Greater | Grand Sudbury



WATER & WASTEWATER ASSET MANAGEMENT PLAN

2025 UPDATE

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INTRODUCTION

Overview

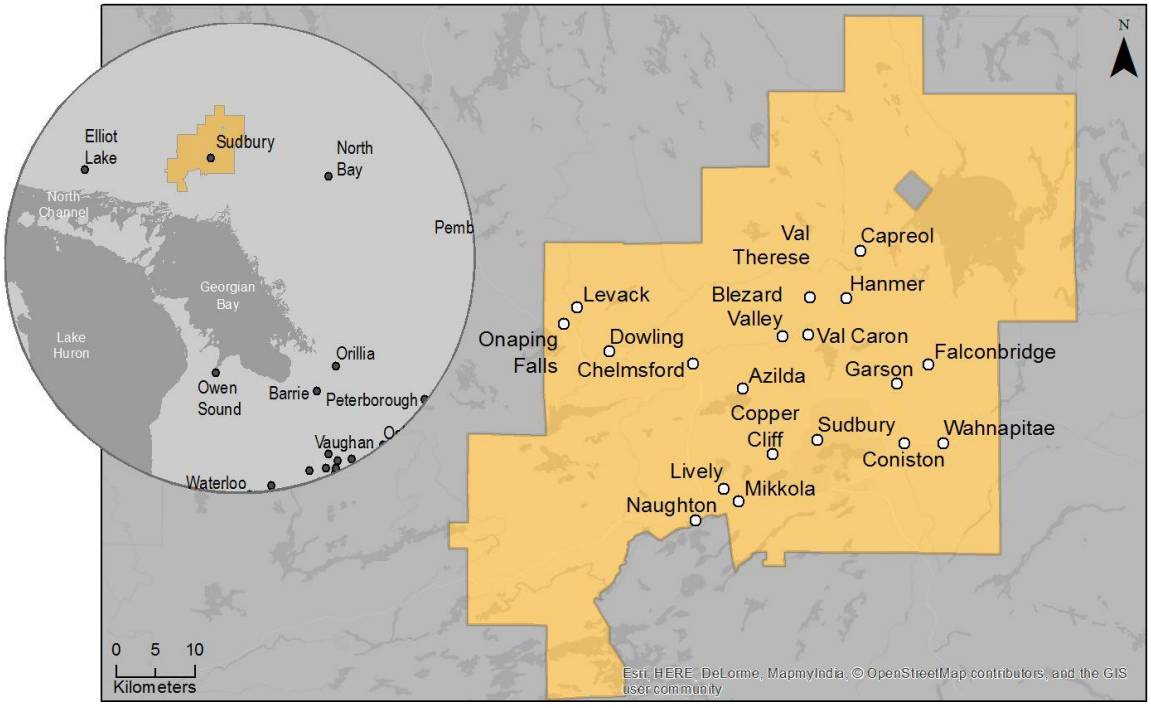
This Asset Management Plan Update outlines the current condition of the City of Greater Sudbury's water and wastewater assets with recommendations on how to extend the service life of assets in good condition while investing enough capital to keep the City's water and wastewater assets in a state of good repair.

This report contains a summary of the City's linear and vertical water & wastewater assets, including the quantity and average age of each asset type, their average condition, and the Total Replacement Values (TRVs) of these assets.

City of Greater Sudbury

The City of Greater Sudbury (the "City") is located in Northeastern Ontario at the convergence of Trans Canada Highway 17 and Highway 69 south (Map 1). Formed on January 1st, 2001, the City is geographically the largest municipality in Ontario and serves as the regional capital of Northeastern Ontario.

Map 1 City of Greater Sudbury



Background & Context of the Organization

Internal Context

The City has established the following vision, mission, and values:

VISION - *A centre of excellence and opportunity- a vibrant community of communities living together.*

MISSION - *resilient, dependable, accessible service and progressive policies that promote sustainable progress.*

VALUES - *As stewards of the City of Greater Sudbury, we believe in recognizing the specific needs of all our citizens in urban, rural, and suburban areas, and are guided by our belief in:*

- *Acting today in the interests of tomorrow*
- *Providing quality service with a citizen focus*
- *Embodying openness and transparency*
- *Communicating honestly and effectively*
- *Creating a climate of trust and a collegial working environment to manage our resources efficiently, responsibly, and effectively.*
- *Encouraging innovation, continuous improvement, and creativity*
- *Fostering a culture of collaboration*
- *Ensuring an inclusive, accessible community for all*
- *Respecting our people and our places.*

As part of the City's "open doors" theme of Open Government, strategic planning in the City is a valuable tool for performance measurement with a focus on who the municipality serves, what the municipality does and why, in both the immediate and long-term. Strategic planning can help define where the City is going and evaluate outcomes for success. This strategic planning is used to set priorities, focus energy and resources, strengthen operations, establish common goals for employees and elected officials, achieve agreement on intended outcomes, and assess and adjust operations in response to a changing environment.

This Asset Management Plan Update supports the City's internal objectives by linking planned asset strategies with the City's mission of providing quality municipal services in a transparent, open manner.

External Context

The current regulatory framework Ontario O.Reg. 588/17 states that:

"Every municipality shall prepare a strategic asset management policy that includes the municipality's goals, policies or plans that are supported by its asset management plan and the process by which the asset management plan is to be considered in the development of the municipality's budget or any long-term financial plans that take into account municipal infrastructure assets".

WSP was retained to provide an update to the Asset Management Plan (AMP) so that the City can continue utilizing this plan to assist with decisions regarding the building, operating, maintaining, renewing, replacing, disposing, and funding of their water and wastewater infrastructure assets. This plan meets the 2022 and 2025 regulatory requirements of Ontario Regulation 588/17 Asset Management Planning for Municipal Infrastructure (O.Reg. 588/17) for the City's water & wastewater assets, which are defined as a core infrastructure asset in the regulation. O.Reg. 588/17 requirements are summarized in Figure 1 (refer to p.4). This AMP has six sections:

1 Introduction
2 State of Infrastructure
3 Levels of Service
4 Asset Management Strategy
5 Financing Strategy
6 Improvement Plan & Next Steps

Purpose

The AMP seeks to responsibly manage the assets, as defined O.Reg. 588/17, in a manner that balances costs, risks, and the level of service and in alignment with The City's Strategic Goals.

The objective of this Water and Wastewater AMP Update is to provide a strategic document that will guide decisions related to how the City's water and wastewater infrastructure will be managed to most efficiently and effectively allocate capital in a manner that will meet the City's stakeholders desired levels of service for the lowest overall lifecycle costs.

The purpose of developing this AMP for the City is to identify the current state of the City's water and wastewater infrastructure from the perspective of condition, performance, and risk. This information will aid the City in their infrastructure investment decisions across the organization's water and wastewater asset portfolio. Over-investment in one area can lead to an under-investment in another. To demonstrate the impact of investment decisions, target Levels of Services were set so that performance against these targets can be measured.

Relationship to Other Planning Documents

This AMP Update does not stand apart, or alone in assisting the City in the sustainable planning of infrastructure investment. Reliance upon other targeted planning documents is how the overall asset strategy will be formulated. This document has already drawn upon the valuable work completed under other planning documents such as the:

- City of Greater Sudbury Water and Wastewater Master Plan, WSP (current)
- City of Greater Sudbury Water and Wastewater AMP Update, WSP (2022)
- City of Greater Sudbury Water and Wastewater Master Plan, WSP (2018)
- City of Greater Sudbury Transportation Master Plan, WSP (formerly MMM) (2018)
- Condition Assessment of Lift Stations, Booster Stations, and Treatment Plants by various consultants (2019 - present)
- Enterprise Asset Management Plan, KPMG (2021)
- Water condition assessments
- Other internally developed planning resources

Scope of the Asset Management Plan

This AMP Update only documents the asset management strategy for the City's Water and Wastewater systems and does not include infrastructure that is privately owned and maintained. It is to be noted here, that the AMP did not include other infrastructure in the same corridor of the water/ wastewater infrastructure, such as roadways, sidewalks etc. The City has an enormous Water & Wastewater System servicing various communities. It contains eight (8) distinct water systems and fourteen (14) independent wastewater systems. The linear infrastructure consists of approximately:

	Linear	Vertical
Water	– **1,034 km** of watermains – **927 km** of service connections – **6,041** hydrants – **15,607** water valves – **2,514** valve chambers – **47,940** water meters – **6** water meter stations	– **12** booster stations – **2** chemical treatment facilities – **4** pressure control facilities – **1** water metering facility – water storage facilities – **19** water well facilities – **2** water treatment plants
Wastewater	– **810 km** of gravity mains – **22 km** of rock tunnel – **70.8 km** of force mains – **46,948** lateral service connections – **12,355** maintenance holes – **21** drop shafts – **82** control valves	– **70** lift stations – **4** wastewater treatment lagoons – **10** wastewater treatment plants

The capital renewal forecast in this AMP Update has been developed considering a 10-year planning horizon. This was based on available financial information from the City and a Water and Wastewater Financial Plan completed on behalf of the City by BMA Management Consulting.

The AMP is to be treated as a living document to be updated as contexts change and at no less frequent a rate than once every five years. As such, this update builds upon the other planning documents mentioned above and provides the City with important context to make capital planning decisions for the next 10 years and beyond.

Asset Management Objectives

The objectives of this AMP Update are:

- To identify the current state of the City's water and wastewater infrastructure from the perspective of condition, performance, and risk.
- To establish updated Level of Service for the City's water and wastewater infrastructure that enables measurement of initiatives associated with "providing quality municipal services;"
- To forecast water and wastewater infrastructure needs, aligned with corporate objectives, over a short term (5 to ten years); and
- To identify opportunities for improvement to the City's asset management strategy' inline with the City's vision of innovation, to attain asset management maturity in compliance with O. Reg. 588/17.

Development of the Asset Management Plan

Asset management in Ontario is subject to Ontario Regulation 588/17. Under this regulation organizations are required to prepare and periodically update a Strategic Asset Management Policy (SAMP) or framework and an Asset Management Plan (AMP). These guiding documents aim to help organizations with the long-term planning of their infrastructure through improved asset information and subsequent understanding of the investment needs required to maintain service delivery. A periodic review and update of the Strategic Asset Management Policy and Asset Management Plan by the organization is required at least every five years.

The AMP will continue to be updated at least every five years to reflect the changing needs and funding levels of the City's infrastructure and to ensure adequacy of the levels of service provided to the Greater Sudbury community.

The management framework presented in the International Infrastructure Management Manual outlines the relationship between the processes and procedures being presented in this Plan. An asset management strategy as presented in this document is a way of managing assets with the intention of delivering the City's services at the lowest lifecycle cost. This Plan is a framework that presents a strategy for best management of the City's infrastructure on an annual basis. Although certain principles of asset management such as Condition Assessment, Levels of Service and Capital Planning are addressed within this document, these are high level approaches and assessments that are to be refined as the City's asset management strategies grow. This Asset Management Plan will require on-going and continual work to ensure its success.

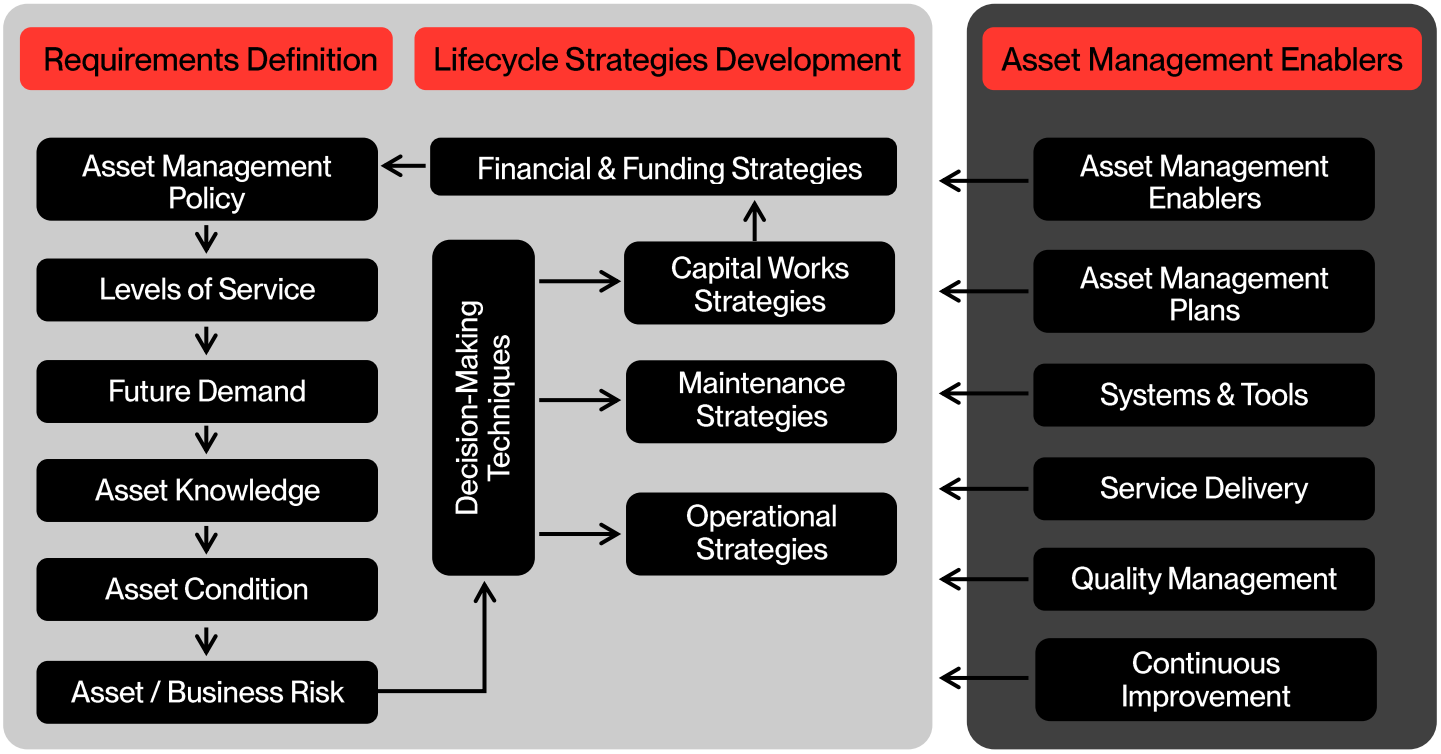


Figure 1 Typical Asset Management Framework

A periodic review and update of the Strategic Asset Management Policy and Asset Management Plan by the City is required at least every five years. This AMP is an update of the 2018 AMP. Details of the key deliverables of this regulation are listed in Figure 2.

