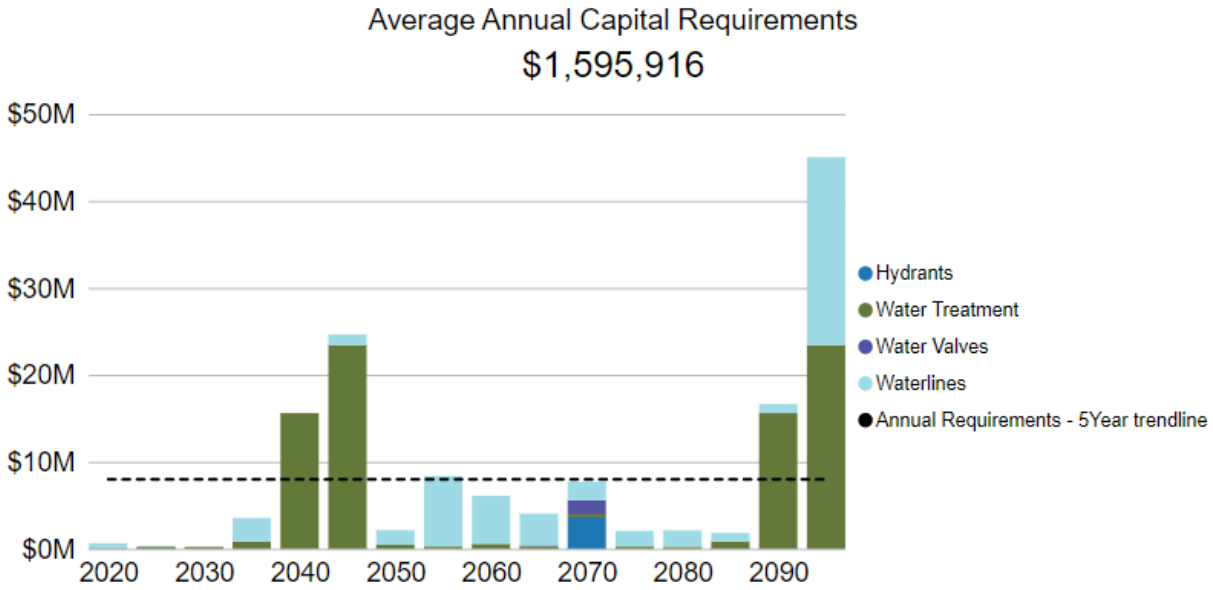
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following table outlines the Town's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Main flushing and valve exercising are completed on 100% of the network twice per year using in-house resources.
Rehabilitation	Trenchless re-lining of water mains presents significant challenges and is not always a viable option.
Replacement	In the absence of mid-lifecycle rehabilitative events, most mains are simply maintained with the goal of full replacement once it reaches its end-of-life.
	Replacement activities are identified based on an analysis of the main break rate as well as any issues identified during regular maintenance activities.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 80 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

5.1.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix D for the criteria used to determine the risk rating of each asset.

This is a high-level model developed for the purposes of this AMP and Town staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of the water network are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)

The identification of critical assets allows the Town to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Town is currently facing:

Aging Infrastructure & Design

A large portion of the water network is reaching the end of its useful life. The metal pipes that are part of the system are more susceptible to sudden breaks, corroding, and clogging. The Town is seeking to identify old metal pipes for replacement as part of long-term capital planning.

Extreme Weather

The region experiences extremely cold weather which can result in main breaks. Furthermore, a higher frequency of freeze-thaw cycles can damage underground infrastructure and contribute to increased deterioration of assets. Staff have determined that the installation of new plastic pipes may reduce the impact of extremely cold weather.

5.1.5 Levels of Service

The following tables identify the Town's current level of service for water network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Town has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by water network.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	See Appendix C
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	See Appendix C
Reliability	Description of boil water advisories and service interruptions	The Municipality experienced 1 boil water advisory 2020 that lasted 1 day. In the case of a boil water advisory, the Town follows Ontario's DWQMS and delivers a boil water advisory notice to affected households.

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the water network.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal water system	82%
	% of properties where fire flow is available	24%
Reliability	# 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	1
	# of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal water system	0.03
Performance	Capital re-investment rate	0.51%

5.1.6 Recommendations

Asset Inventory

- Review the waterlines, hydrants, and water valves in the inventory to determine whether all municipal assets within these asset segments have been accounted for.
- The hydrant inventory includes 1 pooled asset that should be broken into discrete segments to allow for detailed planning and analysis. The water valves also include several pooled assets that should be segmented.
- Review the water treatment assets to ensure the full scope of treatment assets are included in the inventory.
- Several upgrades were performed on the water treatment assets. Staff should review the inventory and update condition values to reflect the impact of upgrades.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk water network assets.
- It can be challenging to gather assessed condition for watermains. Consider optimizing other attributes to approximate condition, such as age, material, soil type, history of main breaks, etc.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the Town has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

5.2 Sanitary Sewer Network

The sanitary services provided by the Town are managed and operated by OCWA and municipal staff. OCWA manages the sanitary treatment plant and municipal staff are responsible for 109 km of waterlines and additional assets that makeup the sanitary system.

The state of the infrastructure for the sanitary sewer network is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$150.1 million	Poor (37%)	Annual Requirement:	$3,027,000
		Funding Available:	$312,000
		Annual Deficit:	$2,715,000

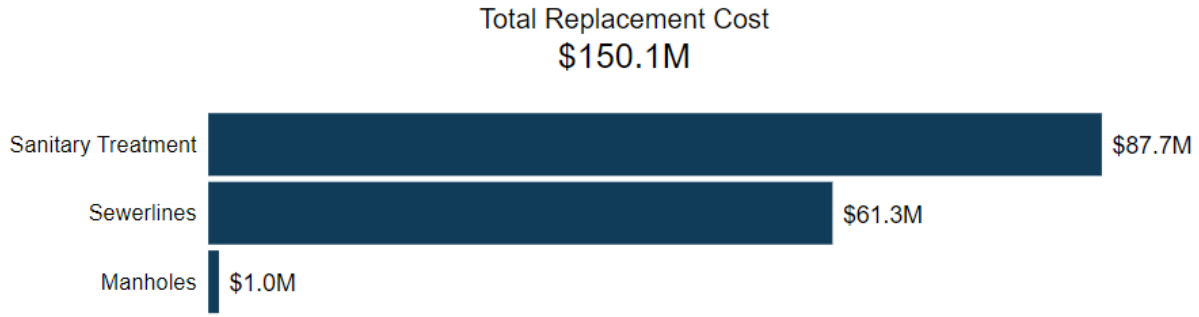
The following core values and level of service statements are a key driving force behind the Town's asset management planning.

Service Attribute	Level of Service Statement
Scope	The Municipal sanitary sewer network is accessible to 99% of the community in sufficient capacity (does not exceed maximum capacity).
Quality/Reliability	The sanitary sewer network is in poor condition but with minimal unplanned service interruptions due to backups and effluent violations.

5.2.1 Asset Inventory & Costs

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Town's sanitary sewer network inventory.

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Manholes	261	$1,044,000	$20,880
Sanitary Treatment	15[4]	$87,745,998	$2,188,480
Sewerlines	108,789 m	$61,298,990	$817,320
Total		**$150,088,988**	**$3,026,680**



Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

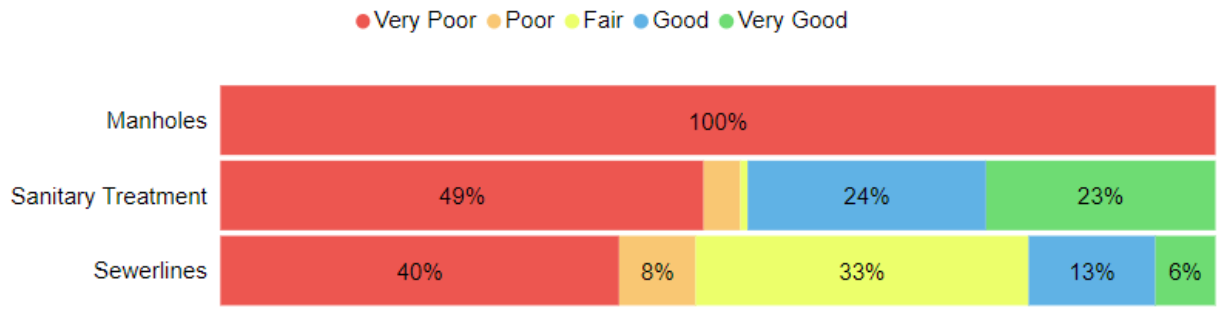
[4] The Sanitary Treatment assets consist of 15 components, which includes, a treatment plant, pumping stations, and associated pumps and equipment.

5.2.2 Asset Condition & Age

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Asset Segment	Estimated Useful Life (Years)	Average Age	Average Condition (%)
Manholes	50	40.0	20% (Poor)
Sanitary Treatment	25 - 50	23.1	39% (Poor)
Sewerlines	75	54.8	34% (Poor)
Average		**54.3**	**37% (Poor)**

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



To ensure that the Town's sanitary sewer network continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the sanitary sewer network.

Each asset's Estimated Useful Life should also be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Town's current approach:

- CCTV inspections are completed for sanitary mains as budget becomes available. The Town receives video footage of mains and manholes, but the consultant does not provide a detailed report with condition ratings.
- The sanitary treatment plant is assessed by OCWA staff in accordance with environmental compliance requirements.

