

Municipality of Brooke-Alvinston Asset Management Plan for Water and Wastewater Systems

SUBMITTED BY

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Executive Summary

Water and Wastewater Facility Asset Portfolio

The scope of this Asset Management Plan (AMP) includes all water and wastewater assets. The infrastructure portfolio has an estimated replacement value of approximately \$46 million.

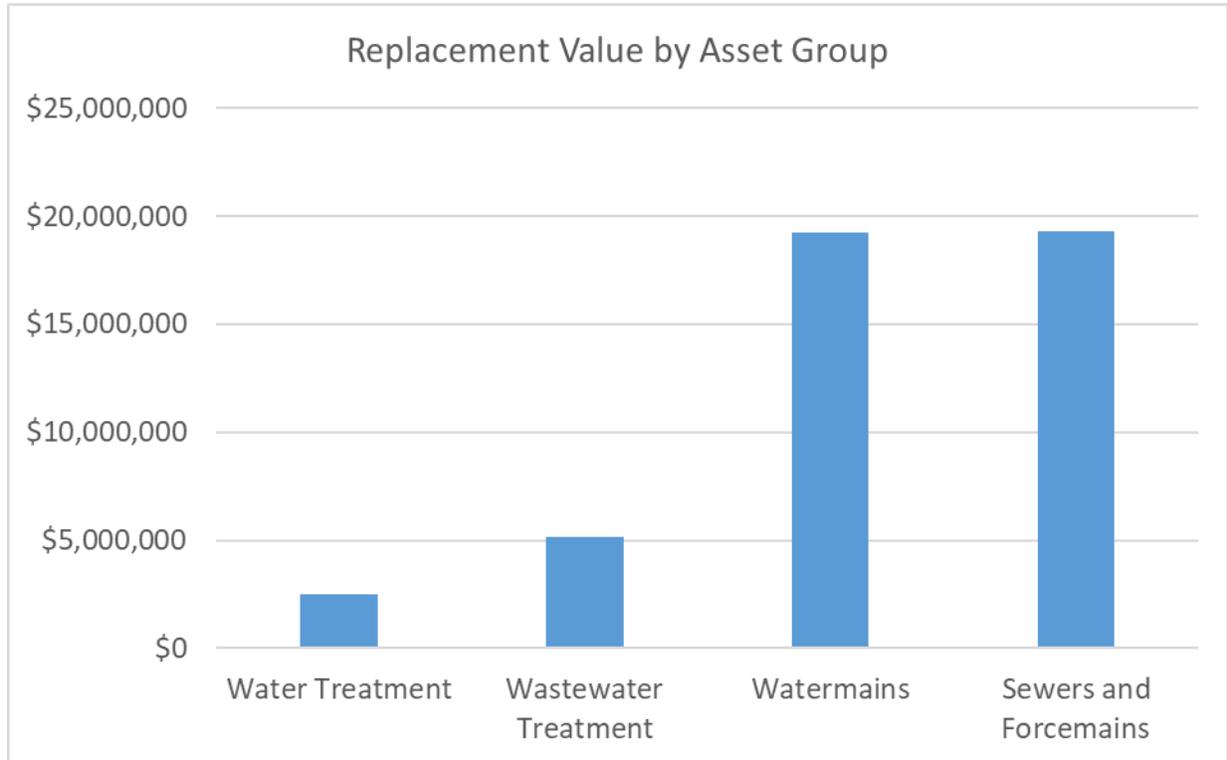


Figure ES1: Asset Portfolio Summary

Note: Actual costing values are subject to market forces at the time of infrastructure construction/improvement activity, above values are based on historical averages and industry standards.

Current Asset Performance

The best available asset information is combined with the judgement of subject matter experts to establish the current performance of each of the individual asset records that are represented in the asset portfolio. The performance of individual assets is aggregated to present the performance distribution of each asset group.

The current asset performance results are provided below.