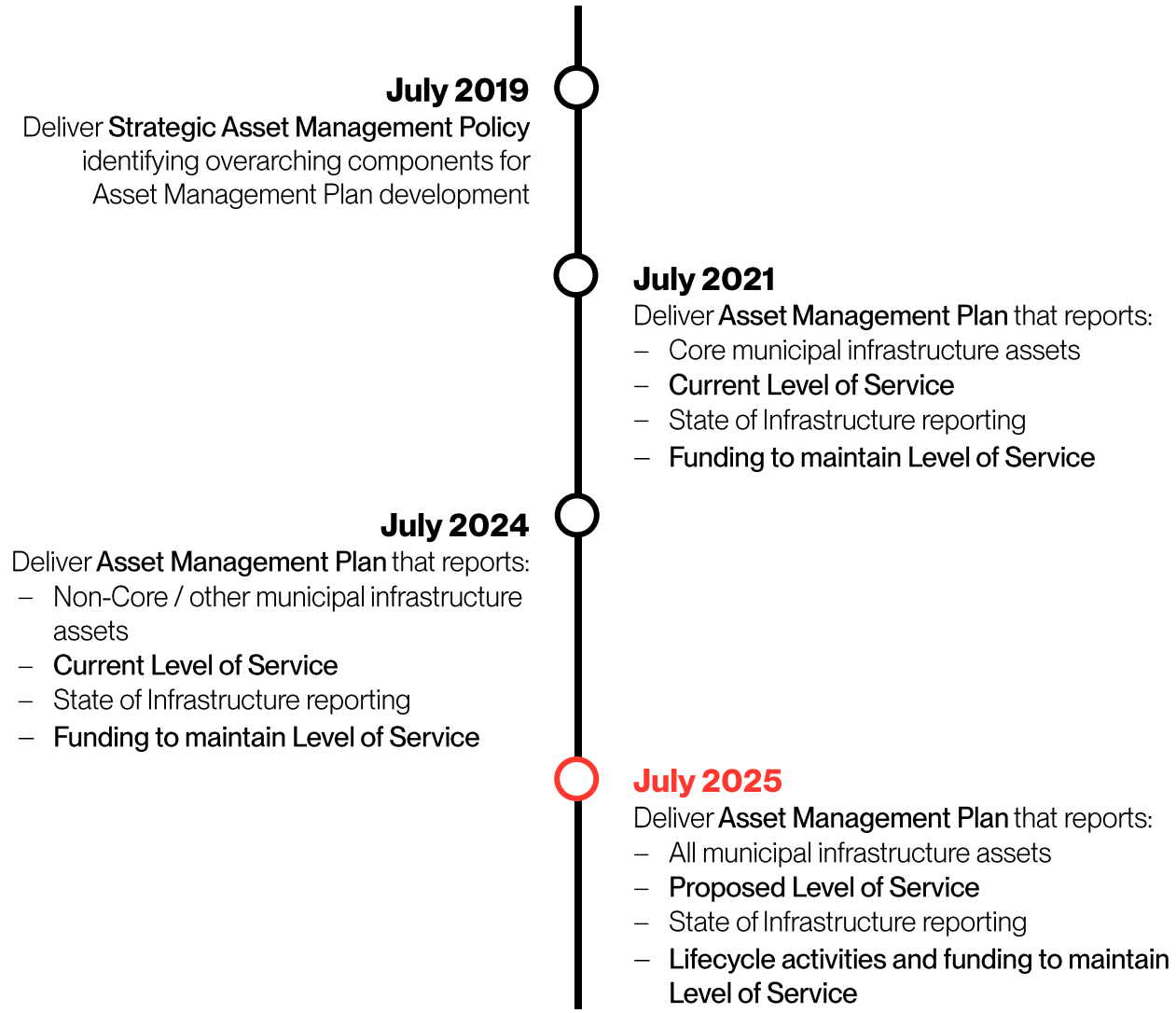


Figure 2 Deliverable Timeline for O. Reg. 588/17

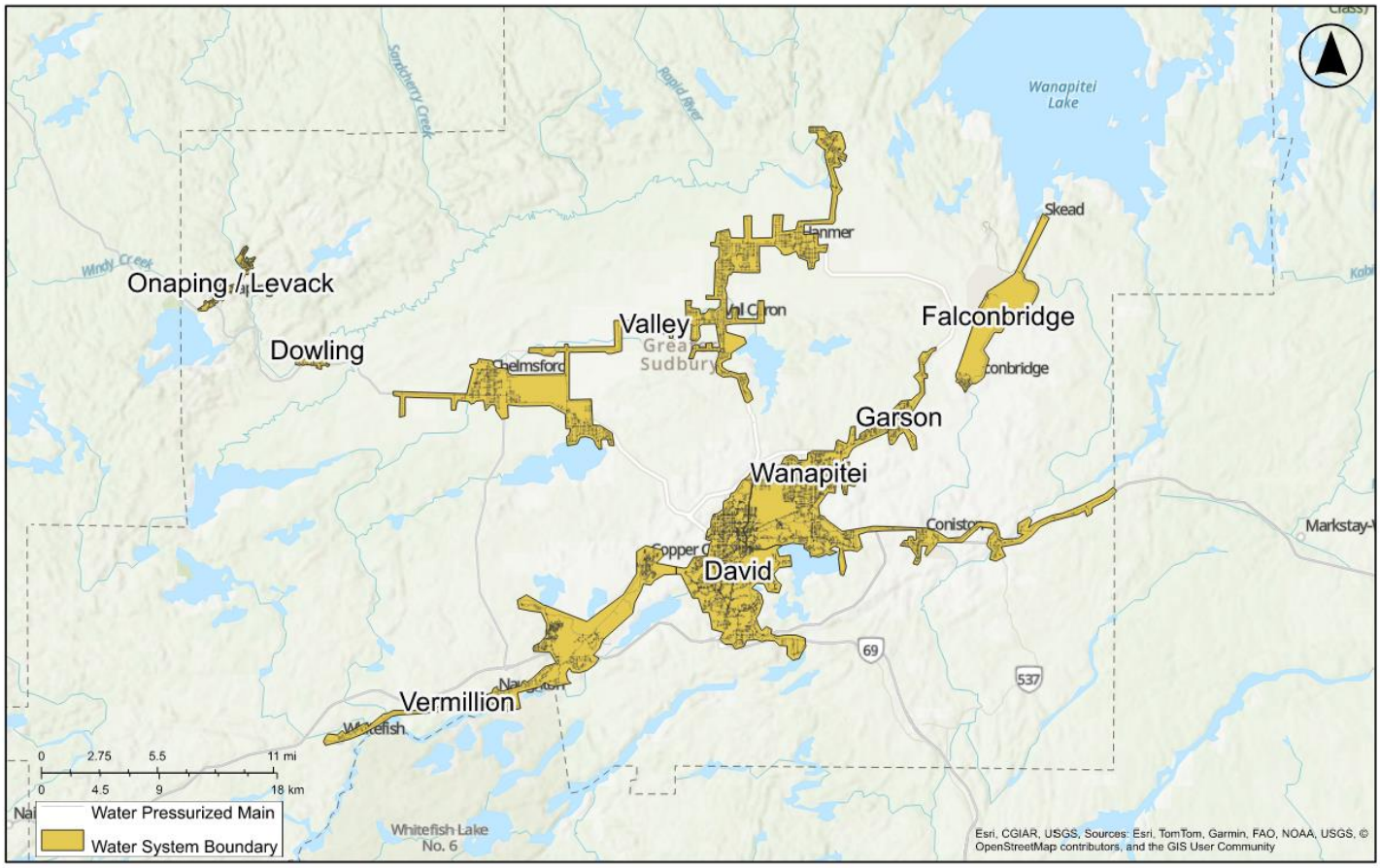
STATE OF INFRASTRUCTURE

System Overview

The City owns and operates eight (8) municipal water supply systems (Map 2) and fourteen (14) independent wastewater systems (Map 3) that service the various communities in the City of Greater Sudbury.

Key asset inventory information including location, size, length, material, year of installation and other attribute information are included in the digital asset inventory provided with this AMP.

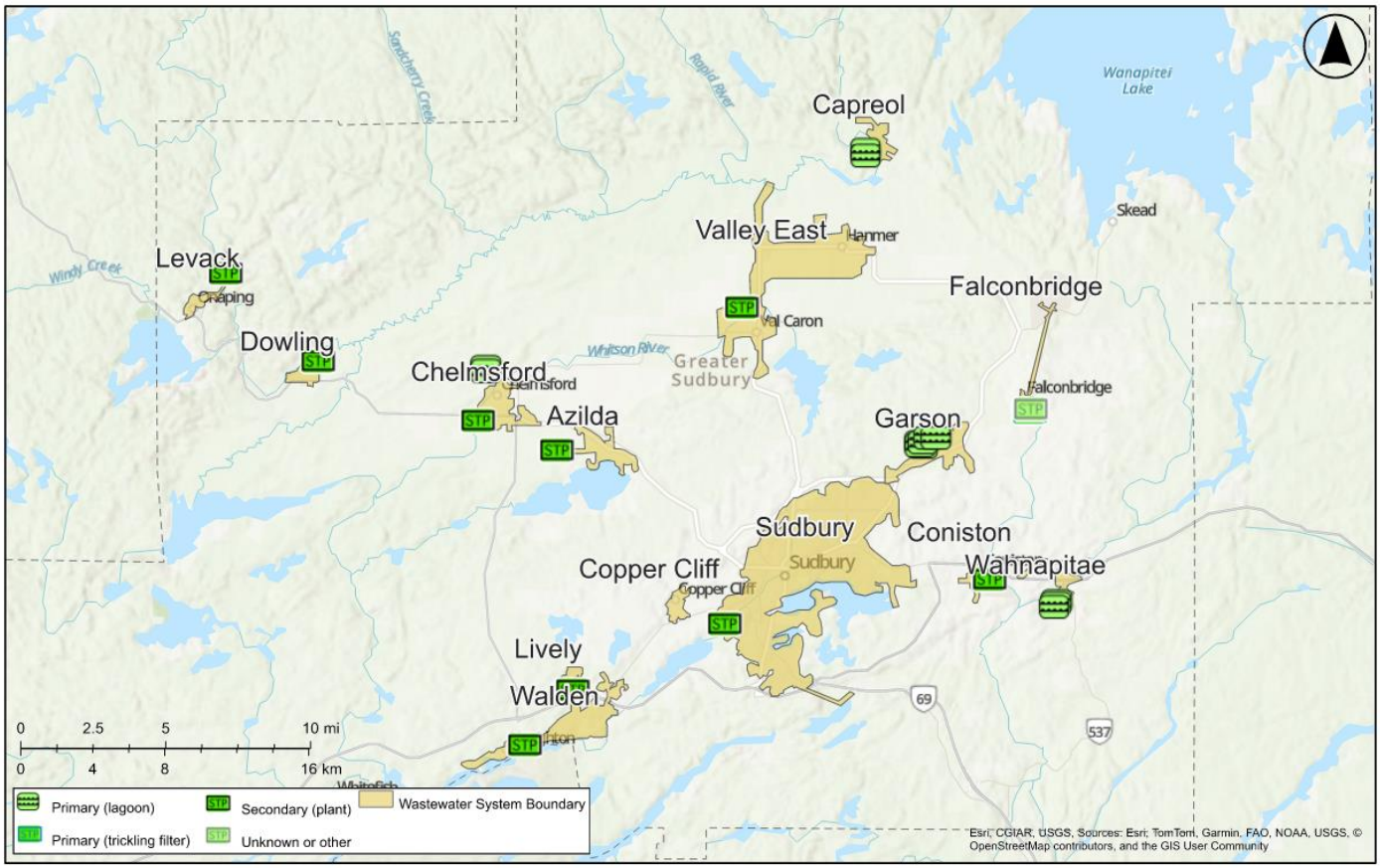
Map 2 **Greater Sudbury Water System Map**



The City's Water System consists of:

- Onaping/Levack Water System
- Dowling Water System
- Blezard Valley / Capreol Water System
- Vermilion Water System
- Falconbridge Water System
- Garson Water System
- Wanapitei Water System
- David Water System

Map 3 Greater Sudbury Wastewater System Map



The City's Wastewater System consists of:

- Onaping/Levack Wastewater System
- Dowling Wastewater System
- Chelmsford Wastewater System
- Valley Water System
- Azilda Wastewater System
- Copper Cliff Wastewater System
- Lively Wastewater System
- Walden Wastewater System
- Sudbury Wastewater System
- Coniston Wastewater System
- Wahnapitei Wastewater System
- Garson Wastewater System
- Falconbridge Wastewater System
- Capreol Wastewater System

Data Sources

This AMP update built on the 2022 AMP Update that was developed for the City by WSP. The main data source for the linear inventory is the City's Water and Wastewater infrastructure Geographic Information System (GIS) which was reviewed and updated by WSP with additional information and clarifications provided by the City and CANN Forecast Inc. input. The vertical inventory built on the 2022 AMP Update and available Condition assessments and other relevant reports provided by the City.

The following sections describe the City of Greater Sudbury's Water and Wastewater asset portfolio in terms of (1) quantity, (2) replacement value, (3) age, (4) condition, and (5) risk. The strategies were applied to individual assets to develop the forecasts of lifecycle needs and costs to maintain the desired levels of services.

Maps illustrating the service areas for the City's water and wastewater systems are provided in Appendix A. Appendix B provides maps of the City's linear water and wastewater infrastructure .

Asset Portfolio Summary

Portfolio by Quantity

Water System

The City is responsible for the operation and maintenance of approximately 1,034 km of watermains (Figure 3), 6,041 fire hydrants, 15,607 valves, 2,514 valve chambers, 927 km of service connections, 82 control valves, 47,940 water meters, and 6 meter stations.

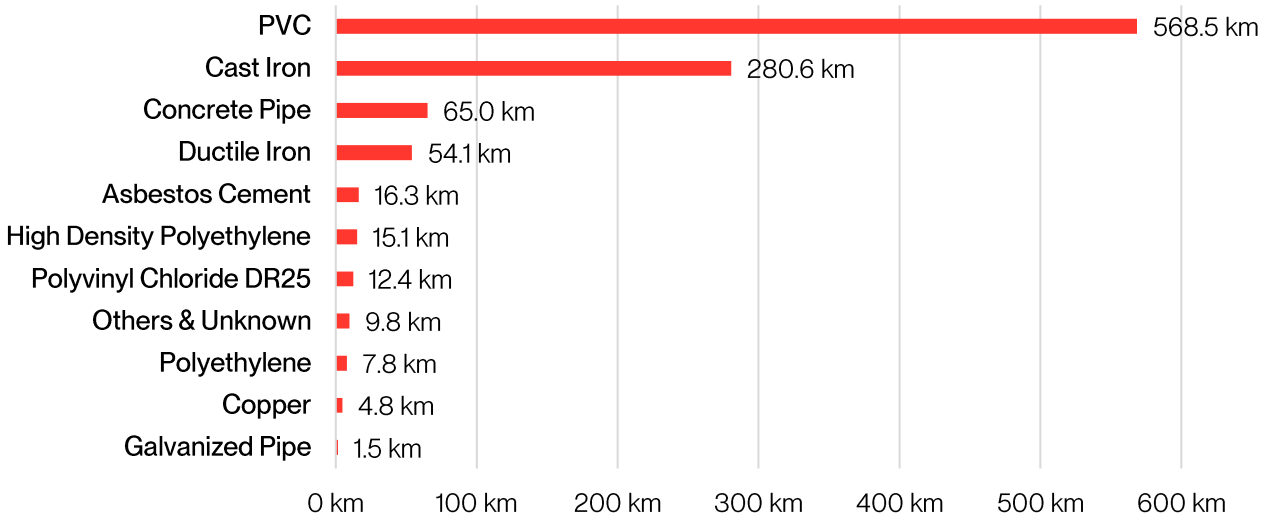


Figure 3 Watermain Length by Material of Construction

The City water system includes 47 vertical facilities: 12 booster stations, 2 chemical treatment facilities, 4 pressure control facilities, 1 water metering facility, 7 water storage facilities, 19 water well facilities, and 2 water treatment plants.

Wastewater System

The City is responsible for the operation and maintenance of approximately 810 km of sanitary sewers (Figure 4), with 396 km of service connections, 70.8 km of sanitary force mains, 12,355 maintenance holes, 87 control valves and 21 drop shafts.

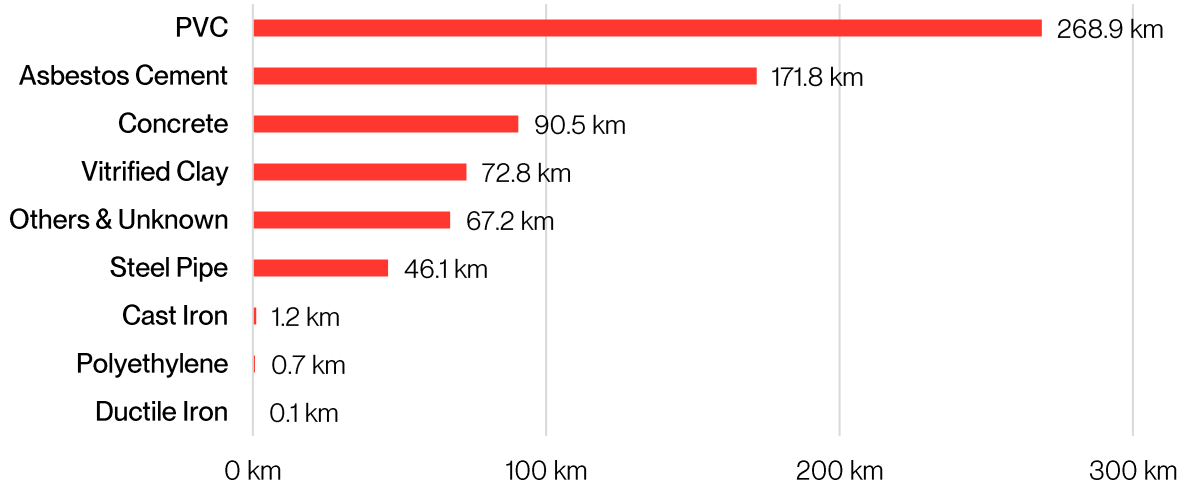


Figure 4 Sanitary Collection System (Sewers) Length by Material of Construction

The City is also responsible for the operation and maintenance of approximately 84 wastewater facilities, including 70 lift stations, 4 wastewater treatment lagoons, and 10 wastewater treatment facilities.

Portfolio by Replacement Value

A water and wastewater infrastructure capital plan was developed, and it was determined that the total replacement value for the entire inventory is estimated at $6.06 billion. The vertical infrastructure replacement values used in this update are based on either the values previously established in the 2022 plan, with inflation accounted for, or on the data provided from condition assessment reports of these facilities between 2022 and 2025. Summaries for the water linear, water vertical, wastewater linear and wastewater vertical infrastructure are provided in the following pages.