In this AMP the following rating criteria is used to determine the current condition of sewer network assets and forecast future capital requirements:

Condition	Rating
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

5.2.3 Lifecycle Management Strategy

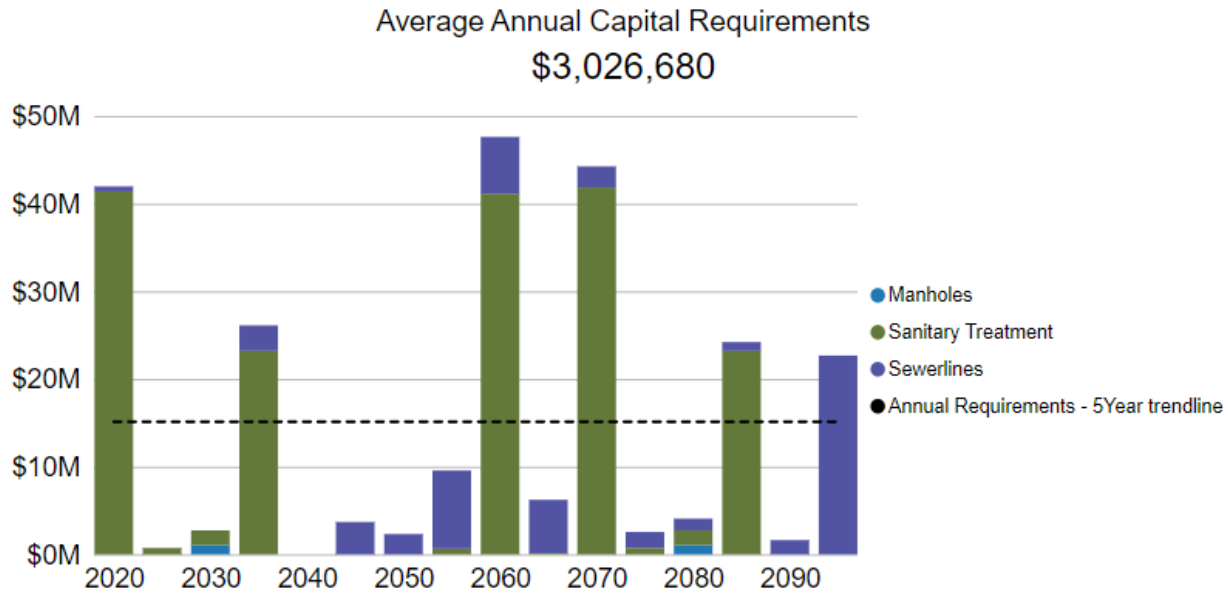
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following table outlines the Town's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Main flushing is completed in conjunction with CCTV assessments and when blockages occur.
	Maintenance of the treatment assets are performed by OCWA in accordance with their maintenance schedules.
Rehabilitation	Trenchless re-lining of sanitary mains has not been investigated network-wide, considering the cost and benefits as compared to end-of-life replacement.
Replacement	In the absence of mid-lifecycle rehabilitative events, most mains are simply maintained with the goal of full replacement once it reaches its end-of-life.
	Replacement activities are identified based on an analysis of the main break rate as well as any issues identified during regular maintenance activities.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 80 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

5.2.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix D for the criteria used to determine the risk rating of each asset.

This is a high-level model developed for the purposes of this AMP and Town staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of the sanitary sewer network are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)

The identification of critical assets allows the Town to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Town is currently facing:

Aging Infrastructure & Design

A large portion of the sanitary network made up of clay pipes and is reaching the end of its useful life. Furthermore, staff do not have sufficient budget to routinely determine the condition of underground assets. Staff have identified areas with aging infrastructure and are seeking to prioritize those areas for CCTV inspections and/or replacement.

Inflow and Infiltration

The Town has concerns related to inflow and infiltration (I&I). Extreme weather and I&I have resulted in surcharge events, limiting capacity in the sanitary treatment plant. To address concerns with I&I staff aim to become more proactive with flow monitoring. A regular flow monitoring program would help identify I&I at an earlier stage and provide staff with data to inform lifecycle planning.

5.2.5 Levels of Service

The following tables identify the Town's current level of service for sanitary sewer network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Town has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by sanitary sewer network.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system	See Appendix C
Reliability	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes	The Town does not own any combined sewers
	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches	The Town does not own any combined sewers
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	Stormwater can enter into sanitary sewers due to cracks in sanitary mains or through indirect connections (e.g. weeping tiles). In the case of heavy rainfall events, sanitary sewers may experience a volume of water and sewage that exceeds its designed

Service Attribute	Qualitative Description	Current LOS (2020)
		capacity. In some cases, this can cause water and/or sewage to overflow backup into homes. the disconnection of weeping tiles from sanitary mains and the use of sump pumps and pits directing storm water to the storm drain system can help to reduce the chance of this occurring.
	Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to stormwater infiltration	The Town follows a series of design standards that integrate servicing requirements and land use considerations when constructing or replacing sanitary sewers. These standards have been determined with consideration of the minimization of sewage overflows and backups.
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system	Effluent refers to water pollution that is discharged from a wastewater treatment plant, and may include suspended solids, total phosphorous and biological oxygen demand. The Environmental Compliance Approval (ECA) identifies the effluent criteria for municipal wastewater treatment plants.

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the sanitary sewer network.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal wastewater system	99%
Reliability	# 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	N/A
	# of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system	0[5]
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	0.003
Performance	Capital re-investment rate	0.43%

[5] In 2020, the Town has not been notified of wastewater backups related to the municipal sanitary system.

5.2.6 Recommendations

Asset Inventory

- Review the sanitary sewerlines and manholes in the inventory to determine whether all municipal assets within these asset segments have been accounted for. The manhole inventory includes 1 pooled asset that should be broken into discrete segments to allow for improved location markers and lifecycle strategies.
- Review the treatment assets to ensure the full scope of inventory is included. Upgrades and repairs to assets should be incorporated as improvements, rather than stand-alone assets.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Lifecycle Management Strategies

- A trenchless re-lining strategy is expected to extend the service life of sanitary mains at a lower total cost of ownership and should be implemented to extend the life of infrastructure at the lowest total cost of ownership.
- Evaluate the efficacy of the Town's lifecycle management strategies at regular intervals to determine the impact cost, condition and risk.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the Town has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

6 Impacts of Growth

Key Insights

- Understanding the key drivers of growth and demand will allow the Town to more effectively plan for new infrastructure, and the upgrade or disposal of existing infrastructure
- History of moderate decrease in population and employment
- The costs of growth should be considered in long-term funding strategies that are designed to maintain the current level of service

6.1 Description of Growth Assumptions

The demand for infrastructure and services will change over time based on a combination of internal and external factors. Understanding the key drivers of growth and demand will allow the Town to more effectively plan for new infrastructure, and the upgrade or disposal of existing infrastructure. Increases or decreases in demand can affect what assets are needed and what level of service meets the needs of the community.

6.1.1 Kirkland Lake Official Plan (May 2016)

The Town adopted the Official Plan to guide the physical development of the Town of Kirkland. The Official Plan is written in accordance with the Provincial Policy Statement 2014 (PPS) and Growth Plan for Northern Ontario and is intended to encourage efficient public works investments and other capital investments in the Town.

The Official Plan came into effect on May 5th, 2016.

The Town's vision includes the achievement of long-term positive economic growth, population stability, and community vitality. The Official Plan provides the basis for a population of up to 12,000. The distribution of land uses aims to provide employment and housing opportunities with dedicated areas for parks and open spaces, linked with efficient transportation system.

Year	Historical Population	Historical Private Dwellings
2006	8,248	N/A
2011	8,133	4,234
2016	7,981	4,466
2021	7,750	4,353

There is an average decrease of 2% every five years between 2006 and 2021. The population is trending downward. A 2012 "Population, Housing, and Employment Forecast Study" was referenced in the development of the 2016 Official Plan. Despite the historical decline in population, the study projected steady growth between 2011 and 2031. The study projected 35% growth between 2011 and 2021, however, census data shows a 5% decreased between 2011 and 2021.

The study also projects 47% growth between 2021 and 2031. Between 2011 and 2031, employment is projected to grow by 920 new jobs and housing is projected to grow by 21%. Growth drivers in the area continue to include the mining sector as a key driver, followed by jobs in retail, business services, personal services, and the institutional sector.

6.2 Impact of Growth on Lifecycle Activities

By July 1, 2025, the Municipality's asset management plan must include a discussion of how the assumptions regarding future changes in population and economic activity informed the preparation of the lifecycle management and financial strategy.

As the municipality's population is expected to remain the same with potential moderate decreases and increases in the coming years, demand will evolve, and it is likely that funding will need to be reprioritized. As growth-related assets are constructed, retired, or acquired, they should be integrated into the AMP. Furthermore, the municipality will need to review the lifecycle costs of growth-related infrastructure. These costs should be considered in long-term funding strategies that are designed to, at a minimum, maintain the current level of service.