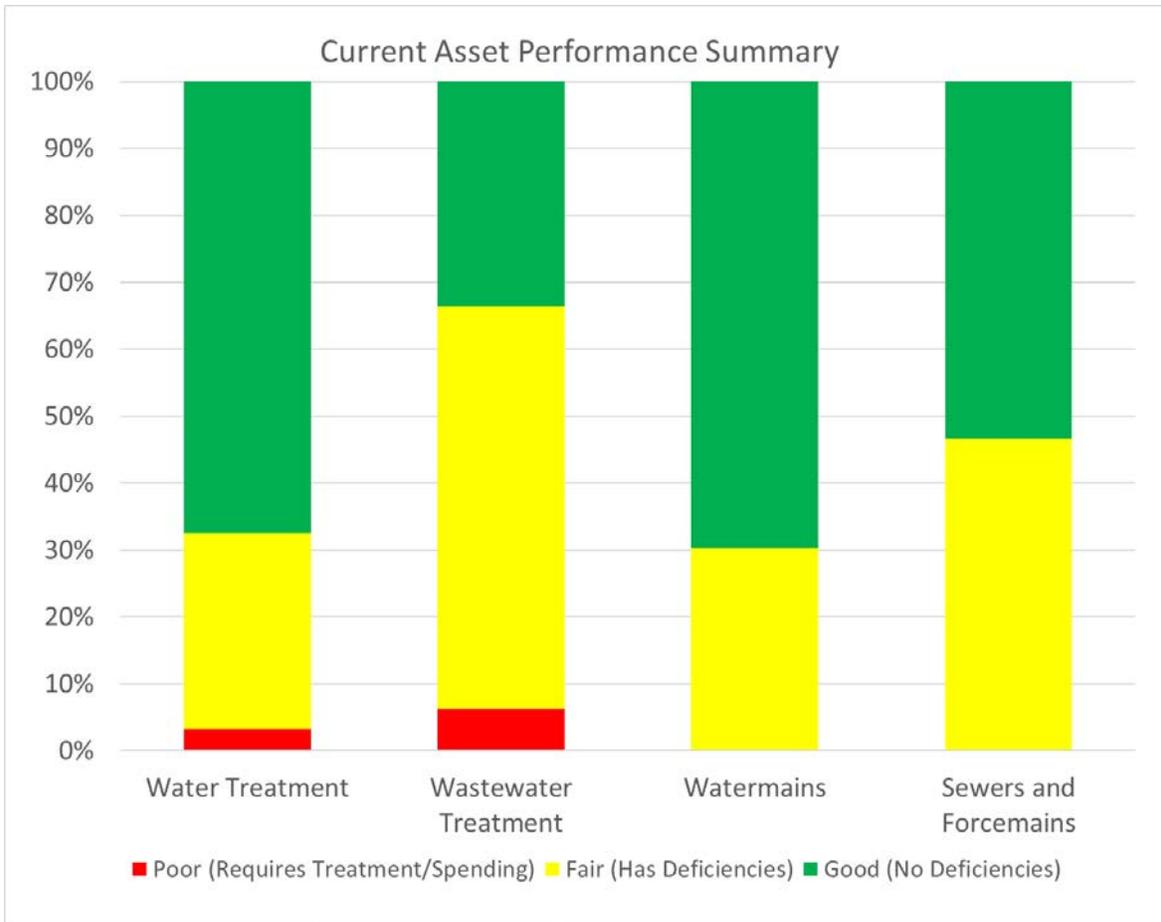


Figure ES1 – Current Performance Summary

The total replacement cost of the assets in the poor performance category is approximately \$400,000, which represents approximately 1% of the total asset portfolio. It should be noted that the spending required to restore these assets to the good performance category is not necessarily equal to the replacement cost, since some assets only require rehabilitation while others require replacement with a more expensive asset.

Table ES1: Current Performance by Replacement Value

System	Good (No Deficiencies)	Fair (Has Deficiencies)	Poor (Requires Treatment/Spending)	Total
Water Treatment	\$1,689,501	\$732,001	\$81,000	\$2,502,502
Wastewater Treatment	\$1,722,000	\$3,099,000	\$320,000	\$5,141,000
Watermains	\$13,405,000	\$5,845,700	\$0	\$19,250,700
Sewers and Forcemains	\$10,293,400	\$9,008,800	\$0	\$19,302,200
Total	\$27,109,901	\$18,685,501	\$401,000	\$46,196,402

Spending Forecast to Maintain Current Asset Performance

The spending forecast results to maintain current asset performance are summarized in Table ES2.