Water Linear Infrastructure

Replacement Value: $2.62 Billion

Table 1 Water Linear Infrastructure Replacement Value by Asset Type

ASSET TYPE	QUANTITY	REPLACEMENT VALUE
Watermains	1,034 km	$2.09B
Service Connections	927 km	$258M
System Valves	15,607	$105M
Control Valves	102	$935K
Hydrants	6,025	$70.1M
Metering Stations	7	$1.5M
Valve Chambers	2,514	$86.1M
Water Meters [1]	48,857	$10.3M
Total Replacement Value	**$2.62 Billion**	

Note: (1) Does not account for recent City replacement of Water Meters

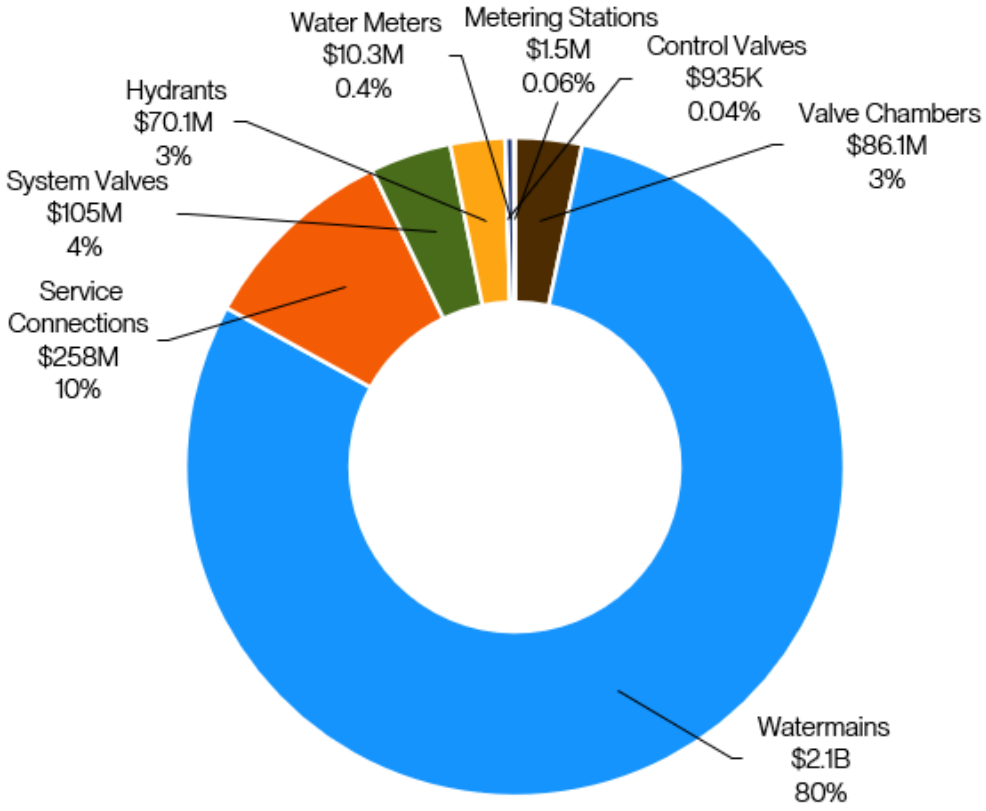


Figure 5 Water Linear Infrastructure Replacement Value by Asset Type

Water Vertical Infrastructure

Replacement Value: $340 Million

Table 2 Water Vertical Infrastructure Replacement Value by Asset Type

ASSET TYPE	QUANTITY	REPLACEMENT VALUE
Distribution Facilities, including: — 12 Booster Stations — 4 Pressure Control Facilities — 1 Metering Station	17	$33.8M
Storage Facilities	7	$57.4M
Treatment Facilities, including: — 2 Surface Water Plants — 1 Reservoir — 1 Re-chlorination — 1 Fluoridation Station	4	$169M
Groundwater Facilities	19	$80.2M
Total Replacement Value	$340 Million	

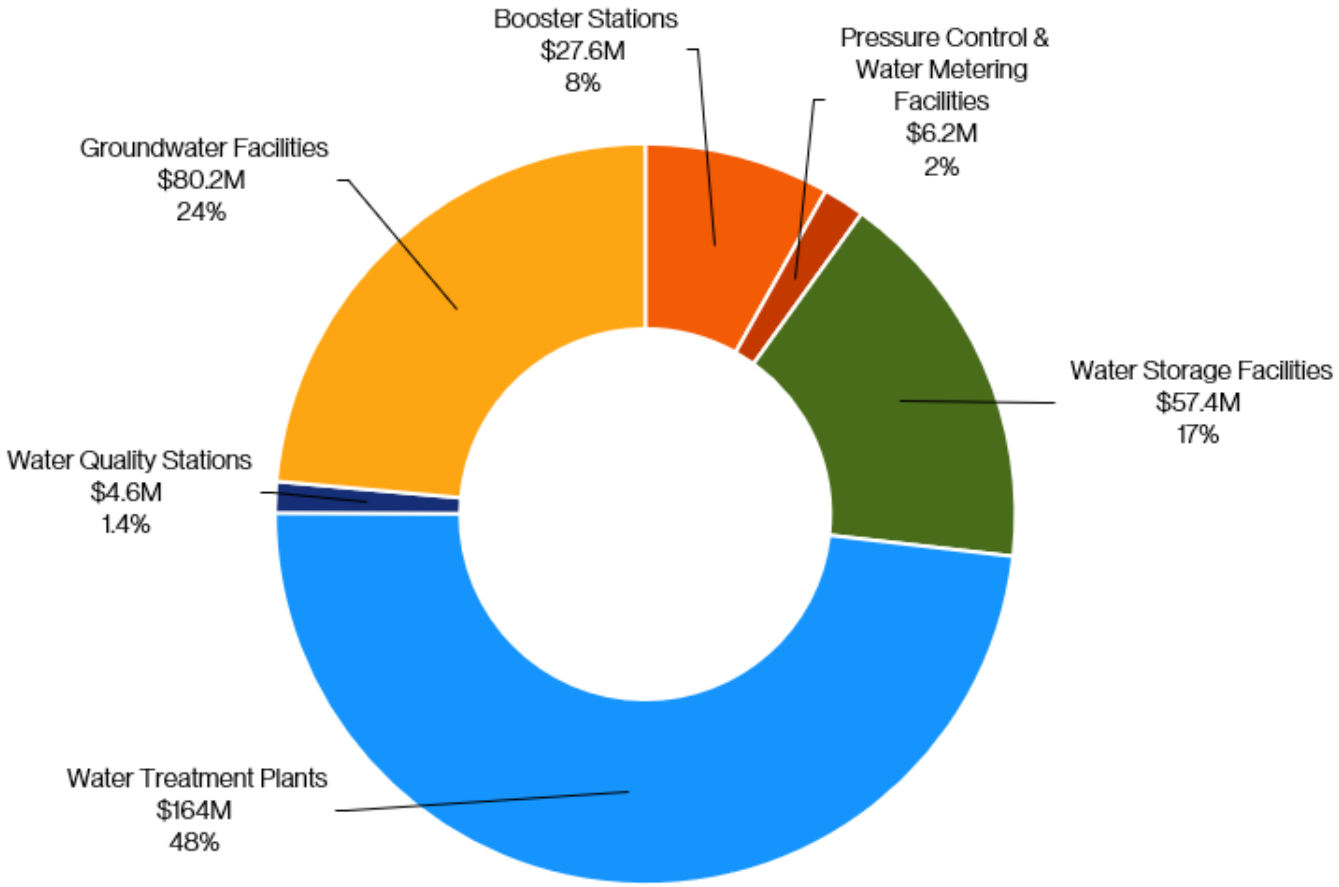


Figure 6 Water Vertical Infrastructure Replacement Value by Asset Type

Wastewater Linear Infrastructure

Replacement Value: $2.01 Billion

Table 3 Wastewater Linear Infrastructure Replacement Value by Asset Type

ASSET TYPE	QUANTITY	REPLACEMENT VALUE
Forcemains	73 km	$154M
Gravity Sewers	810 km	$1.5B
Lateral Connections	46,948	$215M
Valves	82	$3.2M
Drop Shafts	21	$25.5M
Maintenance Holes	12,338	$107M
Total Replacement Value	**$2.01 Billion**	

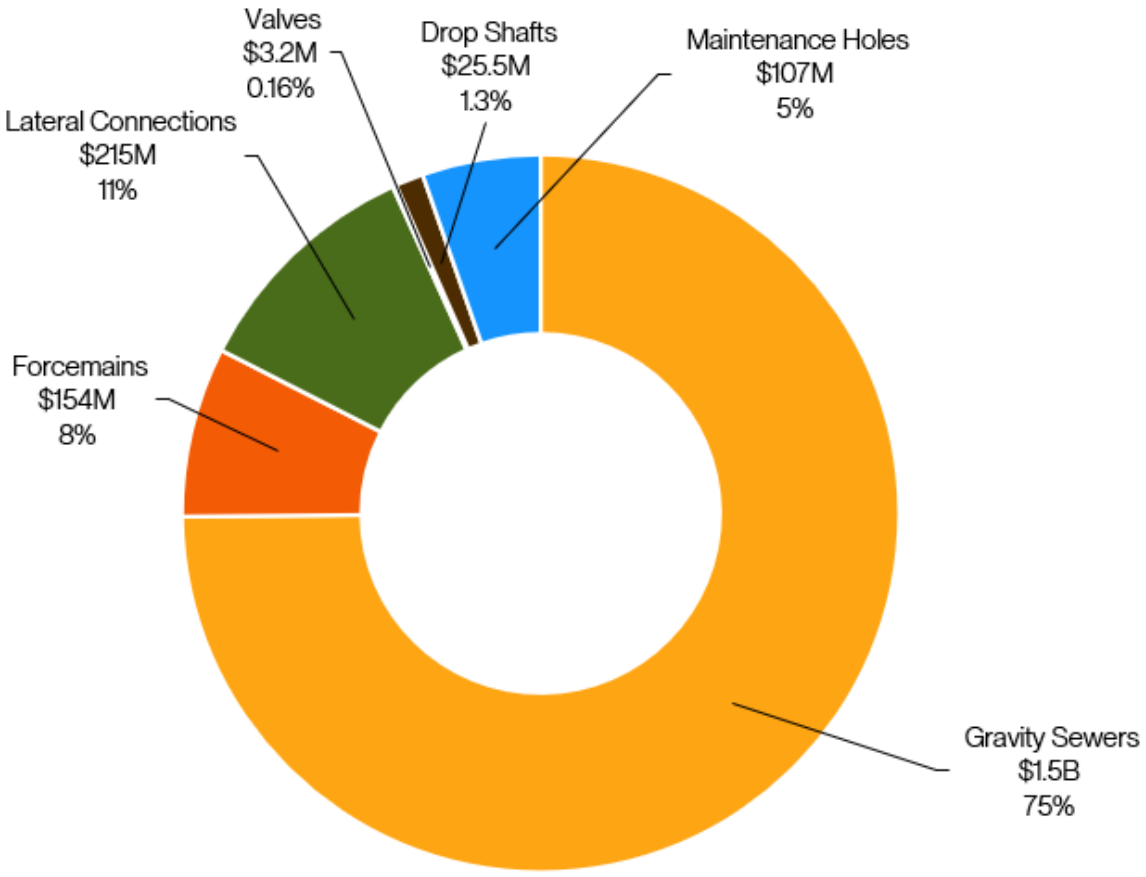


Figure 7 Wastewater Linear Infrastructure Replacement Value by Asset Type

Wastewater Vertical Infrastructure

Replacement Value: $1.08 Billion

Table 4 Wastewater Vertical Infrastructure Replacement Value by Asset Type

ASSET TYPE	QUANTITY	REPLACEMENT VALUE
Treatment Facilities, including: — 10 Wastewater Treatment Plants — 4 Lagoons	14	$868M
Collection Facilities (Lift Stations)	70	$217M
Total Replacement Value	$1.08 Billion	

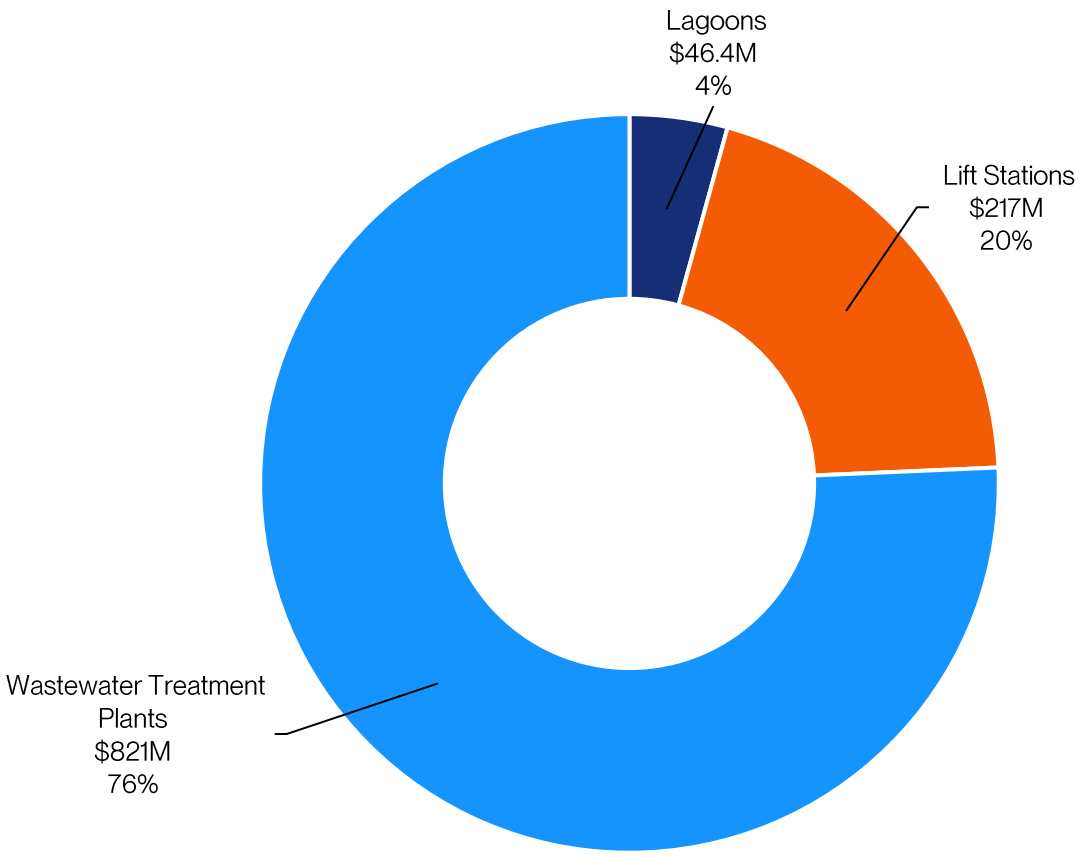


Figure 8 Wastewater Vertical Infrastructure Replacement Value by Asset Type

Portfolio by Asset Age

Expected Service Life

Asset service life estimates (Table 5, Table 6, Table 7) were developed based on industrial accepted standards and local experience of City staff. In cases where material data was missing, this field was populated based on the material used in the hydraulic model, if available.

Table 5 Linear Asset Expected Service Life (Years) by Material

MATERIAL	DESCRIPTION	WATER MAINS	SEWERS
AC	Asbestos Cement	55	55
CI	Cast iron	75	75
CIPP	Cured in place	80	-
COP	Copper	60	-
CP	Concrete (non-reinforced)	95	90
DI	Ductile iron	75	75
GP	Galvanized pipe	60	-
HDPE	High density polyethylene	80	80
PE	Polyethylene	55	55
PVC	Poly vinyl chloride	105	105
SP	Steel	60	60
UNK	Unknown	60	60
VC	Vitrified Clay	-	55

Table 6 Expected Service Life (Years) for Water Appurtenances

DESCRIPTION	EXPECTED SERVICE LIFE
Hydrants	60
System Valves	40
Control Valves (PRV, SRV, ARV)	30
Service Connections	60
Water Meters	20
Maintenance Holes and Chambers	70

Table 7 Vertical Facility Assets Expected Service Life (Years)

LIFECYCLE CATEGORY	WATER	WASTEWATER
Structural	80	80
Architectural	20	20
Building Services	20	20
Site Works	25	25
Process Piping & Equipment (PP&E)	30	25
Electrical	30	30
Instrumentation & Control Systems and Life Safety & Compliance Systems (I&CS)	15	15
Standby Power	25	25
Sanitary Forcemain	-	Varies by material per linear inventory



Water System

The City's GIS data was reconciled by WSP to establish the current linear data. Figure 9 shows the distribution of the City of Greater Sudbury's Watermains material distribution by age and length. Figure 10 shows the age distribution of water facilities, with the majority being installed in the 1970's and 1980's. The average age of the City's water assets is approximately 40 years.