7 Financial Strategy

Key Insights

- The Town is committing approximately $2,492,000 towards capital projects per year from sustainable revenue sources
- Given the annual capital requirement of $7,235,000, there is currently a funding gap of $4,743,000 annually
- For tax-funded assets, we recommend increasing tax revenues by 1.2% each year for the next 5 years to achieve a sustainable level of funding
- For the sanitary sewer network, we recommend increasing rate revenues by 3.5% annually for the next 20 years to achieve a sustainable level of funding
- For the water network, we recommend increasing rate revenues by 1.7% annually for the next 15 years to achieve a sustainable level of funding

7.1 Financial Strategy Overview

For an asset management plan to be effective and meaningful, it must be integrated with financial planning and long-term budgeting. The development of a comprehensive financial plan will allow the Town of Kirkland Lake to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

This report develops such a financial plan by presenting several scenarios for consideration and culminating with final recommendations. As outlined below, the scenarios presented model different combinations of the following components:

1. The financial requirements for:
    a. Existing assets
    b. Existing service levels
    c. Requirements of contemplated changes in service levels (none identified for this plan)
    d. Requirements of anticipated growth (none identified for this plan)
2. Use of traditional sources of municipal funds:
    a. Tax levies
    b. User fees
    c. Reserves
    d. Debt
3. Use of non-traditional sources of municipal funds:
    a. Reallocated budgets
    b. Partnerships
    c. Procurement methods
4. Use of Senior Government Funds:
    a. Gas tax
    b. Annual grants

Note: Periodic grants are normally not included due to Provincial requirements for firm commitments. However, if moving a specific project forward is wholly dependent on receiving a one-time grant, the replacement cost included in the financial strategy is the net of such grant being received.

If the financial plan component results in a funding shortfall, the Province requires the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the Province may evaluate a Town's approach to the following:

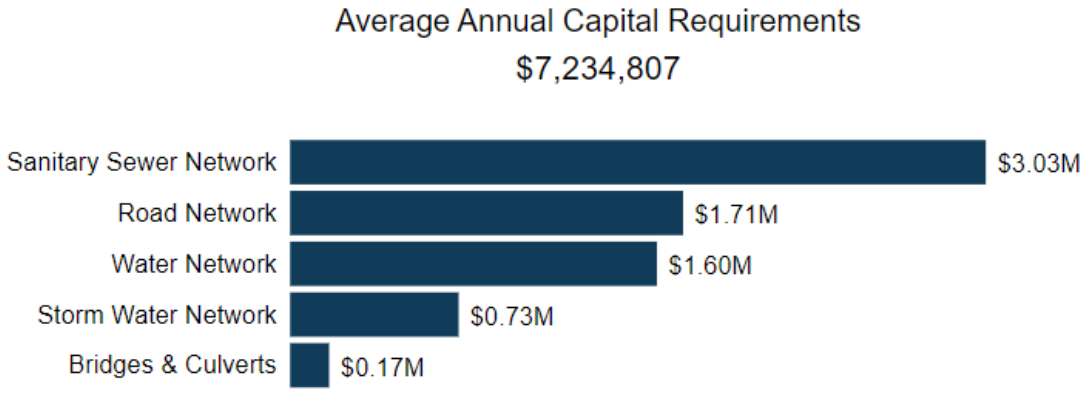
1. In order to reduce financial requirements, consideration has been given to revising service levels downward.

2. All asset management and financial strategies have been considered. For example:
    a. If a zero-debt policy is in place, is it warranted? If not, the use of debt should be considered.
    b. Do user fees reflect the cost of the applicable service? If not, increased user fees should be considered.

7.1.1 Annual Requirements & Capital Funding

Annual Requirements

The annual requirements represent the amount the Town should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs and achieve long-term sustainability. In total, the Town must allocate approximately $7.2 million annually to address capital requirements for the assets included in this AMP.



For most asset categories the annual requirement has been calculated based on a "replacement only" scenario, in which capital costs are only incurred at the construction and replacement of each asset.

However, for the road network, lifecycle management strategies have been developed to identify capital costs that are realized through strategic rehabilitation and renewal of the Town's roads and sanitary sewer mains respectively. The development of these strategies allows for a comparison of potential cost avoidance if the strategies were to be implemented. The following table compares two scenarios for the road network:

1. **Replacement Only Scenario**: Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.

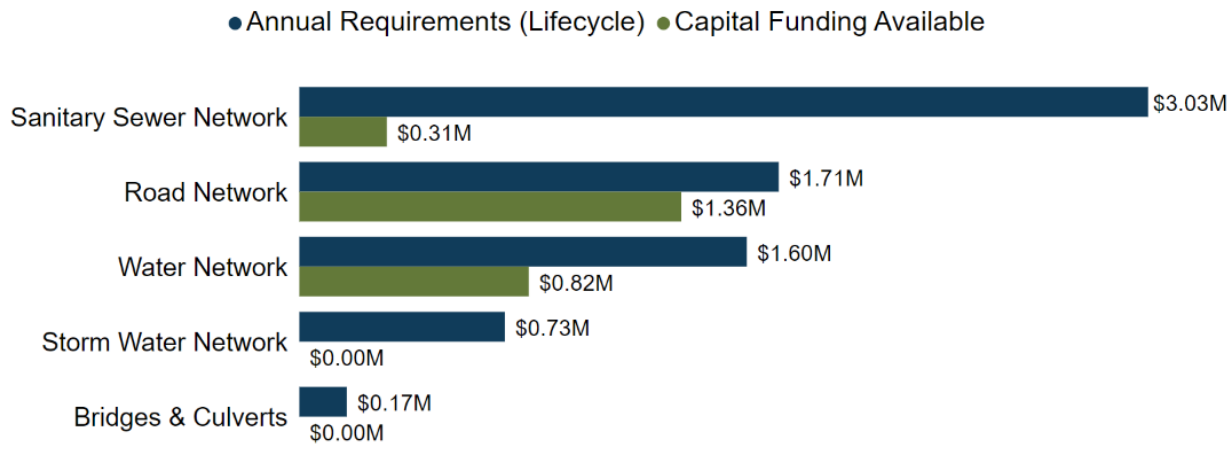
2. **Lifecycle Strategy Scenario**: Based on the assumption that lifecycle activities are performed at strategic intervals to extend the service life of assets until replacement is required.

Asset Category	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Road Network	$2,302,640	$1,709,697	$592,943

The implementation of a proactive lifecycle strategy for roads leads to a potential annual cost avoidance of $593,000 for the road network. This represents an overall reduction of the annual requirements by 35%. As the lifecycle strategy scenario represents the lowest cost option available to the Town, we have used this annual requirement in the development of the financial strategy.

Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the Town is committing approximately $2,492,000 towards capital projects per year from sustainable revenue sources. Given the annual capital requirement of $7,235,000, there is currently a funding gap of $4,743,000 annually.



7.2 Funding Objective

We have developed a scenario that would enable Kirkland Lake to achieve full funding within 20 years for the following assets:

1. **Tax Funded Assets:** Road Network, Bridges & Culverts, Storm Water Network
2. **Rate-Funded Assets:** Water Network, Sanitary Sewer Network

Note: For the purposes of this AMP, we have excluded gravel roads since they are a perpetual maintenance asset and end of life replacement calculations do not normally apply. If gravel roads are maintained properly, they can theoretically have a limitless service life.

For each scenario developed we have included strategies, where applicable, regarding the use of cost containment and funding opportunities.

7.3 Financial Profile: Tax Funded Assets

7.3.1 Current Funding Position

The following tables show, by asset category, Kirkland Lake's average annual asset investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Taxes	Gas Tax	OCIF	Total Available	
Road Network	1,710,000	166,000	993,000	203,000	1,362,000	348,000
Bridges & Culverts	169,000	0	0	0	0	169,000
Storm Water Network	733,000	0	0	0	0	733,000
Total	2,612,000	166,000	993,000	203,000	1,362,000	1,250,000

The average annual capital expenditure requirement for the above categories is $2.6 million. Annual revenue currently allocated to these assets for capital purposes is $1.4 million leaving an annual deficit of $1.2 million. Put differently, these infrastructure categories are currently funded at 52% of their long-term requirements.

7.3.2 Full Funding Requirements

In 2020, Town of Kirkland Lake has annual tax revenues of $10.96 million. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time:

Asset Category	Tax Change Required for Full Funding
Road Network	3.2%
Bridges & Culverts	1.5%
Storm Water Network	6.7%
Total	**11.4%**

The following changes in costs and/or revenues over the next number of years should also be considered in the financial strategy:

a) Kirkland Lake's formula based OCIF grant is scheduled to grow from $609,000 in 2020 & 2021 to $1.1 million in 2022.
b) Kirkland Lake's debt payments for these asset categories will be decreasing by $119,000 over the next 5 years.

