2021/2022

Final – June 2022

The Township of Terrace Bay Asset Management Plan

TERRACE BAY 2021/2022 ASSET MANAGEMENT PLAN

PHASE 2

TOWNSHIP OF TERRACE BAY

PROJECT NO.: 211-02822-00
DATE: JUNE 20, 2022

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June 20, 2022

TOWNSHIP OF TERRACE BAY
P.O. Box 40, 1 Selkirk Avenue,
Terrace Bay, ON P0T 2W0

Attention: Dan Mulligan, Treasurer / Deputy Clerk

Dear Mr. Mulligan,

Subject: Terrace Bay 2021/2022 Asset Management Plan

We respectfully submit the Final Revision of the 2021/2022 Asset Management Plan for the Township of Terrace Bay for your records.

If you have any questions or concerns, please do not hesitate to contact the undersigned.

Sincerely,

Joshua DiCerbo, EIT
Project Manager

WSP ref.: 211-02822-00

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1 EXECUTIVE SUMMARY

WSP Canada Inc. has updated the Corporation of the Township of Terrace Bay's Asset Management Plan to bring it in compliance with Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure. The Asset Management Plan is to be used to assist with the maintaining, renewing, replacing, and funding of the Township's assets. The assets include the water treatment plant, water distribution system, raw water pumping station, wastewater lagoon and collection system, stormwater collection system, municipally owned buildings located throughout the municipality, and other municipally owned assets. The municipal infrastructure has been inspected where possible and the results have been provided for input into CityWide Software Solutions database. The Condition Indices have been calculated with input from CityWide which uses an aged based method and adjusted as necessary based on field inspections.

The asset management plan provides an evaluation of the current performance and characteristics of the local infrastructure and highlights which assets are not providing the expected levels of service. The plan then provides a basic financial strategy based on this information and is broken down into work to be done within the next five (5) years and the next twenty-five (25) years.

A representative sample of the sewers and manholes were inspected, and conditions confirmed however the water distribution system was rated solely on an age-based method. The next inspection for buried infrastructure should be done in approximately ten (10) years. In addition, the municipality should become as familiar as possible with CityWide Software Solutions and update the asset's information regularly to discover its full potential. This will assist with managing the assets and predicting the financial state of the Corporation of the Township of Terrace Bay.

This report quantifies the full life cycle costs of sustaining the Town of Terrace Bay water, wastewater and stormwater drainage systems in perpetuity. The projected costs for replacement of the various components in the systems over the next 100 years were evaluated to provide a sense of current funding requirements. This study focuses on the renewal of the existing systems and does not investigate the expansion of the systems to service future growth in the Town.

The estimated replacement cost of the water, wastewater, stormwater systems are $34.2 million, $13.1 million and $5.6 million, respectively, for a total of $62.73 million. Accounting for the road network, buildings, and other municipally owned assets with replacement costs of approximately $33.9 million, $53.3 million, and $14.8 million, respectively, for a grand total of $144.40 million. This translates into a total overall replacement cost of approximately $38,940 per capita (water, wastewater and stormwater systems only) or $89,630 per capita (all municipal assets).

Since detailed information on the condition of each component of the systems is not readily available, a theoretical service life has been assumed for each of the components. The weighted average service life for the water, wastewater and stormwater systems is 62, 73 and 72 years, respectively. In other words, to fully sustain these systems, the Town should renew at least 1.4% of its water system, 1.4% of its wastewater system and 1.4% of its stormwater system each year.

In order to ensure sustainable water, wastewater and stormwater services, the Town should invest $0.90 million per annum in renewing their systems. This value does not include routine operating or maintenance costs, nor any road reconstruction or other restoration costs necessitated by the replacement of underground components.

In addition to the municipal infrastructure, WSP also reviewed all municipal roads, buildings and other municipally owned assets. Condition assessments were performed, and condition ratings were assigned to help determine the renewal investment required to sustain these assets. In order to sustain the road network, building assets, and other assets, the Town should invest $2.07 million per annum. This does not include maintenance.

Roads, buildings, and other municipally owned assets are presented separately from the water, wastewater and stormwater system infrastructure in the financial strategy and analysis so the municipality can choose where they want to focus their funds for renewal.

2 INTRODUCTION

WSP Canada Inc. was retained by the Township Terrace Bay to update their existing asset management plan (completed in 2014) for infrastructure that includes water distribution, sanitary, and storm systems in Terrace Bay as well as municipally owned buildings. The Township can then utilize this as a tool to assist with decisions regarding the operating, maintaining, renewing, replacing, disposing, and funding of their local asset needs.

The Town of Terrace Bay provides water, wastewater and storm drainage service to the urban area within the Town as well as to the Pulp Mill (Figure 1). The 2016 population of the Town was approximately 1,611 (Statistics Canada; 2016).

Figure 1 - Terrace Bay (Arial View)

2.1 PROJECT OVERVIEW

This Asset Management Plan (AMP) will serve to update the Township's most current Asset Management Plan which was developed in 2014. The AMP will include a detailed evaluation of the Township's water and sewer (sanitary and storm) infrastructure, incorporating a condition assessment of representative assets and the preparation of a replacement plan or capital plan to guide future infrastructure investments in compliance with O.Reg. 588/17.

The Township's core assets consist of a sanitary sewer system which includes two (2) infiltrative lagoons with four (4) sedimentation tanks for pre-treatment, a storm sewer system, a water distribution system which includes a water treatment plant and a raw water pumping station, and a road network. Municipal buildings which are included are the water treatment plant, the raw water pumping station, the public works garage, the airport office, the airport garage, the tourist information centre, the cultural centre, the pool building, the community centre, the fire hall office, and the fire hall garage, lighthouse, and beach house. WSP completed an evaluation of these assets and prepared this asset management plan. The investigation undertaken by WSP, with respect to this plan and any conclusions or recommendations made in this plan, reflect WSP's professional opinion based on the conditions observed at the time of the inspections, and on information available at the time of preparation of this plan. Extrapolation of visual data was necessary where there was no access and condition ratings were based on material and age where necessary.

The asset management plan is anticipated to be valid for 5 years with diminishing returns and should be updated regularly. The plan should be evaluated and improved through updated information at every scheduled inspection.

2.2 PURPOSE AND METHODOLOGY

The purpose of the asset management plan is to attempt to establish a workable document that will assist with decisions related to how the Township's infrastructure will be managed to ensure that it is capable of providing the levels of service required to support the Township's goals. An asset management plan is a business strategy used to effectively and efficiently allocate available funds amongst valid and competing asset needs. It links expectations for asset conditions, performance, and availability with management and investment strategies. The asset management plan identifies the overall system components and summarizes key asset and planning information to recommend work for the assets to perform at their expected level of service at a single point and time.

This report is broken down into seven (7) elements as follows:

- Executive Summary;
- Introduction;
- State of local infrastructure;
- Desired levels of service;
- Asset management strategy;
- Financing strategy; and,
- Accountability and feedback.

This report estimates the full (life cycle) cost to sustain the Town's water, wastewater and stormwater systems in perpetuity. It is beyond the scope of this study to address the expansion of the existing systems to service future development. Similarly, this report does not address the investment that might be required to comply with new regulations related to municipal water, wastewater and stormwater.

This approach does not explicitly account for the projected growth within the Town or inflation. It has been assumed that the water and wastewater user rates will be increased each year to offset inflation. Although the Town's population increased between 2011 and 2016 from 1,471 to 1,611, it was the first and only period where the Town's population did not decline over the last 15-year period in which census data was collected (2001 – 2016). Between 2001 and 2016 the Town has experienced a decrease in population of approximately 1.2%. If this trend continues, the Town could be faced with insufficient revenues unless the water and wastewater rates are increased accordingly. To mitigate this risk, the Township has committed to undertaking a rate analysis on user rates moving forward. It is worth noting, however, that the population of a small municipality such as Terrace Bay is very dependent on local economic factors since a large industry coming to (or leaving) the area could have a significant impact, and for this reason any population projections beyond a 5-10 year horizon would be very speculative.

As more detailed information becomes available on the condition and rate of deterioration of the water, wastewater and stormwater systems and the effectiveness of various rehabilitation strategies, it will be possible to refine the asset management plan and the life cycle costs. Nevertheless, this report attempts to quantify the magnitude of the projected costs with the expectation that at some point in the future, the level of investment in renewal of these systems will be significantly greater than at present. As a result, it would be prudent for the Town to develop a strategy to sustain their water, wastewater and stormwater systems over the long term.

The cost of sustainable service should be updated every five years or so as more detailed information becomes available on the condition of the water, wastewater and stormwater systems and to account for population changes, the revenue base and inflation in the Town.

2.3 ONTARIO REGULATION 588/17

Since January 1, 2018, the Ontario Government has implemented Ontario Regulation 588/17 (O.Reg. 588/17): Asset Management Planning for Municipal Infrastructure (effective as of January 1, 2018) in an effort to help improve the way municipalities plan for their infrastructure. The regulation builds on the progress municipalities have made while bringing consistency and standardization to asset management plans to help spread best practices throughout the sector and enable the collection of comparable data.

O.Reg. 588/17 outlines a phase-in schedule with respect to the required elements of an Asset Management Plan. The schedule is outlined as follows:

Phase 1	July 1, 2019	Date for municipalities to have a finalized strategic asset management policy that promotes best practices and links asset management planning with budgeting, operations, maintenance and other municipal planning activities.
Phase 2	July 1, 2022 (revised from July 1, 2021)	Date for municipalities to have an approved asset management plan for **core assets** (roads, bridges and culverts, water, wastewater and stormwater management systems) that identifies current levels of service and the cost of maintaining those levels of service.
Phase 3	July 1, 2024 (revised from July 1, 2023)	Date for municipalities to have an approved asset management plan for **all municipal infrastructure assets** that identifies current levels of service and the cost of maintaining those levels of service. **Other assets** that are not classified as core infrastructure assets include buildings, parks, recreational facilities, fire & emergency service assets.
Phase 4	July 1, 2025 (revised from July 1, 2024)	Date for municipalities to have an approved asset management plan for all municipal infrastructure assets that builds upon the requirements set out in 2023. This includes an identification of proposed levels of service, what activities will be required to meet proposed levels of service, and a strategy to fund these activities.

It should be noted that the deadlines for phases 2 through 4 have been pushed by one (1) year due to the COVID-19 pandemic.

In the past, most Ontario municipalities focused their resources on expansion of their infrastructure to service population growth. However, most municipalities are now beginning to expend more resources on renewal of their infrastructure. Furthermore, the public are now demanding a higher level of service; gaining an increasing awareness of environmental issues; and expecting a more transparent decision-making process. As a result of these demands, historical levels of investment in water, wastewater and stormwater infrastructure must be examined relative to the cost of sustaining this infrastructure on a long-term basis.

2.3.1 O.REG. 588/17 COMPLIANCE REVIEW

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

Table 1 - O.Reg. 588/17 Compliance Review

REQUIREMENT	O. REG. SECTION	AMP SECTION REFERENCE	STATUS
Summary of assets in each category	S.5(2), 3(i)	3.2	Complete
Replacement cost of assets in each category	S.5(2), 3(ii)	3.4	Complete
Average age of assets in each category	S.5(2), 3(iii)	3.2	Complete
Condition of core assets in each category	S.5(2), 3(iv)	3.6	Complete
Description of municipality's approach to assessing the condition of assets in each category	S.5(2), 3(v)	5.2	Complete
Current levels of service in each category	S.5(2), 1(i-ii)	3.2	Complete
Current performance measures in each category	S.5(2), 2	4	Complete
Lifecycle activities needed to maintain current levels of service for 10 years	S.5(2), 4	5.3	Complete
Costs of providing lifecycle activities for 10 years	S.5(2), 4	6	Complete
Growth assumptions	S.5(2), 5(i-ii) S.5(2), 6(i-vi)	2.2	Complete

3 STATE OF LOCAL INFRASTRUCTURE

3.1 GENERAL

All assets have a natural service life span. In order to keep water supply, sewers, and buildings functioning in a safe and usable condition, regular maintenance and inspections should be scheduled based on inspection results and service conditions. It is recommended, when possible, for sewers to undergo an inspection every ten (10) years by a trained inspector who is either a professional engineer or under their direction. The inspector should review and rate each asset's condition. These ratings are used in determining the current condition and forecasting future performance. This is done so that the township can be aware of changing conditions and can plan maintenance and rehabilitation activities with confidence. Inspections should be carried out considering seasonal conditions such that harsh weather does not interfere with inspections, causing delays, overlooked information, and unnecessary expenses.

3.2 INVENTORY OF ASSETS

All assets' key inventory information, including their installation date, historical cost, and useful life are stored in the CityWide Software Solutions database. The assets have already been segmented into groups through the development of the 2014 AMP. The detailed inventory is listed in Appendix A of this plan.

The detailed inventory of the municipal water system, wastewater system, stormwater system, and building assets was compiled through a thorough review of all available drawings, Certificates of Approval, and other municipal records. Staff from the Town were interviewed to fill in gaps in the data, such as the approximate year of construction, and material types. This inventory also includes a breakdown of the total length of water mains, sanitary sewers and storm sewers by diameter, age and pipe material. Buildings are broken down by type, age, and square footage.

Drawings contained in a pocket at the rear of this report, are general plans of the Town which show the municipal Water System (Map 1), Wastewater System (Map 2), and Stormwater System (Map 3). Buildings are also labelled on these drawings.

3.2.1 WATER SYSTEM

The Town of Terrace Bay owns one (1) water treatment plant and one (1) Raw Water Pumping Station. In addition, the Town's water distribution system includes approximately 21 km of watermain; 114 hydrants and 866 water services. Table 2 summarizes the inventory of the Town's water system assets.

Table 2 - Replacement Costs of Water System Components

ASSET	AREA (SQ.M)	HISTORICAL COST (IF AVAIL.)	QUANTITY	UNIT COST	REPLACEMENT COST [1] ($M)
Water Mains (km)	--	--	21.07	$520 / m	$10.956 M
Hydrants	--	--	114	$10,800 ea	$1.231 M
Water Services	--	--	866	$2,700 ea	$2.338 M
Water Treatment Plant	1540	--	1	$12,860 / m^2	$19.804 M
Pumping Station	69	$9,690,000	1	$9,690,000 ea	$9.690 M
			Total		**$44.019 M**

1 A 3% inflation rate was used to convert all unit cost from 2013 dollars as provided in the original Asset Management Plan to 2021 dollars. Replacement costs for Wastewater System Components do not consider spikes in costs as a consequence of unforeseen events (Force Majeure).

The water mains supplying the Town's customers range in size from 150 mm to 350 mm in diameter. There is also a 900 mm watermain which services the paper mill however is not owned by the Town. Any costs associated with the 900mm watermain have not been accounted for in this report as it is assumed the mill will pay for all costs in maintaining and/or replacing this watermain. Table 3 provides a breakdown of the total pipe length by diameter. Approximately 89% of watermains (by length) have a diameter in the range of 150 mm to 250 mm with 2% being smaller than 150mm in diameter and 9% being greater than 250mm in diameter.

Table 3 - Water Main Sizes

DIAMETER (mm)	LENGTH (km)	% OF TOTAL
150	12.93	61%
200	2.77	13%
250	3.18	15%
300	1.18	6%
350	1.01	5%
Total	**21.07**	**100%**

Table 4 summarizes the breakdown of total length by pipe material. Approximately 81% of mains (by length) are cast iron and ductile iron. HDPE and PVC mains account for the remaining 19% of the total length.

Table 4 - Water Main Materials

MATERIAL	LENGTH (km)	% OF TOTAL
PVC	0.42	2%
HDPE	3.45	16%
Cast	11.55	55%
Ductile	5.65	27%
Total	**21.07**	**100%**

Similarly, Table 5 summarizes the breakdown of total length by pipe age. It is apparent that only 25% of the water mains (by length) were constructed since 1970. In other words, the water distribution system is relatively old, having an average age of approximately 55 years.

Table 5 - Water Main Ages

DECADE	LENGTH (KM)	% OF TOTAL
1950-1959	11.30	54%
1970-1979	4.23	20%
1980-1989	1.64	8%
2000-2009	3.22	15%
2010-2019	0.28	1%
2020-present	0.40	2%
Total	**21.07**	**100%**

COMMUNITY LEVELS OF SERVICE

The following table outlines the qualitative descriptions that determine the community levels of service provided by Water System Network.

Table 6 – Water System Community Levels of Service

SERVICE ATTRIBUTE	TECHNICAL METRIC	CURRENT LOS (2021)
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 B
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	See Appendix B
Reliability	Description of boil water advisories and service interruptions	Maintenance and rehabilitation of the water systems can lead to temporary disruptions. The length of the interruption would depend on the nature of the maintenance or rehabilitation. Water main breaks may require several blocks to be turned off during the time of repair, approximately 4-8 hours, and sufficient notice is provided to all directly affected. Water hydrant flushing will cause pressure drop in areas and could lead to colour changes in the water. Valve exercising program can lead to short events of low flow or no flow lasting 1-3 minutes.
Performance	% of customers where service is interrupted above target frequency	0%

TECHNICAL LEVELS OF SERVICE

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

Table 7 – Water System Technical Levels of Service

SERVICE ATTRIBUTE	TECHNICAL METRIC	CURRENT LOS (2021)
Scope	% of properties connected to the municipal water system	100%
	% of properties where fire flow is available	100%
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	0
	# 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	0.00231 (2 or 3 instances of low flow or no flow due to water main breaks per year)

3.2.2 WASTEWATER SYSTEM

The Town's sewage collection system includes approximately 14.6 km of sanitary sewer; 202 sanitary manholes; and 850 sanitary service connections. Table 8 summarizes the inventory of the Town's wastewater system.

Table 8 - Replacement Costs of Wastewater System Components

	QUANTITY	UNIT COST	REPLACEMENT COST [1] ($M)
Sanitary Sewers (km)	14.6	$420/m	$6.132 M
Sanitary Manholes	202	$12,300 ea	$2.423 M
Sanitary Services [2]	850	$2,400 ea	$2.040 M
Sedimentation Tanks	4	$633,400 ea	$2.534 M
		TOTAL	**$13.129 M**

1 A 3% inflation rate was used to convert all unit cost from 2013 dollars as provided in the original Asset Management Plan to 2021 dollars. Replacement costs for Wastewater System Components do not consider spikes in costs as a consequence of unforeseen events (Force Majeure).

2 Replacement cost for sanitary services is representative of full replacement costs of the service, typically completed during full road reconstruction. The replacement cost is not representative of repair costs for individual services.

The sanitary sewers range in size from 200 mm to 300 mm diameter. Table 9 provides a breakdown of the total pipe length by diameter. Approximately 89% of sanitary sewers (by length) have a diameter of 200 mm or 250 mm.

Table 9 - Sanitary Sewer Sizes

DIAMETER (mm)	LENGTH (km)	% OF TOTAL
200	10.65	73%
250	2.42	16%
300	1.55	11%
Total	**14.62**	**100%**

Table 10 summarizes the breakdown of total length by pipe material. Approximately 52% of sanitary sewers (by length) are Clay (VCT) and 16% are PVC. Transite pipes account for the remaining 32% of the total length.

Table 10 - Sanitary Sewer Materials

MATERIAL	LENGTH (km)	% OF TOTAL
Transite	4.73	32%
VCT	7.55	52%
PVC	2.34	16%
Total	**14.62**	**100%**

Similarly, Table 11 summarizes the breakdown of total length by pipe age. It is noted that approximately 55% of sanitary sewers (by length) were constructed since 1970. In other words, nearly half of the Town's sanitary sewers have been in service for over 60 years.

Table 11 - Sanitary Sewer Ages

DECADE	LENGTH (KM)	% OF TOTAL
1950-1959	6.63	45%
1970-1979	3.94	27%
1980-1989	1.71	12%
2000-2009	1.43	10%
2010-2019	0.70	5%
2020-present	0.21	1%
Total	**14.62**	**100%**

The sanitary sewers discharge into sedimentation tanks prior to discharging to infiltrative lagoons. There are a total of four (4) sedimentation tanks.