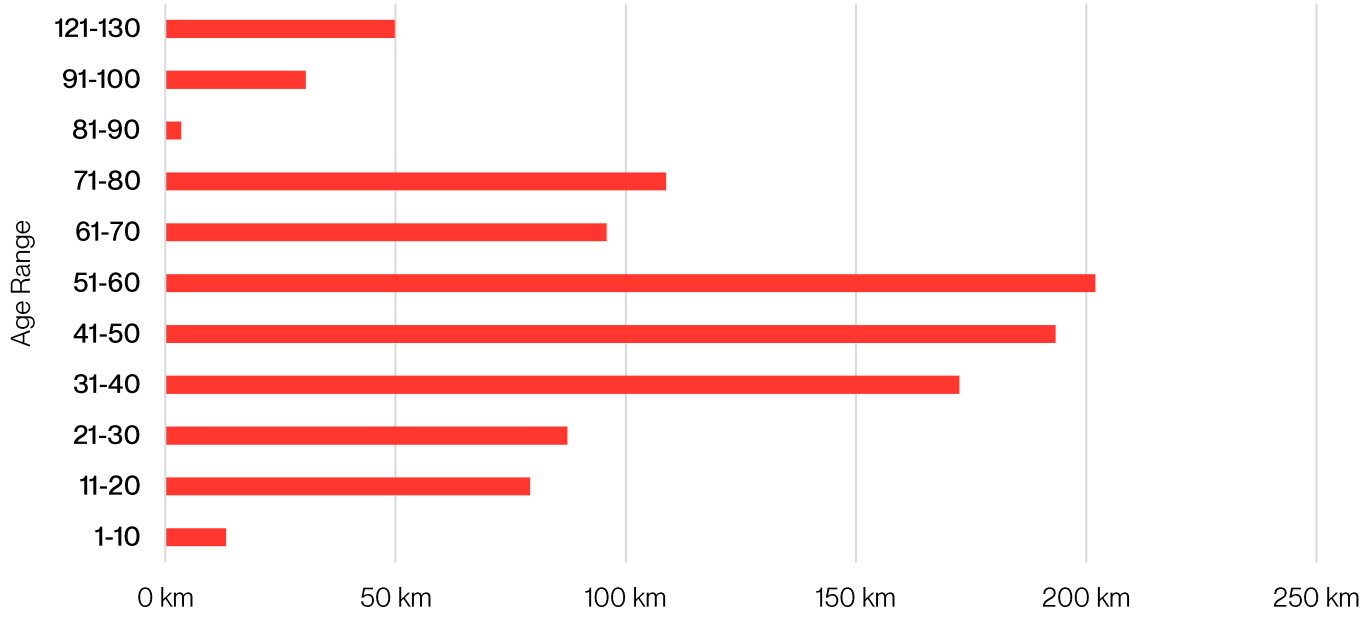


Figure 9 Watermain Distribution by Age and Length

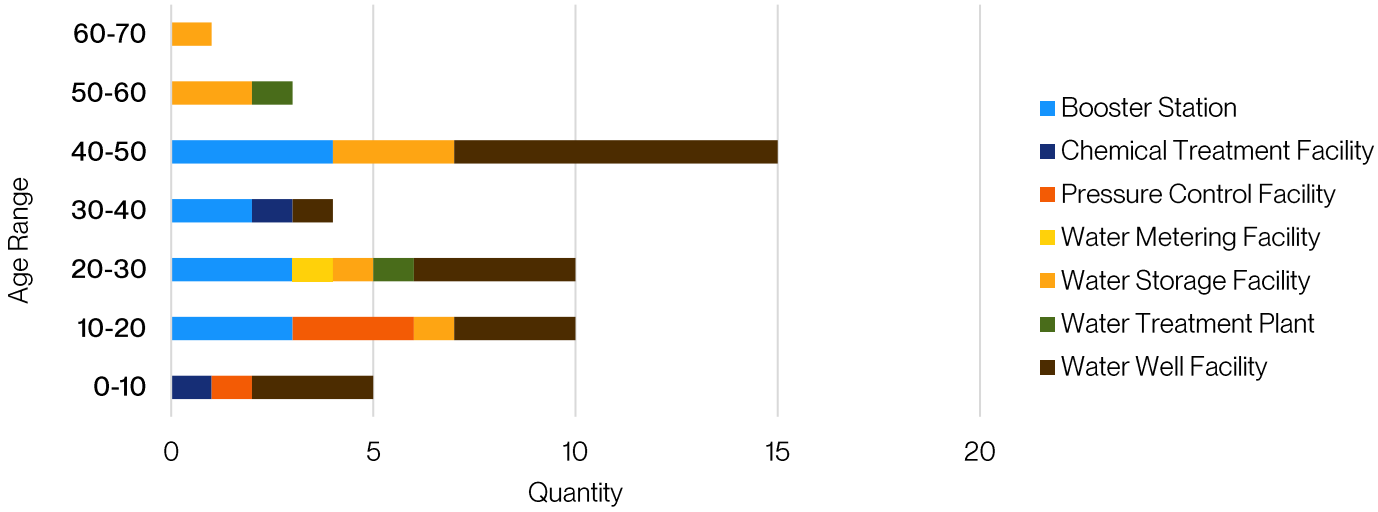


Figure 10 Water Facilities Age Distribution by Facility Type

Wastewater System

The ages of the sanitary sewers in the City of Greater Sudbury (Figure 11) is expected to follow a similar distribution as the water linear infrastructure, with considerable installations in the 1970's – 1990's. The age distribution of vertical wastewater facilities can be seen in Figure 12. The average age of the City's wastewater assets is approximately 50 years.

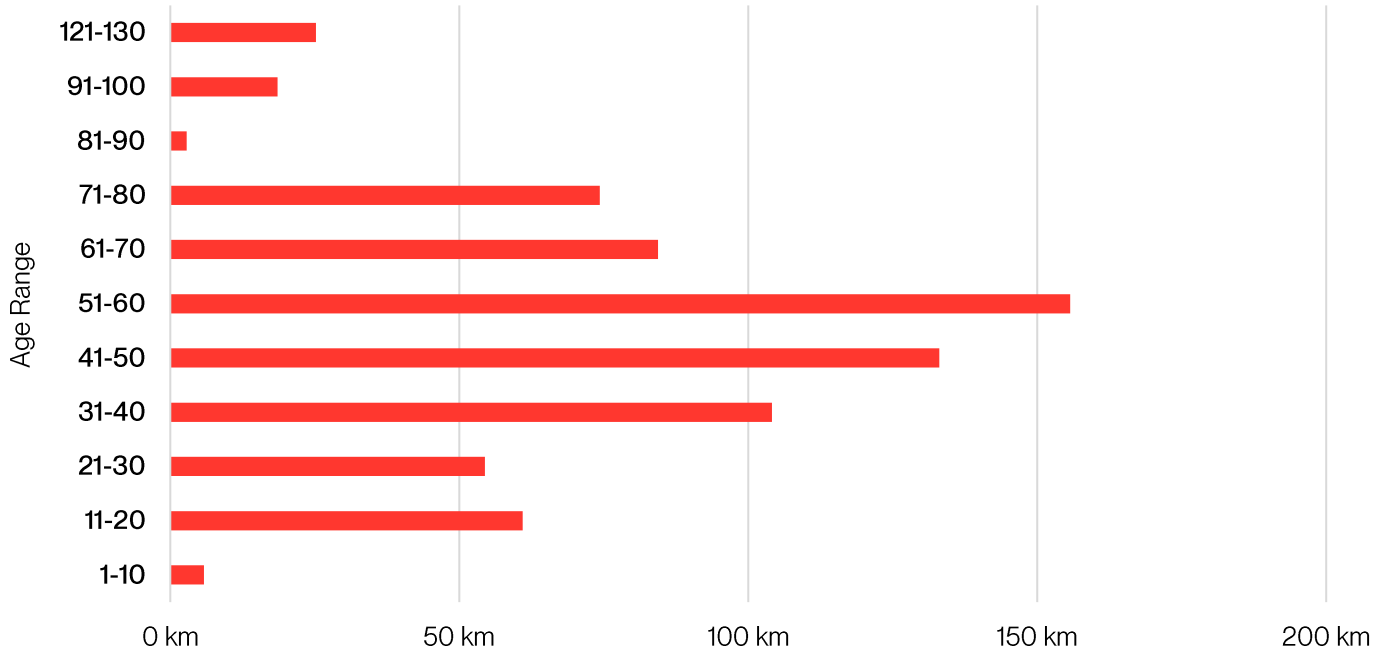


Figure 11 Sanitary Sewer Distribution by Age and Length

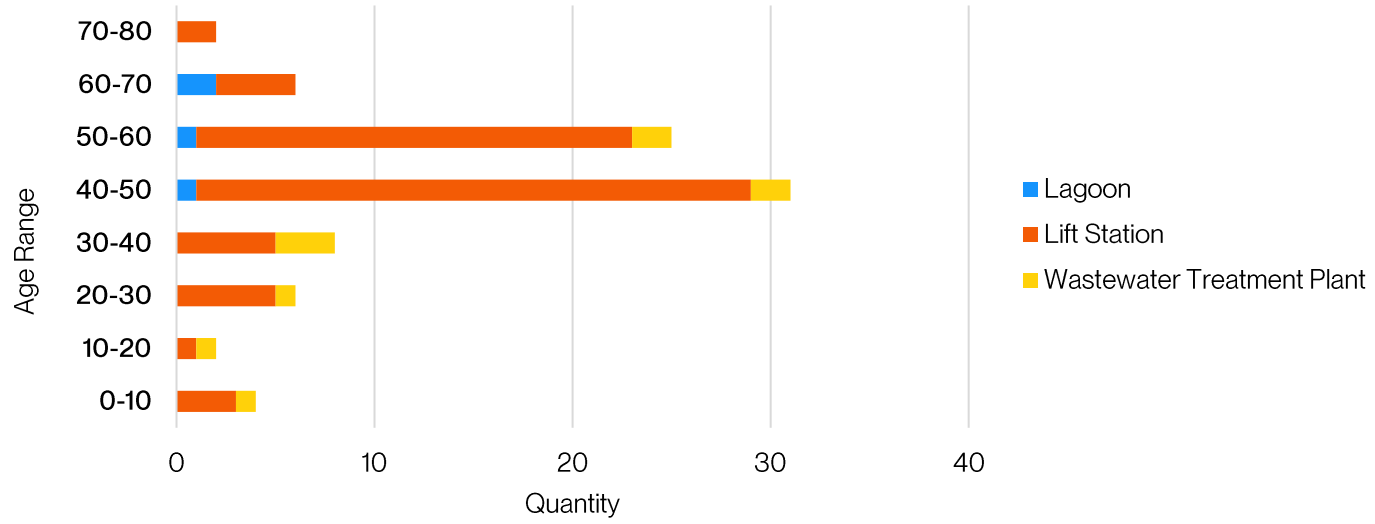
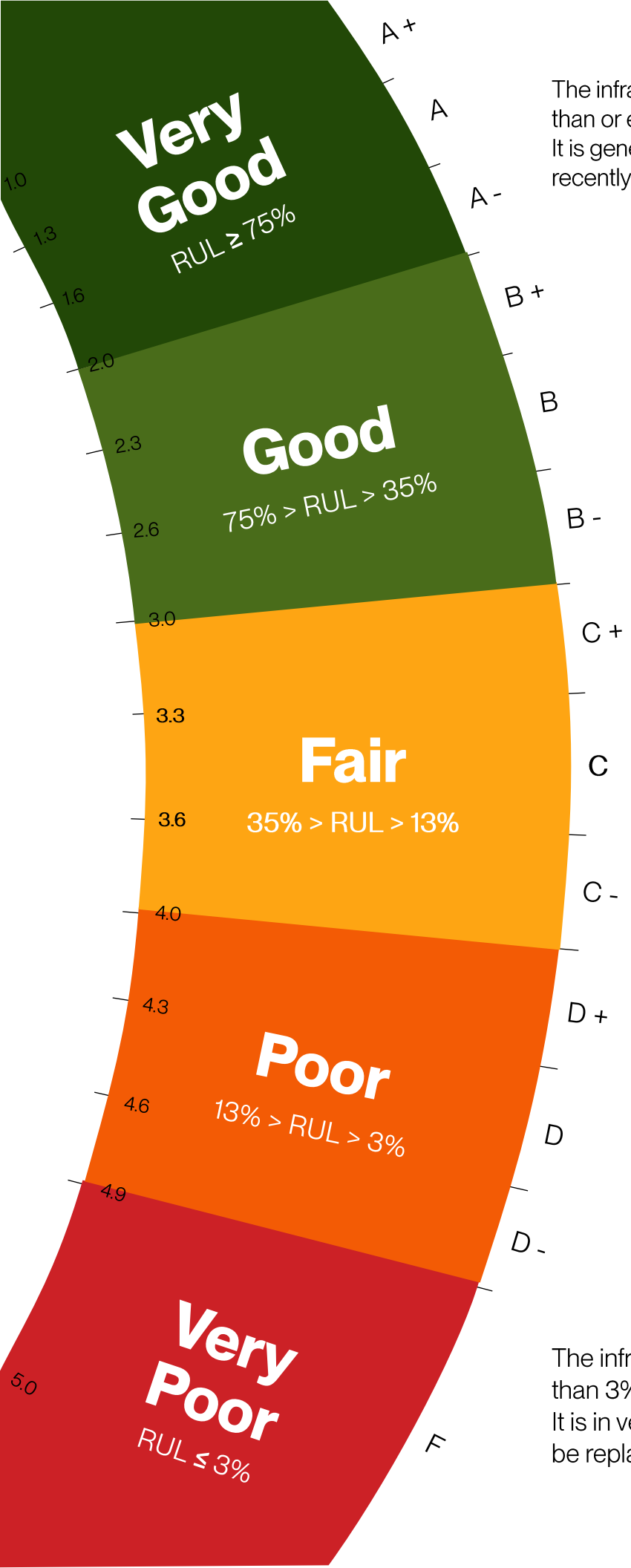


Figure 12 Wastewater Facilities Age Distribution by Facility Type

Portfolio by Condition

Condition Rating Scale

Asset condition was assigned to the City's Water and Wastewater infrastructure based on remaining useful life (RUL) or asset life expectancy and asset age. Condition scores were assigned using a rating system of 1 (early stage of lifecycle) to 5 (reaching or beyond expected useful service life), as illustrated on the next page.



The infrastructure in the system or network has greater than or equal to 75% of its remaining useful life.
It is generally in very good condition, typically new or recently rehabilitated. Perform normal maintenance.

The infrastructure in the system or network has less than 75% (and greater than or equal to 35%) of its remaining service life.
It is in good condition. Perform normal maintenance.

The infrastructure in the system or network has less than 35% (and greater than or equal to 13%) of its remaining service life. It is in fair condition.

The infrastructure in the system or network has less than 13% (and greater than or equal to 3%) of its remaining service life.
It is in poor condition and mostly below standard, with many elements approaching the end of their service life.

The infrastructure in the system or network has less than 3% of its remaining service life.
It is in very poor, unacceptable condition and should be replaced or rehabilitated.

Water System

Water Linear Infrastructure

The condition of the water linear infrastructure assets has been summarized below in Figure 13, Table 8, and Table 9.

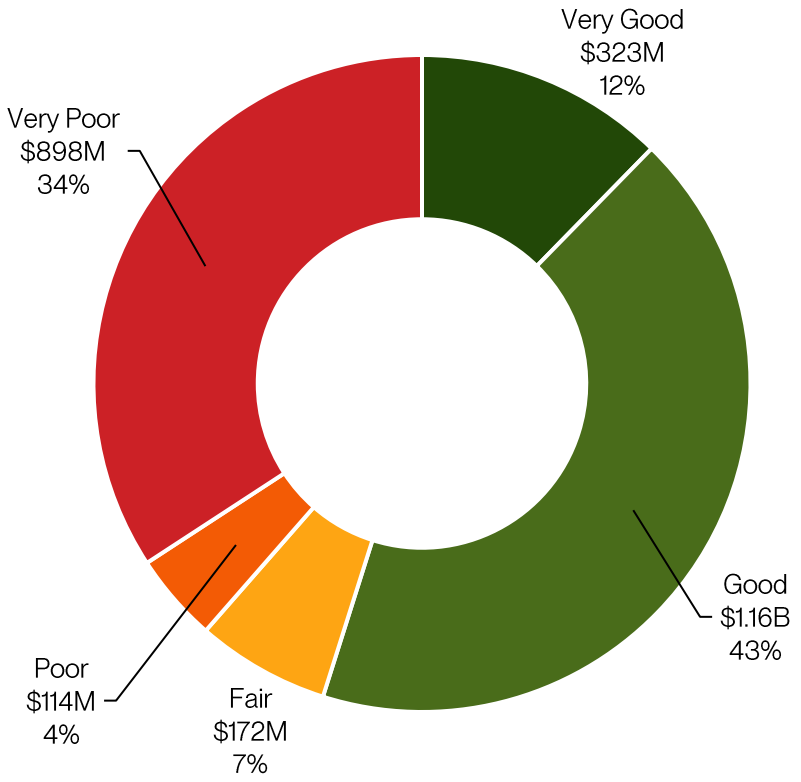


Figure 13 Condition Profile for Linear Water Assets

A combined 55% of linear water assets are in *very good* condition or *good* condition, while 34% of assets are in *very poor* condition.

Table 8 Water Linear Infrastructure Average Asset Condition

ASSET GROUP	QUANTITY	CURRENT AVERAGE ASSET AGE	AVERAGE EXPECTED ASSET LIFE	AVERAGE ASSET CONDITION
Watermains	1,034 km	44	78	Fair
Service Connections	927 km	43	54	Fair
System Valves	15,607	41	36	Poor
Control Valves	102	40	27	Poor
Hydrants	6,025	41	54	Fair
Metering Stations	7	45	27	Poor
Valve Chambers	2,514	46	36	Poor

Table 9 shows the condition of the watermain by pipe material type.

Table 9 Watermains Condition by Material

MATERIAL	AVERAGE AGE (YEARS)	EXPECTED SERVICE LIFE (YEARS)	AVERAGE CONDITION RATING	CONDITION GRADE
Asbestos Cement	55	55	3.8	C -
Cast Iron	65	75	4.2	D +
Cured in place	46	80	2.1	B +
Copper	71	60	4.2	D +
Concrete Pipe (Non-reinforced)	50	95	2.0	B +
Ductile Iron	59	40	4.4	D
Galvanized Pipe	72	60	4.5	D
High density polyethylene	35	80	3.1	C +
Prestressed Concrete Cylinder Pipe	54	70	2.1	B +
Polyethylene	57	55	3.0	C +
Polyvinyl chloride	40	105	1.8	A -
Polyvinyl chloride DR25	37	105	1.3	A +
SCPTR	49	60	2.0	B +
Steel Pipe	57	60	3.1	C +
Transite	63	55	4.3	D +
Unknown	101	60	3.3	C

Water Vertical Infrastructure

The condition of the water vertical infrastructure assets has been summarized below in Figure 14 and Table 10:

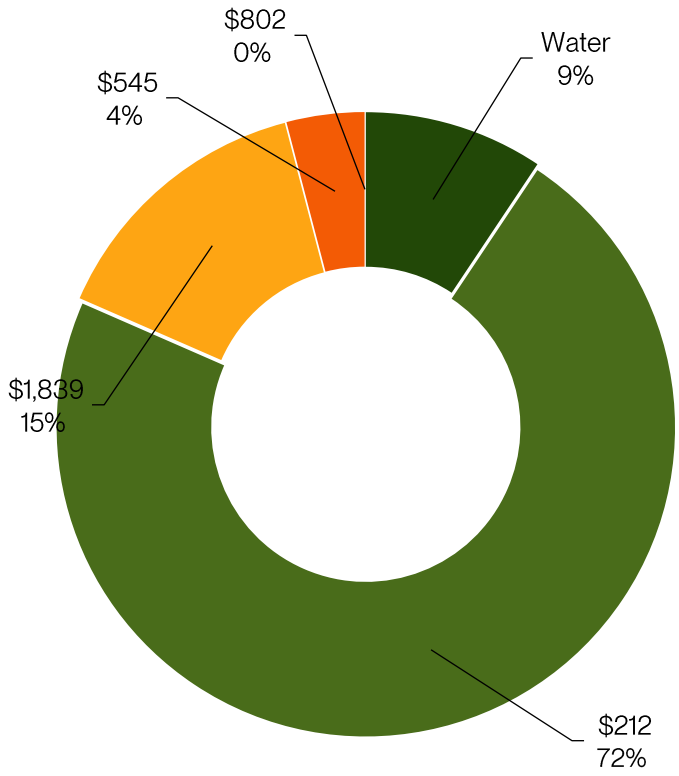


Figure 14 Condition Profile for Vertical Water Assets

A combined 60% of vertical water assets are in *very good* or *good* condition, while 24% of assets are in *poor* condition.