Our recommendations include capturing the above changes and allocating them to the infrastructure deficit outlined above. The table below outlines this concept and presents several options:

	Without Capturing Changes				With Capturing Changes			
	5 Years	**10 Years**	**15 Years**	**20 Years**	**5 Years**	**10 Years**	**15 Years**	**20 Years**
Infrastructure Deficit	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-119,000	-119,000	-119,000	-119,000
Change in OCIF Grants	N/A	N/A	N/A	N/A	-509,000	-509,000	-509,000	-509,000
Resulting Infrastructure Deficit	1,250,000	1,250,000	1,250,000	1,250,000	622,000	622,000	622,000	622,000
Tax Increase Required	11.4%	11.4%	11.4%	11.4%	5.7%	5.7%	5.7%	5.7%
Annually	2.2%	1.1%	0.8%	0.6%	1.2%	0.6%	0.4%	0.3%

7.3.3 Financial Strategy Recommendations

Considering all the above information, we recommend the 5-year option. This involves full funding being achieved over 5 years by:

a) when realized, reallocating debt cost reductions to the infrastructure deficit as outlined above.
b) increasing tax revenues by 1.2% each year for the next 5 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
c) allocating the current gas tax and OCIF revenue as outlined previously.
d) allocating the scheduled OCIF grant increases to the infrastructure deficit as they occur.
e) reallocating appropriate revenue from categories in a surplus position to those in a deficit position.
f) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included OCIF formula-based funding, if applicable, since this funding is a multi-year commitment[6].
2. We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

Although this option achieves full funding on an annual basis in 5 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $31.8 million for the road network and $932,000 for the storm water network.

[6] The Town should take advantage of all available grant funding programs and transfers from other levels of government. While OCIF has historically been considered a sustainable source of funding, the program is currently undergoing review by the provincial government. Depending on the outcome of this review, there may be changes that impact its availability.

Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

7.4 Financial Profile: Rate Funded Assets

7.4.1 Current Funding Position

The following tables show, by asset category, Kirkland Lake's average annual asset investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by rates.

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Rates	To Operations	OCIF	Total Available	
Water Network	1,596,000	2,773,000	-2,158,000	203,000	818,000	778,000
Sanitary Sewer Network	3,027,000	2,773,000	-2,664,000	203,000	312,000	2,715,000
	4,623,000	5,546,000	-4,822,000	406,000	1,130,000	3,493,000

The average annual investment requirement for the above categories is $4.62 million. Annual revenue currently allocated to these assets for capital purposes is $1.13 million leaving an annual deficit of $3.49 million. Put differently, these infrastructure categories are currently funded at 24% of their long-term requirements.

7.4.2 Full Funding Requirements

In 2020, Kirkland Lake had annual sanitary revenues of $2.77 million and annual water revenues of $2.77 million. As illustrated in the table below, without consideration of any other sources of revenue, full funding would require the following changes over time:

Asset Category	Tax Change Required for Full Funding
Water Network	28.1%
Sanitary Sewer Network	97.9%

In the following tables, we have expanded the above scenario to present multiple options. Due to the significant increases required, we have provided phase-in options of up to 20 years:

	Water Network				Sanitary Sewer Network			
	5 Years	**10 Years**	**15 Years**	**20 Years**	**5 Years**	**10 Years**	**15 Years**	**20 Years**
Infrastructure Deficit	778,000	778,000	778,000	778,000	2,715,000	2,715,000	2,715,000	2,715,000
Rate Increase Required	28.1%	28.1%	28.1%	28.1%	97.9%	97.9%	97.9%	97.9%
Annually:	5.1%	2.6%	1.7%	1.3%	14.7%	7.1%	4.7%	3.5%

7.4.3 Financial Strategy Recommendations

Considering all of the above information, we recommend the 15-year option that includes debt cost reallocations. This involves full funding being achieved over 20 years by:

a) increasing rate revenues by 1.7% for the Water Network each year for the next 15 years and by 3.5% for the Sanitary Sewer Network each year for the next 20 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
b) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place.
2. We realize that raising rate revenues for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.
3. Any increase in rates required for operations would be in addition to the above recommendations.

Although this option achieves full funding on an annual basis in 20 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $23.77 million for the water network and $22.58 million for the sanitary sewer network.

Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

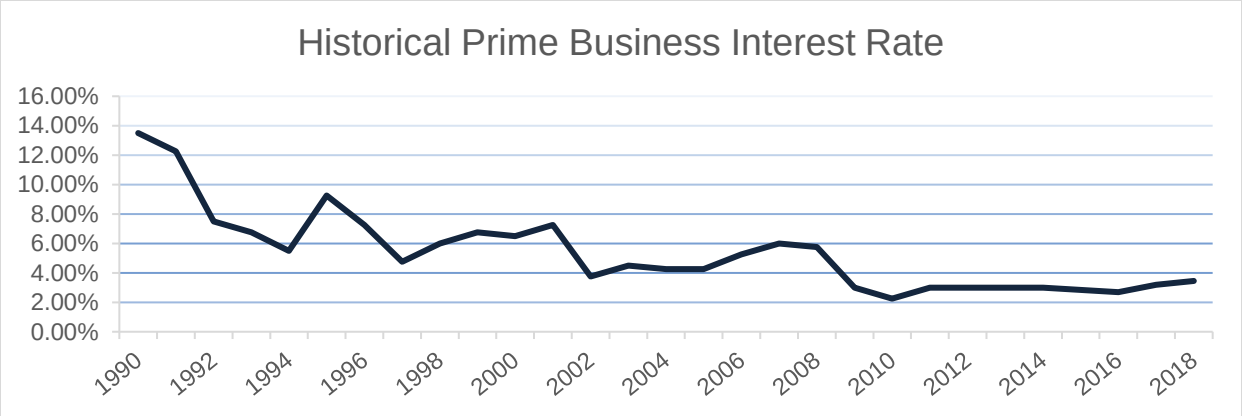
7.5 Use of Debt

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a $1M project financed at 3.0%[7] over 15 years would result in a 26% premium or $260,000 of increased costs due to interest payments. For simplicity, the table does not consider the time value of money or the effect of inflation on delayed projects.

Interest Rate	Number of Years Financed					
	5	**10**	**15**	**20**	**25**	**30**
7.0%	22%	42%	65%	89%	115%	142%
6.5%	20%	39%	60%	82%	105%	130%
6.0%	19%	36%	54%	74%	96%	118%
5.5%	17%	33%	49%	67%	86%	106%
5.0%	15%	30%	45%	60%	77%	95%
4.5%	14%	26%	40%	54%	69%	84%
4.0%	12%	23%	35%	47%	60%	73%
3.5%	11%	20%	30%	41%	52%	63%
3.0%	9%	17%	26%	34%	44%	53%
2.5%	8%	14%	21%	28%	36%	43%
2.0%	6%	11%	17%	22%	28%	34%
1.5%	5%	8%	12%	16%	21%	25%
1.0%	3%	6%	8%	11%	14%	16%
0.5%	2%	3%	4%	5%	7%	8%
0.0%	0%	0%	0%	0%	0%	0%

It should be noted that current interest rates are near all-time lows. Sustainable funding models that include debt need to incorporate the risk of rising interest rates. The following graph shows where historical lending rates have been:

[7] Current municipal Infrastructure Ontario rates for 15-year money is 3.2%.



A change in 15-year rates from 3% to 6% would change the premium from 26% to 54%. Such a change would have a significant impact on a financial plan.

The following tables outline how Kirkland Lake has historically used debt for investing in the asset categories as listed. There is currently $176,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $119,000, well within its provincially prescribed maximum of $3.52 million.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2015	2016	2017	2018	2019
Road Network	176,000	775,000	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0
Storm Water Network	0	0	0	0	0	0
Total Tax Funded:	176,000	775,000	**0**	**0**	**0**	**0**
Water Network	0	0	0	0	0	0
Sanitary Sewer Network	0	0	0	0	0	0
Total Rate Funded:	**0**	**0**	**0**	**0**	**0**	**0**

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2019	2020	2021	2022	2023	2024	2029
Road Network	119,000	119,000	119,000	60,000	0	0	0
Bridges & Culverts	0	0	0	0	0	0	0
Storm Water Network	0	0	0	0	0	0	0
Total Tax Funded:	**119,000**	**119,000**	**119,000**	**60,000**	**0**	**0**	**0**
Water Network	0	0	0	0	0	0	0
Sanitary Sewer Network	0	0	0	0	0	0	0
Total Rate Funded:	**0**	**0**	**0**	**0**	**0**	**0**	**0**

The revenue options outlined in this plan allow Kirkland Lake to fully fund its long-term infrastructure requirements without further use of debt.

7.6 Use of Reserves

7.6.1 Available Reserves

Reserves play a critical role in long-term financial planning. The benefits of having reserves available for infrastructure planning include:

a) the ability to stabilize tax rates when dealing with variable and sometimes uncontrollable factors
b) financing one-time or short-term investments
c) accumulating the funding for significant future infrastructure investments
d) managing the use of debt
e) normalizing infrastructure funding requirement

By asset category, the table below outlines the details of the reserves currently available to Kirkland Lake.

Asset Category	Balance on December 31, 2020
Road Network	697,000
Storm Water Network	69,000
Bridges & Culverts	299,999
Total Tax Funded:	**1,065,000**
Water Network	1,868,000
Sanitary Sewer Network	2,371,000
Total Rate Funded:	**4,239,000**

There is considerable debate in the municipal sector as to the appropriate level of reserves that a Town should have on hand. There is no clear guideline that has gained wide acceptance. Factors that municipalities should take into account when determining their capital reserve requirements include:

a) breadth of services provided
b) age and condition of infrastructure
c) use and level of debt
d) economic conditions and outlook
e) internal reserve and debt policies.

These reserves are available for use by applicable asset categories during the phase-in period to full funding. This coupled with Kirkland Lake's judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for high priority and emergency infrastructure investments in the short- to medium-term.