The infiltrative lagoons have been in operation since the development of the town in the early 1950s.

COMMUNITY LEVELS OF SERVICE

he following table outlines the qualitative descriptions that determine the community levels of service provided by Sanitary Sewer Network.

Table 12 – Wastewater Community Levels of Service

SERVICE ATTRIBUTE	TECHNICAL METRIC	CURRENT LOS (2021)
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 B
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	No 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	No 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 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 municipality 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 lagoon, and may include suspended solids, total phosphorous and biological oxygen demand. The Environmental Compliance Approval (ECA) identifies the effluent criteria for municipal wastewater treatment lagoons.
Performance	# of customers that experience a service interruption due to main blockages	0

TECHNICAL LEVELS OF SERVICE

The following table outlines the quantitative metrics that determine the technical level of service provided by the Sanitary Sewer Network.

Table 13 - Wastewater Technical Levels of Service

SERVICE ATTRIBUTE	TECHNICAL METRIC	CURRENT LOS (2021)
Scope	% of properties connected to the municipal wastewater system	100%
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	0
	# of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system	0
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	0

3.2.3 STORMWATER SYSTEM

The Town's storm sewer system includes approximately 8.0 km of storm sewers and culverts, 93 manholes, 174 catch basins and 57 catch basin manholes. Table 14 summarizes the inventory of the Town's stormwater system.

Table 14 - Replacement Costs of Stormwater System Components

	QUANTITY	UNIT COST	REPLACEMENT COST [1] ($M)
Storm Sewers (km)	8.04	$380/m	$3.055M
Storm Manholes	93	$9,900 ea	$0.921 M
Catchbasins	174	$6,000 ea	$1.044 M
Catchbasin Manholes	57	$9,900 ea	$0.564 M
		TOTAL	**$5.584 M**

1 A 3% inflation rate was used to convert all unit cost from 2013 dollars as provided in the original Asset Management Plan to 2021 dollars. Replacement costs for Wastewater System Components do not consider spikes in costs as a consequence of unforeseen events (Force Majeure).

The storm sewers range in size from 150 mm to 1050 mm. Table 15 provides a breakdown of total pipe length by diameter. Approximately 72% of storm sewers (by length) have a diameter of 150 mm to 300 mm.

Table 15 - Storm Sewer Sizes

DIAMETER (mm)	LENGTH (km)	% OF TOTAL
150	0.79	9.8%
200	2.26	28.1%
250	1.31	16.3%
300	1.39	17.3%
350	0.07	0.9%
375	0.29	3.6%
400	0.42	5.3%
450	0.54	6.8%
500	0.09	1.1%
525	0.09	1.1%
600	0.15	1.9%
750	0.32	4.0%
1050	0.30	3.8%
Total	**8.04**	**100%**

Table 16 summarizes the breakdown of total length by pipe material. Approximately 98% of storm sewers (by length) are constructed of Clay (VCT) or Transite. The other 2% of storm sewers (by length) are constructed of PVC (MacDonald Avenue).

Table 16 - Storm Sewer Materials

MATERIAL	LENGTH (km)	% OF TOTAL
Transite	3.37	41.9%
VCT	3.74	46.5%
PVC	0.93	11.6%
Total	**8.04**	**100%**

Similarly, Table 17 summarizes the breakdown of total length by pipe age. It is noted that 63% of storm sewers have been constructed since 1970 and therefore 37% the storm sewers are approaching 60 years of age. Overall, the average age of the storm sewers is approximately 45 years.

Table 17 - Storm Sewer Ages

DECADE	LENGTH (KM)	% OF TOTAL
1950-1959	2.94	36.6%
1970-1979	1.50	18.7%
1980-1989	2.79	34.7%
2000-2009	0.00	0.0%
2010-2019	0.54	6.7%
2020-present	0.27	3.3%
Total	**8.04**	**100%**

COMMUNITY LEVELS OF SERVICE

The following table outlines the qualitative descriptions that determine the community levels of service provided by Storm Water Network.

Table 18 – Storm System Community Levels of Service

SERVICE ATTRIBUTE	TECHNICAL METRIC	CURRENT LOS (2021)
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 B
Performance	# of locations in the Township regularly experiencing flooding during wet weather events	3

TECHNICAL LEVELS OF SERVICE

The following table outlines the quantitative metrics that determine the technical level of service provided by the Storm Water Network.

Table 19 - Storm System Technical Levels of Service

SERVICE ATTRIBUTE	TECHNICAL METRIC	CURRENT LOS (2021)
Scope	% of properties in municipality resilient to a 100-year storm	Unknown – insufficient data available
	% of the municipal stormwater management system resilient to a 5-year storm	100%

3.2.4 ROAD NETWORK

The Road Network is a critical component of the provision of safe and efficient transportation services. It includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure streetlights. The Township's Road Network is maintained by the Public Works Department.

The Town's road network includes approximately 16.26 km of paved roadways, 3.83 km of gravel surface roadways, and 236 streetlights. Table 20 summarizes the inventory of the Town's road network. The replacement costs presented are for surface rehabilitation only.

Table 20 - Replacement Costs of Road Network Components

	QUANTITY	UNIT COST	REPLACEMENT COST [1] ($M)
Paved Roads (km)	15.51	$2,000/m	$31.020 M
Gravel Roads (km)	2.60	$850/m	$2.210 M
Streetlights [2]	236	$2,750 ea	$0.649 M
		TOTAL	**$33.879 M**

1 Replacement costs for Wastewater System Components do not consider spikes in costs as a consequence of unforeseen events (Force Majeure).

2 Replacement cost for streetlights is representative of replacement costs of the streetlight, typically completed during full road reconstruction. The replacement cost is not representative of repair costs for individual streetlights.

The Replacement Cost for roads is representative of full road restoration, i.e. road surface, granular base, and granular subbase.

COMMUNITY LEVELS OF SERVICE

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

Table 21 – Road Network Community Levels of Service

SERVICE ATTRIBUTE	TECHNICAL METRIC	CURRENT LOS (2021)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Appendix B
Quality	Description or images that illustrate the different levels of road class pavement condition	A visual inspection of all roads was completed to determine a Pavement Condition Index (PCI). The PCI is a 0-100 rating that ranges from 0 (Fail) to 100 (Good). Photos of existing road conditions are appended to this plan.
Performance	Streetlight bulb outages left unreplaced for a period exceeding seven (7) days *	2

* One (1) bulb outage may exceed 7 days as the Township does not call for repairs for a single outage. However, if two (2) bulbs are out, repairs are called in immediately.

TECHNICAL LEVELS OF SERVICE

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

Table 22 - Road Network Technical Levels of Service

SERVICE ATTRIBUTE	TECHNICAL METRIC	CURRENT LOS (2021)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km2)	0
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km2)	0
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km2)	12.7
Quality	Average pavement condition index for paved roads in the municipality	65 – Fair
	Average surface condition for unpaved roads in the municipality (e.g. excellent, good, fair, poor)	Good
Performance	# of complaints about road condition issues per year	12

3.2.5 BRIDGES & CULVERTS

Bridges and structural culverts are classified as structures having a span of 3m or greater. All bridge and structural culverts subject to biennial inspections as per the Ontario Bridge Inspection Manual (OSIM).

The Township does not own any bridges or culverts.

3.2.6 BUILDINGS

The Town of Terrace Bay owns thirteen (13) properties throughout the municipality. Some of these properties have more than a single building on the site and have been considered separately for condition assessments and recommendations. Table 23 summarizes the inventory of the Town's building assets.

Replacement costs are based on recent construction projects in Northern Ontario. Building cost examples are provided in Appendix E for reference.

The Water Treatment Plant and Raw Water Pumping Station buildings are not included under the “Buildings” assets as the information relevant to managing those two assets are captured under “Water System” assets

Table 23 - Replacement Cost of Buildings

	AREA (SQ.M)	HISTORICAL COST (IF AVAIL.)	UNIT REPLACEMENT COST (PER SQ.M)	REPLACEMENT COST [1] ($M)
Public Works Garage	520	--	$2,400	$1.248 M
Airport Office	90	--	$2,700	$0.243 M
Airport Garage	139	--	$2,400	$0.334 M
Tourist Information Centre	150	--	$3,100	$0.465 M
Cultural Centre	2032	--	$3,400	$6.909 M
Pool Building	163	--	$3,400	$0.554 M
Community Centre	5110	--	$3,400	$17.374 M
Fire Hall Office	89	--	$2,700	$0.240 M
Fire Hall Garage	270	--	$2,400	$0.648 M
Sewage Treatment Building + Tanks (Decommissioned)	224	$445,000	--	$0.445 M
Lighthouse	28	$745,000	--	$0.745 M
Beach House	350	$2,300,000	--	$2.300 M
TOTAL	12,789			**$34.255 M**

1 A 3% inflation rate was used to convert all unit cost from 2013 dollars as provided in the original Asset Management Plan to 2021 dollars. Replacement costs for Wastewater System Components do not consider spikes in costs as a consequence of unforeseen events (Force Majeure).

COMMUNITY LEVELS OF SERVICE

Table 24 - Buildings Community Levels of Service

SERVICE ATTRIBUTE	TECHNICAL METRIC	CURRENT LOS (2021)
Safety	Number of incidents reported	0
	% of buildings compliant to accessibility compliant*	92%
	Number of complaints received regarding nefarious / suspicious activities on building properties per year	To be recorded moving forward
Quality	% of buildings which have undergone significant upgrades/repairs within the last 40 years (1980 or later) *	30% to 40%

* Excludes the decommissioned Sewage Treatment building.

TECHNICAL LEVELS OF SERVICE

Table 25 - Buildings Technical Levels of Service

SERVICE ATTRIBUTE	TECHNICAL METRIC	CURRENT LOS (2021)
Safety	Number of complaints received regarding state of buildings	To be recorded moving forward
Quality	Number of unplanned closures / use restrictions per year	To be recorded moving forward
	Number of emergency repairs required on buildings per year	To be recorded moving forward

3.2.7 OTHER MUNICIPAL ASSETS

The Town of Terrace Bay owns other assets which they are responsible for the maintenance and usability throughout the municipality. Table 26 summarizes the inventory of the Town's "other" assets.

Table 26 - Replacement Cost of Other Municipal Assets

SERVICE AREA	DESCRIPTION	QUANTITY	HISTORICAL COST (IF AVAIL.)	UNIT REPLACEMENT COST	REPLACEMENT COST [1] ($M)
Fleet Vehicles	Public Works Fleet	4 pickup trucks 11 heavy trucks/machines	--	$55,000 ea (pickup truck) $250,000 ea (heavy truck/machine)	$2.970 M
	Fire Fleet	1 pickup truck 1 heavy pickup truck 2 heavy trucks 1 snow mobile 1 ATV	--	$55,000 ea (pickup truck) $150,000 ea (heavy pickup truck) $600,000 ea (heavy truck) $20,000 (ATV / snow mobile)	$1.445 M
	Other Township Vehicles	3 pickup trucks 1 snow mobile	--	$55,000 ea (pickup truck) $20,000 (snow mobile)	$0.185 M
Community Recreation	Beach House Boardwalk	310 m	--	$3,400 /m	$1.054 M
	Docks	82 m	$90,000	--	$0.090 M
	Aguasabon Gorge Boardwalk & Stairs	108 m	$1,000,000	--	$1.000 M
	Community Parks/Playgrounds	4	--	$54,000 ea	$0.216 M
Waste Management	Landfill [2]	1	$10,561,000		$10.561 M
Other	Cemetery	1	$150,000		$0.150 M
		TOTAL			**$17.671 M**

1 Replacement costs for Wastewater System Components do not consider spikes in costs as a consequence of unforeseen events (Force Majeure).

2 Landfill replacement cost is based on progressing the active current landfill. The current landfill has enough operational capacity to sustain the Township for approximately the next 15 years. The landfill property has adequate space to provide waste management for an additional 75 years, with necessary expansions occurring at 100,000 cubic meter increments (approximately every 10 years).

COMMUNITY LEVELS OF SERVICE

Table 27 - Other Municipal Assets Community Levels of Service

SERVICE AREA(S)	SERVICE ATTRIBUTE	TECHNICAL METRIC	CURRENT LOS (2021)
Fleet Services	Reliability	Description of vehicle safety inspections	As per vehicle/machine owner's manual recommendations or every 6,000 km. See Appendix F. All fleet asset inspections are completed in compliance with all applicable MTO requirements.
Community Recreation & Other	Quality	Description of vehicle safety inspections	Assets inspected on an annual basis (minimum). See Appendix F.
		% of customers who are unsatisfied with overall experience	0
Waste Management	Sustainability	Description of site condition: - Waste segregation - Overall cleanliness - Controlled access to site - Site attendant present during hours of operation	Excellent

TECHNICAL LEVELS OF SERVICE

Table 28 - Other Municipal Assets Technical Levels of Service

SERVICE AREA(S)	SERVICE ATTRIBUTE	TECHNICAL METRIC	CURRENT LOS (2021)
Fleet Services	Reliability	% of preventative maintenance inspections completed	To be recorded moving forward
		% of repair hours spent on unscheduled repairs and service not PM related.	To be recorded moving forward
Community Recreation & Other	Quality	% of assets inspected at least annually	To be recorded moving forward
Waste Management	Sustainability	% of facilities operating within ECA requirements	100%

3.3 ASSET'S CURRENT YEAR VALUE

According to the suppliers, water distribution infrastructure, sanitary sewers, and storm sewers typically have a 60- to 80-year lifespan, depending on the type of material used during construction. The weighted average service life for the water, wastewater and stormwater systems is 62, 73 and 72 years, respectively.

Buildings have various components with different expected service lives. Structures typically have a 50-year lifespan where roof structures usually have a 15- to 20- year life expectancy. Mechanical equipment typically has a 20- to -30-year life expectancy. Through strategic forecasting, mechanical improvements, and good maintenance, a building can expect to have an 80-year lifespan. The weighted average service life of these specific buildings should be taken as 60 years.

The remaining useful life of each asset should also be taken as the ratio of their condition index. Again, for buried infrastructure, the condition is extrapolated, and the remaining life is simply the design life minus the age of the assets. Both the remaining useful life and current year value are listed in Appendix A of this plan.

3.4 REPLACEMENT COSTS

There are several ways to estimate the value of assets, including: original book value; depreciated book value; market value; and replacement cost. For the purposes of quantifying life cycle costs, the replacement cost is deemed to be the most appropriate.

The replacement costs for the water, wastewater, stormwater systems, and building components are based on cost data compiled by WSP from several sources, including recent tenders, surveys, review of Township records and other studies. These estimates do not include any road restoration costs necessitated by the replacement of underground components.

The cost estimates presented in this report are deemed to be sufficiently accurate for the initial development of an asset management plan. However, a more detailed analysis is required in order to estimate the replacement cost for individual components. A detailed cost estimate should account for restoration requirements, staging of construction, site constraints, and economic factors.

3.4.1 WATER SYSTEM

Figure 2 illustrates the replacement cost for each water system components based on the inventory and unit costs summarized in Table 2. The estimated replacement cost of the water system is approximately $44.0 million. From Figure 2, the replacement cost of water mains is approximately 25% of the total replacement cost of the water system.

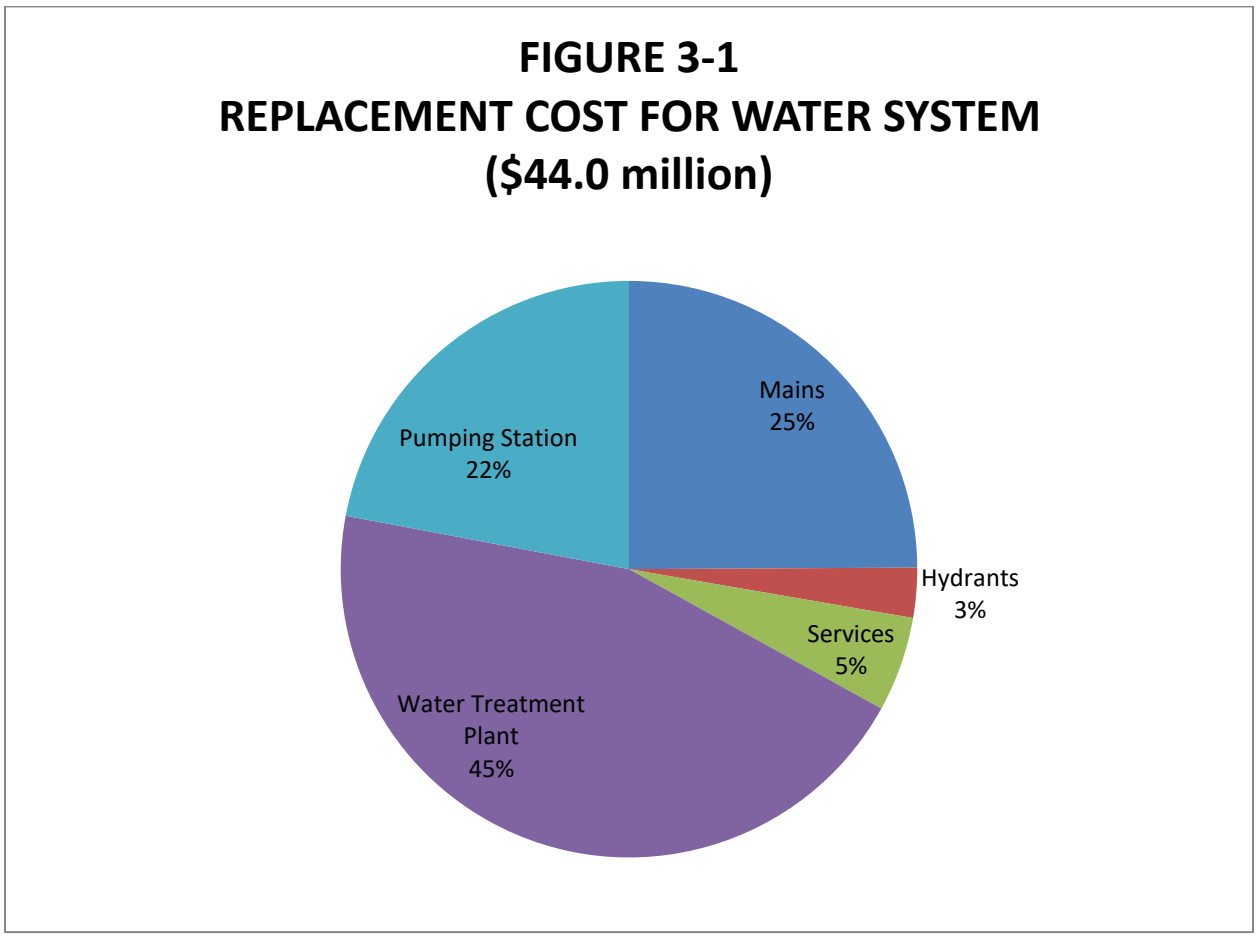

Figure 2 – Replacement Cost for Water System

3.4.2 WASTEWATER SYSTEM

Figure 3 illustrates the replacement cost for each wastewater system component based on the inventory and unit costs summarized in Table 8. The estimated replacement cost of the wastewater system is approximately $13.1 million. It is apparent from Figure 3 that the replacement cost of sanitary sewers is 47% of the total replacement cost of the wastewater system.