Table 10 Average Condition of Water Vertical Assets by Facility Type

ASSET TYPE	QUANTITY	CURRENT AVERAGE ASSET AGE	AVERAGE EXPECTED ASSET LIFE	AVERAGE ASSET CONDITION
Booster Stations	12	24	60	Good
Water Quality Stations	2	24	60	Good
Pressure Control Facilities	4	13	60	Very Good
Metering Stations	1	24	60	Good
Storage Facilities	7	29	60	Good
Groundwater Facilities	19	38	60	Fair
Treatment Facilities	2	36	60	Fair

Wastewater System

Wastewater Linear Infrastructure

The condition of the wastewater linear infrastructure assets has been summarized in Figure 15 and Table 11 below.

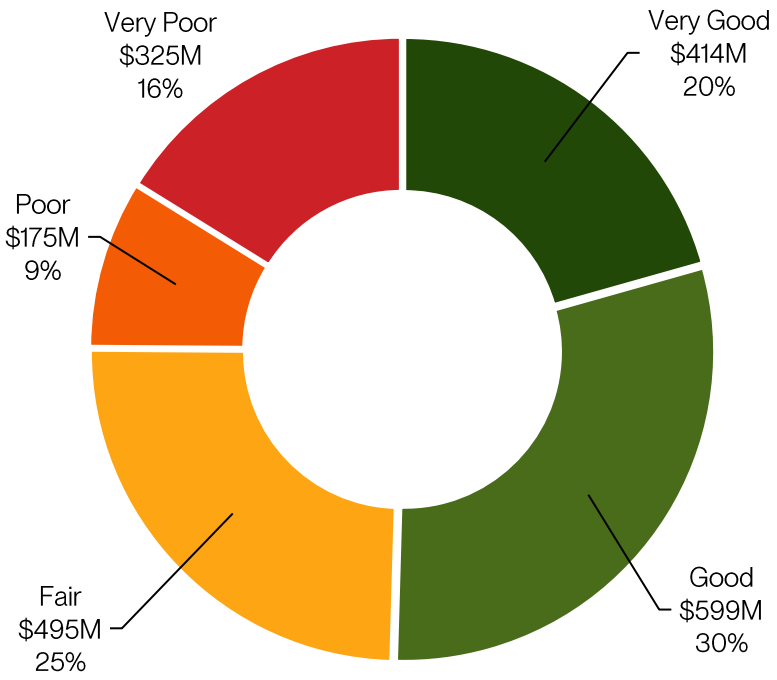


Figure 15 Condition Profile of Linear Wastewater Assets

A combined 50% of linear wastewater assets are in *very good* or *good* condition, while 16% are in *poor* condition.

Table 11 Average Condition of Wastewater Linear Assets

ASSET GROUP	QUANTITY	CURRENT AVERAGE ASSET AGE	AVERAGE EXPECTED ASSET LIFE	AVERAGE ASSET CONDITION
Forcemains	73 km	38	66	Good
Gravity Sewers	810 km	44	74	Good
Lateral Connections	46,948	42	54	Fair
Maintenance Holes	12,338	42	63	Fair
Valves	82	37	27	Poor
Drop Shafts	21	30	63	Good

Table 12 shows the average condition for the sanitary sewers by material type.

Table 12 City of Greater Sudbury Average Sanitary Sewer Condition by Material

MATERIAL	AVERAGE AGE (YEARS)	EXPECTED SERVICE LIFE (YEARS)	AVERAGE CONDITION RATING	CONDITION GRADE
Asbestos Cement	52	55	3.5	C
Cast Iron	57	75	3.9	C-
Concrete	46	90	2.3	B
Concrete Pipe (Non-reinforced)	49	95	2.5	B
Ductile Iron	31	40	3.9	C-
Prestressed Concrete Cylinder Pipe	40	70	2.1	B+
Polyethylene	39	55	2.8	B-
Polyvinyl Chloride	46	105	2.0	B+
Rock Tunnel	78	90	5.0	D+
Steel Pipe	56	60	3.4	C
Vitrified Clay	67	55	3.9	C-

Wastewater Vertical Infrastructure

The condition of the wastewater vertical infrastructure assets has been summarized below in Figure 16 and Table 13.

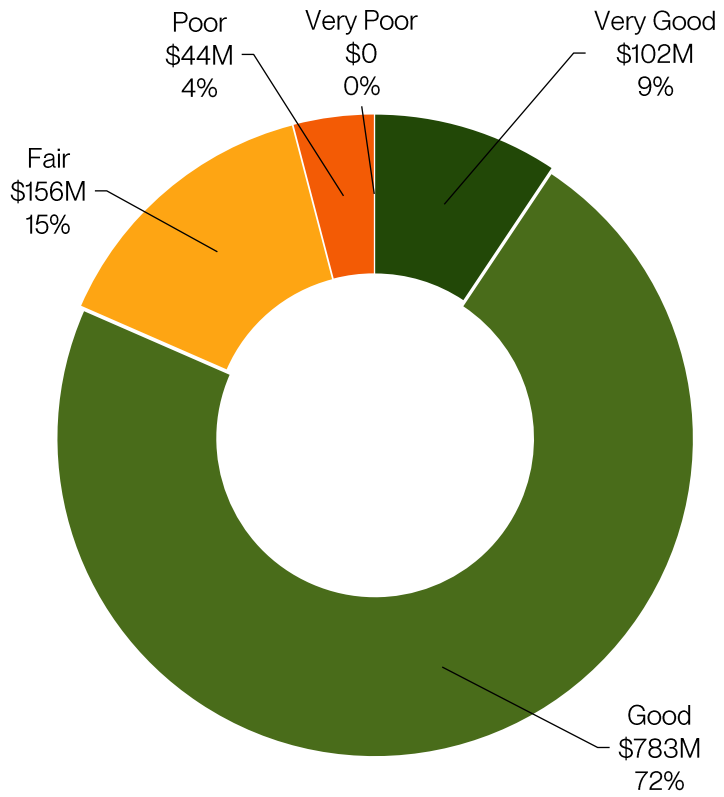


Figure 16 Condition Profile of Vertical Wastewater Assets

A combined 81% of vertical wastewater assets are in *very good* or *good* condition. Only 4% of assets are currently in *poor* condition.

Table 13 Average Condition of Wastewater Vertical Assets by Facility Type

FACILITY TYPE	QUANTITY	CURRENT AVERAGE ASSET AGE	AVERAGE EXPECTED ASSET LIFE	AVERAGE ASSET CONDITION
Lagoons	4	50	60	Fair
Lift Stations	70	41	60	Good
Wastewater Treatment Plants	10	29	60	Good

Asset Risk

Overview

Asset level risks were calculated by multiplying the consequence of failure for each asset with the likelihood of that asset failing. For an initial assessment, the likelihood and consequence of failure are based on:

Likelihood of failure: a 1-5 score for remaining life of each asset (based on an age-based condition rating or measured condition state determined from physical condition assessments).

Consequence of failure: a 1-5 criticality score for each asset.

Consequence of Failure (COF) × **Likelihood of Failure (LOF)** = **Risk**

The Consequence of Failure (COF) ratings are presented in Table 14.

Table 14 Consequence of Failure (COF) or Severity Rating

CONSEQUENCE	DESCRIPTION	RATING
Insignificant or Very low	No disruption to normal operation, no environmental impact, no financial investment.	1
Minor or Low	Some manageable operational disruption, minor environmental impact, small financial investment.	2
Moderate or Medium	Significant modification to normal operation but manageable, easy to mitigate environmental impact, moderate financial investment.	3
Major or High	Reduced production with inability to meet demand imminent, significant environmental impact, large financial investment.	4
Catastrophic or Very High	Inability to meet demand, potential injury, severe environmental impact, significant financial investment.	5

The Likelihood of Failure (LOF) ratings are presented in Table 15.

Table 15 Probability of Failure Ratings

LIKELIHOOD	DESCRIPTION	RATING
Rare or Very Low	Based on age-based remaining useful life. RUL ≥ 75%	1
Unlikely or Low	Based on age-based remaining useful life. 75% > RUL ≥ 35%	2
Moderate or Medium	Based on age-based remaining useful life. 35% > RUL ≥ 13%	3
Likely or High	Based on age-based remaining useful life. 13% > RUL ≥ 3%	4
Almost Certain or Very High	Based on age-based remaining useful life. RUL < 3%	5

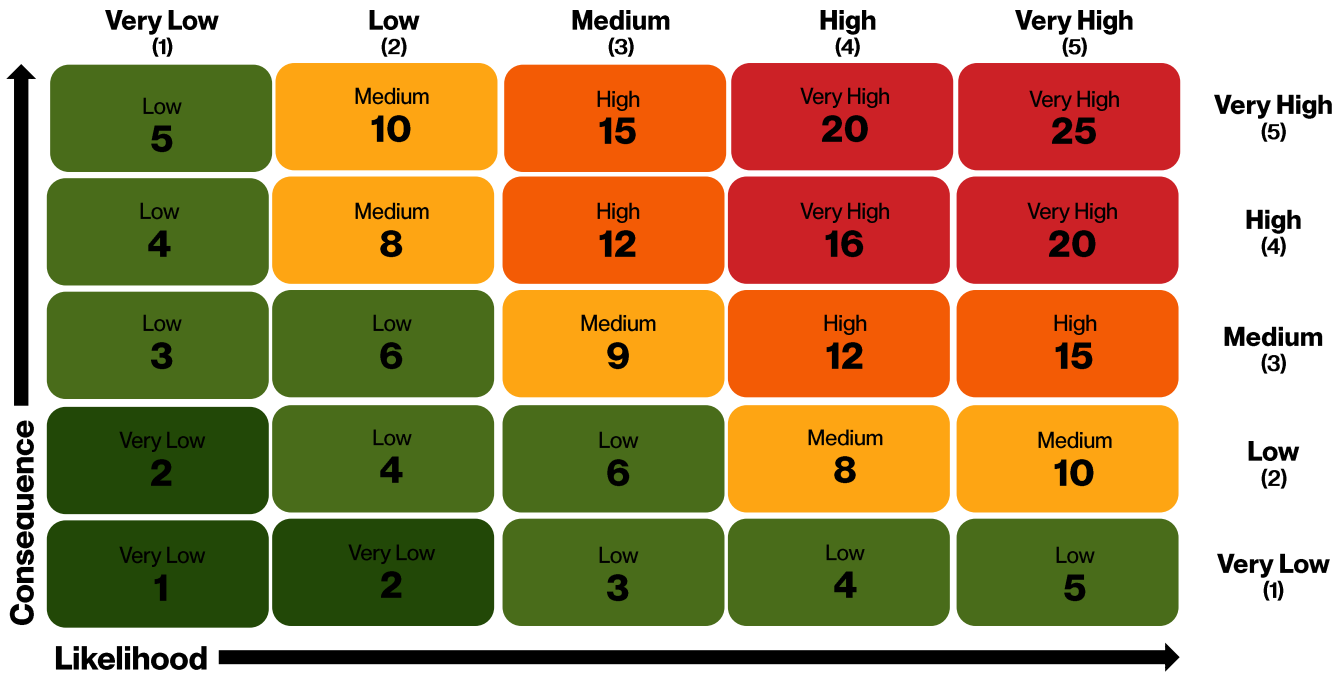


Figure 17 Risk Assessment Matrix

The risk score was calculated as the product of LIKELIHOOD (1-5) x CONSEQUENCE (1-5) and assessed from *very low* to *very high* based on the matrix shown in Figure 17.

Figure 18 and Figure 19 summarize the risk profile of the linear and vertical water / wastewater infrastructure and their associated replacement values.

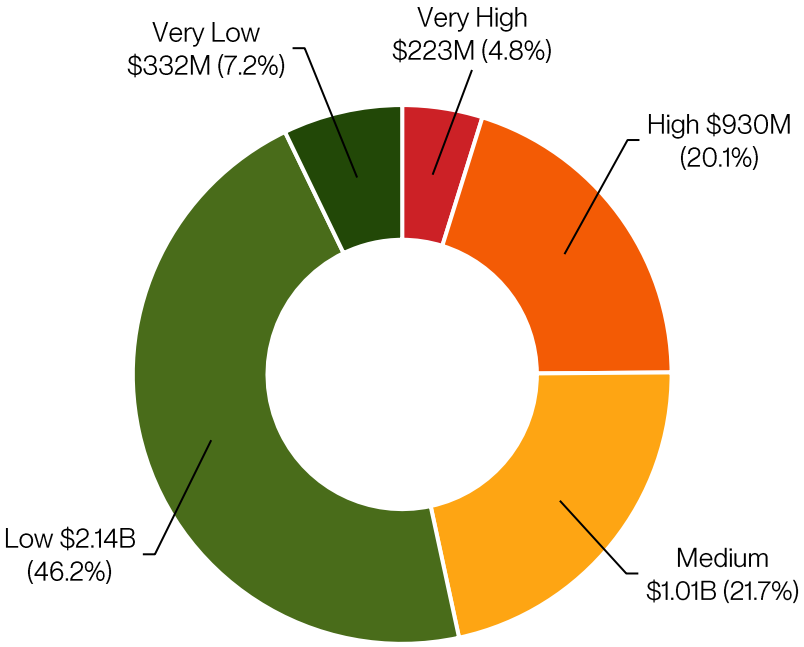


Figure 18 Risk Profile of Linear Assets

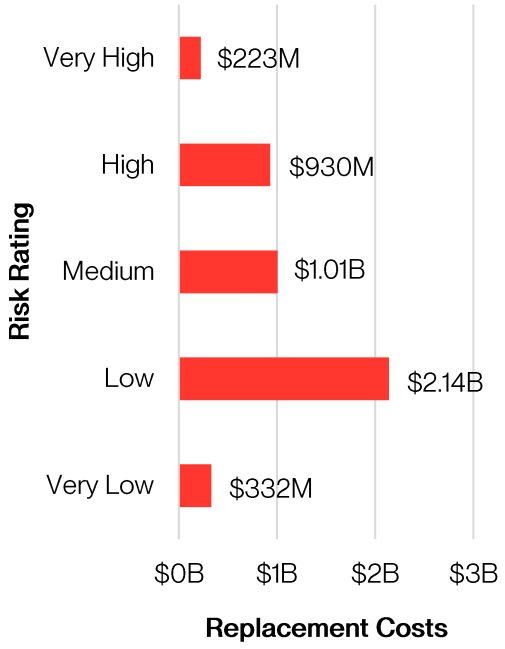


Figure 19 Linear Asset Risk Profile with Replacement Costs

Per Figure 18 and Figure 19, $1.15 billion, or 24.9% of linear assets are rated as *very high* or *high* risk. Over 50% of linear assets are rated as *low* or *very low* risk.

Figure 20 and Figure 21 below summarize the risk profile of the vertical water / wastewater infrastructure and their associated replacement values.