7.6.2 Recommendation

In 2024, Ontario Regulation 588/17 will require Kirkland Lake to integrate proposed levels of service for all asset categories in its asset management plan update. We recommend that future planning should reflect adjustments to service levels and their impacts on reserve balances.

8 Appendices

Key Insights

- Appendix A includes a one-page report card with an overview of key data from each asset category
- Appendix B identifies projected 10-year capital requirements for each asset category
- Appendix C includes several maps that have been used to visualize the current level of service
- Appendix E provides additional guidance on the development of a condition assessment program

Appendix A: Infrastructure Report Card

Asset Category	Replacement Cost (millions)	Asset Condition	Financial Capacity	
Road Network	$46.97	Very Poor	Annual Requirement:	$1,710,000
			Funding Available:	$1,362,000
			Annual Deficit:	**$348,000**
Bridges & Culverts	$3.45	Good	Annual Requirement:	$169,000
			Funding Available:	$0
			Annual Deficit:	**$169,000**
Storm Water Network	$53.42	Poor	Annual Requirement:	$733,000
			Funding Available:	$0
			Annual Deficit:	**$733,000**
Water Network	$95.52	Poor	Annual Requirement:	$1,596,000
			Funding Available:	$818,000
			Annual Deficit:	**$778,000**
Sanitary Sewer Network	$150.09	Poor	Annual Requirement:	$3,027,000
			Funding Available:	$312,000
			Annual Deficit:	**$2,715,000**
Overall	**$349.44**	**Poor**	Annual Requirement:	$7,235,000
			Funding Available:	$2,492,000
			Annual Deficit:	**$4,743,000**

Appendix B: 10-Year Capital Requirements

The following tables identify the capital cost requirements for each of the next 10 years in order to meet projected capital requirements and maintain the current level of service.

Road Network

Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Curbs	$264,000	$0	$0	$0	$0	$0	$0	$48,000	$0	$48,000	$176,000
HCB	$23,700,600	$360,000	$166,000	$620,000	$360,000	$1,740,000	$2,696,000	$432,000	$898,000	$396,000	$630,000
LCB	$5,375,000	$0	$0	$0	$0	$0	$302,600	$0	$0	$0	$0
Sidewalks	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Streetlights	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Traffic Signals	$2,471,071	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$31,810,671	$360,000	$166,000	$620,000	$360,000	$1,740,000	$2,998,600	$480,000	$898,000	$444,000	$806,000

Bridges & Culverts

Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Bridges	$0	$0	$0	$0	$0	$0	$0	$0	$957,195	$0	$0
Culverts	$0	$229,410	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pedestrian Bridges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$0	$229,410	$0	$0	$0	$0	$0	$0	$957,195	$0	$0

Storm Water Network											
Segment	**Backlog**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Catch Basins	$0	$0	$1,997,421	$0	$0	$0	$0	$0	$0	$0	$0
Manholes	$0	$0	$1,044,000	$0	$0	$0	$0	$0	$0	$0	$0
Storm Sewerlines	$931,648	$0	$0	$0	$0	$0	$0	$199,576	$0	$0	$0
Total	$931,648	$0	$3,041,421	$0	$0	$0	$0	$199,576	$0	$0	$0

Water Network											
Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Hydrants	$1,809,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Treatment	$137,943	$0	$0	$72,344	$0	$0	$124,835	$135,619	$0	$26,063	$0
Water Valves	$804,476	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Waterlines	$21,022,342	$0	$0	$0	$0	$573,531	$0	$88,243	$0	$0	$0
Total	$23,773,761	$0	$0	$72,344	$0	$573,531	$124,835	$223,862	$0	$26,063	$0

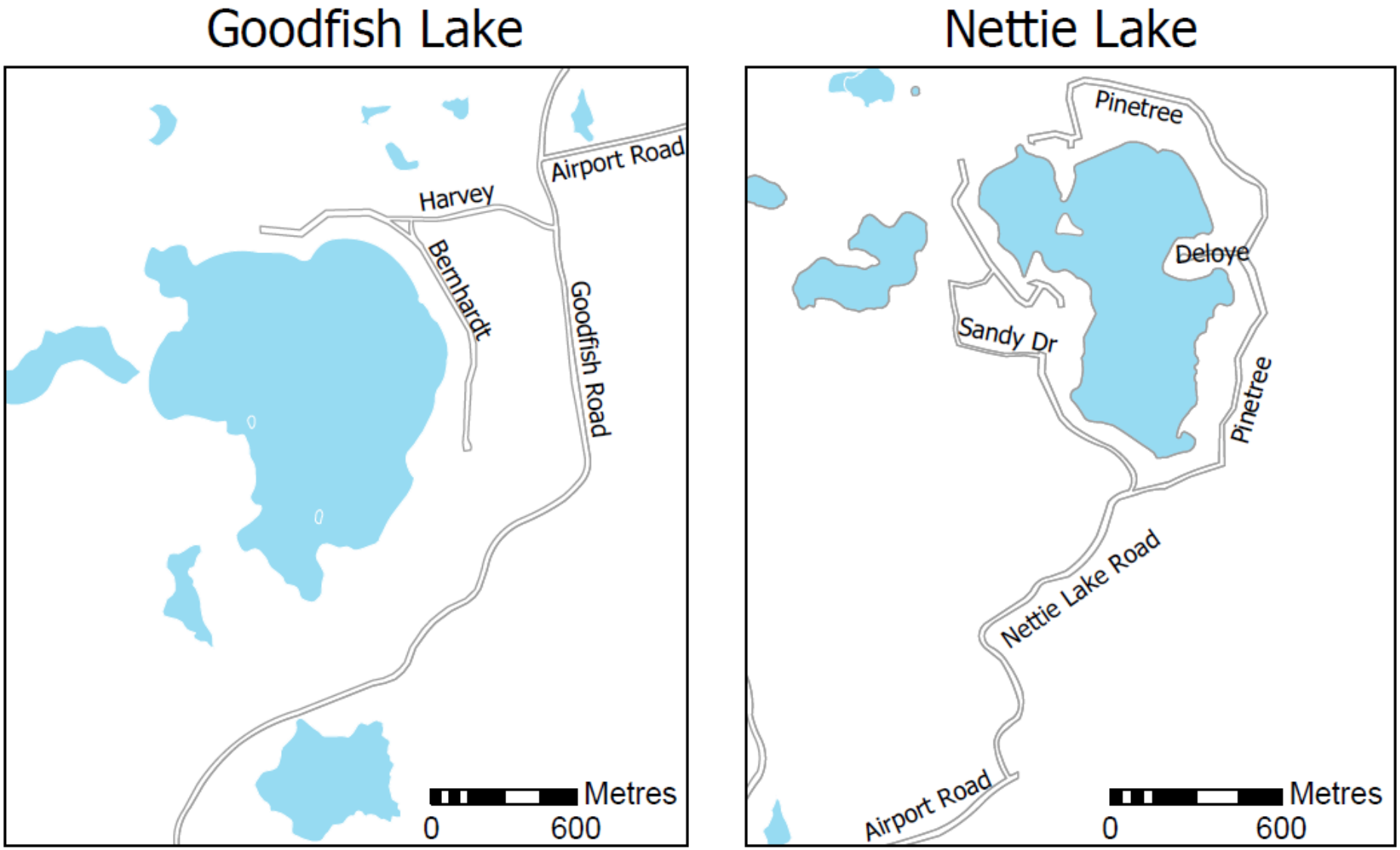
Sanitary Sewer Network											
Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Manholes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sanitary Treatment	$504,889	$41,374,392	$0	$0	$0	$0	$0	$0	$0	$734,584	$0
Sewerlines	$22,075,676	$0	$0	$0	$180,000	$426,200	$0	$0	$0	$0	$0
Total	$22,580,565	$41,374,392	$0	$0	$180,000	$426,200	$0	$0	$0	$734,584	$0