Table ES2 Spending Forecast Summary

System	Short Term (next 5 years) Average Annual Spending Need	Long Term (20 year) Average Annual Spending Need
Water	\$20,000	\$20,000
Wastewater	\$90,000	\$75,000

An average of approximately \$110,000 per year (in 2021 \$) in asset rehabilitation or replacement is needed over the next five years to maintain current asset performance expectations for the water and wastewater systems. The long term average annual spending needs are appropriately \$95,000 per year (in 2021 \$).

Spending to Enhance Asset Performance or Service New Development

The annual spending summarized above excludes any future spending to enhance service levels or to provide services to new development.

Financial Strategy

The Municipality has completed a parallel Rate Study (OCWA; 2022) that establishes the strategy to fund the forecasted expenditures. Future budgets will present the optimal balance of the available financing options to fund the desired infrastructure program.

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1 INTRODUCTION

1.1 Overview

This Asset Management Plan (AMP) is structured around the relationship between infrastructure spending and asset performance. It is a living document that supports infrastructure decision-making processes and is updated on a periodic (annual) basis to reflect changing circumstances.

An AMP is the tactical output of a corporate management system which is described further in Subsection 1.4.

1.2 Defining Asset Performance

Asset performance is defined as “the ability of an asset to fulfill the organization’s objectives or requirements”.

The performance of an asset is directly related to the level of service it provides:

- An asset is in the good performance category when it is meeting the expectations of the community (i.e. providing an appropriate level of service); and
- An asset is in the poor performance category when it is not meeting expectations (i.e. not providing an appropriate level of service) and requires spending to have it meet expectations.

The community’s asset performance expectations balance costs and affordability and are therefore unique to each community based on its infrastructure inventory, financial status and community/corporate priorities.

1.3 Provincial Asset Management Planning Requirements

The Province of Ontario developed Regulation 588/17 under the Infrastructure for Jobs and Prosperity Act (2015). The following points summarize the requirements of O.Reg. 588/17:

- An AM policy is required to articulate specific principles and commitments that will guide decisions around when, why and how money is spent on infrastructure assets. The Policy is required by July 1, 2019. The Municipality successfully adopted their AM Policy in 2019.
- By July 1, 2022 the AMP will be required to establish the spending that is required **to maintain current** asset performance expectations for water, wastewater, stormwater, roads and bridges.
- By July 1, 2024 the AMP will be required to establish the spending that is required to **maintain current** asset performance expectations for all asset groups.
- By July 1, 2025 the AMP will be required to establish the spending that is required to **achieve desired** asset performance expectations, and the financial strategy to fund the required spending.

1.4 AMP Development Approach

The approach in developing this AMP has been guided by OCWA’s Asset Stewardship Quality Management System (ASQMS), depicted in Figure 1. The ASQMS Framework shows how technical asset lifecycle strategies are connected to community priorities to develop optimized spending plans that balance service levels and costs. An AMP is a tactical output of the ASQMS.

The ASQMS aligns with Ontario Regulation 588/17 Asset Management Planning for Municipal Infrastructure and the international standard for infrastructure asset management (ISO 55000).



Figure 1: ASQMS Framework

The development of this AMP leverages the Municipality’s best available asset and financial information, staff input, subject matter expert professional judgement, and AM best practices, to complete the following steps:

1. Develop a complete listing of infrastructure assets to be included in the AMP.
2. Assess current performance (level of service) of the assets based on existing information.
3. Prepare an asset lifecycle management strategy (i.e. spending plan) that maintains the current performance of the Municipality’s infrastructure assets.
4. Determine the gap between required spending levels to achieve asset performance objectives versus historic spending.

1.5 Updating the Asset Management Plan

The AMP should be updated on a periodic basis to reflect the latest information and respond to evolving asset performance expectations in the community. This can be accomplished annually in conjunction with the Municipality’s budget processes, or more frequently if required to support funding applications.