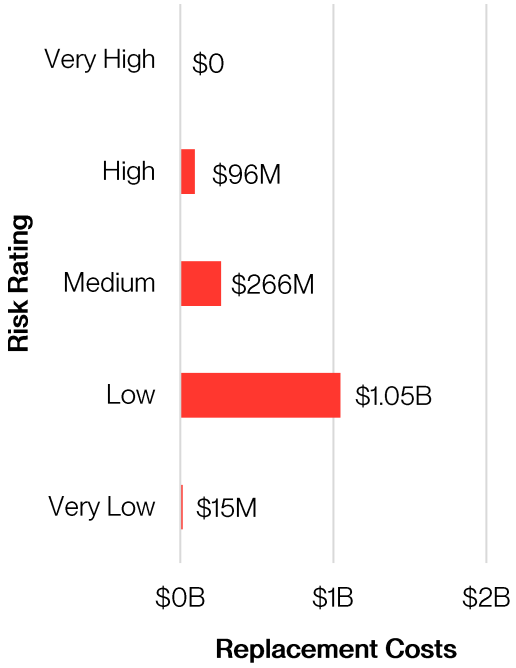


Figure 20 Vertical Asset Risk Profile with Replacement Costs

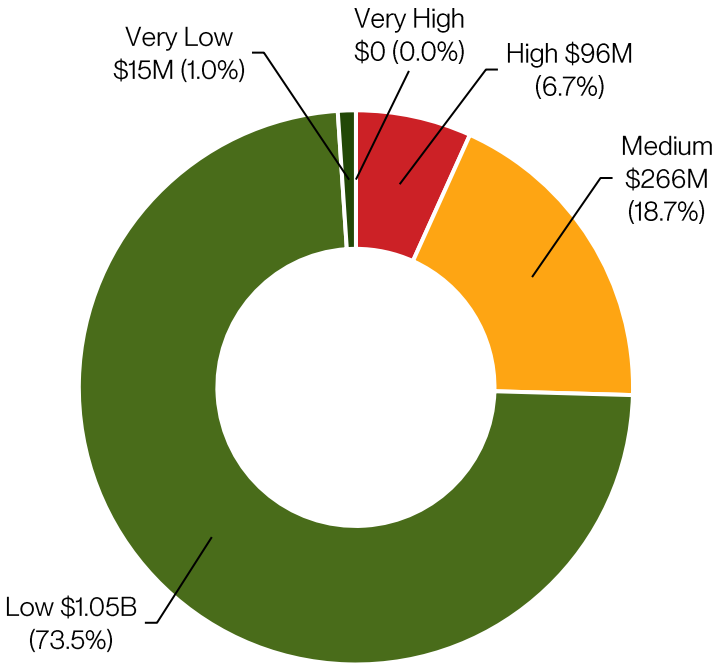


Figure 21 Risk Profile of Vertical Assets

Per Figure 20 and Figure 21, $96.1 million, or 6.7% of vertical assets are rated as *high* risk ($48.1 million for lift stations, $28.2 million for the water well facilities, $6.96 million for the lagoons and $2.07 million for the booster stations). The majority of vertical assets are rated as *low* or *medium* risk.

LEVELS OF SERVICE

Levels of service provide the means to measure community's needs and expectations of the City and the services provided and offers a mechanism for communicating costs of services. The level of service metrics selected are driven by the City's Vision, Mission and Values and are therefore focused on the impact to citizens, communities, and the natural environment. This section outlines the expected levels of service for the City's water and wastewater systems.

The City developed the AMP objectives using key Strategic documents to create alignment with the City's Mission, Vision, and Values.

Table 16 Alignment of Asset Management Plan with Corporate Objectives

MISSION, VISION, AND VALUES	OBJECTIVE	IMPLICATION TO ASSET MANAGEMENT PLAN
To support a growing community with quality municipal services	To ensure that all growth is well managed, well designed, and sustainable.	Proposed levels of service and financial strategy should be used by the to support future water wastewater financial plans, development charge study updates, and long-range planning exercises with the goal of identifying sustainable funding needs and mechanisms including rates, reserves, debt, and development charges.
To demonstrate innovative leadership amongst northern communities	Embrace infrastructure asset management as a best practice throughout the organization and become an Asset Management leader amongst Northern Ontario Municipalities	This second edition of the Asset Management Plan aims to build on the initial plan released in 2018 and includes updates to the initial levels of service and updates to the assets inventory. Associated asset risks and an updated financial plan have also been achieved as part of this update.
Acting today in the interests of tomorrow	Develop a strategic Asset Management Plan that relies upon social, environmental, and financial risk to prioritize infrastructure investment decisions	A risk-based prioritization framework has been implemented throughout this AMP to facilitate strategic infrastructure decision-making. Integrating outstanding recommendations from the Water and Wastewater Master Plan will provide a comprehensive plan that covers not only the ongoing management of existing infrastructure but also development to meet future needs.

Stakeholder Analysis

A community consultation (customer satisfaction survey) or measure of willingness to pay, was not undertaken as part of this iteration of the City's Asset Management Plan. future asset management plans will seek to integrate stakeholders' engagement where possible. Some of the City's stakeholders include:

- Regulatory bodies
- City of Greater Sudbury community, visitors
- Local industry
- City Council
- City Departments

Regulatory Requirements

Regulatory bodies represent one of the City's critical stakeholders. As a minimum level of service, there are regulatory requirements associated with the City's water and wastewater infrastructure that must be met (Table 17). These represent an absolute minimum level of service targets that must be met by the City but are not expressly tracked within this Plan.

Table 17 Minimum Regulatory Requirements

ASSET CATEGORY	REGULATORY REQUIREMENTS
Water and Wastewater Infrastructure	Environmental Protection Act Ontario Water Resources Act, R.S.O. 1990 Safe Drinking Water Act, 2002
Facilities	Building Code Act, 1992(Ontario Regulation 332/12) Accessibility for Ontarians with Disabilities Act (AODA)
Water and Wastewater Infrastructure	O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure

O.Reg. 588/17 differentiates Level of Service (LOS) between Community LOS and Technical LOS. To ensure the 'line of sight' with the City's vision statement is satisfied, additional LOS performance measures have been included as shown in Figure 22. These LOS include historical data, where available, to establish trends in the performance of the wastewater system.

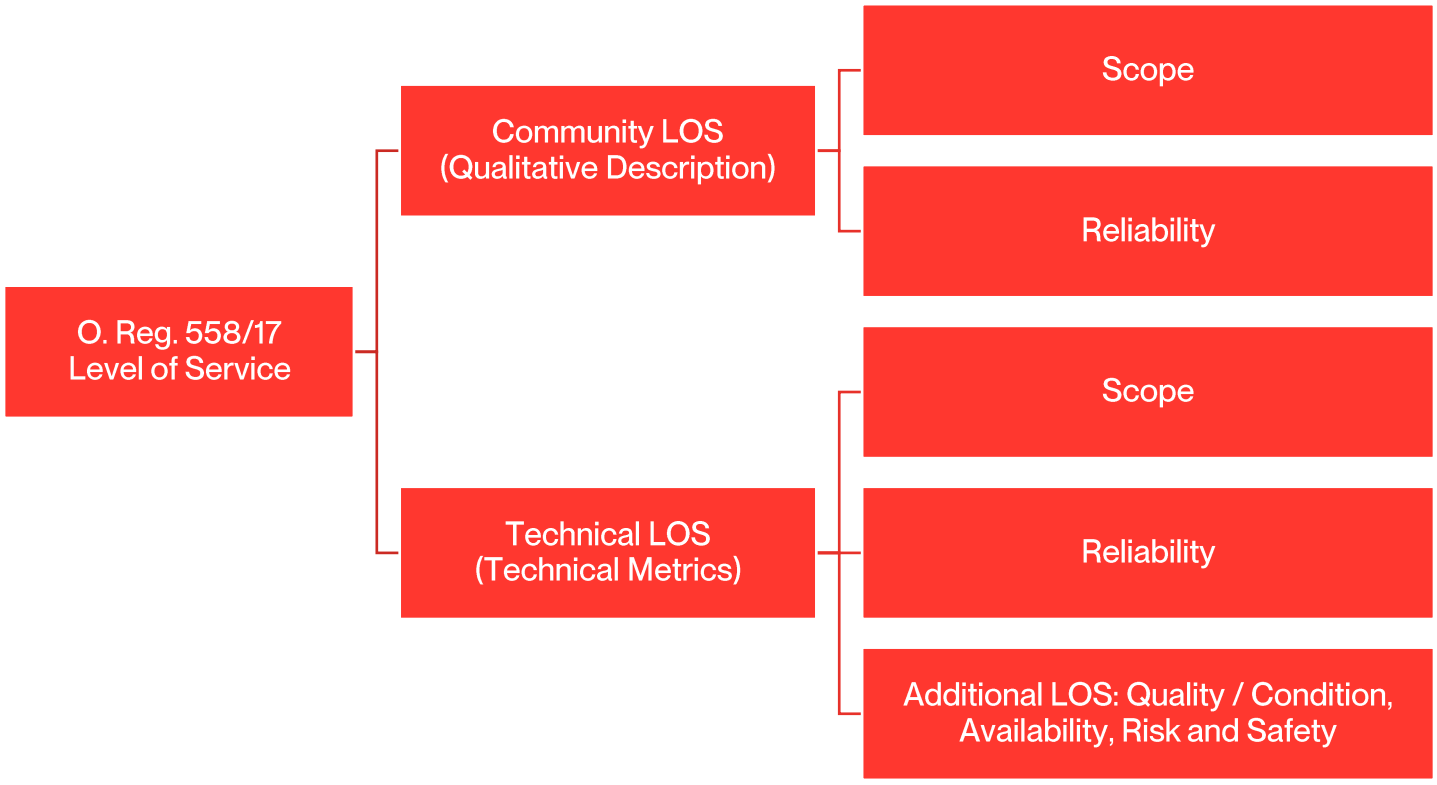


Figure 22 Level of Service Hierarchy per O. Reg. 588/17

Community & Technical Levels of Service

Levels of service are defined in terms of Community Levels of Service and Technical Level of Service. Community Levels of Service are qualitative statements about the expectations of the community (customers) served by the infrastructure. Technical Levels of Service are quantitative objectives about the infrastructure that the City can measure their performance against.

Community and Technical Levels of Service have been established for water (Table 18) and wastewater assets (Table 19) in accordance with O.Reg. 588/17.

Table 18 LOS Descriptions and Performance Measures – Water Assets

SERVICE ATTRIBUTE	COMMUNITY LEVELS OF SERVICE	TECHNICAL LEVELS OF SERVICE	PERFORMANCE	PERFORMANCE TARGET
Scope	Description, which may include maps of the user groups or areas of the municipality that are connected to the municipal water system. (O.Reg. 588/17).	Percentage of properties connected to the municipal water system.	See Appendix A "Water Linear Asset Property Service" Map	Not applicable.
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow. (O.Reg. 588/17).	Percentage of properties where fire flow is available.	Not available.	Maintain current levels of fire protection and evaluate opportunities for improvement
Reliability	Description of boil water advisories and service interruptions. (O.Reg. 588/17).	The number of connection-days per year where a boil water advisory is in place compared to the total number of properties connected to the municipal water system.	▪ 2022: 4 days ▪ 2023: 10 days ▪ 2024: 6 days ▪ 2025 (to date): 6 days	In no calendar year exceed 10 days of service interruptions.
		The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system.	Current 5-year average of 84 breaks per year.	5-year average below 90 breaks per year.

Table 19 LOS Descriptions and Performance Measures – Wastewater Assets

SERVICE ATTRIBUTE	COMMUNITY LEVELS OF SERVICE	TECHNICAL LEVELS OF SERVICE	PERFORMANCE	PERFORMANCE TARGET
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system. (O.Reg. 588/17).	Percentage of properties connected to the municipal wastewater system.	See Appendix A "Wastewater Linear Asset Property Service" Map	Not applicable.
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. (O.Reg. 588/17).	The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system.	The City is no longer serviced by combined sewers.	Not applicable.
	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occurs in habitable areas and beaches. (O.Reg. 588/17).		The City is no longer serviced by combined sewers.	Not applicable.
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes. (O.Reg. 588/17).	The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system.	Infiltration and inflow into sanitary sewers during storm events may enter from a variety of sources such as cracks in the sanitary sewers and downspout/sump pump connections to the system.	Maintain and continue to reduce by means of targeted preventative intervention.
	Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid overflow or backup events. (O.Reg. 588/17).	The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.	To mitigate sewage overflow or backup events into streets or homes, the City of Sudbury has designed the sanitary sewers to accommodate flows so that infiltration is accounted for, and these events are minimized.	All sewers are designed to meet the City's standards.
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system. (O.Reg. 588/17).		Effluent discharge meets the environmental compliance approval limits.	Effluent discharge meets the environmental compliance approval limits.

ASSET MANAGEMENT STRATEGY

This section outlines strategies based on four (4) lifecycle strategies (operations & maintenance strategies, renewal / rehabilitation strategies, capital replacement strategies, and disposal strategies), expansion strategies and non-infrastructure strategies.

Lifecycle Strategies

The City of Greater Sudbury undertakes regular lifecycle maintenance activities to keep the City's infrastructure performing at desired levels of service and in a state of good repair. These activities include:

- Regular maintenance, including facility cleaning, inspections, and maintenance. These activities will be asset type specific and include mid-life interventions as well as general operational maintenance to ensure continued performance.
- Condition assessments to identify assets which may need either additional monitoring or accelerated / delayed replacement schedules.
- Rehabilitation of assets to extend service life such as cathodic protection, lining or other engineering activities which may renew an asset.
- Timely capital replacements at end of service life

Implementing an annual maintenance program and completing timely renewal works will keep the infrastructure performing at the desired levels of service and at the same time prolong the life of the infrastructure and reduce overall spending. Therefore, the most cost-effective strategy for managing the City's infrastructure is to perform regular maintenance and complete timely renewal works.

Operations & Maintenance Strategies

Maintenance is essential to managing infrastructure, as the expected level of service often relies on maintenance activities. Regular maintenance can also add significant life to assets. In addition to ongoing observations of condition and performance established during regular operation, it is important that the City schedule regular inspections of its assets to identify maintenance and capital requirements. An initial recommended inspection and testing strategy for the water and wastewater facilities has been developed (Table 20); it is recommended that the City continue to refine these strategies as the City's asset management practices evolve.

Table 20 Recommended Inspection and Testing Strategy for Water and Wastewater Facilities

FACILITY	RECOMMENDED TREATMENT	CYCLE LENGTH FOR FULL INVENTORY	ESTIMATED ANNUAL COST (2025 CAD)	DESCRIPTION
Water Reservoirs	Water Storage Facility Cleaning & Inspection	3 Years	$125,000	Remotely operated vehicle (ROV) inspection program
Water Treatment Plants	Inspect Plant Intake Structure	10 Years	$100,000	ROV/Diver inspection program
Wastewater Treatment Plants	Piping Inspection and Condition Assessment	5 Years	$120,000	Non-destructive inspection and testing
Water Treatment Plants	Piping Inspection and Condition Assessment	5 Years	$110,000	Non-destructive inspection and testing

FACILITY	RECOMMENDED TREATMENT	CYCLE LENGTH FOR FULL INVENTORY	ESTIMATED ANNUAL COST (2025 CAD)	DESCRIPTION
Wastewater Treatment Plants	Transformer and MCC Inspection & Maintenance	2 Years	$23,000	Maintenance Testing and Inspection per ANSI/NETA MTS-2015
Water Treatment Plants	Transformer and MCC Inspection & Maintenance	2 Years	$23,000	Maintenance Testing and Inspection per ANSI/NETA MTS-2015
Water Wells	Well Inspection	3 Years	$420,000	Water Well Inspection program
W\WW Facilities	Facility Audits	10 Years	$475,000	Audits on all Facilities on a 10-year Cycle

It is recommended that the City undertake regular condition assessments of its infrastructure and apply maintenance records, local knowledge, and CCTV records of piping to update asset condition ratings. The City should use this information to develop suitable predictive and preventative maintenance strategies for assets as is commensurate with the inherent risk and importance of the assets, including refinement of the inspection and testing schedule.

Initial operations and maintenance strategies for the water and wastewater facilities are shown in Table 21. It is recommended that the City continue to refine these strategies as the City's asset management practices evolve.

Table 21 Recommended O&M Strategy for Water and Wastewater Facilities

FACILITY ASSETS	RECOMMENDED TREATMENT	TIMING (YEARS)	INTERVENTION COST (% OF REPLACEMENT COST)	DESCRIPTION	ESTIMATED ANNUAL COST (2025 CAD)
Architectural Components	Architectural Inspection/ Maintenance	Every 5 Years	5.0%	Roof debris removal (2x annually), visual inspection (2x annually), and minor roof membrane repairs	$1,000,000
Building Services	Building Services Equipment Inspection	Annually	1.0%	Heat, ventilation equipment inspection	$430,000
Electrical Components	Electrical System Inspection & Maintenance	Every 4 Years	1.0%	Electrical service & distribution system inspection and maintenance	$280,000
I&C Systems and Life Safety Systems	Instrumentation & Control Systems Inspection	Annually	2.0%	Maintenance & inspection of instrumentation and inspection/testing of health & safety systems i.e., Fire extinguishers, hoists, anchor points	$600,000
W\WW Facilities	Tempered Water Upgrade Program for Water and Wastewater Facilities	As required	-	Assumed 10 water facility upgrades and 10 wastewater facility upgrades at $10,000 each	$310,000

A more detailed operation and maintenance strategy should be developed as the granularity of the asset inventory increases. The City should track the sufficiency and efficacy of its ongoing maintenance expenditures over time and adjust as needs dictate.

Recommended infrastructure studies and programs (Table 22) should continue to be updated as the City's understanding of system behavior evolves.

Table 22 Recommended O&M Strategy for Linear Infrastructure

SYSTEM	RECOMMENDED STRATEGY	TIMING (YEARS)	ESTIMATED COST (2025 CAD)	DESCRIPTION
Water Distribution	Transient (Air Release Valve) Studies	Annually	$35,000	Transient analysis (estimated 2 studies per year)
Water Distribution	Watermain Physical Failure Study	10-Year	$155,000	Analysis to understand break frequency and potential mitigation measures
Water Distribution	Valve Criticality Study	As required	$82,000	Engineering study to determine valve criticality across entire System
Water Distribution	Valve Turning Program	Annually	$1.2M	Inspect and operate system valves once every three years (16,572 System valves)
Water Distribution	Valve Chamber Inspection Program	Annually	$92,000	Structural inspection of valve chambers on 15-year cycle (200/year @ $460 per chamber)
Wastewater Collection	Rock Tunnel Inspection and Mapping Program	Annually	$155,000	Inspection and mapping of rock tunnel
Wastewater Collection	Sewer Inspection and Maintenance Program	Annually	$3.6M	CCTV inspection and flushing / cleaning program (70 km/year @ $48 per meter)

Renewal / Rehabilitation Strategies

Rehabilitation is necessary when an asset does not perform to its desired level of service. Significant repairs designed to extend the life of the asset are determined through regular inspections. Rehabilitation over replacement is advantageous when there are only a few components that need repair, offering cost-efficiency and minimizing service disruption.