Appendix C: Level of Service Maps

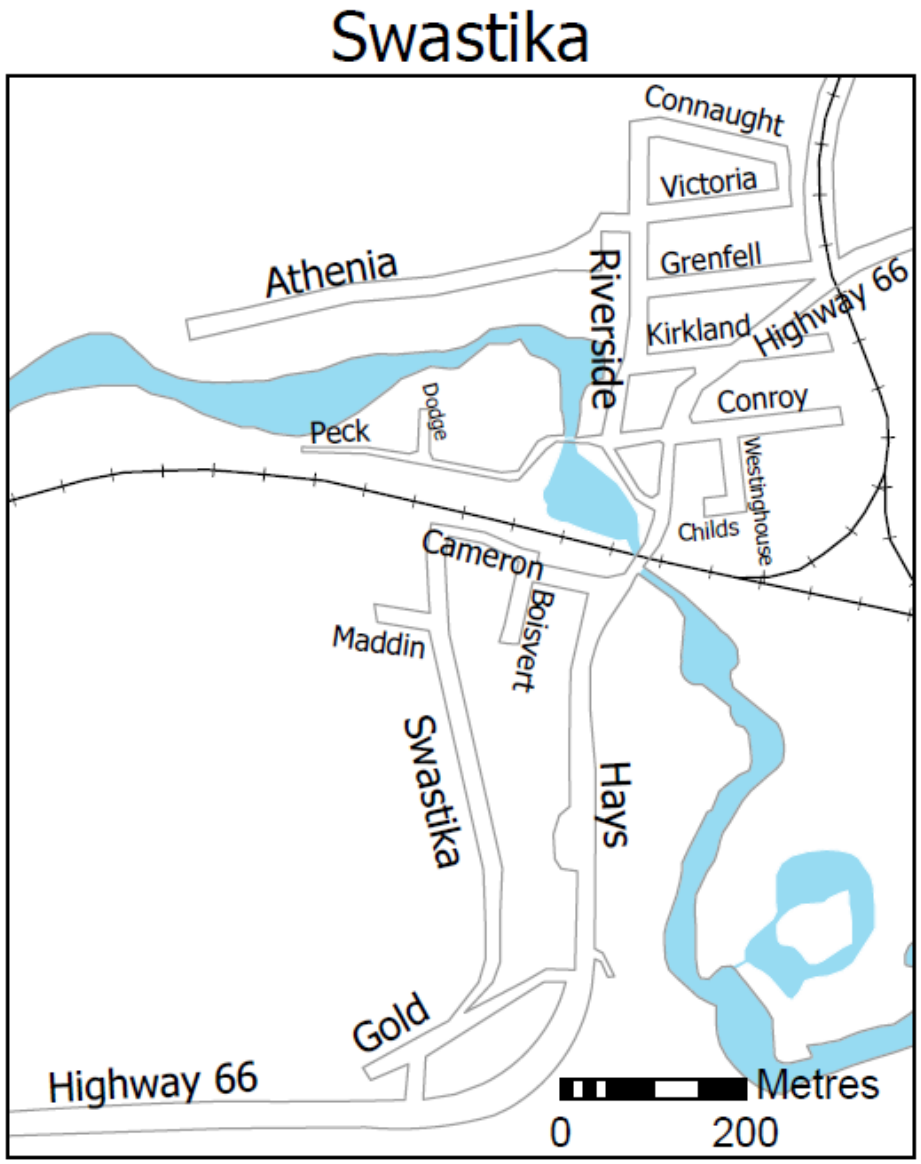
Road Network Connectivity Map – Part 1

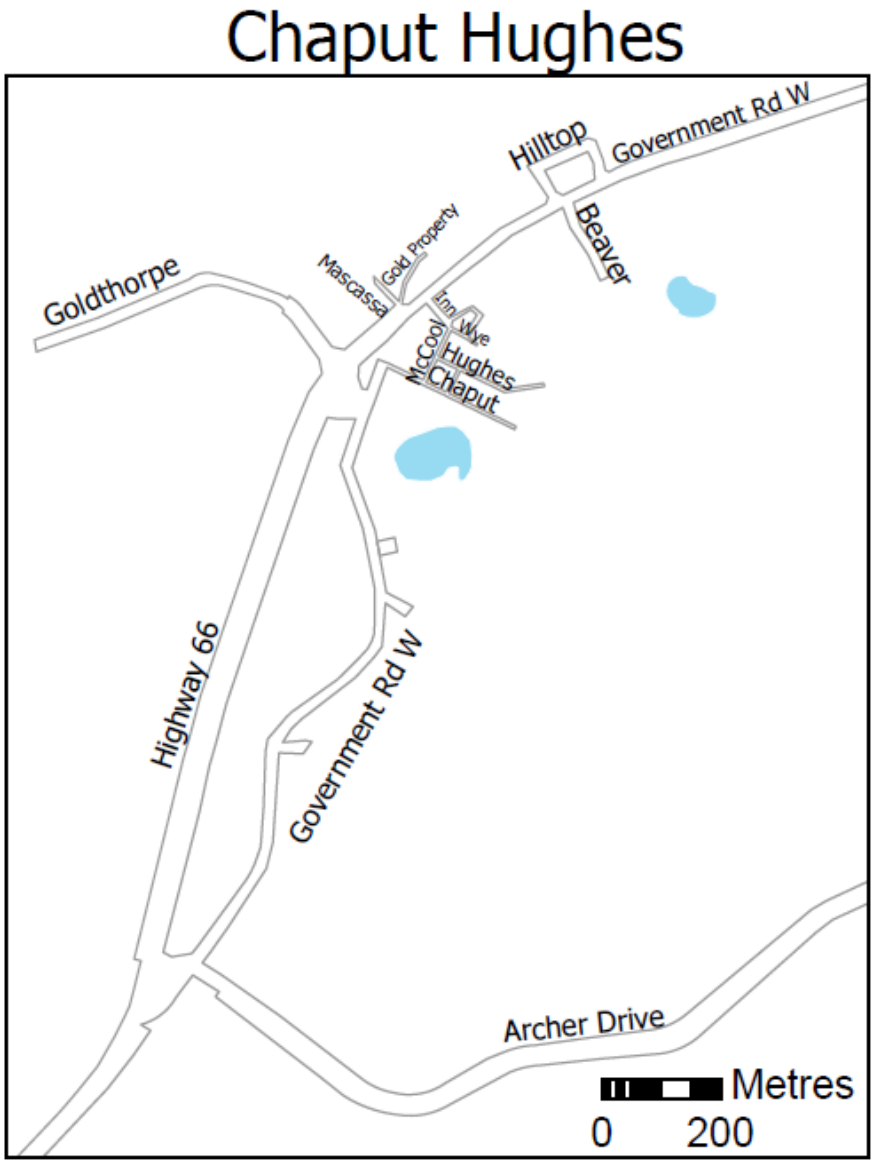
Road Network Connectivity Map – Part 2

Road Network Connectivity Map – Part 3