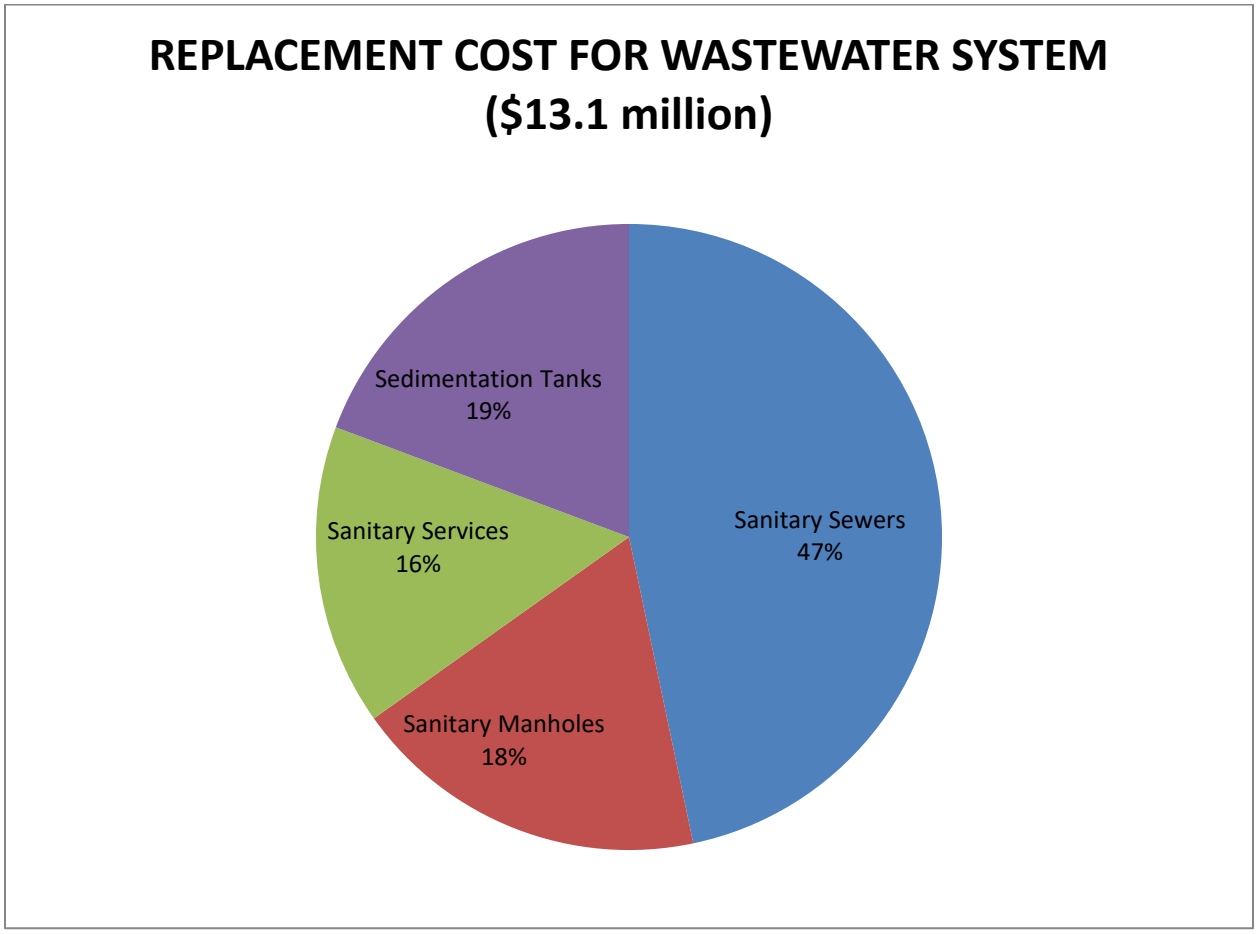

Figure 3 - Replacement Cost for Wastewater System

3.4.3 STORMWATER SYSTEM

Figure 4 illustrates the replacement cost for each stormwater system component based on the inventory and unit costs summarized in Table 14. The estimated replacement cost of the stormwater system is approximately $5.6 million.

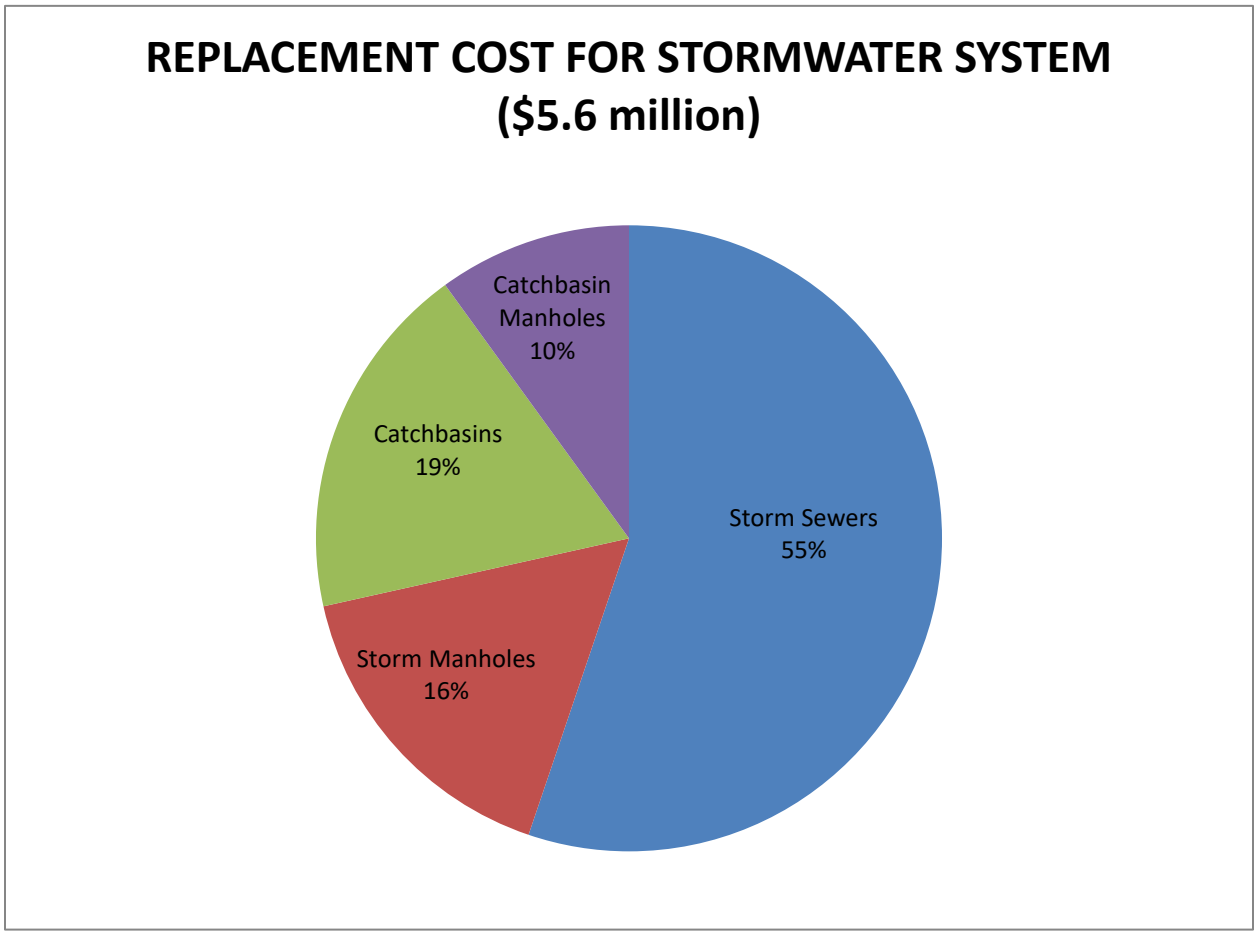

Figure 4 - Replacement Cost for Stormwater System

3.4.4 ROADS

A Figure 5 illustrates the replacement cost for each road network component based on the inventory and unit costs summarized in Table 20. The estimated replacement cost of the road network is approximately $36.4 million, with over 90% of the replacement costs stemming from paved roads.

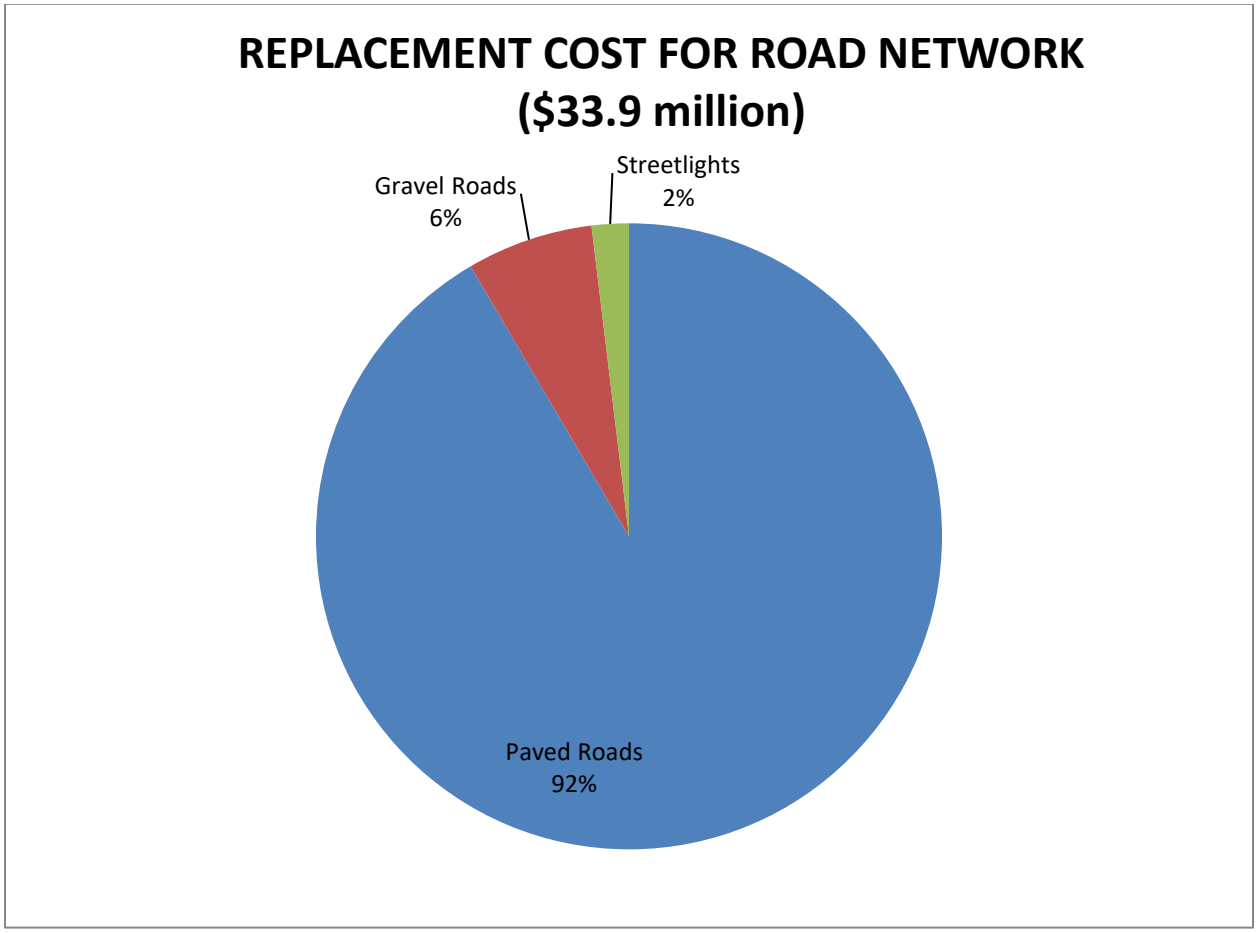

Figure 5 - Replacement Cost for Road Network

3.4.5 BUILDINGS

Figure 6 illustrates the replacement cost for individual buildings based on the inventory and replacement costs summarized in Table 23. The estimated replacement cost of all buildings is approximately $34.3 million. It is apparent from Figure 6 that the replacement cost of Community Center accounts for approximately 51% of the total replacement cost of the building assets.

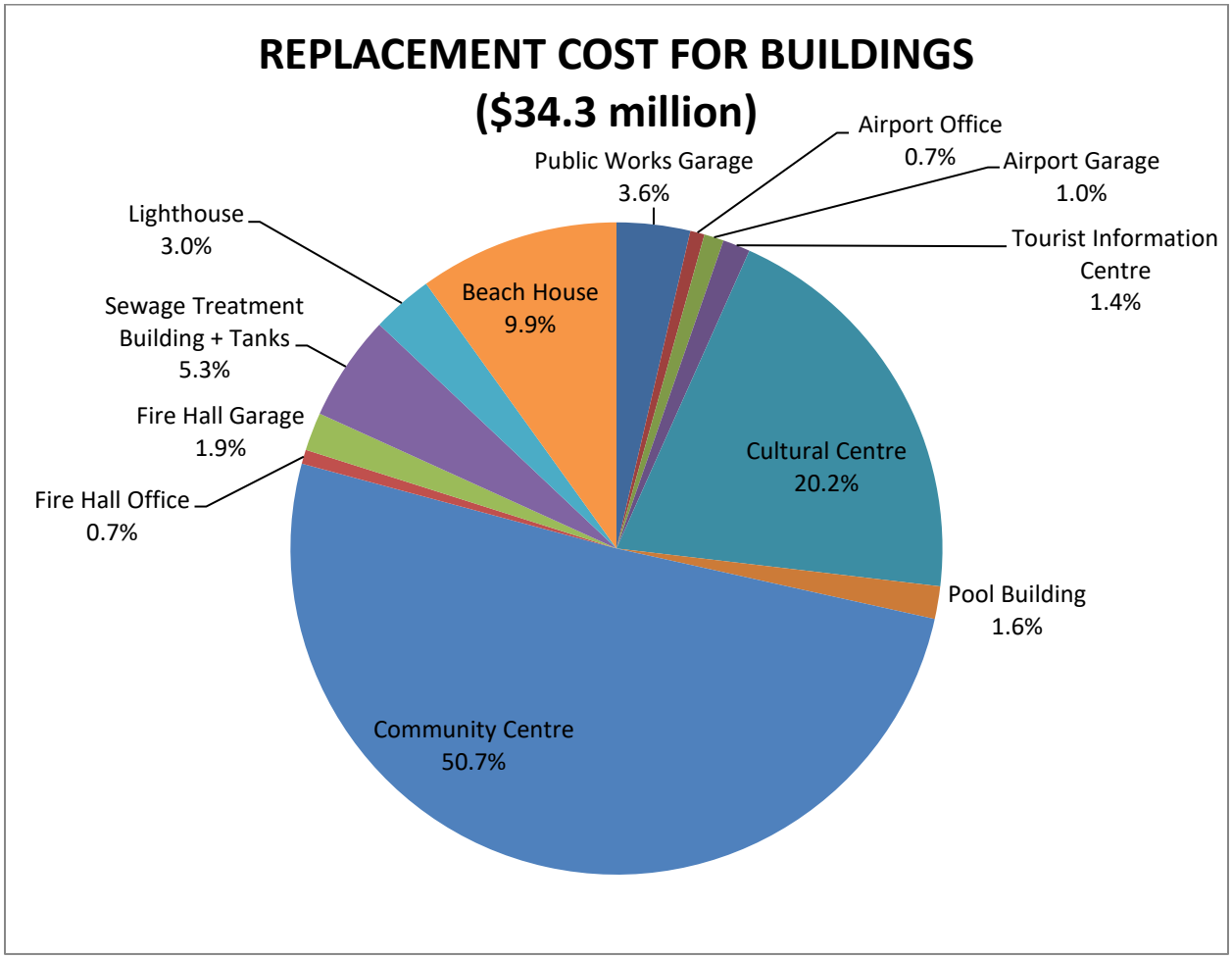

Figure 6 - Replacement Cost for Buildings

3.4.6 OTHER MUNICIPAL ASSETS

Figure 7 illustrates the replacement cost for other individual municipally owned assets based on the inventory and replacement costs summarized in Table 26. The estimated replacement cost of all other assets is approximately $17.7 million. It is apparent from Figure 7 that the replacement cost of Landfill is approximately 60% of the total replacement cost of the other assets.

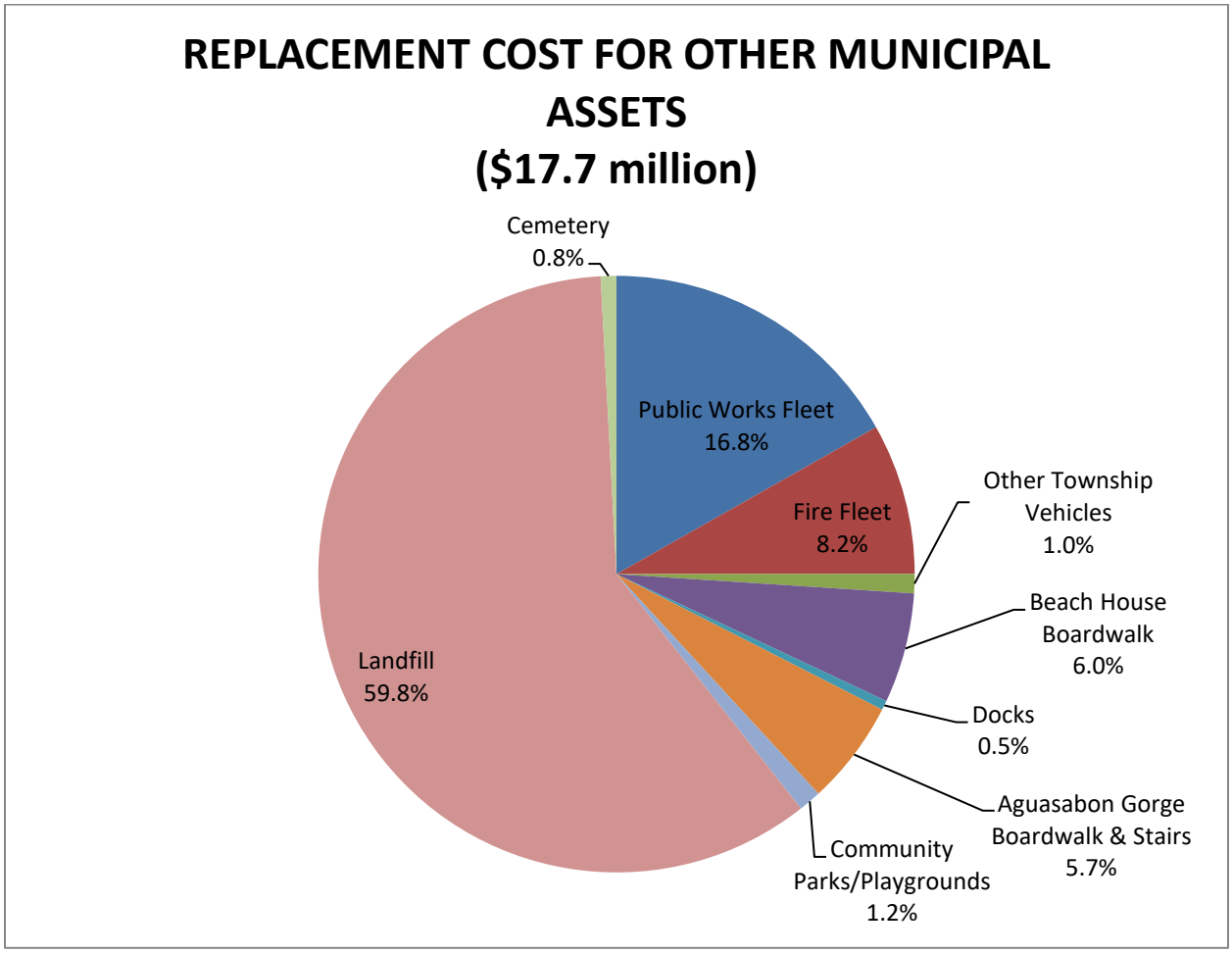

Figure 7 - Replacement Cost for Other Assets

3.4.7 SUMMARY OF REPLACEMENT COSTS

The total replacement cost of the water, wastewater and stormwater systems is approximately $62.72 million. Including the road network, buildings, and other municipally owned assets, the replacement cost would amount to $148.52 million. Since the current population in the Town is approximately 1,611, the replacement cost of the water, wastewater and stormwater systems is approximately $38,930 per capita or $92,195 per capita if the road network, building, and other municipal assets are included.