The initial rehabilitation strategy recommended for the water and wastewater facilities (Table 23) and linear infrastructure (Table 24) should be considered a living document and revised as the City's asset management practices mature and as additional data becomes available. These strategies are grounded in current knowledge and assumptions, and they must evolve in alignment with continuous improvement principles and adaptive management approaches.

As asset inventories become more granular and performance data becomes more robust, the City should:

— Regularly assess the effectiveness and sufficiency of ongoing renewal and rehabilitation efforts,
— Refine treatment intervals and costs based on observed asset performance and life-cycle cost analysis,
— Integrate feedback loops from inspection findings and maintenance records into planning,
— Embrace technological innovations in condition assessment and rehabilitation methods, and
— Ensure alignment with regulatory requirements, climate resiliency goals, and community service expectations.

Table 23 Recommended Renewal / Rehab Strategy for Water and Wastewater Facilities

FACILITY ASSETS	RECOMMENDED TREATMENT	TIMING (YEARS)	INTERVENTION COST (% OF REPLACEMENT COST)	DESCRIPTION
Structural Components	Minor Structural Rehabilitation	Every 15 Years	2.0%	Concrete and masonry minor repairs
Structural Components	Minor Structural Rehabilitation	At 50% of Service Life	10.0%	Caulking replacement, minor repairs of floor construction and roof construction, etc.
Structural Components	Major Structural Rehabilitation	At 75% of Service Life	20.0%	Building cladding rehabilitation
Architectural Components	Minor Architectural Repair	Every 15 years	18.5%	Roof covering doors, windows, and interior stairs minor repairs
Site Works	Minor Site Works Rehabilitation	Every 5 Years	5.0%	Minor site works rehabilitation including repairs of fence, barbed wire, facility gates, posts, pavement, etc.
Site Works	Minor Site Works Replacement	Every 10 Years	10.0%	Minor site works rehabilitation including repairs of fencing, asphalt, and pavers.
Wastewater Facility Process Piping & Equipment	Minor Process Piping & Equipment Rehabilitation	Every 5 Years	10.0%	Minor equipment and process piping maintenance
Water Facility Process Piping & Equipment	Minor Process Piping & Equipment Rehabilitation	Every 5 Years	5.0%	Minor equipment and process piping maintenance
Water Facility Process Piping & Equipment	Minor Process Piping & Equipment Rehabilitation	Every 10 Years	20.0%	Major equipment and process maintenance. May include membrane filter or media replacement
Electrical Components	Electrical System Inspection & Maintenance	Every 4 Years	1.0%	Electrical service & distribution system inspection and maintenance
I&C Systems and Life Safety Systems	Life Safety & Compliance Systems Replacement	Every 10 Years	20.0%	Replacement of life safety equipment

Table 24 Recommended Renewal / Rehab Strategy for Water and Wastewater Linear Infrastructure

ASSET TYPE	RECOMMENDED TREATMENT	TIMING (YEARS)	ESTIMATED COST (% OF REPLACEMENT COST)	DESCRIPTION
Mains	Lining	As Required	25%-100%	Lining of internal pipe surface

The City is committed to a continuous improvement framework, where asset management strategies are updated iteratively to reflect evolving best practices, and successful historical interventions. This proactive approach ensures that infrastructure investments are optimized over time for performance, reliability, and cost-effectiveness.

Capital Replacement Strategies

Occasionally, the extent of damage or deterioration to an asset is too great and rehabilitation is deemed unfeasible. At this point, replacement is necessary. As an asset approaches the end of its service life, more frequent inspection may be necessary to determine if replacement of the asset is critical in the short-term, or if deferral of the asset replacement is possible.

Recommended lifecycle rehabilitation for the water and wastewater facilities (Table 25) should be updated as the City's asset management practices evolve.

Table 25 Recommended Capital Replacement Strategy for Water and Wastewater Facilities

FACILITY ASSETS	RECOMMENDED TREATMENT	TIMING (YEARS)	INTERVENTION COST (% OF REPLACEMENT COST)	DESCRIPTION
Architectural Components	Major Architectural	End of Service Life	100.0%	Replacement of roof coverings, celling, door, windows, floor, etc.
Building Services	Building Services	End of Service Life	100.0%	Replace all heating, ventilation, and air conditioning (HVAC), air distribution system, and water supply systems (excludes piping).
Site Works	Major Site Works Replacement	End of Service Life	50.0%	Full replacement not anticipated, resurface asphalt, sidewalks pavers and retaining walls. Underground services i.e., Piping and valve chambers inspection/rehabilitation.
Wastewater Facility Process Piping & Equipment	Major Process Piping & Equipment Replacement	End of Service Life	50.0%	Major process equipment replacement, full replacement not anticipated, replace pumps, motors, motor starters, etc.
Water Facility Process Piping & Equipment	Major Process Piping & Equipment Replacement	End of Service Life	60.0%	Major process equipment replacement, full replacement not anticipated, replace pumps, motors, motor starters etc.
Electrical Components	Major Electrical Replacement	End of Service Life	100.0%	Electrical service & distribution system replacement, lighting and branch wiring replacement, communication & security system replacement
I&C Systems and Life Safety Systems	Instrumentation & Control Systems Replacement	End of Service Life	80.0%	Replacement of instrumentation & general control systems
Standby Power	Standby Power Replacement	End of Service Life	100.0%	Full replacement of standby power equipment
Wastewater Facility Sanitary Forcemain	Sanitary Forcemain	End of Service Life	100.0%	Sanitary forcemain replacement

A more detailed operation and maintenance strategy should be developed as the granularity of the asset inventory increases. The City should track the sufficiency and efficacy of its ongoing renewal and rehabilitation initiatives over time and adjust as needs dictate.

Recommended replacement for the water distribution system and wastewater collection system (Table 26) include the replacement at the end of service life.

Table 26 Recommended Capital Replacement Strategy for Linear Infrastructure

ASSET TYPE	RECOMMENDED TREATMENT	TIMING (YEARS)	ESTIMATED COST (% OF REPLACEMENT COST)	DESCRIPTION
Mains, Appurtenances and Meters	Replacement	End of Service Life	100.0%	Full replacement of infrastructure at the end of their service life

Disposal Strategies

Managing assets requires considering the full lifecycle of an asset from planning for new assets to the disposal of old assets. To continue delivering water wastewater services that residents and businesses depend on, the City must make the right decisions at the right time to the right assets.

Asset disposal costs are generally included with the estimates made for asset replacement. This section refers to disposal costs associated with the reduction of services or elimination of demands placed on systems. By establishing target levels of service, the City can determine whether infrastructure or particular assets are needed. Facilities that have recently been decommissioned were not included in this asset management plan. The City should continuously monitor for excess or obsolete assets / infrastructure that is not required for delivery of desired levels of service to the community. The AMP is a dynamic document and should be updated regular to reflect current and accurate inventory.

Expansion Activities

Expansion activities are required to extend services to previously un-serviced areas or to expand services to accommodate growth demands. The City of Greater Sudbury had a population of approximately 171,446 in 2022 as per the last census and is expected to grow to a population of approximately 185,000 by 2042. As part of the upcoming update to the Water and Wastewater Master Plan, the City will continue to re-evaluate previously identified infrastructure expansion, upgrade, and replacement projects to ensure that the current funding levels are sufficient to support these initiatives, alongside the asset renewal and operations and maintenance forecasts outlined in this plan.

Non-Infrastructure Solutions

Non-infrastructure solutions produce lower costs for long-term asset sustainability. Cost and time savings are optimized by implementing an organizational approach for all infrastructure works. Important non-infrastructure solutions include pursuing maturity of the asset management strategy per O.Reg 588/17 and implementing a rigorous and regular inspection, maintenance, or rehabilitation of the various water wastewater infrastructure assets. The City collaborates between internal divisions so that the water & wastewater capital works can be coordinated with other divisions such as roads. Such initiatives enable cost effectiveness, environmental responsibility, reliability, and safety thus minimizing impact to the community and the environment.

FINANCING STRATEGY

This AMP Update does not present a specific strategy for funding the City's water and wastewater infrastructure needs but presents a long-term forecast to help inform financial planning. The financial strategy presented below is based on information obtained from the City and the City of Greater Sudbury Water and Wastewater Financial Plan prepared by BMA Management Consulting, which forecasts the anticipated capital contributions and operating budget from 2025 to 2031.

To ensure the appropriate level of capital investment is reached to maintain assets in a good state of repair, continual analysis and planning is undertaken by the City to ensure the proposed interventions for the assets and the timing for these interventions are accurate and can be fully funded.

Using the water and wastewater detailed asset inventory (linear and vertical infrastructure), the Water and Wastewater Financial Plan prepared by BMA Management Consulting, and building on the current state of infrastructure and asset management strategies detailed in this document, a capital planning tool was used to develop a ten-year capital renewal forecast. Figure 23 and Figure 24 show the annual investment recommended for water and wastewater infrastructure, respectively. A full breakdown of the recommended spend for linear and vertical infrastructure can be found in Table 27.

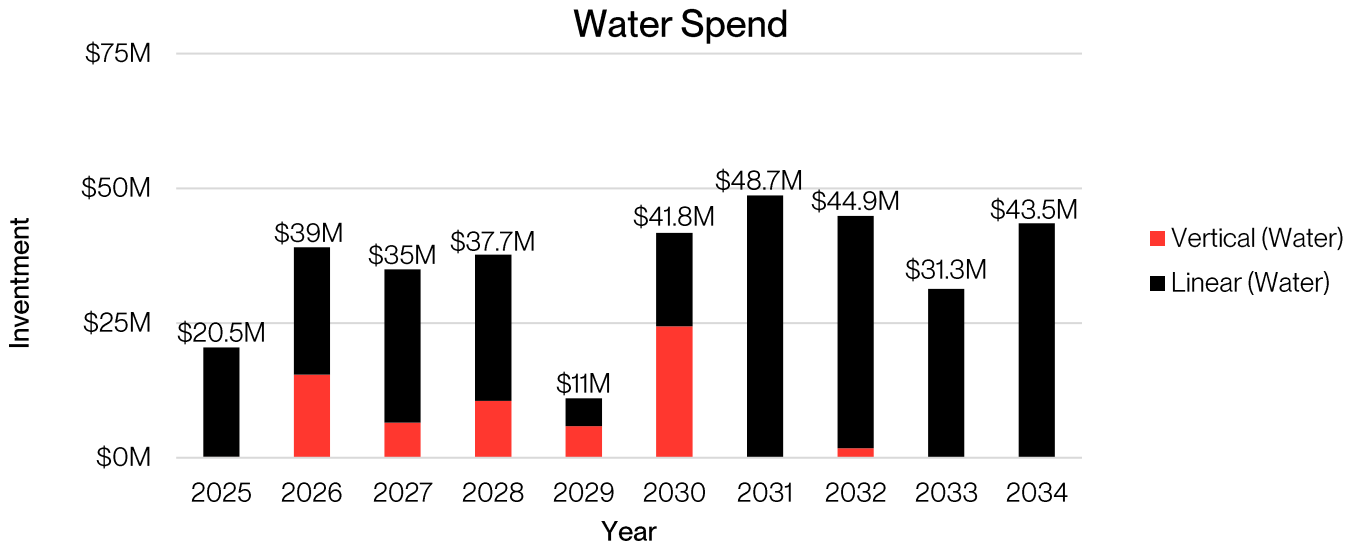


Figure 23 Ten-Year Capital Forecast for Water Infrastructure

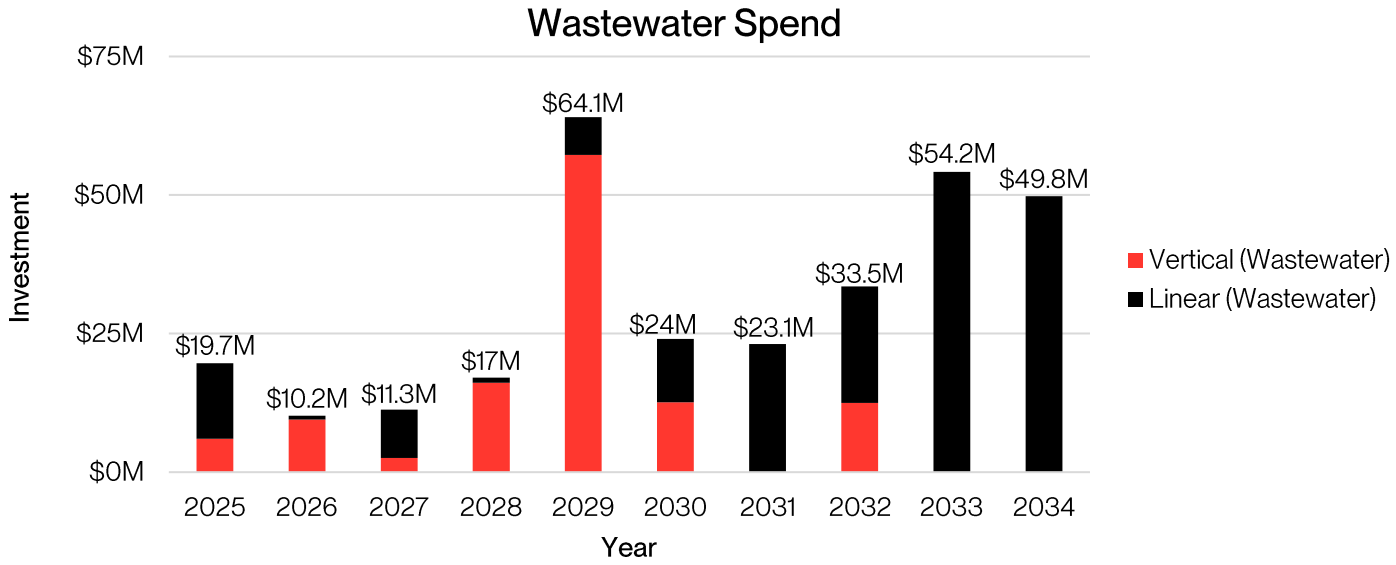


Figure 24 Ten-Year Capital Forecast for Wastewater Infrastructure

Table 27 Ten-Year Capital Investment Summary

YEAR	WATER		WASTEWATER	
	Linear	Vertical	Linear	Vertical
2025	$20.30M	$0.17M	$13.66M	$6.02M
2026	$23.63M	$15.43M	$0.66M	$9.50M
2027	$28.43M	$6.53M	$8.73M	$2.57M
2028	$27.11M	$10.58M	$0.93M	$16.11M
2029	$5.16M	$5.86M	$6.84M	$57.21M
2030	$17.37M	$24.39M	$11.43M	$12.59M
2031	$48.70M	-	$23.10M	$0.00M
2032	$43.11M	$1.74M	$21.01M	$12.50M
2033	$31.35M	-	$54.17M	-
2034	$43.53M	-	$49.81M	-

Table 27 shows that annual capital spending on water and wastewater infrastructure should grow over a ten-year period as the City has more reserve funds available to spend on capital projects. There is an early emphasis on spending on linear water projects in the first five years, based on their condition and risk profiles.

Figure 25 below shows the combined spend on water and wastewater infrastructure projects.

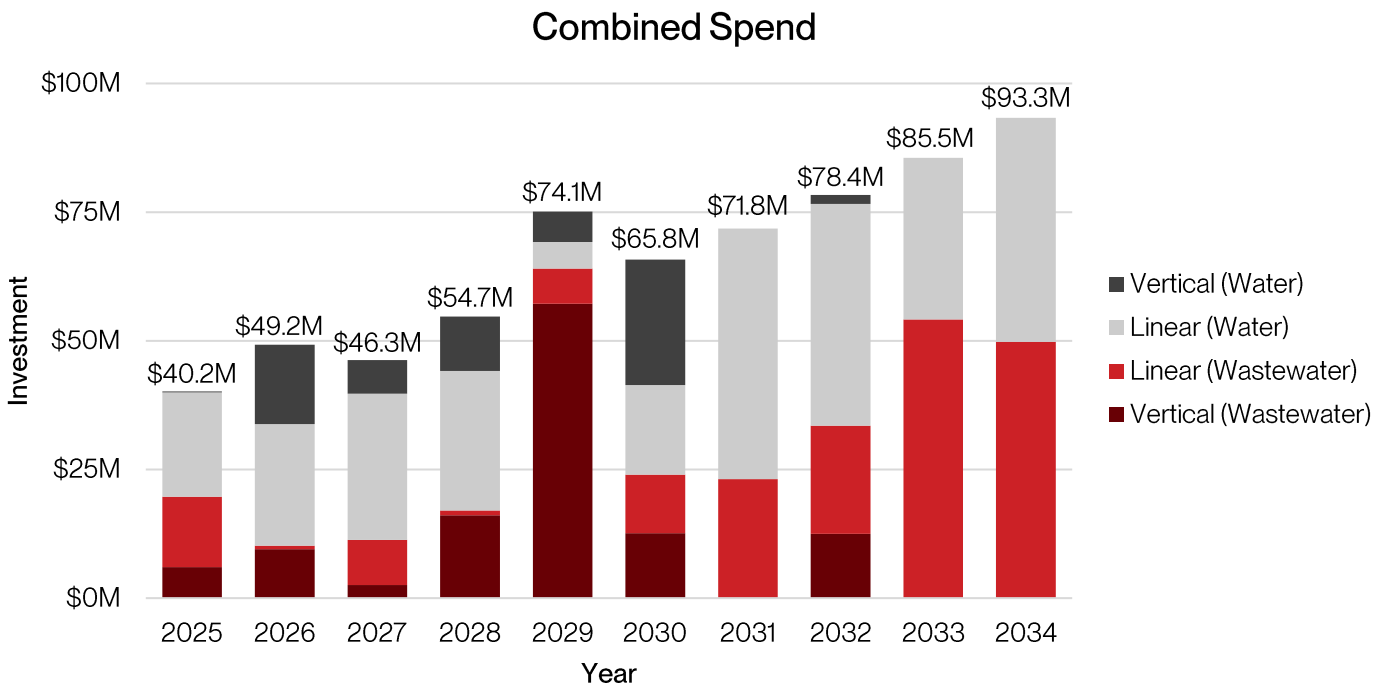


Figure 25 Combined Capital Spend on Water and Wastewater Infrastructure

Operation & Maintenance

To maintain the water and wastewater assets in a state of good repair, the operations and maintenance (O&M) activities discussed in the Asset Management Strategy section of this document should be carried out in time and adequately. An efficient O&M strategy minimizes risks to operations and premature failure of assets.