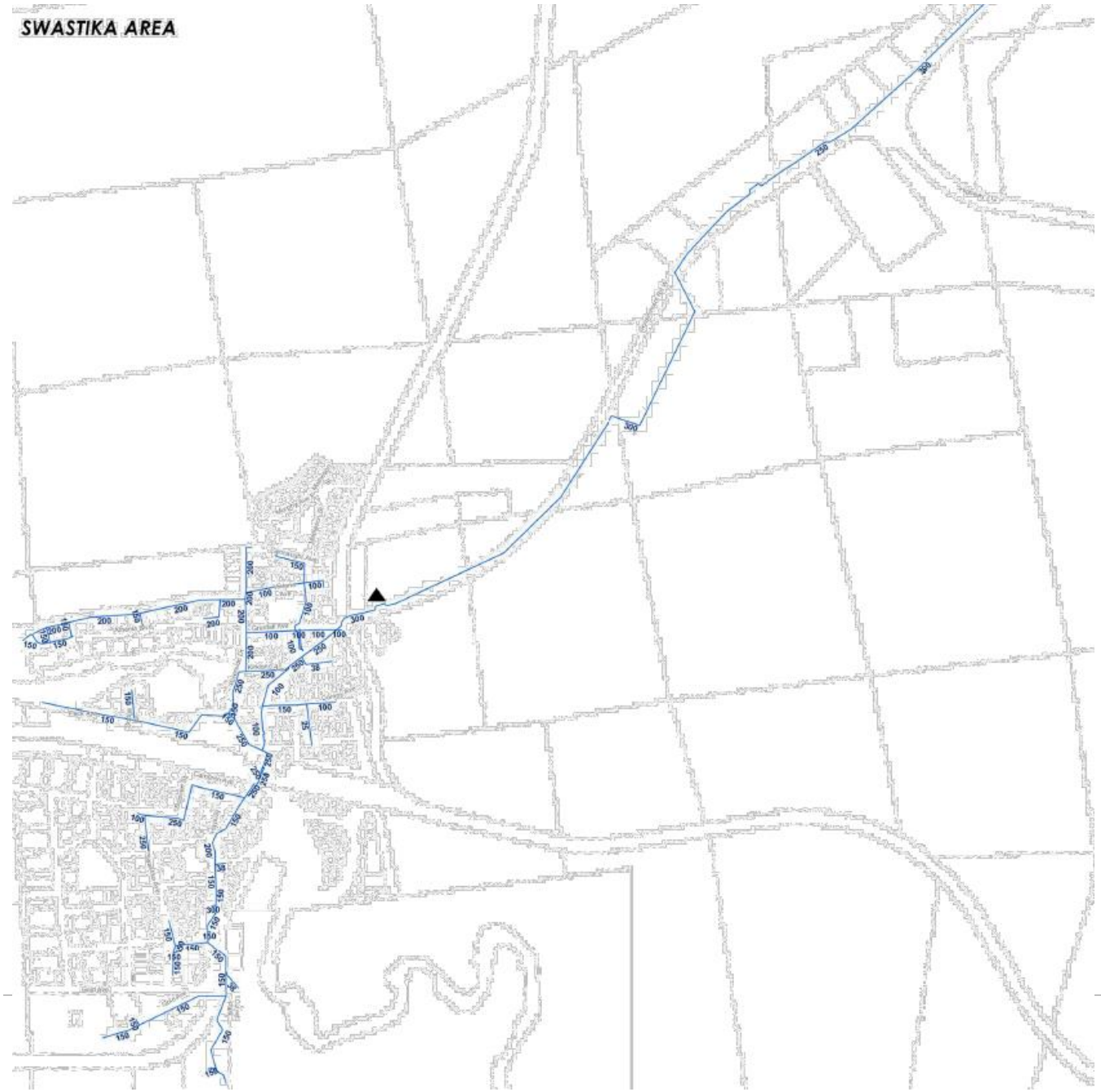


Road Network Connectivity Map – Part 4

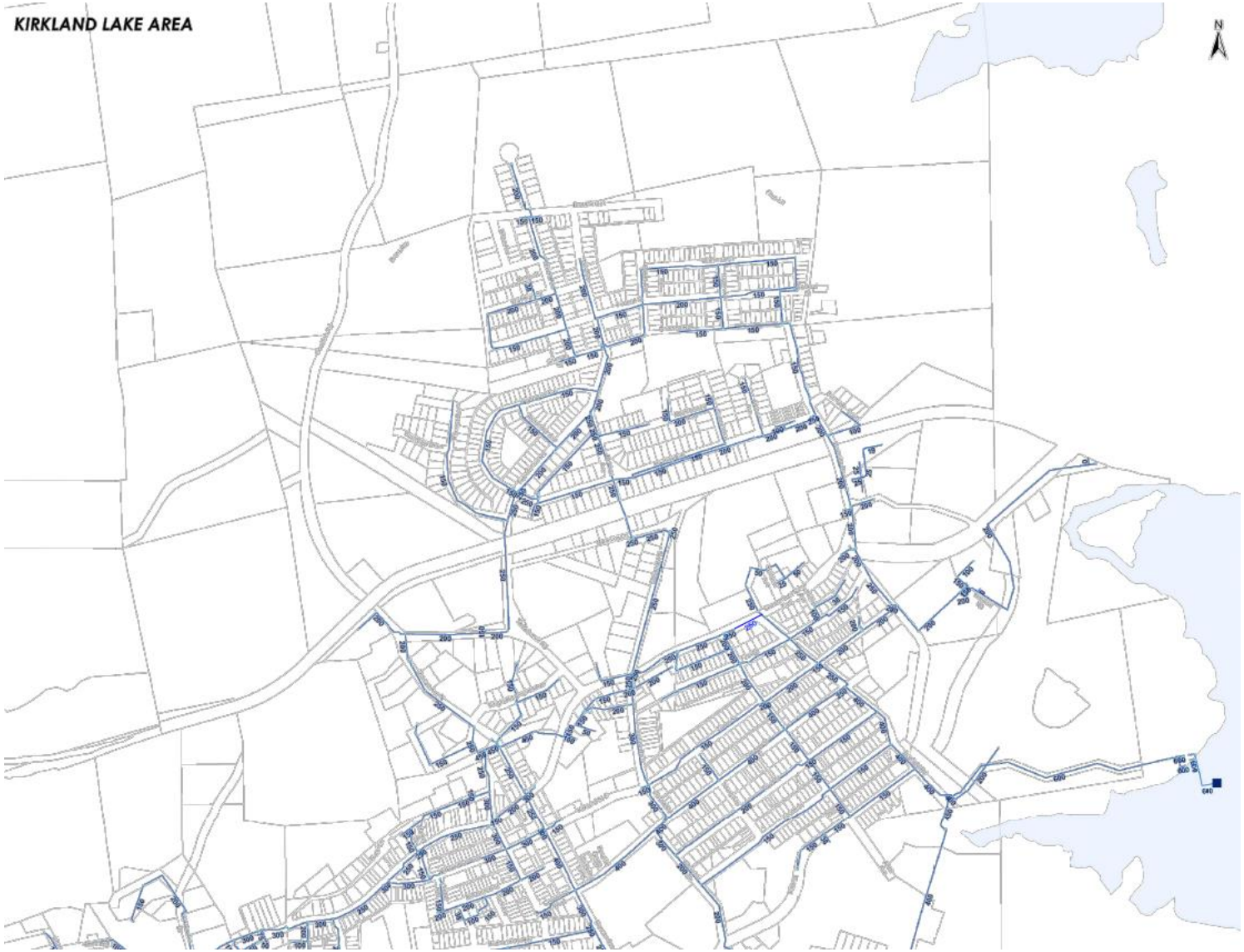




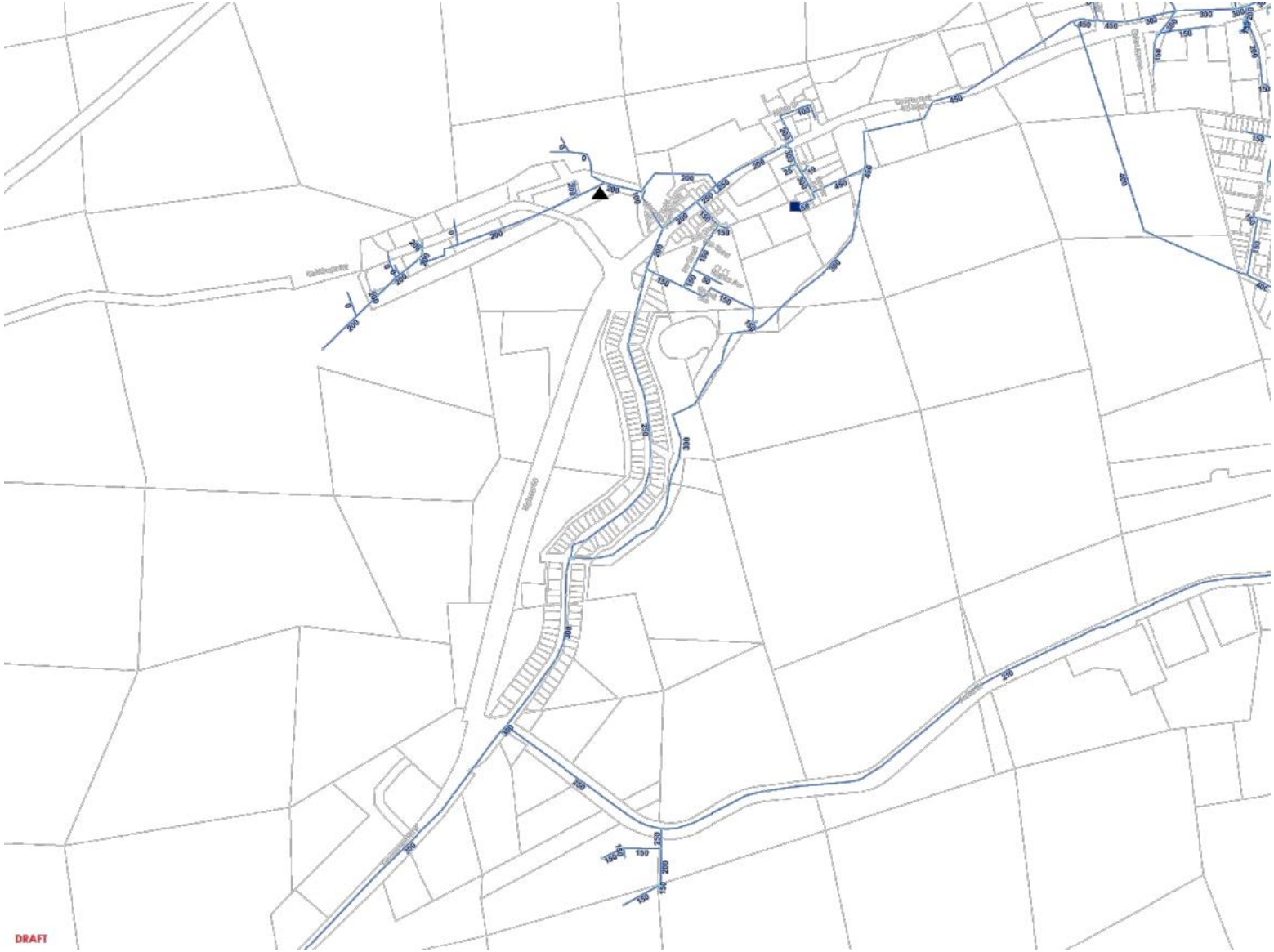
Water Network Connectivity Map – Swastika Area