3.5 ASSET CONDITIONS

The Condition Index (CI) is a planning tool which assists with the scheduling of maintenance and upkeep. A higher number indicates a better overall condition. The CI is a basic economic indication of the current value as a

percentage of its replacement cost. The CI is a simple, convenient and inexpensive way to monitor the condition of the assets, identify maintenance and rehabilitation needs, and to ensure that maintenance budgets are spent wisely. Using the CI can help identify trigger points for preventive maintenance that can stop an asset from deteriorating to the point that it needs expensive rehabilitation.

The condition indices are calculated values representative of the condition of an asset. The values in this plan vary from 0-100 (indicating completely deteriorated to new condition). Buried assets use an age condition index approach similar to the CityWide Software while buildings use a facility condition index. Typically, visual inspections are carried out and details are entered into the database which in turn produces a calculated condition index based on inspected elements. Where access is limited or not possible it is necessary to make assumptions considering age, design life, and material. For example, roads are inspected, and parameters usually include severity and frequency of items such as potholes, distortion, tire rutting, or washboard. These severities and frequencies can then be entered into the asset management software and in turn produce a condition index. CityWide Software uses a completely age-based condition rating system unless overridden. The assets' current conditions are presented in Appendix A of this plan.

3.5.1 AGE CONDITION INDEX

The assets vary from critical to excellent age-based condition, and most are currently providing acceptable levels of service. The rating system is as follows:

Table 29 – Condition Index

CONDITION INDEX	100 – 75	75 – 50	49 – 25	24 – 0
Rating	1 – Excellent	2 – Good	3 – Fair	4 – Poor

The infrastructures in the municipality were visually inspected where safe access could be gained to determine their current condition and engineering characteristics. CCTV inspections were conducted and reviewed for approximately 4% of the infrastructure assets. Extrapolation to remaining assets was necessary from the CCTV videos.

Normally a Serviceability Condition Index (SCI) is used for applications like these however it is not recommended with assets approaching the end of their useful lives. The SCI takes into account the condition, cost, and criticality (consequence of failure). Because these services are vital and aged, most would produce an SCI of exactly 50.

The Age Condition Index (ACI) is the default condition rating system used by CityWide. Normally this rating system is avoided because they lead to assets being replaced based on age rather than performance. For buried infrastructure this method is recommended simply because access cannot be granted for detailed performance evaluations. Although the CCTV videos are helpful, only select sewers with random distribution were chosen for inspection.

It is recommended that CCTV inspections be conducted and reviewed for the entire storm and sanitary sewer systems, particularly problematic areas, so actual condition rather than age-based condition indices can be established and entered into CityWide. The CI for water distribution systems are purely age and material based (ACI).

3.5.2 FACILITY CONDITION INDEX

The facility condition index (FCI) is the adopted method used to evaluate building conditions which indicate the relative financial investment need of a facility or group of buildings independent of building type, construction type, location or cost. The FCI is a ratio of the cost of remedying the requirements to the current replacement value.

The FCI is not strictly a measure of condition, as it is focused on current needs and not the overall condition. For instance, a building which is generally in very good condition, but which requires some minor (but immediate) needs, will have a lower FCI than a building in fair condition with no immediate needs.

A low FCI would indicate a significant investment required to remedy the requirements relative to the cost of replacing the facility. Good asset management would therefore place a greater level of attention on these assets to determine whether replacement is a better solution to maintenance or rehabilitation.

The buildings throughout the municipality were visually inspected where safe access could be gained to determine their current condition and engineering characteristics. A good representation of the facilities was achieved and valuable information was collected.

3.5.3 PAVEMENT CONDITION INDEX

The Pavement Condition Index (PCI) is a numerical rating of the pavement condition based on the type and severity of distresses observed on the pavement surface. The PCI value of the pavement condition is represented by a numerical index between 0 and 100, where 0 is the worst possible condition and 100 is the best possible condition, broken down as follows:

- 0-10: Fail
- 11-25: Serious
- 26-40: Very Poor
- 41-55: Poor
- 56-70: Fair
- 71-85: Satisfactory
- 86-100: Good

PCI is calculated based on the distresses observed during condition surveys (inspections). This information is used to determine the PCI values of pavement section. The methods of obtaining PCI values are as per ASTM D6433: Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys.

The PCI history of a pavement section can help establish its rate of deterioration and identify future major rehabilitation needs. PCI values are also used in prioritizing, funding and executing Maintenance and Rehabilitation (M&R) on the pavement section.

Inspections to obtain a PCI value for every municipal road within the Township was not feasible given the time and cost that would be required to complete such an undertaking. Thus, for the purposes of this Asset Management Plan all municipal roads where visually inspected for distress types described in ASTM D6433 and a PCI value was assigned based on visual observations and road age. The assigned PCI value will provide the Township with a sense of the road conditions, flagging any potential roads whose condition will require intervention in the near future, and allow for the prioritization of road rehabilitations within the community. A copy of ASTM D6433 has been provided in Appendix H.

For the purposes of this Asset Management Plan, the remaining useful life for paved roads within the municipality was estimated by assigning an equivalent ACI value from the assigned PCI value, from which the remaining useful life was calculated as outlined in Section 7.2.

Table 30 - ASTM D6433 Distress Types for Asphalt Surface Roads

DISTRESS TYPES

- Alligator Cracking - Bleeding - Block Cracking - Bumps and Sags - Corrugation - Depression	- Edge Cracking - Joint Reflection Cracking - Lane / Shoulder Dropoff - Longitudinal and Transverse Cracking	- Patching & Utility Cut Patching - Polished Aggregate - Potholes - Railroad Crossings - Rutting	- Shoving - Slippage Cracking - Swell - Weathering / Raveling

3.6 SERVICE LIFE

The service life of the water, wastewater, stormwater, road network, building components, and other municipal assets are variable depending upon several factors, such as: construction materials; quality of construction; environmental conditions; and maintenance. In simple terms, the service life of a component is defined as the time period that the component provides an acceptable level of service prior to requiring repairs. The economic service life is defined as the time period when the present worth of the maintenance cost is equal to the present worth of the replacement cost.

The rate of deterioration of assets is also variable. Some components deteriorate in a linear manner, while in other cases they deteriorate in an exponential manner. In a few cases, components will deteriorate rapidly right after construction (typically due to poor construction) and then the rate of deterioration will decline over the balance of its service life.

For the purposes of this study, a theoretical service life has been assumed for each of the Town's water, wastewater, stormwater systems, road network, building components, and other municipal assets as indicated in Table 31, Table 33, Table 35, Table 37, Table 39, and Table 41, respectively. As a result, the remaining life of each system component can be estimated by subtracting the age of the component from its service life.

3.6.1 WATER SYSTEM

Table 31 summarizes the service life assumed for the water system components. It is recognized that the mechanical and electrical components of the water system's buildings (and all buildings) have a shorter life expectancy than the structural components.

Table 31 - Service Life for Water System Components

COMPONENT	EXPECTED SERVICE LIFE
Raw Water Pumping Station:	
- Structural (70% of value)	50 Years
- Mechanical & Electrical (30% of value)	30 Years
Water Treatment Plant	
- Structural (70% of value)	50 Years
- Mechanical & Electrical (30% of value)	30 Years
Water Network Components	
- Hydrants, Valves & Services	80 Years
- Cast Iron Pipe	80 Years
- Ductile Pipe	100+ Years
- HDPE Pipe	100+ Years
- PVC Pipe	100+ Years

Table 32 summarizes the decade of original construction for each of the Pumping Station, Water Treatment Plant, water mains, hydrants and services. The year of construction for each of these facilities is included in Appendix A.

Table 32 - Historical Growth of Water System

FACILITY	DECADE OF CONSTRUCTION								TOTAL
	1950-59	1960-69	1970-79	1980-89	1990-99	2000-09	2010-19	2020-Present	
Pumping Station						1			**1**
Water Treatment Plant						1			**1**
Water Main Length (km)	11.4		4.2	1.6		3.2	0.3	0.4	**21.1**
Hydrants	104						2	8	**114**
Water Services	786						52	28	**866**

No Service Life Remaining | 0 – 5 Years Remaining | 6 – 10 Years Remaining | Over 10 Years Remaining

Note: It is assumed that the hydrants and services are installed at the same rate as the water main installation

3.6.2 WASTEWATER SYSTEM

Table 33 summarizes the service life assumed for the wastewater system components.

Table 33 - Service Life for Wastewater System Components

COMPONENT	EXPECTED SERVICE LIFE
Transite Sanitary Sewers	60 Years
Clay Sanitary Sewers	70 Years
PVC Sanitary Sewers	100+ Years
Manholes & Services	80 Years
Sedimentation Tank	80 Years

Table 34 summarizes the decade of original construction for the Town's wastewater system inventory.

Table 34 - Historical Growth of Wastewater System

FACILITY	DECADE OF CONSTRUCTION								TOTAL
	1950-59	1960-69	1970-79	1980-89	1990-99	2000-09	2010-19	2020-Present	
Sanitary Sewer Length (km)	6.6		3.9	1.7		1.4	0.7	0.2	**14.6**
Manholes	93		61	26			15	8	**203**
Sanitary Services	396		264	110			52	28	**850**
Sedimentation Tanks	3		1						**4**

No Service Life Remaining | 0 – 5 Years Remaining | 6 – 10 Years Remaining | Over 10 Years Remaining

Note: It is assumed that the manholes and services were installed at the same rate as the sanitary sewer installation.

The Town's current inventory includes the decade of construction for sanitary sewers. However, the inventory does not include the decade of construction for the sanitary manholes. Therefore, it has been assumed that the number of sanitary manholes has increased in proportion to the length of sanitary sewers installed.

3.6.3 STORMWATER SYSTEM

Table 35 summarizes the service life assumed for the stormwater system components.

Table 35 - Service Life for Stormwater System Components

COMPONENT	EXPECTED SERVICE LIFE
Transite Storm Sewers	60 Years
Clay Storm Sewers	70 Years
PVC Storm Sewers	100+ Years
Manholes, Catchbasins Manholes, & Catchbasins	80 Years

Table 36 summarizes the decade of original construction for the Town's current stormwater system inventory.

Table 36 - Historical Growth of Stormwater System

FACILITY	DECADE OF CONSTRUCTION								TOTAL
	1950-59	1960-69	1970-79	1980-89	1990-99	2000-09	2010-19	2020-Present	
Storm Sewer Length (km)	2.9		1.5	2.8			0.5	0.3	**8.0**
Manholes	35		18	23			11	6	**93**
Catchbasins	61		38	48			18	9	**174**
Catchbasin Manholes	17		16	21			1	2	**57**

No Service Life Remaining | 0 – 5 Years Remaining | 6 – 10 Years Remaining | Over 10 Years Remaining

3.6.4 ROADS

Table 37 summarizes the service life assumed for the road network components.

Table 37 - Service Life for Road Network Components

COMPONENT	EXPECTED SERVICE LIFE
Paved Roads	20 Years (Road Surface) 80 Years (Full Road Reconstruction)
Gravel Roads	50 Years
Streetlights	30 Years

Table 38 summarizes the decade of original construction for the Town's current Road Network inventory.

Table 38 - Historical Growth of Road Network

FACILITY	DECADE OF CONSTRUCTION								TOTAL
	1950-59	1960-69	1970-79	1980-89	1990-99	2000-09	2010-19	2020-Present	
Paved Roads (km)	8.5		3.4	2.9			0.5	0.2	**15.5**
Gravel Roads (km)								2.6	**2.6**
Streetlights							236		**236**

No Service Life Remaining | 0 – 5 Years Remaining | 6 – 10 Years Remaining | Over 10 Years Remaining

Note: It was assumed that full road reconstructions for paved roads occurred within the Township occurred at the same rate as watermain. sanitary sewer, and/or storm sewer installations.

According to CityWide records, streetlights underwent maintenance/replacement as needed on a 5-year basis from since 1975. As of 2014, streetlights have been refurbished to LED.

3.6.5 BUILDINGS

Table 39 summarizes the service life assumed for the building components.

Table 39 - Service Life for Building Components

COMPONENT	EXPECTED SERVICE LIFE
Structure (70% of Value)	50 Years
Roof Structure (10% of Value)	20 Years
HVAC (5% of Value)	30 Years
Plumbing & Electrical (15% of Value)	30 Years

Table 40 summarizes the year of original construction for the Town's building inventory.

Table 40 - Historical Growth & Remaining Service Life of Municipal Buildings

FACILTY	YEAR OF CONSTRUCTION	REMAINING SERVICE LIFE
Water Treatment Plant	2005	Structure: 35 Years Roof: 5 Years HVAC: 15 Years Plumbing/Electrical: 15 Years
Raw Water Pumping Station	2009	Structure: 40 Years Roof: 10 Years HVAC: 20 Years Plumbing/Electrical: 20 Years
Public Works Garage	1975 (1995 addition, 2020 roof repairs)	Structure: 5 – 25 Years Roof: 20 Years HVAC: 5 Years Plumbing/Electrical: 5 Years
Airport Office	1978	Structure: 10 Years Roof: 0 Years HVAC: 0 Years Plumbing/Electrical: 0 Years
Airport Garage	1979	Structure: 10 Years Roof: 0 Years HVAC: 0 Years Plumbing/Electrical: 0 Years
Tourist Information Centre	1991	Structure: 20 Years Roof: 0 Years HVAC: 0 Years Plumbing/Electrical: 0 Years
Cultural Centre	1980 (2010 full repairs)	Structure: 40 Years Roof: 10 Years HVAC: 20 Years Plumbing/Electrical: 20 Years

Pool Building	1962	Structure: 0 Years Roof: 0 Years HVAC: 0 Years Plumbing/Electrical: 0 Years
Community Centre	1959 (1980 & 1998 additions)	Structure: 0 – 30 Years Roof: 0 Years HVAC: 0 – 10 Years Plumbing/Electrical: 0 – 10 Years
Fire Hall Office	1980 (2020 roof repairs)	Structure: 10 Years Roof: 20 Years HVAC: 0 Years Plumbing/Electrical: 0 Years
Fire Hall Garage	1974 (2020 roof repairs)	Structure: 10 Years Roof: 20 Years HVAC: 0 Years Plumbing/Electrical: 0 Years
Sewage Treatment Building + Tanks	1978	N/A – Decommissioned
Lighthouse	2011	Structure: 40 Years Roof: 10 Years HVAC: N/A Plumbing/Electrical: N/A
Beach House	2020	Structure: 50 Years Roof: 20 Years HVAC: 30 Years Plumbing/Electrical: 30 Years

3.6.6 OTHER ASSETS

Table 41 summarizes the in-service date and service life assumed for the various other assets owned by the Township.

Table 41 - Historical Growth & Remaining Service Life Other Municipal Assets

ASSET	IN-SERVICE DATE	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Municipally Owned Vehicles	1999, 2011 (x2), 2013, 2015, 2016, 2018, 2019 (pickup trucks) 2003 (heavy pickup truck) 2010, 2013, 2016 (ATVs / snowmobiles) 1980, 1992, 1993, 1996, 1997, 2005 (x2), 2009, 2011, 2012 (x2), 2014, 2017 (heavy trucks / machines)	10 Years	Ongoing maintenance as required. Vehicles with model years prior to 2010 should be considered for replacement
Beach House Boardwalk	2020	40 Years	40 Years
Docks	2017	60 Years	50-60 Years
Aguasabon Gorge Boardwalk & Stairs	1990 (2019 repainted)	40 Years	10 Years
Community Parks/Playgrounds	N/A (repainted as required)	10 Years	Ongoing maintenance as required
Landfill	1978	60 Years	+/- 15 Years
Cemetery	1952 (expansions as required)	10 Years	Ongoing maintenance/expansions as required

4 DESIRED LEVELS OF SERVICE

The current Levels of Service metrics presented for each asset within their respective sections throughout Section 3.2, apart from the qualitative descriptions set out in Column 2 and the technical metrics set out in Column 3 of Table 1, 2, 3, 4 or 5 of O.Reg. 588/17, were established through discussions held with the Township. At the time of this Asset Management Plan update, the Township did not have any specific policies outlining desired Levels of Service (LOS) for the municipally owned assets, however, are currently working on developing a LOS Policy.

Township staff strive to maintain the existing infrastructure so that interruptions are minimized. Interruptions may be caused by unexpected or unplanned watermain breaks or beaks in the wastewater or stormwater collection systems.

It is recommended that LOS policies be established in order to better serve the users of the water and wastewater, and stormwater systems. A typical LOS policy would include metrics such as:

- Acceptable number of breaks per 100km of pipe;
- Response time to watermain / sewer breaks;
- Acceptable duration of service interruption;
- Number of customer complaints;
- Colour/odour/taste of drinking water;
- Water pressure (drinking water system);
- Water temperature;
- Minimum and maximum chlorine residual levels (drinking water system);
- Minimum Fire Hydrant flows;
- Catchbasin debris removal;
- Sewer flow velocity;
- Sewer odour control;
- Percent blockage of sewers;
- Percentage of roads inspected within the last five years;
- Operating costs for paved roads per lane km;
- Operating costs for gravel roads per lane km;
- Number of customer requests received annually;
- Percentage of customer requests with a 24-hour response rate;
- Roof/surface drainage;
- Energy efficiency;
- Cleanliness;
- Noise barriers; and
- Barrier-free access.

Once the metrics are available to quantify the Level of Service currently available, the Township can then review the costs associated with maintaining the existing water, wastewater, stormwater systems, and buildings at their current LOS. An increased amount of money must be spent on these systems in order to maintain the current LOS. This is due to the increasing age of the systems. In other words, as the systems get older, they require more money to keep them performing at the same Level of Service they provide today. Some examples of expected levels of service are included Appendix E.

5 ASSET MANAGEMENT STRATEGY

5.1 NON-INFRASTRUCTURE SOLUTIONS

Non-infrastructure solutions can produce lower, more sustainable costs in maintaining existing assets. Non-infrastructure solutions are solutions that do not include the physical repairs of the assets. It is an organizational approach that will aid in the future by lowering costs, having organized data, saving time, and therefore resulting in better efficiency. Inspection reports should identify the maintenance work required within a timeframe for the work, and an opinion of probable cost. To extend the service life of an asset, the Township should use the information acquired from the inspections to update their financial plan accordingly and ensure that the plan is implemented. Currently, the Township utilizes CityWide Software Solutions stores the asset's historical data and provides an organized future path forward.

It is important to accurately keep any asset management software up to date; or the municipality increases the risk of having inconsistent and inaccurate information produced. This would make the true value of assets incorrect and future values very difficult to determine. It also compromises any other asset information such as construction costs, replacement information, or useful life.

5.2 MAINTENANCE ACTIVITIES

Regular maintenance is essential to managing municipal assets. The expected level of service often relies on maintenance activities. It is imperative that the municipality schedules regular inspections for their assets and inspectors identify the needs for maintenance work as well as the required timeframe. They will also identify if immediate action should be taken to address any safety concerns. Regular maintenance can add significant life to assets and save the municipality money in the long term. Routine maintenance and minor repair work to an element can normally be performed without professional engineering direction.

Buried infrastructure such as sewers and watermains should be inspected whenever there is a suspicion of a malfunction or approximately every ten years. WSP recommends inspections be carried out in late spring to early autumn for more detailed and accurate results. The information regarding the characteristics, value, and condition of assets should be updated into CityWide after every inspection.

5.2.1 WATER DISTRIBUTION

The major objectives for maintaining water distribution systems are to provide safe and aesthetically pleasing water to residents. While it is not practical to excavate watermains for inspection, new technologies such as in-service CCTV watermain inspections are possible for critical watermains which cannot be taken out of service. It is recommended to only to excavate for watermain replacement when a break is suspected. Some maintenance activities for water distribution systems may include:

- Flushing & swabbing;
- Exercise mainline valves and hydrants; and
- Strategic valve placement / replacement.