Long-Term Renewal Investment Needs

In addition to the short-term renewal needs discussed above, it is also important to understand the needs of the City's wastewater assets over the long term. Further analysis is required to understand the long-term renewal investment needs of the city's current water and wastewater asset portfolio.

The ten-year financial plan above anticipates hat the City will build more reserves over time that can be used for capital projects, including water and wastewater asset renewal. Building adequate reserves and/or other sources of funding capacity ensures that renewal activities can be undertaken for the right assets at the right time.

Several options may be considered to help manage the long-term investment needs, including:

— Maintaining existing assets versus installing new assets
— External funding sources
— Capital prioritization (e.g., environmental compliance, risk, legislation, others)
— Changes to levels of service
— Increasing wastewater rates to build reserves

Going forward, the information in this financial analysis can be used to support future water & wastewater financial plans, development charge study updates, and long-range planning exercises with the goal of identifying sustainable funding needs and mechanisms including rates, reserves, debt, and development charges to ensure the City's long-term financial health.

IMPROVEMENT PLAN & NEXT STEPS

Table 28 below provides improvement recommendations and next steps that will ensure the AMP is continuously improved as asset understanding evolves. The focus is on asset inventory accuracy, adequate levels of service to the community and an asset management strategy that the City can fully fund to ensure a good state of repair for the water wastewater assets.

Table 28 Recommended Improvements / Next Steps

SECTION	CATEGORY	RECOMMENDATIONS
2 State of Infrastructure	General	— Continual improvement on asset identification standard that will be used in all relevant data sets including GIS, Hydraulic Model and PSAB, and in associated capital and O&M project lists.
	Linear Infrastructure	— Continue revising, consolidating, and updating the GIS data that was delivered with this plan. — Continue to conduct regular condition assessments to identify remaining service lives. — Accurately link pipe failure and condition data to allow for seamless computation. Implement mobile solutions for on-site capturing of high-resolution data. — Continue to coordinate or group linear infrastructure projects with other divisions like roads to enable cost effectiveness, environmental responsibility, reliability, and safety.
	Vertical Infrastructure	— Continue to conduct regular condition assessments to identify remaining service lives. — Risk assessment – consequence of failure in terms of regulatory requirements, environment and health and safety — Conduct detailed condition assessments to arrive at actual condition and needs
3 Levels of Service	Community & Technical Levels of Service	— Collect and document Performance Measures — Identify community expectations and willingness to pay through a Public Consultation Process
	Desired Levels of Service & Public Consultation Process	— Future asset management plans will seek to integrate stakeholders' engagement where possible.
4 Asset Management Strategy	Lifecycle Interventions	— Review and refine lifecycle intervention strategies as the City's asset management practices evolve.
	Asset Management Plan	— Update Asset Management strategy and AMP per O.Reg. 588/17 at least every five years. This AMP is an update of the 2018 AMP.
	Risk-based Prioritization	— Critical assets should be monitored and prioritized in terms of maintenance and inspections. The City should develop and refine its practices for documenting and maintaining its critical infrastructure. — Develop and refine practices for documenting and maintaining critical customers and assets. — Develop physical and economic failure models. — Develop risk ratings for each W&WW facility. — Undertake a detailed condition assessments for each facility at least once every five years.
5 Financial Strategy	Funding Sources	— Determine the appropriate long-term strategies to fund the identified investment needs and recommendations.

The key challenges identified in this AMP Update for the management of the City's water and wastewater systems can be divided into those related to the maintenance and renewal of the existing infrastructure, and those specifically related to the Master Plan recommendations.

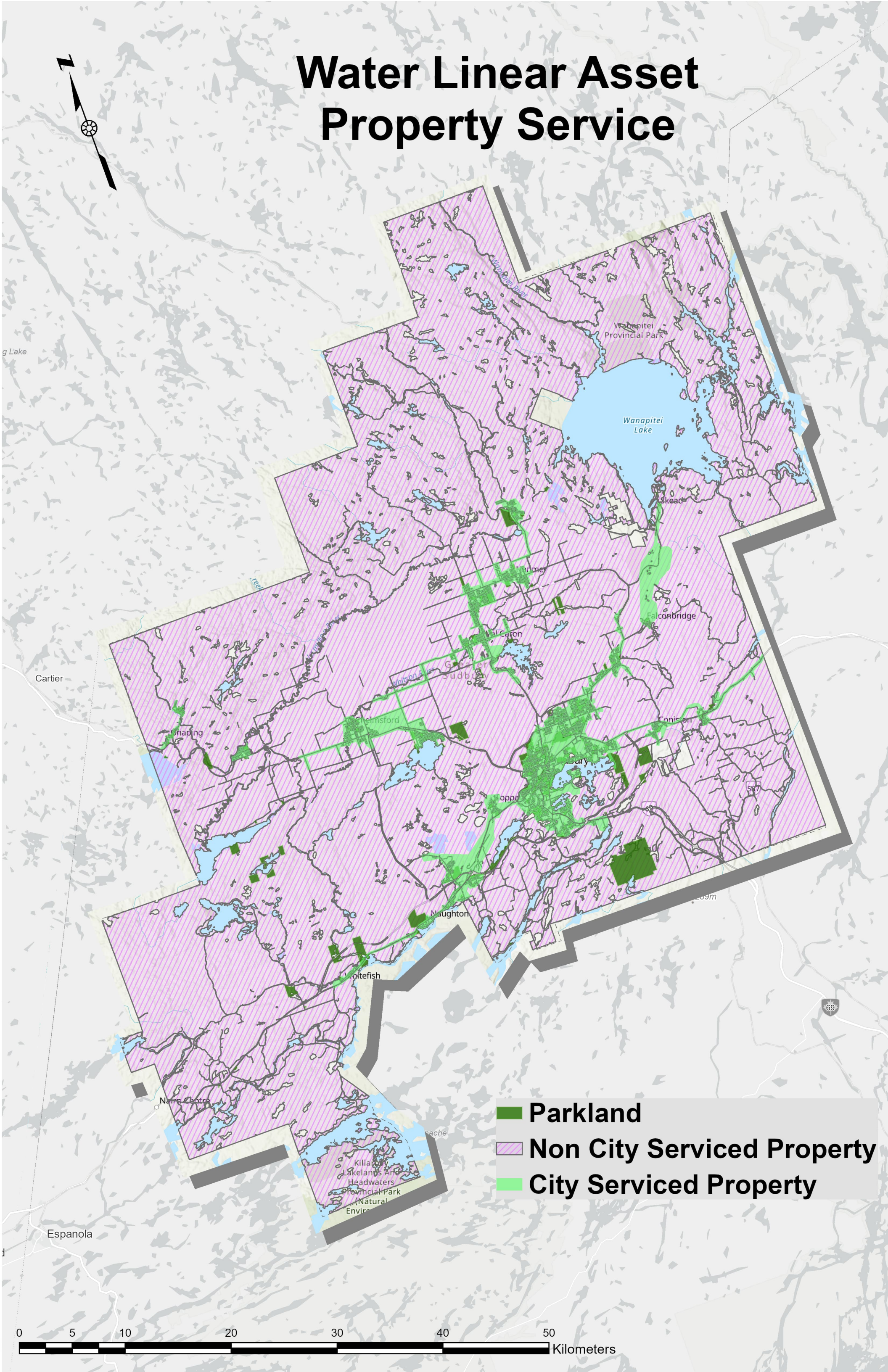
Regarding optimizing the maintenance and renewal of the existing infrastructure, the challenges are securing a sustainable budget, establishing a comprehensive framework for defining, tracking, and securing levels of service and implementing a robust risk-driven infrastructure management framework. The framework introduced in this AMP update should be developed and refined on an ongoing basis and guide the City's maintenance and renewal efforts.

Finally, good asset management relies on good data management. Several recommendations have been provided in this AMP update regarding data management; the City of Greater Sudbury has developed an impressive data set that has made this AMP update possible and is continuously improving its data collection and management practices. As the City's asset and data management practices evolve, so will its ability to optimize its decision-making process.

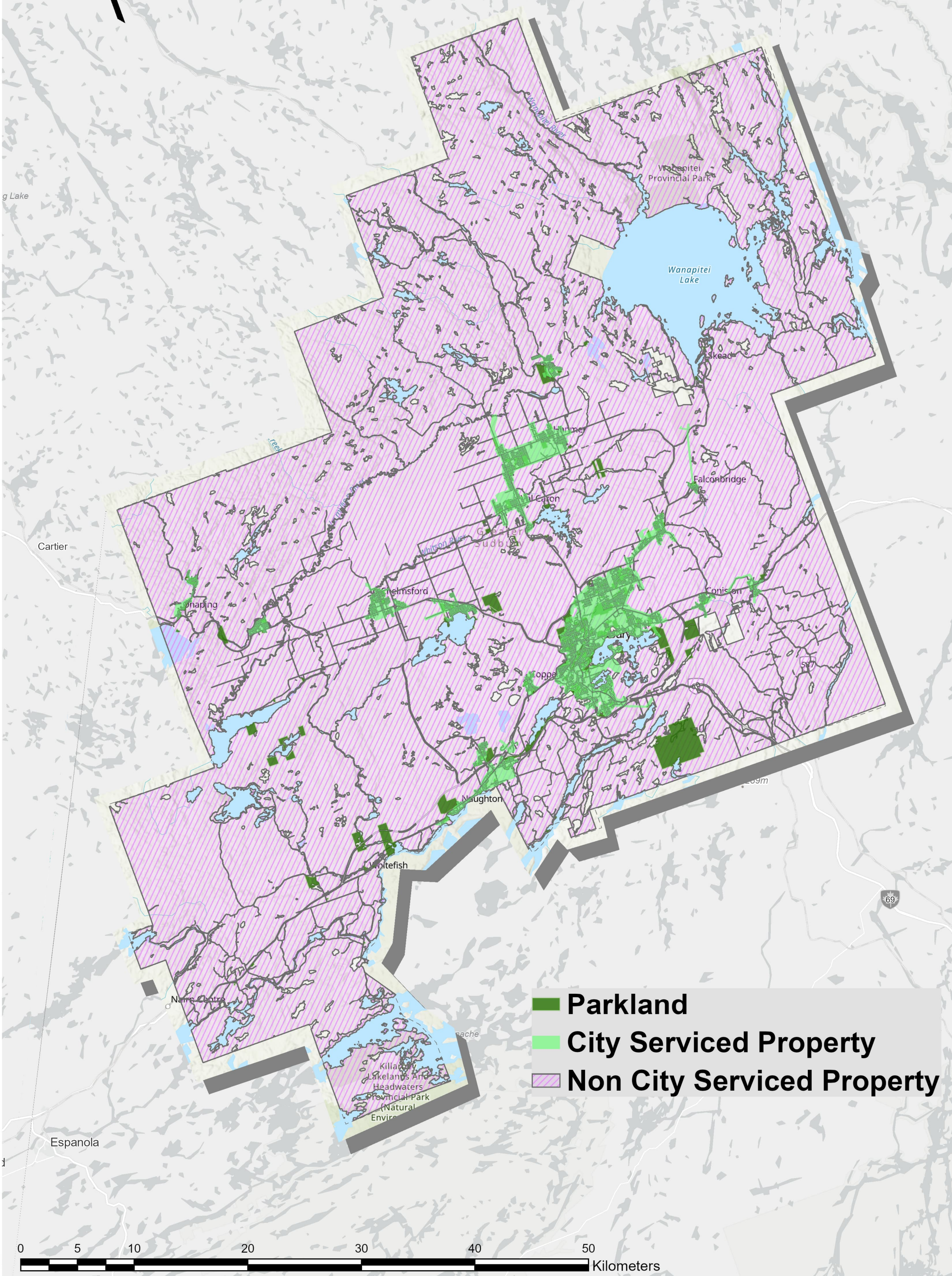
APPENDIX A

SERVICE AREA MAPS

Water Linear Asset Property Service



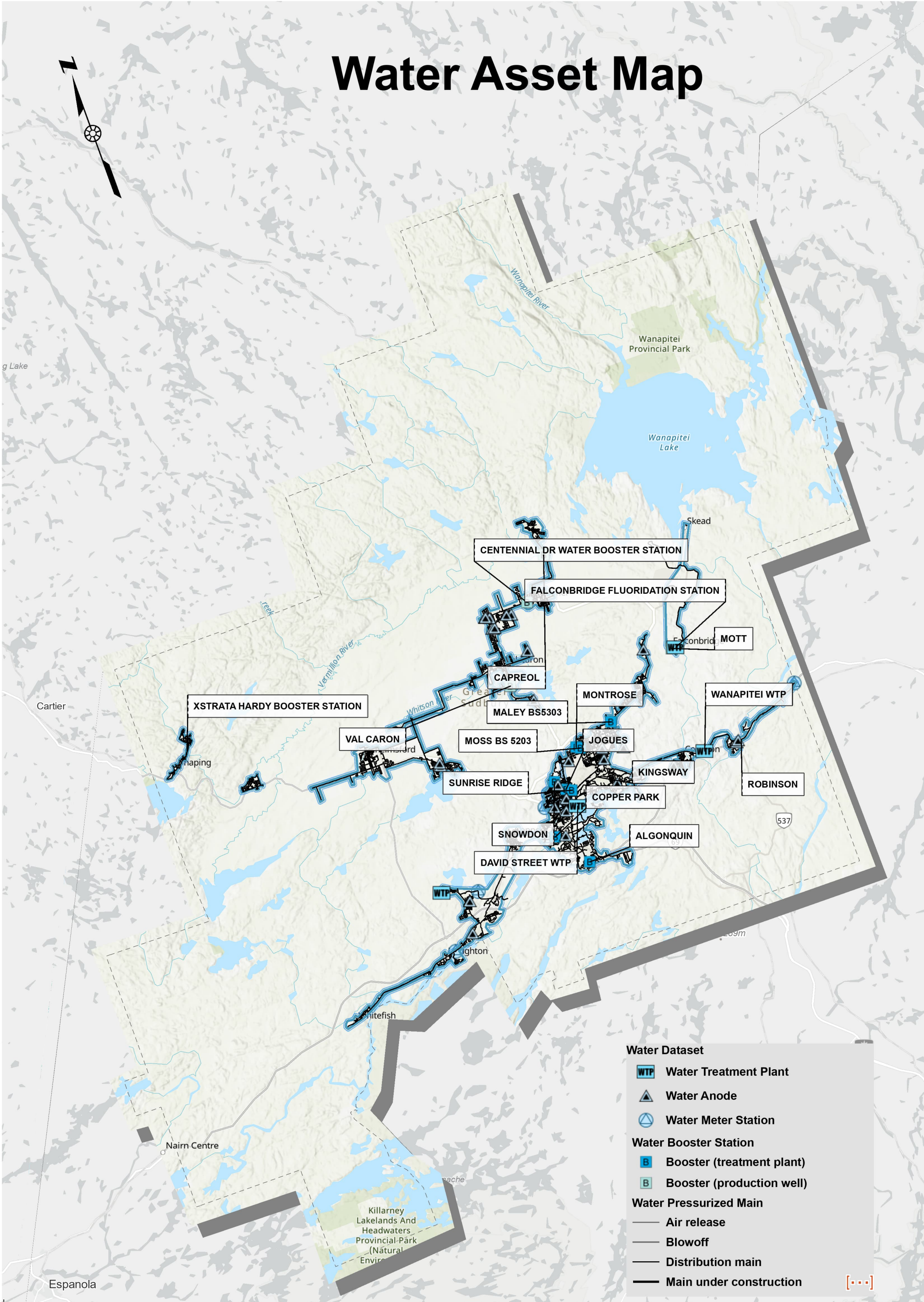
Wastewater Linear Asset Property Service



APPENDIX B

ASSET MAPS

Water Asset Map



Water Dataset

- Water Treatment Plant
- Water Anode
- Water Meter Station

Water Booster Station

- Booster (treatment plant)
- Booster (production well)

Water Pressurized Main

- Air release
- Blowoff
- Distribution main
- Main under construction

0 5 10 20 30 40 50 Kilometers

Wastewater Asset Map