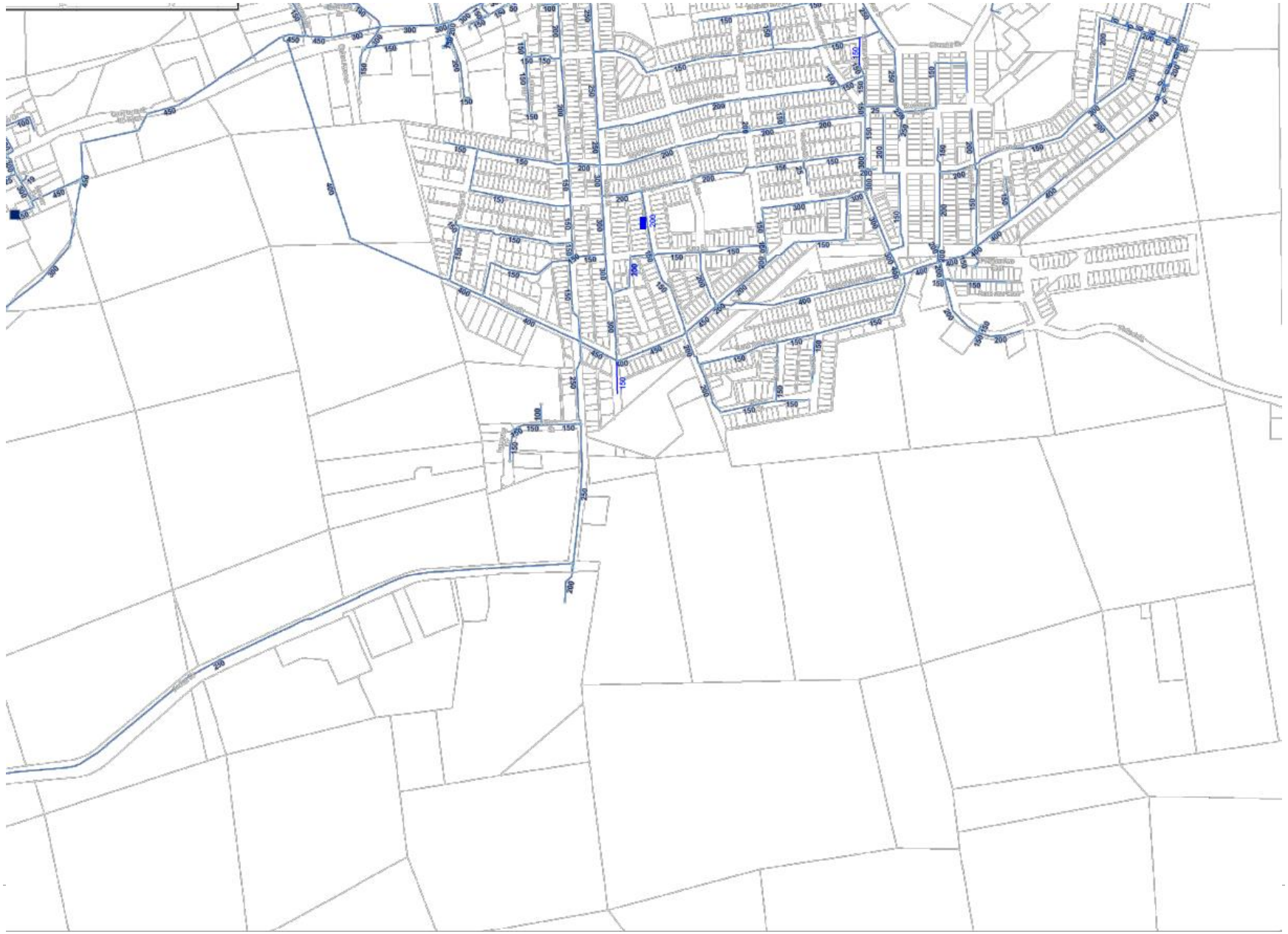
Water Network Connectivity Map – Kirkland Area Part 1



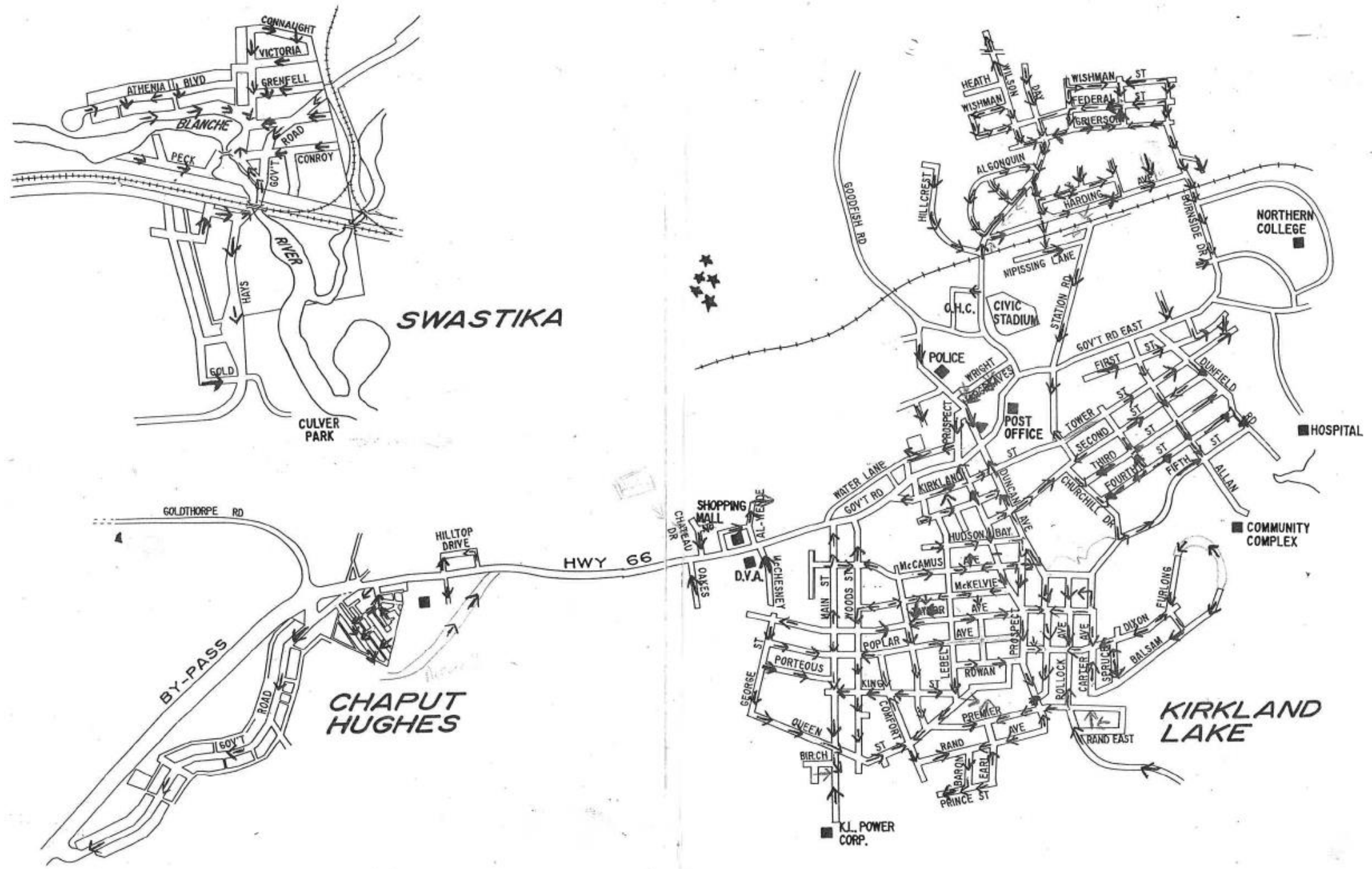
Water Network Connectivity Map – Kirkland Area Part 2



Water Network Connectivity Map – Kirkland Area Part 3



Sanitary Sewer Network Connectivity



Appendix E: Condition Assessment Guidelines

The foundation of good asset management practice is accurate and reliable data on the current condition of infrastructure. Assessing the condition of an asset at a single point in time allows staff to have a better understanding of the probability of asset failure due to deteriorating condition.

Condition data is vital to the development of data-driven asset management strategies. Without accurate and reliable asset data, there may be little confidence in asset management decision-making which can lead to premature asset failure, service disruption and suboptimal investment strategies. To prevent these outcomes, the Town's condition assessment strategy should outline several key considerations, including:

- The role of asset condition data in decision-making
- Guidelines for the collection of asset condition data
- A schedule for how regularly asset condition data should be collected

Role of Asset Condition Data

The goal of collecting asset condition data is to ensure that data is available to inform maintenance and renewal programs required to meet the desired level of service. Accurate and reliable condition data allows municipal staff to determine the remaining service life of assets, and identify the most cost-effective approach to deterioration, whether it involves extending the life of the asset through remedial efforts or determining that replacement is required to avoid asset failure.

In addition to the optimization of lifecycle management strategies, asset condition data also impacts the Town's risk management and financial strategies. Assessed condition is a key variable in the determination of an asset's probability of failure. With a strong understanding of the probability of failure across the entire asset portfolio, the Town can develop strategies to mitigate both the probability and consequences of asset failure and service disruption. Furthermore, with condition-based determinations of future capital expenditures, the Town can develop long-term financial strategies with higher accuracy and reliability.

Guidelines for Condition Assessment

Whether completed by external consultants or internal staff, condition assessments should be completed in a structured and repeatable fashion, according to consistent and objective assessment criteria. Without proper guidelines for the completion of

condition assessments there can be little confidence in the validity of condition data and asset management strategies based on this data.

Condition assessments must include a quantitative or qualitative assessment of the current condition of the asset, collected according to specified condition rating criteria, in a format that can be used for asset management decision-making. As a result, it is important that staff adequately define the condition rating criteria that should be used and the assets that require a discrete condition rating. When engaging with external consultants to complete condition assessments, it is critical that these details are communicated as part of the contractual terms of the project. There are many options available to the Town to complete condition assessments. In some cases, external consultants may need to be engaged to complete detailed technical assessments of infrastructure. In other cases, internal staff may have sufficient expertise or training to complete condition assessments.

Developing a Condition Assessment Schedule

Condition assessments and general data collection can be both time-consuming and resource intensive. It is not necessarily an effective strategy to collect assessed condition data across the entire asset inventory. Instead, the Town should prioritize the collection of assessed condition data based on the anticipated value of this data in decision-making. The International Infrastructure Management Manual (IIMM) identifies four key criteria to consider when making this determination:

1. **Relevance**: every data item must have a direct influence on the output that is required
2. **Appropriateness**: the volume of data and the frequency of updating should align with the stage in the assets life and the service being provided
3. **Reliability**: the data should be sufficiently accurate, have sufficient spatial coverage and be appropriately complete and current
4. **Affordability**: the data should be affordable to collect and maintain