5.2.2 SEWERS

Preventative actions can have substantial impacts on the life and preservation of the assets. Sediments may build up and cause blockages stopping the flow of material. This will cause it to back up into residential dwellings and could lead to extensive property damage and contamination. Sewer maintenance may include:

- Repairing damaged or deteriorated sections of sanitary sewers;
- High pressure flushing to clear debris; and

- CCTV inspections.

5.2.3 ROADS

The Road Network is a critical component of the provision of safe and efficient transportation services. It includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure streetlights. Preventative maintenance activities can be applied in order to obtain one year of added life, i.e., maintenance activities must often be applied on a yearly basis in order to maintain an acceptable level of service. Of course, preventative maintenance activities can only be applied to a road at a relatively early point in the life cycle. Road network maintenance may include:

- **Gravel Roads**:
  - Dust control (calcium chloride) in summer months / dry periods,
  - Magnesium crystal applied later in summer if necessary,
  - Grading as required.
- **Paved Roads**:
  - Pothole repairs,
  - Crack sealing,
  - Cut-and-pave techniques (e.g. resurfacing).

The management of gravel roads is not through major rehabilitation and replacement, but rather through good perpetual maintenance and some minor rehabilitation which depend on a few basic principles: proper techniques and cycles for grading; the use and upkeep of good surface gravel; and, dust abatement and stabilization.

5.2.4 BUILDINGS

Building maintenance can have a significant impact on the success and service life of a building asset. Maintenance on a building will help maintain the value of the asset by replacing failed mechanical equipment, preserving the functionality of the facility. As previously discussed, various components of a building have different expected service lives.

Aesthetically, maintenance helps keep a facility appearing professional and clean, and will contribute to the success of a building asset, depending on its purpose. Although aesthetics are secondary to the functionality and structural integrity to a building, they are valuable requirements. Building maintenance may include:

- Removing rust and painting steel at initial signs of corrosion;
- Replace ceiling tiles where stained and monitor;
- Investigate roof leaking, caulk if necessary;
- Replace weather stripping at all doors;
- Keep snow away from doors and below window level; and
- Concrete/grout patching in damaged areas.

5.2.5 OTHER ASSETS

Other municipal assets range in nature thus maintenance activities may vary amongst assets which fall under this designation. However, general maintenance activities which aim to maintain asset value by replacing failed mechanical equipment, preserving the functionality of the facility, and upkeep of aesthetic maintenance. At a high level, general maintenance activities for “other” assets may include:

- Removing rust and painting steel at initial signs of corrosion;
- Concrete/grout patching in damaged areas;
- Proper winterization and/or snow clearing; and,
- Annual preventative care for mechanical components.

5.3 REHABILITATION / REPLACEMENT ACTIVITIES

5.3.1 GENERAL

Rehabilitation/replacement of the assets is necessary when the levels of service do not conform to expectations or any applicable standards. Significant repairs designed to extend the life of the asset are determined at every inspection. It is essential to schedule regular inspections to monitor the asset's conditions.

Rehabilitation over replacement is advantageous when there are only few components that need repair. Occasionally, the number of repairs is too extensive, and rehabilitation is deemed unfeasible or uneconomical. Large cities that are unable to interrupt large volumes of traffic will rehabilitate their sewers by relining them which will add structural integrity and seal them from leakage. This judgement is different for every case and sometimes replacement is the more cost effective alternative when considering future repairs for smaller municipalities.

Replacement is considered when extensive damage or deterioration has occurred to the asset. Replacing assets is sometimes costly and requires considerable additional review, such as detailed investigations. For buried infrastructure, it is understandable that replacement activities are only done in cases of failure or when they are excavated due to unrelated work (i.e. road work, gas lines, etc.) Taking advantage of replacing the buried infrastructure that is beyond its design life while the road is removed will save significant funds in the future if a break were to occur.

It is recommended that whenever an opportunity presents itself (unrelated excavation, breaks, roadwork, etc.), to replace expired watermains/sewers, lead services, decayed valves, and install isolation valves throughout the municipality to control the water flow during breaks or other activities that require water to be diverted.

The Township currently relies on infiltrative lagoons for the treatment and disposal of the sanitary sewage generated by the Town of Terrace Bay. While the system appears to be operating with no apparent failures, the Ministry of Environment may impose on the Township to phase out the use of the infiltrative lagoon and consider the construction of a new Sewage Treatment Plant to treat the sewage using modern methods of sewage treatment. It is recommended the Township prepare for this possible eventuality in future planning.

There are specific problem areas that were identified by the township and WSP recommends these issues be resolved before extensive damage occurs to surrounding property. These problem areas can be found in Appendix C. Issues include low spots in sewers, undersized sewers, frequent breakages, and lead water services.

Table 42, Table 43, Table 44, Table 45, Table 46, and Table 47 summarize the average annual investment required for renewal of the Town's water, wastewater, stormwater systems, road network, buildings, and other assets, respectively. The average annual investment is based on the replacement cost and the assumed service life for each of the system components. The average annual investment in renewal should be at least $0.639 million for the water supply system, $0.182 million for the wastewater system, $0.080 million for the stormwater system, and $0.454 million for the road network. The water treatment plant and pumping station are considered as part of the water distribution system and financial analysis carries on with that assumption. These two facilities are excluded from the buildings when considering renewal costs. The average annual investment for building renewal is approximately $0.809 million, and $0.494 million for other upkeep/repairs on other municipal assets.

Table 42 - Average Annual Renewal Cost for Water System

		REPLACEMENT COST ($M)	SERVICE LIFE (YEARS)	AVERAGE ANNUAL INVESTMENT ($M)
Watermains		$10.956 M	90	$0.122 M
Hydrants		$1.231 M	80	$0.015 M
Water Services		$2.338 M	80	$0.029 M
Water Treatment Plant	Structural (70%)	$13.863 M	50	$0.277 M
	M & E (30%)	$5.941 M	30	$0.198 M
Pumping Station	Structural (70%)	$6.783 M	50	$0.136 M
	M & E (30%)	$2.907 M	30	$0.097 M
Total		**$44.019 M**		**$0.639M**
Weighted Average			**62**	

Table 43 - Average Annual Renewal Cost for Wastewater System

	REPLACEMENT COST ($M)	SERVICE LIFE (YEARS)	AVERAGE ANNUAL INVESTMENT ($M)
Sanitary Sewers	$6.132 M	65	$0.094 M
Sanitary Manholes	$2.423 M	80	$0.030 M
Sanitary Services	$2.040 M	80	$0.026 M
Sedimentation Tanks	$2.534 M	80	$0.032 M
Total	**$13.129 M**		**$0.182 M**
Weighted Average		**73**	

Table 44 - Average Annual Renewal Cost for Stormwater System

	REPLACEMENT COST ($M)	SERVICE LIFE (YEARS)	AVERAGE ANNUAL INVESTMENT ($M)
Storm Sewers	$3.116 M	65	$0.048 M
Storm Manholes	$0.921 M	80	$0.012 M
Catchbasins	$1.044 M	80	$0.013 M
Catchbasin Manholes	$0.564 M	80	$0.007 M
Total	**$5.569 M**		**$0.080 M**
Weighted Average		**72**	

Table 45 - Average Annual Renewal Cost for Road Network

	REPLACEMENT COST ($M)	SERVICE LIFE (YEARS)	AVERAGE ANNUAL INVESTMENT ($M)
Paved Roads	$31.020 M	80	$0.388 M
Gravel Roads	$2.210 M	50	$0.044 M
Streetlights	$0.649 M	30	$0.022 M
Total	**$36.365 M**		**$0.454 M**
Weighted Average		**59**	

Table 46 - Average Annual Renewal Cost for Buildings (Excluding water components)

		REPLACEMENT COST ($M)	SERVICE LIFE (YEARS)	AVERAGE ANNUAL INVESTMENT ($M)
Public Works Garage	Structural (70%)	$0.874 M	50	$0.017 M
	Roof (10%)	$0.125 M	10	$0.012 M
	M & E (20%)	$0.250 M	30	$0.008 M
Airport Office	Structural (70%)	$0.170 M	50	$0.003 M
	Roof (10%)	$0.024 M	10	$0.002 M
	M & E (20%)	$0.049 M	30	$0.002 M
Airport Garage	Structural (70%)	$0.234 M	50	$0.005 M
	Roof (10%)	$0.033 M	10	$0.003 M
	M & E (20%)	$0.067 M	30	$0.003 M
Tourist Information Centre	Structural (70%)	$0.326 M	50	$0.007 M
	Roof (10%)	$0.047 M	10	$0.005 M
	M & E (20%)	$0.093 M	30	$0.003 M
Cultural Centre	Structural (70%)	$4.836 M	50	$0.097 M
	Roof (10%)	$0.691 M	10	$0.069 M
	M & E (20%)	$1.382 M	30	$0.046 M
Pool Building	Structural (70%)	$0.388 M	50	$0.008 M
	Roof (10%)	$0.055 M	10	$0.006 M
	M & E (20%)	$0.111 M	30	$0.004 M
Community Centre	Structural (70%)	$12.162 M	50	$0.243 M
	Roof (10%)	$1.737 M	10	$0.174 M
	M & E (20%)	$3.475 M	30	$0.116 M

		REPLACEMENT COST ($M)	SERVICE LIFE (YEARS)	AVERAGE ANNUAL INVESTMENT ($M)
Fire Hall Office	Structural (70%)	$0.168 M	50	$0.003 M
	Roof (10%)	$0.024 M	10	$0.002 M
	M & E (20%)	$0.048 M	30	$0.002 M
Fire Hall Garage	Structural (70%)	$0.454 M	50	$0.009 M
	Roof (10%)	$0.065 M	10	$0.006 M
	M & E (20%)	$0.130 M	30	$0.004 M
Sewage Treatment Building + Tanks	Structural (70%)	$0.312 M	50	$0.006 M
	Roof (10%)	$0.045 M	10	$0.004 M
	M & E (20%)	$0.089 M	30	$0.003 M
Lighthouse	Structural (80%)	$0.596 M	50	$0.012 M
	Roof (20%)	$0.149 M	10	$0.015 M
	M & E (0%)	$0.000 M	30	$0.000 M
Beach House	Structural (70%)	$1.610 M	50	$0.032 M
	Roof (10%)	$0.230 M	10	$0.023 M
	M & E (20%)	$0.460 M	30	$0.015 M
Total		**$31.505 M**		**$0.970 M**

Table 47 - Average Annual Renewal Cost for Other Assets

	REPLACEMENT COST ($M)	SERVICE LIFE (YEARS)	AVERAGE ANNUAL INVESTMENT ($M)
Municipally Owned Vehicles	$4.600 M	10 Years	$0.460 M
Beach House Boardwalk	$1.054 M	30 Years	$0.035 M
Docks	$0.090 M	60 Years	$0.002 M
Aguasabon Gorge Boardwalk & Stairs	$1.000 M	30 Years	$0.033 M
Community Parks/Playgrounds	$0.216 M	10 Years	$0.022 M
Landfill	$10.561 M	60 Years	$0.176 M
Cemetery	$0.150 M	10 Years	$0.015 M
Total	**$17.671 M**		**$0.743 M**

Based on Table 42, the weighted average service life for the water system is 62 years. In other words, the Town should renew 1.9% of their water system each year in order to maintain it in perpetuity. Similarly, the weighted average service lives for the wastewater and stormwater systems are 73 and 72 years, respectively. In this case, the Town should renew at least 1.4% of their wastewater system, 1.4% of their stormwater system, and 1.4% of their road network each year.

The projected replacement costs for each decade over the next 100 years are presented in the following sections.

5.3.2 WATER SYSTEM

Figure 8 illustrates the projected replacement costs for the water system over the next 100 years based on the replacement cost for the components (Table 2); the service life for the components (Table 31); and the age of the components (Table 5).

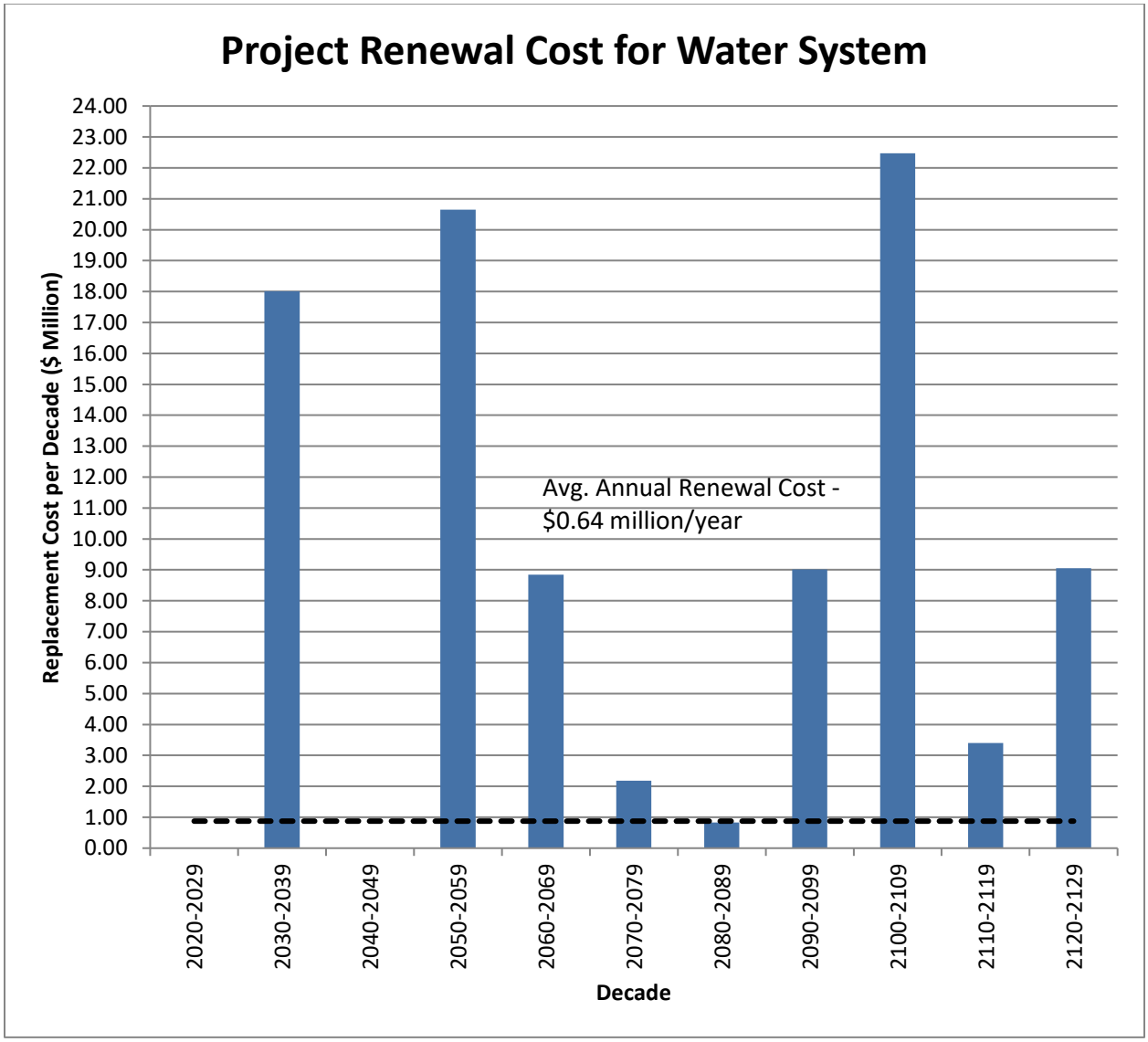

Figure 8 – Project Renewal Cost for Water System

It is difficult to quantify the backlog in renewal without conducting a detailed condition assessment of the infrastructure.

Figure 8 indicates that the next decade does not require any investment in the water system. The replacement costs are expected to increase significantly over the next 70 years especially in 20, 40 and 90 years' time when the watermains installed in the 1950's and the Water Treatment Plant and Raw Water Pumping Station components will be at the end of their service lives.

5.3.3 WASTEWATER SYSTEM

Figure 9 illustrates the replacement costs for the wastewater system over the next 100 years based on the replacement cost for the components (Table 8); the service life for the components (Table 33); and the age of the components (Table 11).

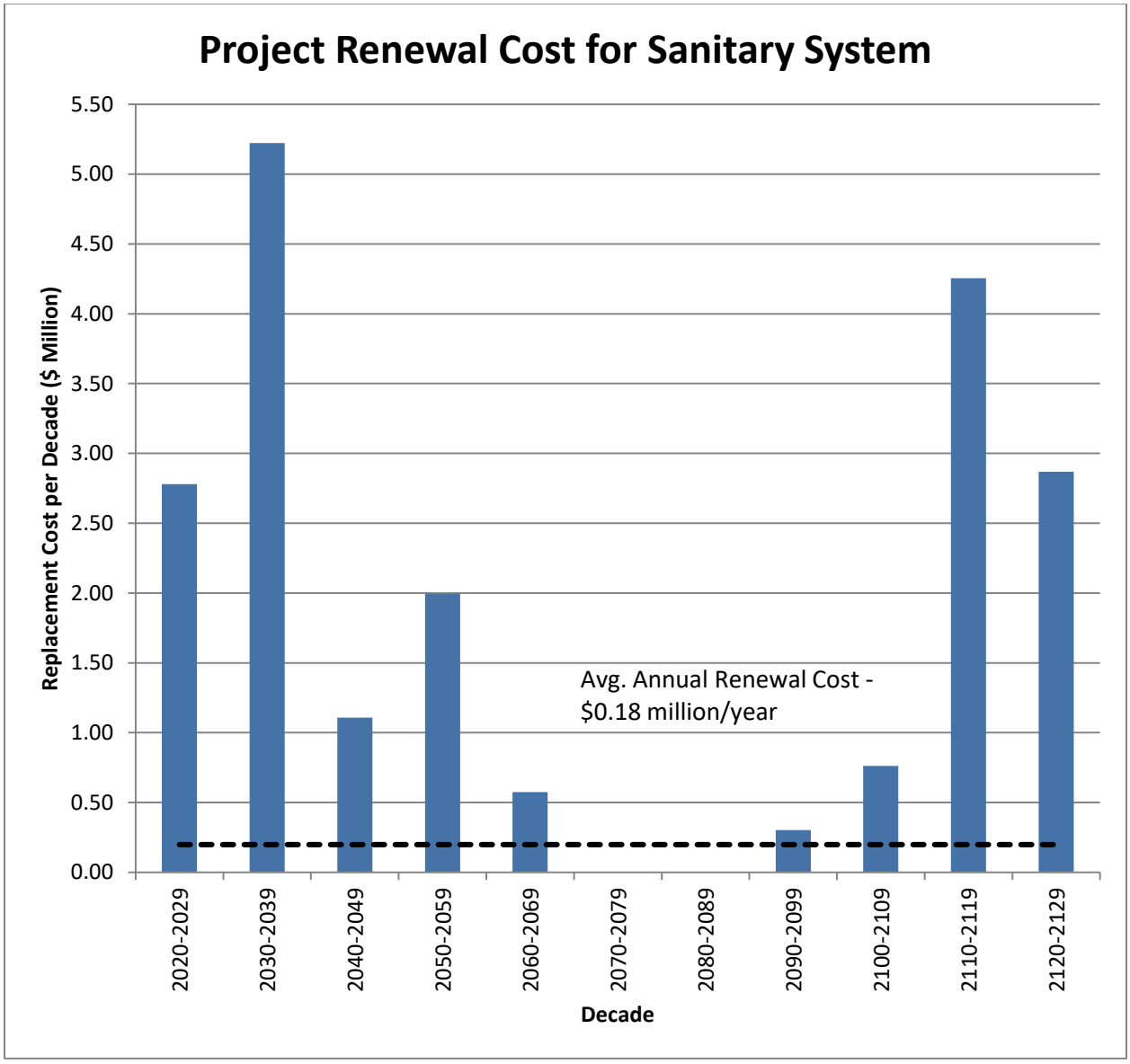

Figure 9 - Project Renewal Cost for Wastewater System

Figure 9 indicates that the next two decades will require investment in the wastewater system, with a significant amount required in latter due to the backlog of clay and transite sewers that are going to be reaching the end of their services lives. Furthermore, it is apparent from Figure 9 that replacement costs will decrease over the next 50 years until the same sewers will require replacement once again.

5.3.4 STORMWATER SYSTEM

Figure 10 illustrates the projected costs for the stormwater system over the next 100 years based on the replacement cost for the components (Table 14); the service life for the components (Table 35); and the age of the components (Table 17).

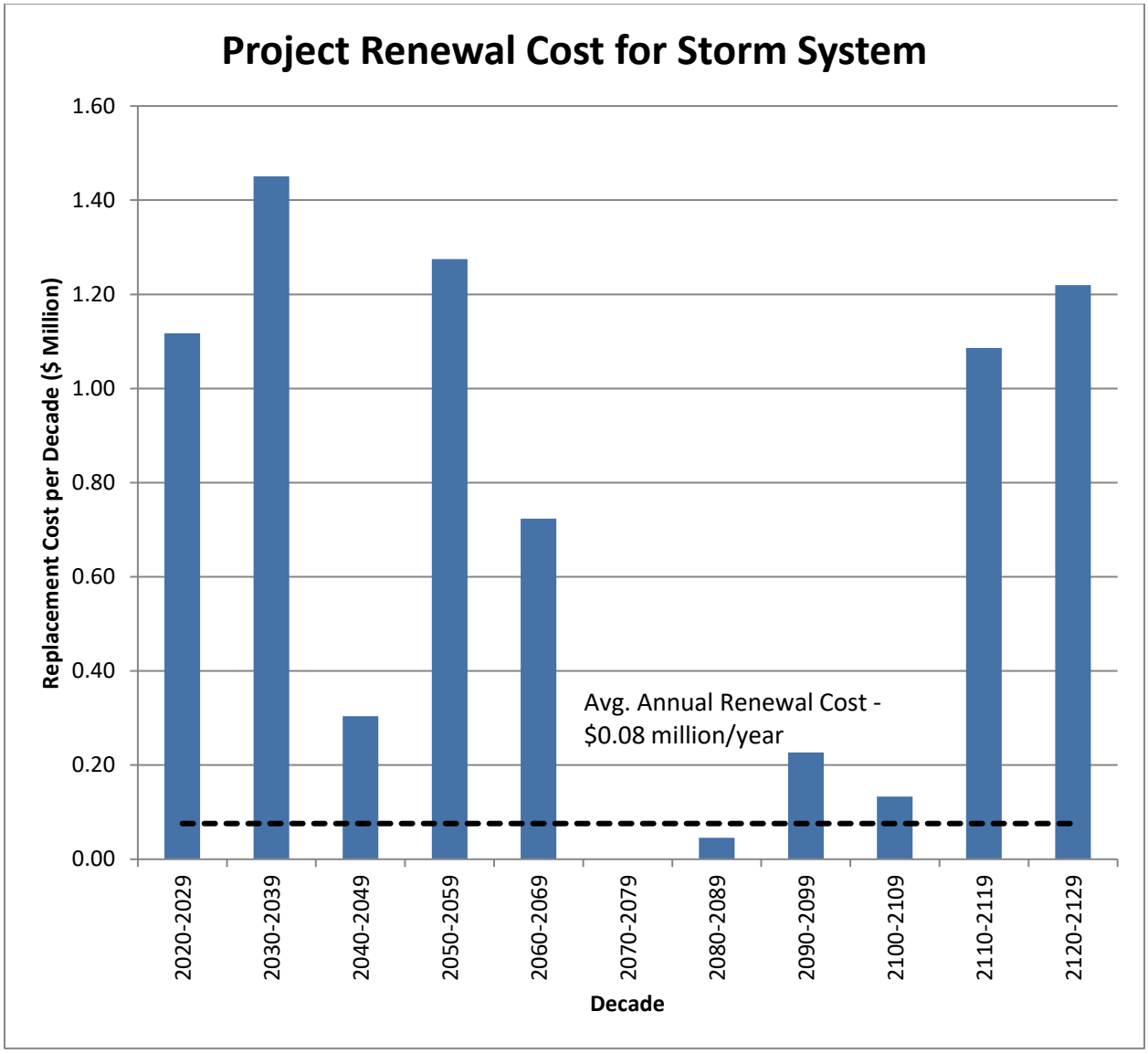

Figure 10 - Project Renewal Cost for Stormwater System

Figure 10 indicates that the next two (2) decades as well as in 40 years' time, replacement costs will require significant investment due to backlog of clay and transite sewers reaching the end of their services lives.

5.3.5 ROADS

Figure 11 illustrates the projected costs for the road network over the next 100 years based on the replacement cost for the components (Table 20); and the age and service life for the components (Table 37).

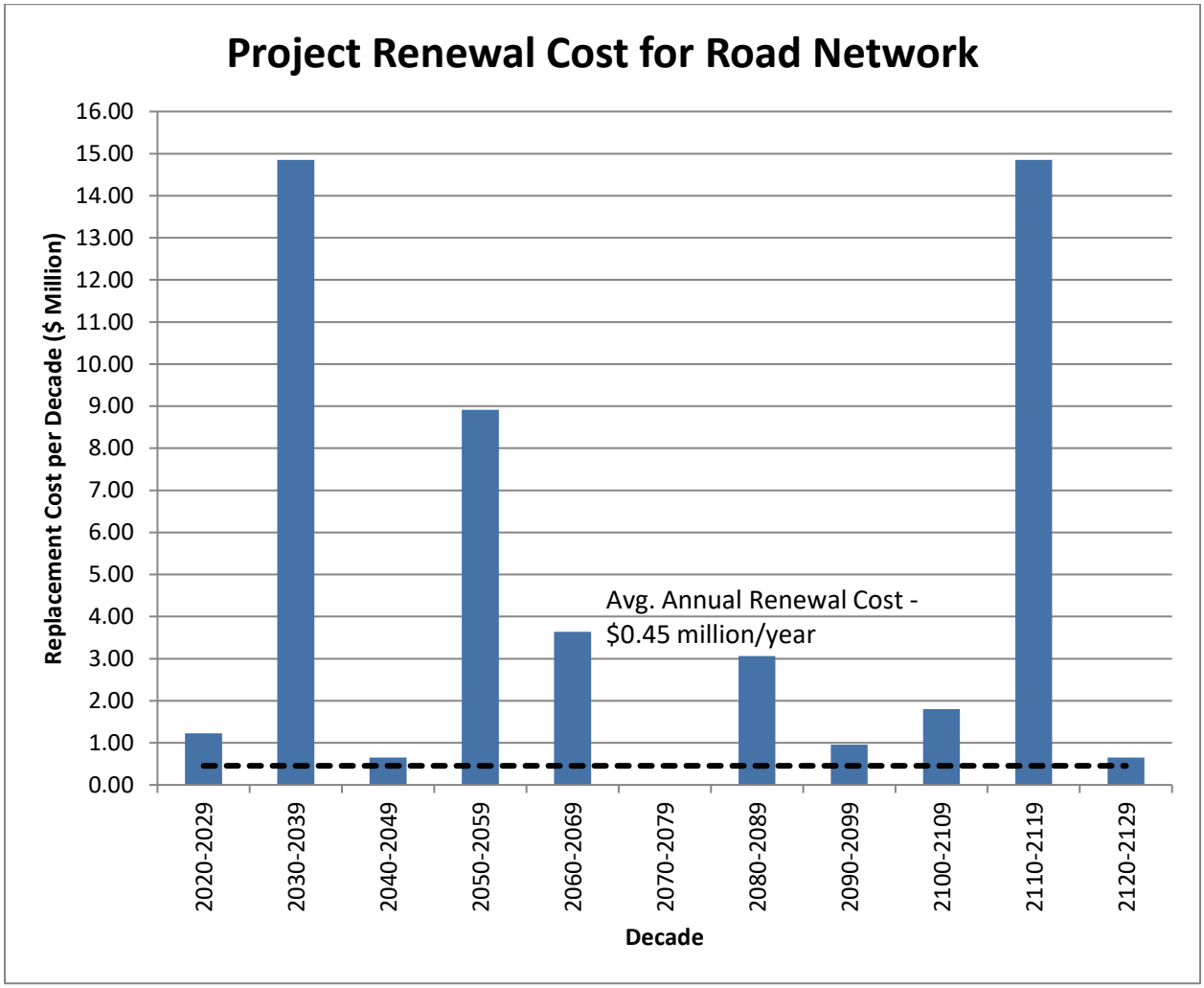

Figure 11 - Project Renewal Cost for Road Network

Figure 11 indicates that in 20-years time a significant investment in the road network will be required next decade. This is because the majority of the paved roadways were built in during the 1950's and will reach the end of their useful lives causing major deterioration of the road structure. As the expected service life of a paved roadway is approximately 80 years, this spike in investment is expected again in the decade of 2110. A lesser, but still significant investment in the road network is expected in 40-years as a portion of paved and gravel roads will be due for renewal. It should be noted that continual (annual) maintenance to gravel roads will greatly increase their service life and may possibly never require full reconstruction.

5.3.6 BUILDINGS

Figure 12 illustrates the projected costs for the municipally owned buildings over the next 100 years based on the replacement cost for the components (Table 23); and the age and service life for the components (Table 40).

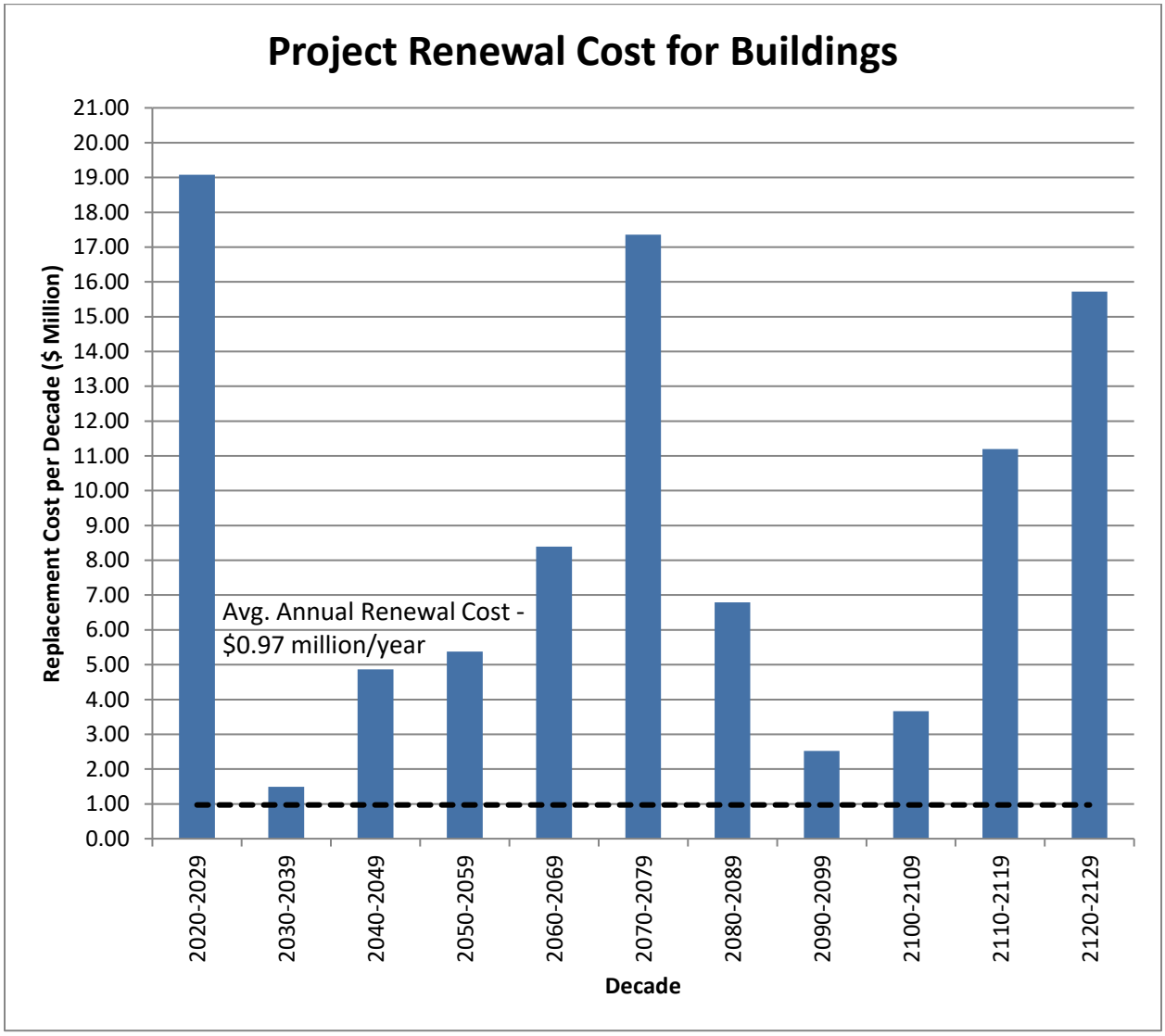

Figure 12 - Project Renewal Cost for Buildings

Figure 12 indicates that the next decade requires a significant investment in buildings. This is because the community centre is at the end of its theoretical life and is due for renewal. The community centre also has many improvements done recently. The next spike in figure 5-4 is again when the community centre will be due for renewal.

Table 40 summarizes the remaining life for building assets and when they are up for renewal. This indicates when the municipality should disburse the recommended annual investments set aside. The assets will be due for renewal, but good maintenance may significantly extend the useful life. Therefore, these remaining lives are based on the buildings reaching the end of their service life if no investments are made in the meantime.

5.3.7 OTHER ASSETS

Figure 13 illustrates the projected costs for the other municipally assets over the next 100 years based on the replacement cost for the components (Table 26); and the age and service life for the components (Table 41).

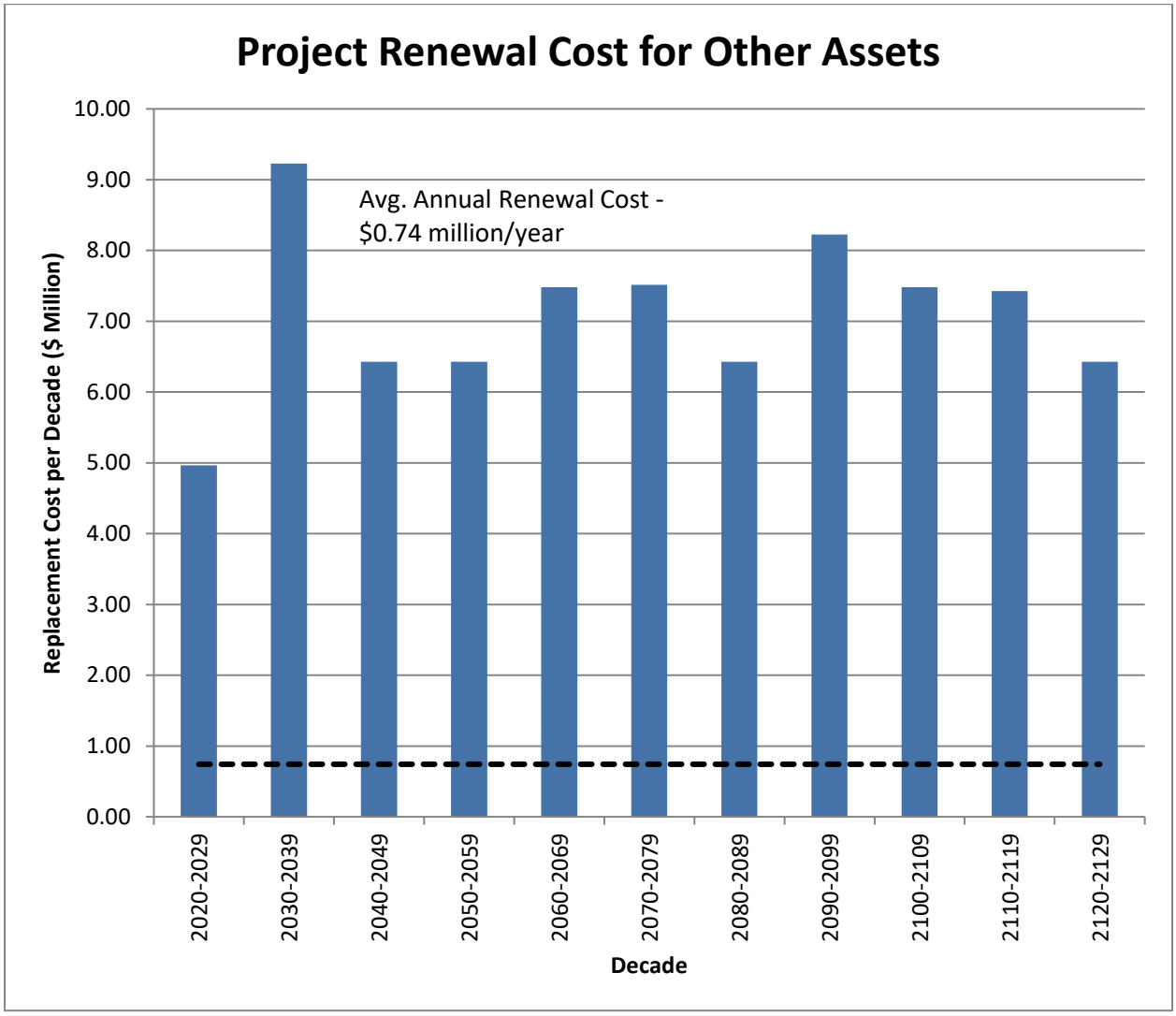

Figure 13 - Project Renewal Cost for Other Assets

Figure 13 indicates that investment in the other municipally owned assets is required every decade. A significant portion of the investment is due to the expansion of the landfill estimated to occur every decade. The replacement costs are expected to increase in the decades of the 2030's and the 2090's when the current landfill and the expanded landfill property is anticipated to reach the end of its operational capacity, respectively, and will require closure/decommissioning of the landfilled area.

Table 41 summarizes the remaining life for other assets and when they are up for renewal. This indicates when the municipality should disburse the recommended annual investments set aside. The assets will be due for renewal, but good maintenance may significantly extend the useful life. Therefore, these remaining lives are based on the other assets reaching the end of their service life if no investments are made in the meantime.

5.3.8 SUMMARY

The Town should prepare a long-term financial plan for their water, wastewater and stormwater systems and the road network to ensure the sufficient resources are available to sustain these systems and to ensure that the money that is invested is spent efficiently. Ideally, the revenues generated from water and sewer rates should be sufficient to cover the full costs of the systems. If the Town's revenue base continues to decline, the water and sewer rates will have to be further increased to generate sufficient revenues.

The recommended annual investment into buildings and other assets is kept separate so the municipality can choose where to allocate their funds strategically. The majority of the renewal costs for buildings and other assets are not critical to the functionality of the facilities but rather aesthetic recommendations.

5.4 DISPOSAL ACTIVITIES

There is no disposal activity anticipated until an asset fails or an opportunity for replacement occurs (i.e., road replacement). The assets currently generally meet the level of service expected based on asset ages.

The level of service defines the current and future operating conditions of assets using qualitative measures. The operating conditions and level of service are normally defined by the municipality, and the characteristics generally include pressure, temperature, and appearance for water distribution. For sewers, characteristics usually include flow velocity, percent blockage, deterioration, and odour control. Buildings expected level of service may include proper surface drainage, energy efficiency, noise barriers, vapour barriers, or barrier-free access.

The level of service also describes what the governing body, 'customer', or community wants, how much it will cost to achieve, and whether it is affordable. Therefore, the levels of service should be specific and measurable, and linked to the strategic objectives and outcomes of the township. Until the assets no longer meet any of the expected levels of service, disposals are not anticipated.

5.5 OVERVIEW OF RISKS

Understanding risks is important to the safety and functionality of the community as it relates to its infrastructure. Having assets perform at the expected level of service is important for the Township. If the assets have to shut down or are compromised, it becomes inconvenient for all. Below are some noted risks gathered during inspections.

Table 48 – Overview of Risks

	KEY INDICATOR	ISSUE	POTENTIAL IMPACT	CURRENT CONTROLS	ACTION PLAN
Sewer System	Condition Index ACI 0	Potential of sewer failure due to age	Sewage will contaminate the groundwater	None	Replace when possible
	CCTV Video	Potential for sewer blockage	May backup sewage into surrounding buildings and will cause property damage	Some backflow preventers installed at lateral inlets	Flush the sewer systems
Water System	Condition Index ACI 0	Potential for watermain failure	Water supply will be interrupted	None	Replace when possible. Exercise valves
	Township Staff	Lead services in water distribution system	Long-term health effects from high lead concentrations.	Corrosion Control Plan in place	Replace
Road Network	Visual Inspection	Surface Distress	May increase vehicular accidents Impede property access	Spot repairs (Pothole filling, crack sealing)	Spot repairs when appropriate Road resurfacing Road reconstruction / rehabilitation
Buildings & Other Assets	Ice build-up from roof	Blocked surface drainage/eaves	Damage to building or roof structure potentially creating leaks	None	Clear roof drains, remove ice buildup, keep snow clear from downspouts

6 FINANCING STRATEGY

A management strategy of planned actions will enable the assets to provide the desired levels of service and extend their useful lives. The values from past years were found in the CityWide Software Solutions inventory and the "Valuation Report of Tangible Capital Asset" spreadsheet created by Suncorp Valuations Ltd. provided by the Township of Terrace Bay. This forecast will help the Township prepare for expenses associated with maintenance and replacement costs. Below are Capital Plans for short-term and long-term forecasting. Some projects require immediate attention while others should be invested in annually. These annual investments were concluded from the costs of maintaining sustainable services and are independent of the townships actual budget. Also included in the Capital Plans are alternative priority projects so the municipality can choose to invest elsewhere, if desired, while still adding value to the assets.

6.1 CAPITAL PLANS

6.1.1 GENERAL

Based on the age and condition assessment of the municipal infrastructure assets, Capital Plans were developed to guide the Township's future infrastructure renewal efforts over a 5-year period and over a 25-year period. These Capital Plans establish the Township's priorities for renewal of the infrastructure systems and show the specific projects that are proposed, how much they will cost, and the timeframe for construction.

The Capital Plans were developed on the basis of the Town providing a minimum investment into infrastructure renewal efforts consistent with the levels established in this report. In other words, it is expected that the Town will set aside funds at least equal to those recommended each year for infrastructure renewal efforts. All of those funds may not necessarily be assigned to capital works in that given year but should remain in a reserve account to fund future renewal efforts as they become necessary. Therefore, the Capital Plans have been developed such that the amount of funds spent on renewal in any given 5-year period does not significantly exceed that recommended for that period. However, in many cases, the amount spent on capital improvements is less than that recommended with the expectation that the funds not expended will remain in a reserve account to finance future renewal efforts that will be required beyond the 25-year Capital Plan.

In developing the Capital Plans, a distinction was made between underground works and aboveground works. There are significant additional costs associated with the renewal of underground systems. In particular, in order to reconstruct sanitary sewers and appurtenances, watermains and appurtenances, and storm sewers and appurtenances, significant additional costs will be realized for reconstructing the roadway. These additional road reconstruction costs are included in the Capital Plans and they are over and above the minimum amount required in maintaining just the services (pipes).

The buildings and other municipal assets are incorporated into the capital plans but as alternative projects. The majority of improvement recommendations are cosmetic and do not require immediate attention from a technical perspective. Maintenance items are not considered as projects for capital planning.

6.1.2 UNDERGROUND WORKS

In developing the Capital Plans for the underground components of municipal infrastructure systems, the costs were quantified that will be necessary to support these efforts – namely road reconstruction costs. In doing so, we have assumed that the Township will elect for complete road reconstruction when replacing sewers and watermains, and other amenities. It has been assumed that roads will be constructed with complete curb and gutter systems, sidewalks on one side, and streetlight systems. This takes advantage of cost efficiencies associated with reconstructing all of the roadway components at the same time.

Also, the life expectancy of roadway components, and in particular, asphalt paving, is typically significantly less than sanitary sewers and watermains and most of these roads are in need of reconstruction when the underground works are replaced.

Based on typical construction costs in Northern Ontario, a generic road reconstruction estimate was prepared to assist in the preparation of Capital Plans. The infrastructure assets for which renewal is required, namely water distribution components, stormwater system components, and wastewater system components, were assessed separately from the road reconstruction costs in order to isolate expenditures related to renewal efforts for the water distribution systems and wastewater collection systems.

For budgeting purposes, road reconstruction costs (in 2021 dollars) in the Township of Terrace Bay are estimated as follows:

Table 49 - Road Reconstruction Estimate

ROADWAY COMPONENT	APPROXIMATE COST PER METRE	PERCENTAGE OF TOTAL
Wastewater System, including sewers, manholes, and services	$825 / m	16%
Water distribution system, including watermains, valves, hydrants & services	$995 / m	18%
Stormwater system, including storm sewers, catchbasins and manholes	$875 / m	17%
Basic Road components, including excavation and removals, granulars, curb & gutter & asphalt	$1,335 / m	25%
Additional roadway components, including sidewalk, driveway reconstruction, sod in boulevards, and streetlight system.	$1,255 / m	24%
Total	**$5,285 / m**	**100%**

The above costs represent complete reconstruction costs, including appropriate allowances for engineering and contingencies.

As can be seen in the above table, the cost for the water distribution system and wastewater collection system components (storm and sanitary) represents approximately 51% of the total road reconstruction costs. A total annual investment in road reconstruction costs of approximately $0.78 million is necessary for an annual renewal investment of approximately $0.40 million in underground water and wastewater systems. This matches the investment required for renewal as previously discussed. Considered another way, the combined cost of buried infrastructure system components is approximately $2,695 / metre. For an average annual investment for renewal of $0.40 million, this represents renewal of approximately 150 lineal metres of these systems, on average, each year at a total cost of approximately $0.78 million. Over a 5-year period, this represents, on average, reconstruction of approximately 750 lineal metres of roadway.

6.1.3 ABOVE GROUND WORKS

The Capital Plan requirements for aboveground works are more straight-forward than underground works. The replacement costs provided in this report are complete and there are no additional restoration costs involved. The average annual investment required for renewal of aboveground infrastructure components is as follows:

Table 50 – Average Annual Investment of Aboveground Works

INFRASTRUCTURE SYSTEM	AVERAGE ANNUAL INVESTMENT

Water System – Aboveground components	$0.473 Million
Wastewater System – Aboveground components	$0.032 Million
Total	$0.505 Million

Over a 25-year period, this corresponds to investments in the aboveground components of the water system of approximately $11.825 million, and the aboveground components of the wastewater system of approximately $0.8 million, for a total of $12.625 million. This amount should be either spent on capital works renewal or committed to reserve accounts for future renewal efforts beyond the 25-year period.

The development of Capital Plans for aboveground works was based on the age of the components, estimated service life, visual inspections of the components, and our knowledge of the infrastructure systems. Portions of the aboveground assets may require replacement before other parts of the facility. For example, it is generally assumed that mechanical and electrical components of such things as pumping stations and treatment plants have a limited service life of approximately 30 years, while structural components such as buildings and structural tanks have a greater service life of approximately 50 years. Therefore, renewal requirements for such facilities are separated into mechanical and electrical upgrades and structural upgrades. For the purposes of budgeting, it has been assumed that mechanical/electrical components make up approximately 20% of the total replacement cost of such facilities, while structural elements make up 80% of the total replacement cost (10% allocated to roofs if asset is roofed with a service life of approximately 20 years).

Buildings require a significant investment of $0.809 million annually. This is based on the 20% mechanical, 10% roofing, and 70% structural split of replacement costs of each facility. It is understandable some buildings take priority over others (such as the arena compared to the airport office) even though they equally require the same level of attention. It is up to the municipality to choose which recommendations are priorities.

The alternative projects outlined in the capital plans follow the total recommended investment of annual renewal budget but exclude road reconstruction costs since these should be done when an opportunity is presented (i.e. if a watermain breaks, during the emergency repair, replace accessible lead services, valves, or install isolation valves).

6.2 5-YEAR CAPITAL PLAN

The 5-year Capital Plan is presented below. The total expenditure required in renewing underground components of the Capital Plan over the 5-year period is approximately $8.6 million. This represents a total investment of approximately $4.3 million in the renewal of the underground water and wastewater infrastructure. The renewal investment during this five-year period of approximately $1.72 million annually is more than that required in an average five-year period. There are still several areas in township built in the late 1950's that will require renewal sooner than other areas (entire central and southwest portion of town). Most of these areas will require reconstruction in the next 5 to 10 years and will require a considerable investment in the underground infrastructure. However, the investment requirement beyond the 10-year period in underground works should lessen until approximately 2045 and beyond. At that time, much of the underground infrastructure constructed in the 1970's and 1980's will be due for renewal. During the intervening years, funds set aside for underground renewal efforts should be utilized to pay off any debt acquired to finance the works in the first 10 years and once that is done, held in a reserve fund for future requirements.

The 5-year Capital Plan must be flexible and should be reviewed and updated annually. If outside funding is available, it is recommended that the town accelerate renewal efforts in the first 5 years to address known problem areas.

Table 51 - 5 Year Capital Plan (2022 - 2026)

PROJECT DESCRIPTION	2022	2023	2024	2025	2026
Underground/Road Works					
1 Hudson Drive - Radisson to Hwy 17 (922m - Type 2)	$4,872,770.00				
2 Lakeview Drive - Elizabeth to 700m Westerly (700m - Type 2)				$3,699,500.00	
Alternative Projects (applies to 25yr plan also)					
1 Sedimentary Tanks Replacement (4)	$2,000,000.00				
2 Community Center Repairs	$5,000,000.00				
3 Valve Replacements (when opportunity present @ $3,000 ea.)					
4 Isolation Valves (when opportunity present @ $3,000 ea.)					
5 CCTV Inspections (entire system ~ 21.4 km @ $20 per m)	$428,000.00				
Totals	**$4,872,770.00**	**$0.00**	**$0.00**	**$3,699,500.00**	**$0.00**

All costs are in “2021” Dollars
Type 1 – No underground services
Type 2 - Full underground services (water, sanitary, storm)
Type 3 - Partial underground services (water, sanitary)
Type 4 - Partial underground services (water only)
Alternative Projects not included in totals.

6.3 25-YEAR CAPITAL PLAN

The 25-year Capital Plan is also presented below. The total expenditure required in renewing underground components of the Capital Plan over the 25-year period is approximately $21.8 million. This represents a total investment of $11.1 million in the renewal of the underground water and wastewater infrastructure (sanitary and storm).

The 25-year Capital Plan should be reviewed and updated at least every 5 years.

Table 52 - 25 Year Capital Plan (2022 - 2046)

PROJECT DESCRIPTION	2022 – 2026	2027 – 2031	2032 – 2036	2037 – 2041	2042 – 2046
Underground/Road Works					
1 Hudson Drive - Radisson to Hwy 17 (922m - Type 2)	$4,872,770.00				
2 Lakeview Drive - Elizabeth to 700m Westerly (700m - Type 2)	$3,699,500.00				
3 Princess - Superior to Fort Garry (261m - Type 3)		$1,151,010.00			
4 Fort Garry - Superior to Hwy 17 (293m - Type 2)		$1,548,505.00			
5 Elizabeth - Fort Garry to Lakeview (338m - Type 3)			$1,490,580.00		
6 Superior Avenue - Princess to Outfall (494m - Type 2)			$2,610,790.00		
7 Kenogami Road - Outfall to Beach Road (275m - Type 3)				$1,212,750.00	
8 Selkirk Avenue - Hudson to Hwy 17 (350m - Type 2)				$1,849,750.00	
9 Selkirk Avenue - Hudson to Hudson (300m - Type 2)				$1,585,500.00	
10 Laurier Avenue - Selkirk to Selkirk (330m - Type 2)					$1,744,050.00
11 **Alternative projects - See 5yr plan**					
Totals	**$8,572,270.00**	**$2,699,515.00**	**$4,101,370.00**	**$4,648,000.00**	**$1,744,050.00**

All costs are in "2021" Dollars
Type 1 – No underground services
Type 2 - Full underground services (water, sanitary, storm)
Type 3 - Partial underground services (water, sanitary)
Type 4 - Partial underground services (water only)
Alternative Projects not included in totals.

7 ACCOUNTABILITY AND FEEDBACK

7.1 PERFORMANCE MEASURES

WSP recommends that the Township receives condition index values at every detailed inspection based on physical characteristics and performance. This will be an excellent and easy way to monitor the conditions of the assets over the years and forecast replacement when necessary.

It is also recommended that inspections include recommended work; categorized by 1 year, 1 – 5 years, and within 25 years. If the available funds are not sufficient, then strategic decisions must be made in an effort to maintain the required level of service within the municipality. The work must be prioritized by considering the Township's goals and level of service expectations.

7.2 PLAN UPDATES

This plan will cover the period from 2021 to 2026 with diminishing returns. The financial needs should be updated when regular inspections are completed and when conditions are re-assessed. It is highly recommended to perform inspections during the spring and summer months for a better representation of the actual conditions.

It is recommended that every asset be inspected either when exposed or by CCTV. Then true representations of the underground assets physical condition can be used in the index methodology rather than an age-based approach with assumptions.

It is also recommended that the Township complete, or retain the necessary services to complete, an in-depth inventory of their road network condition to obtain accurate PCI values. The methods of obtaining PCI values are as per ASTM D6433: Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys (Appendix H).

When a better condition rating system becomes applicable, it is recommended that the condition indices (whichever method is chosen) be entered into this plan and CityWide which will take the place of the ACI. Also, this will affect the current value and remaining useful life of the assets which should be updated. The condition index of a new perfect asset is 100. The methodologies used for condition indices, current values, and remaining useful lives are:

$$ACI = 1 - \frac{Age}{Design\ Life}$$

$$FCI = 1 - \frac{Immediate\ requirements}{Replacement\ Cost}$$

$$Current\ Value = Estimated\ Installation\ Cost - [Yearly\ Depreciation * (Current\ Year - Year\ Installed)]$$

$$Remaining\ Useful\ Life = \frac{ACI}{100} \times Design\ Life$$

8 LIMITATIONS

The information contained in this report represents the professional opinion of WSP Canada Inc. (the Consultant) and their best judgment under the natural limitations imposed by the Scope of Work.

This report is intended solely for the Client named as an indication of the physical condition of the building components addressed in the report. The material in this report reflects the Consultant's best judgment in light of the information available to it at the time of preparation.

Any use a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. The Consultant accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report is limited in scope to only those components that are specifically referenced in this investigation. There may be existing deficiencies in this building that we did not record in this report. Such deficiencies were not apparent to us due to the limitations imposed by the scope of work. We can, therefore, accept no liability for any costs incurred by the Client for subsequent discovery, manifestation or rectification of such deficiencies.

Any costs for repair in this report are the Consultant's opinions of probable construction costs and quantities. These estimates do not include any unforeseen conditions that may require repair at the time the repair work is being completed. Any cost estimates provided are subject to confirmation or adjustment at the time competitive bids are obtained from contractors who specialize in the various items of repair work required. The Consultant makes no representation or warranty expressed or implied as to the reliability of these cost estimates.

Do not use any part of this report as a separate entity. The report has been written to be read in its entirety and for the exclusive use of the Client named.

All files, notes, source data, test results and master files are retained in the offices of WSP Canada Inc. and remain the property of the Consultant.

9 CONCLUSIONS

Asset management is one of the most cost-effective ways to balance the preservation, upgrade, renewal, and replacement of assets. The implementation of the plan will provide guidance for the Corporation of the Township of Terrace Bay to meet the assets' expected level of service and renew the infrastructure over time.

WSP encourages the Corporation of the Township of Terrace to continue using asset management software for long-term infrastructure planning, capital program development, and performance accountability. Being aware of the conditions and the total costs will improve the Township's ability to select options for operations, maintenance, renewal and replacement of municipally owned assets.

The investigation undertaken by WSP with respect to this plan and any recommendations made in this plan reflect WSP's professional opinion based on the sites' conditions observed at the time of the inspections and on information available at the time of preparation of this plan. Extrapolation of visual detail data was necessary where there was no access.

APPENDIX

A ASSET INVENTORIES AND ANALYSIS SPREADSHEETS

APPENDIX

B DRAWINGS

APPENDIX

C CCTV PHOTOS

APPENDIX

D INSPECTION SHEETS

APPENDIX

E LEVEL OF SERVICE EXAMPLES

Township of Terrace Bay

Levels of Service Framework

Including Core and Non-Core Assets

3 June 2025

Annex to the Asset Management Plan

Notice

This report has been prepared by KPMG LLP ("KPMG") for the internal use of the Township of Terrace Bay pursuant to the terms of our engagement agreement with the Municipal Finance Officers' Association (MFOA) ("Client") dated June 14, 2022 (the "Engagement Agreement"). This report is being provided to Client on a confidential basis and may not be disclosed to any other person or entity without the express written consent of KPMG and Client. KPMG neither warrants nor represents that the information contained in this report is accurate, complete, sufficient or appropriate for use by any person or entity other than Client or for any purpose other than set out in the Engagement Agreement.

This document may not be relied upon by any person or entity other than Client, and KPMG hereby expressly disclaims any and all responsibility or liability to any person or entity other than Client in connection with their use of this report. Furthermore, the analysis contained in this report relies on information provided by Client without audit, validation or other verification on KPMG's part. As such readers are cautioned that this analysis should not be relied upon for any other purposes other than those contemplated in the Engagement Agreement.

The procedures performed do not constitute an audit, examination or review in accordance with standards established by the Chartered Professional Accountants of Canada, and we have not otherwise verified the information we obtained or presented in this document. We express no opinion or any form of assurance on the information presented in this document and make no representations concerning its accuracy or completeness.

KPMG's scope was limited to review, analysis and observations only, and the procedures performed were limited in nature and extent. Our procedures consisted of inquiry, observation, comparison, and analysis of Client-provided information available as of the date of this document. KPMG has relied on the Client for the completeness, accuracy, appropriateness, and reliability of the information provided. The Client is responsible for the use of this information and decisions to implement any options or observations and for considering their impact.

Table of Contents

Introduction

A Levels of Service (LOS) Framework is a critical input into any Municipal Asset Management Plan. It is a structured approach that helps a municipality define, measure, and manage the quality of services they provide to their community. The framework is designed to help align service offerings with the community's needs, expectations, and willingness to pay.

The LOS Framework supports key objectives, which can be adopted progressively over time. The goal is to provide a view into the current service levels offered by the municipality's capital assets. This includes attributes such as the quality, capacity, reliability, and responsiveness of the services these assets support. The LOS Framework serves as a tool and key input for to inform decisions within the AMP. It helps to prioritize resources and investments, to manage risks, and to support the sustainability of their services. By aligning the services with the community's needs and expectations, the LOS Framework also contributes to improving the quality of life in the community.

From a regulatory perspective, O-Reg 588/17 stipulates that:

- Before July 1, 2025, Terrace Bay has the option to propose LOS that are different than current. Note that for compliance with 2025 requirements, if the municipality proposes different LOS before July 2025, it must then also identify the activities required and funding strategy to bridge disparities between the current and proposed LOS.
- Terrace Bay must also explain why proposed LOS are appropriate for the municipality. This includes addressing their achievability, affordability, the options for the proposed LOS and risks associated with those options, and how the proposed LOS differ from current LOS.
- If the municipality determines that its proposed LOS are the same as current LOS, this must be clearly indicated in the AMP (for example, through the addition of a new column in the LOS tables indicating the proposed LOS is the same as current LOS). The municipality must still explain why these LOS are appropriate.

Document Overview

This document was developed to support municipalities in the following to support alignment with O-Reg 588/17:

- **Section 1:** Provides an overview of the 2025 O-Reg Requirements and associated references for where the information can be found in this document.
- **Section 2:** Provides a framework to identify the gaps between the current and proposed (desired) levels of service, and supporting strategies (i.e., lifecycle activities and costs) to address these gaps. This informs decisions about investments, operations, maintenance, and renewal of municipal assets in the AMP.
- **Appendix:** Provides a fulsome listing of all LOS, indicating where proposed LOS are the same as current.

Section 1: Overview of 2025 O-Reg Requirements

The table below identifies the requirements under Section 6 of O-Reg 588/17, "Asset management plans, proposed levels of service" to be met by July 1, 2025 in the lefthand-side column. Next to each requirement is the section reference and/or any necessary commentary.

Table 1: 2025 O-Reg 288/17 Requirements

O-Reg 588/17 Requirements from Section 6	Reference and Commentary
1. For each asset category, the levels of service that the municipality proposes to provide for each of the 10 years following the year in which all information required under section 5 and this section is included in the asset management plan, determined in accordance with the following qualitative descriptions and technical metrics: i. With respect to core municipal infrastructure assets, the qualitative descriptions set out in Column 2 and the technical metrics set out in Column 3 of Table 1, 2, 3, 4 or 5, as the case may be. ii. With respect to all other municipal infrastructure assets, the qualitative descriptions and technical metrics established by the municipality.	See Appendix for a fulsome listing of all community (qualitative) and technical (quantitative) LOS for all core and non-core assets. It is assumed that the levels of service that the municipality proposes to provide going forward will be the same for each of the 10 years following 2025.
2. An explanation of why the proposed levels of service under paragraph 1 are appropriate for the municipality, based on an assessment of the following: i. The options for the proposed levels of service and the risks associated with those options to the long term sustainability of the municipality. ii. How the proposed levels of service differ from the current levels of service set out under paragraph 1 of subsection 5 (2). iii. Whether the proposed levels of service are achievable.	i. In identifying proposed LOS different from current LOS, Terrace Bay has taken a risk-oriented approach, focusing on LOS that have been identified to require improvements due to less than desired performance. Having identified the LOS that required changes relative to the current LOS, Terrace Bay took a risk-based approach, proposing LOS that balanced the long-term financial sustainability of the municipality with the service levels required to meet community needs. Lifecycle activities for proposed LOS were also considered in tandem to form a full picture of risk associated with the proposed level of service. ii. See Appendix for a fulsome listing of LOS, including whether the proposed LOS differ from current.

iv. The municipality's ability to afford the proposed levels of service.	iii. As noted in (i), Terrace Bay has taken a risk-based approach to identify proposed levels of service that are achievable from financial and practical standpoints and which meet the needs of the community. These are largely risk-based and do not constitute large increases in service levels, but rather focus on maintaining the status quo or reducing the number of adverse incidents (e.g., boil water advisories). Overall, given that Terrace Bay maintained their LOS from their 2021 AMP to current and the changes proposed are incremental, the collective LOS targets are achievable. iv. Due to the aforementioned risk-based approach, Terrace Bay only identified proposed levels of service where service improvements are required to meet community needs. These improvements have already been incorporated into municipal budgets and are underway.
3. The proposed performance of each asset category for each year of the 10-year period referred to in paragraph 1, determined in accordance with the performance measures established by the municipality, such as those that would measure energy usage and operating efficiency.	See column "Target Performance" in Section 2 and/or the Appendix.
4. A lifecycle management and financial strategy that sets out the following information with respect to the assets in each asset category for the 10-year period referred to in paragraph 1: i. An identification of the lifecycle activities that would need to be undertaken to provide the proposed levels of service described in paragraph 1, based on an assessment of the following: A. The full lifecycle of the assets. B. The options for which lifecycle activities could potentially be undertaken to achieve the proposed levels of service. C. The risks associated with the options referred to in sub-subparagraph B. D. The lifecycle activities referred to in sub-subparagraph B that can be undertaken for the lowest cost to achieve the proposed levels of service. ii. An estimate of the annual costs for each of the 10 years of undertaking the lifecycle activities identified in subparagraph i, separated into capital expenditures and significant operating costs.	i. See column "Lifecycle Activity" in the tables below for a description of the identified lifecycle activities required to reach proposed LOS from current LOS. While the selected lifecycle activities are summarized, a thorough assessment was conducted by the municipality to gather options for lifecycle activities and identify the one that best balanced the assets' ability to provide consistent service quality and the required level over the long-term with the costs and practical requirements associated with each option. ii. The cost estimates associated with the lifecycle activities identified is noted in Column "Costing" in the table below. Note that these are the costs are primarily capital costs for the entire project **over the 10 years** and the municipality has already determined how to allocate these costs over time in its financial planning. Significant operational costs once these lifecycle activities are at a steady-state will be determined and updated. Additionally, note that these are cost estimates and are the best available knowledge the municipality currently has. iii. These costs were determined by the municipality to be required and therefore have already been incorporated in its municipal planning.

iii. An identification of the annual funding projected to be available to undertake lifecycle activities and an explanation of the options examined by the municipality to maximize the funding projected to be available. iv. If, based on the funding projected to be available, the municipality identifies a funding shortfall for the lifecycle activities identified in subparagraph i, A. an identification of the lifecycle activities, whether set out in subparagraph i or otherwise, that the municipality will undertake, and B. if applicable, an explanation of how the municipality will manage the risks associated with not undertaking any of the lifecycle activities identified in subparagraph i.	Between the municipal budget and the grants the municipality has accessed, no shortfalls are expected. iv. See (iii) above.
5. For municipalities with a population of less than 25,000, as reported by Statistics Canada in the most recent official census, a discussion of how the assumptions regarding future changes in population and economic activity, set out in subparagraph 5 i of subsection 5 (2), informed the preparation of the lifecycle management and financial strategy referred to in paragraph 4 of this subsection.	Population growth in Terrace Bay from 2016 to 2021 was about 5%, from 1,523 to 1,606. This translates to an average annual population increase of 1%. Given the relatively limited population changes expected, the municipality is operating with the objective of maintaining service levels and has not factored in large population growth into its asset management planning.

Section 2: Proposed LOS where proposed LOS differ from Current LOS

As per 6(2)ii above, for some LOS Terrace Bay is opting to propose new levels of service that differ from their current levels of service. These proposed levels of service are noted in Table 2 below. For each proposed level of service, the following data points are provided:

- **Asset class:** Identification of whether the asset is core or non-core, as well as the asset class (e.g., water assets, road assets, etc.)
- **Service Attribute:** Identification of service attribute (as provided by O-Reg 588/17). These typically include scope and performance but can include other attributes as well.
- **Type of LOS:** Identification of whether the LOS is a community (qualitative) LOS or a technical (quantitative) LOS. If that specific LOS is required by O-Reg 588/17, it is indicated as such with an asterisk.

- **LOS:** LOS as noted in the 2021 AMP.
- **2021 AMP Performance:** The performance of the municipality against the LOS as noted in its 2021 AMP.
- **Current Performance:** The performance of that municipality against the LOS as of June 2025.
- **Target Performance:** The proposed LOS identified by the municipality in 2025.
- **Lifecycle Activity:** The lifecycle activities the municipality has so far identified as required to reach the proposed LOS.
- **Costing:** The **total cost** of the lifecycle activities the municipality has so far identified. Note that these are the total costs of the project and are not split out into an annual basis.

Table 2: Proposed LOS and associated lifecycle activities and costing

Asset Class	Service Attribute	Type of LOS	LOS	2021 AMP Performance	Current Performance	Target Performance	Lifecycle Activity	Costing
Core Asset – Water Assets	Reliability	Qualitative*	Description of boil water advisories and service interruptions.	Maintenance and rehabilitation of the water systems can lead to temporary disruptions. The length of the interruption would depend on the nature of the maintenance or rehabilitation. Water main breaks may require several blocks to be turned off during the time of repair, approximately 4-8 hours, and sufficient notice is provided to all directly affected. Water hydrant flushing will cause pressure drop in areas and could lead to colour changes in the water. Valve exercising program can lead to short	Approximately 2 boil water advisories per year, system-wide, due to electrical issues at the water treatment plant.	Limiting to 1 boil water advisory per year.	Repairs completed to reach the target included new electrical equipment to improve reliability.	$300,000 (total for 10 years)

				events of low flow or no flow lasting 1-3 minutes.				
Core Asset – Water Assets	Reliability	Quantitative*	The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system.	0	0.01 Two boil water advisories at 4 days each, system-wide (resulting in 8 connection-days). The number of homes connected to the municipal water system is 786.	0.05 Limiting to 1 boil water advisory per year (assumed to be four days in duration). Repairs have been completed to reach this target.	Repairs completed to reach the target included new electrical equipment to improve reliability.	$300,000 (same as $300,000 above)
Non-core assets – Buildings	Quality	Quantitative	% of buildings which have undergone significant upgrades/repairs within the last 40 years (1980 or later).	30%- 40%	40-50%	50-60%, new cultural centre and tourist information centre roofs to be replaced, tender awarded.	Roof replacement	$1,100,000 (total for 1 year)
Non-core assets – Buildings	Safety	Quantitative	Number of inspections performed by provincial authorities where issues have arisen.	To be recorded going forward.	1	0	Increased guarding requested and has been rectified.	Immaterial cost; completed by municipality.

Non-core assets – Buildings	Emergency Response	Qualitative	A statement on the buildings and locations which support emergency services or are available to perform emergency functions.	To be recorded going forward.	WTP has emergency power system, cultural centre has emergency generator purchased and in the process of having installed.	Complete installation of CC emergency generator and list it as emergency operations centre.	Installation of emergency generator.	$100,000 (total for 2 years)
Non-core assets – Buildings	Emergency Response	Quantitative	Number of emergency repairs required on buildings per year.	To be recorded moving forward.	1	0	Undergoing building condition report to identify at or near failure items, roof report received and issues are being addressed Review and reporting of required improvements.	$36,000 (total for (1 year)
Solid Waste and Landfill/Waste Management	Capacity	Quantitative	Estimated remaining capacity in landfill cells.	Not reported.	Estimated 12 years remaining in 2024.	Estimated 50 years remaining.	Conducting an expansion study including an environmental assessment, design, permitting, and construction.	$1,500,000-$3,000,000 (development phase with duration 2years)

							Note that the expansion's expected completion is 2032.	

APPENDIX

As per 6(1) above, Terrace Bay has set LOS across its asset classes, including both those required by O-Reg 588/17 and its own. These LOS are not expected to change (i.e., the target performance is the same as current performance). They are provided for reference only.

For each proposed level of service, the following data points provided:

- **Service Attribute:** Identification of service attribute (as provided by O-Reg 588/17). These typically include scope and performance but can include other attributes as well.
- **Type of LOS:** Identification of whether the LOS is a community (qualitative) LOS or a technical (quantitative) LOS. If that specific LOS is required by O-Reg 588/17, it is indicated as such with an asterisk. Note that the O-Reg 588/17 only has required LOS for core assets – all LOS for non-core assets were determined by the municipality.
- **LOS:** LOS as noted in the 2021 AMP.
- **2021 AMP Performance:** The performance of the municipality against the LOS as noted in its 2021 AMP.
- **Current performance:** The performance of that municipality against the LOS as of June 2025. Note that in some instances, current performance differs from 2021 AMP performance. In these instances, while performance has changed, the municipality has opted not to change its target performance level.

Notes

- There is no column for Target Performance. This is because the municipality has determined that the current performance is satisfactory and has not proposed changes. For LOS where the municipality has proposed LOS that differ from current LOS, there is a placeholder indicating as such and noting that these are described in Table 2.
- LOS are separated into core assets and non-core assets, and then further split out into asset classes. Each asset class has its own table.
- This municipality does not have any bridge or culvert assets, hence associated LOS are not provided.

Core Asset LOS

Table A1: Water Assets

Service Attribute	Type of LOS	LOS	2021 AMP Performance	Current Performance
Scope	Qualitative*	Description of the user groups or areas of the municipality that are connected to the municipal water system.	Provided in Appendix B of 2021 AMP Report.	No change since 2021.
		Description of the user groups or areas of the municipality that have fire flow.	Provided in Appendix B of 2021 AMP Report.	No change since 2021.
	Quantitative*	Percentage of properties connected to the municipal water system.	100%	All properties in Hydro Bay have their own water system. Estimate 99% connected.
		Percentage of properties where fire flow is available.	100%	Fire flow covers the entire community except Hydro Bay. Estimate 99% coverage.
Reliability	Those related to boil water advisories are noted on Table 2 as proposed LOS differ from current LOS.			
	Quantitative*	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.	0.00231 (2 or 3 instances of low flow or no flow due to water main breaks per year)	0.0014 1-2 instances due to water main breaks.
Performance	Quantitative	% of customers where service is interrupted above target frequency	0%	No change since 2021.

Table A2: Wastewater Assets

Service Attribute	Type of LOS	LOS	2021 AMP Performance	Current Performance
Scope	Qualitative*	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system.	Provided in Appendix B of 2021 AMP Report.	No change since 2021.
	Quantitative*	Percentage of properties connected to the municipal wastewater system.	100%	Estimate 93%. Hydro Bay and industrial area properties have on-site treatment.
Reliability	Qualitative*	Description of how combined sewers in the municipal wastewater system are	No combined sewers.	No change since 2021.

		designed with overflow structures in place which allow overflow during storm events to prevent backups into homes.		
		Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches.	No combined sewers.	No change since 2021.
		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 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 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.	No backflow issues due to storm overflow.
		Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described in paragraph 3.	The municipality 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.	No change since 2021.

	Qualitative*	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 lagoon, and may include suspended solids, total phosphorous and biological oxygen demand. The Environmental Compliance Approval (ECA) identifies the effluent criteria for municipal wastewater treatment lagoons.	No change since 2021.
	Quantitative*	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.	0	No change since 2021.
		The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system.	0	No change since 2021.
		The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.	0	No change since 2021.
Performance	Quantitative	The number of customers that experience a service interruption due to main blockages.	0	No change since 2021.

Table A3: Stormwater Assets

Service Attribute	Type of LOS	LOS	2021 AMP Performance	Current Performance
Scope	Qualitative*	Description, which may include maps, of the user groups or areas of the municipality that are protected from	Provided in Appendix B of 2021 AMP Report.	No change since 2021.

		flooding, including the extent of the protection provided by the municipal stormwater management system.		
	Quantitative*	Percentage of properties in municipality resilient to a 100-year storm.	Unknown – insufficient data available.	No change since 2021.
		Percentage of the municipal stormwater management system resilient to a 5-year storm.	100%	No change since 2021..
Performance	Quantitative	The number of locations in the Township regularly experiencing flooding during wet weather events.	3	No change since 2021.

Table A4: Road Assets

Service Attribute	Type of LOS	LOS	2021 AMP Performance	Current Performance
Scope	Qualitative*	Description, which may include maps, of the road network in the municipality and its level of connectivity.	Provided in Appendix B of 2021 AMP Report.	No change since 2021.
	Quantitative*	Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality.	Arterial Roads (MMS classes 1 and 2) – 0 Collector Roads (MMS classes 3 and 4) – 0 Local Roads (MMS classes 5 and 6) - 12.7	No change since 2021.
Quality	Qualitative*	Description or images that illustrate the different levels of road class pavement condition.	A visual inspection of all roads was completed to determine a Pavement Condition Index (PCI). The PCI is a 0-100 rating that ranges from 0 (Fail) to 100 (Good). Photos of existing road conditions are appended to this plan.	No change since 2021.
	Quantitative*	For paved roads in the municipality, the average pavement condition index value.	65 – Fair	No change since 2021.

		For unpaved roads in the municipality, the average surface condition (e.g. excellent, good, fair or poor).	Good	No change since 2021.
Performance	Quantitative	Streetlight bulb outages left unreplaced for a period exceeding seven (7) days*.	2	No change since 2021.
		The number of complaints about road condition issues per year.	12	No change since 2021.

Non-Core Asset LOS

Table A5: Buildings

Service Attribute	Type of LOS	LOS	2021 AMP Performance	Current Performance
Safety	Qualitative	Description of building/facility inspection processes.	Health and safety inspections monthly, emergency lighting and fire suppression system yearly.	Health and safety inspections monthly, emergency lighting and fire suppression system yearly.
	Quantitative	Number of incidents reported.	0	10
		% of buildings compliant to accessibility compliant[1].	92%	100% compliance, new doors have been installed
		Number of complaints received regarding state of buildings.	Not assessed in 2021.	0
		Number of service requests to manage unsafe building conditions per year.	Not assessed in 2021.	0
	Those related to provincial inspections are noted on Table 2 as proposed LOS differ from current LOS.			
Quality	Those related to upgrades are noted on Table 2 as proposed LOS differ from current LOS.			
	Quantitative	Number of unplanned closures / use restrictions per year.	Not assessed in 2021.	0
Accessibility	Qualitative	Description of accessibility measures in place.	Not assessed in 2021.	Ramped doorways and door operators.
	Quantitative	Number and % of public buildings that are AODA complaint. List of recent or planned projects to improve accessibility.	Not assessed in 2021.	100%
Sustainability	Qualitative	Description of implemented sustainability measures (i.e., energy efficiency and emission reduction measures).	Not assessed in 2021.	GHG reduction study underway.
Emergency Response	Those related to emergency response are noted on Table 2 as proposed LOS differ from current LOS.			

[1] Excludes the decommissioned Sewage Treatment building.

Table A6: Vehicles

Service Attribute	Type of LOS	LOS	2021 AMP Performance	Current Performance
Reliability	Qualitative	Description of vehicle safety inspections.	As per vehicle/machine owner's manual recommendations or every 6,000 km. See Appendix F of the 2021 AMP Report. All fleet asset inspections are completed in compliance with all applicable MTO requirements.	Maintenance is completed as planned for all vehicles in the fleet.
	Quantitative	% of preventative maintenance inspections completed.	Not assessed in 2021.	Estimate 100% based on regular services.
Sustainability	Qualitative	Description of implemented sustainability measures (i.e., emission reduction measures, alternative fuels, etc.).	None in 2012.	Recently purchased new hybrid community transport vehicle and awaiting delivery on electric ice re-surfacer.

Table A7: Community Recreation and Other

Service Attribute	Type of LOS	LOS	2021 AMP Performance	Current Performance
Quality	Quantitative	% of customers who are unsatisfied with overall experience.	0	No change since 2021.
	Quantitative	% of assets inspected at least annually.	Not assessed in 2021.	50%

Table A8: Solid Waste and Landfill

Service Attribute	Type of LOS	LOS	2021 AMP Performance	Current Performance
Condition	Qualitative	Description of site condition: - Waste segregation - Overall cleanliness - Controlled access to site - Site attendant present during hours of operation	Excellent	No change since 2021.

Scope	Qualitative	Description of solid waste management services.	Not assessed in 2021.	Weekly curbside, depot deposit 5 days per week in Summer, 4 days per week winter.
	Quantitative	Frequency of waste collection.	Weekly, plus monthly recycling collection.	No change since 2021.
Capacity	Qualitative	Description of landfill opening hours.	5 days per week in Summer, 4 days per week winter, 4 hours per day.	No change since 2021.
	Those related to increasing the capacity are noted on Table 2 as proposed LOS differ from current LOS.			
Safety	Quantitative	Number of reported safety incidents.	0	No change since 2021.
Sustainability	Quantitative	% of facilities operating within ECA requirements.	100%	No change since 2021.

APPENDIX

F ROAD INSPECTION PHOTOS

APPENDIX

G PREVENTATIVE MAINTENANCE LOGS

APPENDIX

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