1.6 Asset Management Plan Scope

This AMP includes all water and wastewater assets owned by the Municipality. Section 2 summarizes the infrastructure portfolio.

1.7 Growth Planning

As seen in Table 1, the population of Brooke-Alvinston has declined modestly over the past 20 years. However the number of water and wastewater customers has remained relatively constant.

Table 1: Brooke-Alvinston Population History

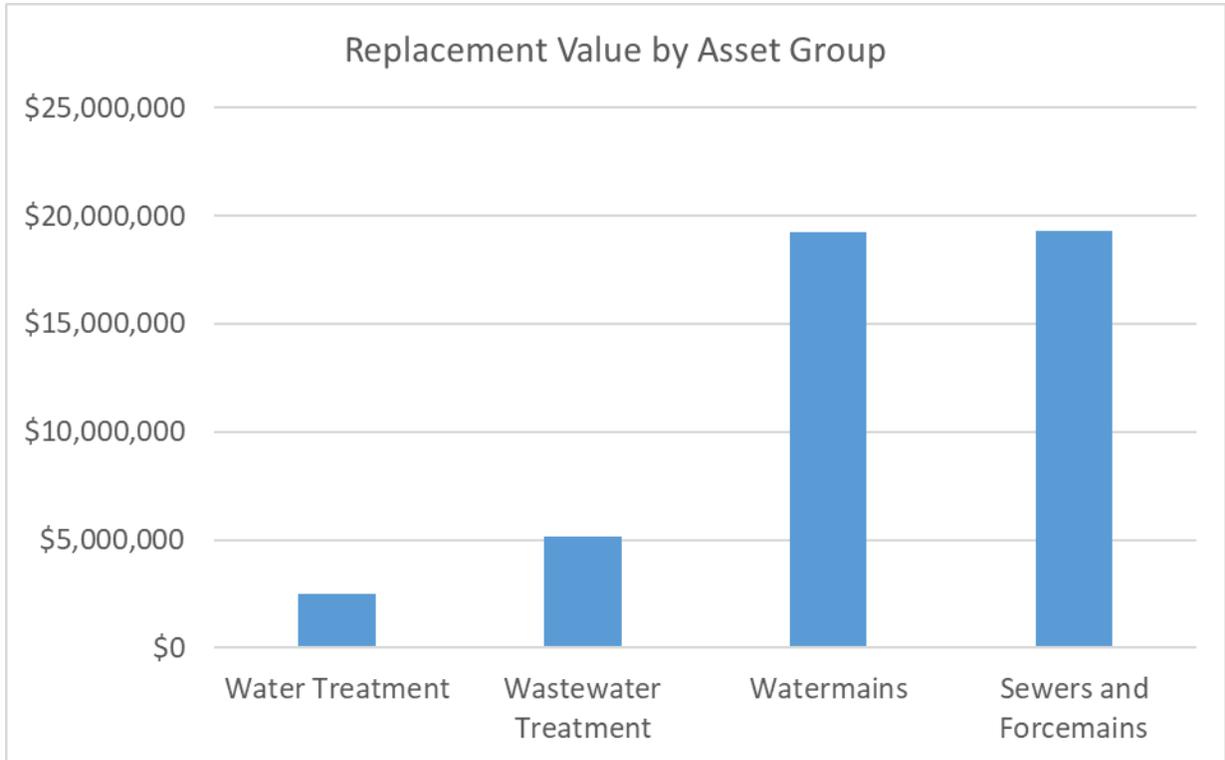
YEAR	POPULATION
1996	2,894
2001	2,785
2006	2,661
2011	2,548
2016	2,411

Population figures from Statistics Canada

2 OVERVIEW OF ASSET PORTFOLIO

The infrastructure portfolio has an estimated replacement value of approximately \$46 million (Figure 2).

Figure 2: Brooke-Alvinston Water and Wastewater Infrastructure Portfolio



Note: Actual costing values are subject to market forces at the time of infrastructure construction/improvement activity, above values are based on historical averages and industry standards.

3 ASSET PERFORMANCE ASSESSMENT

As described in Section 1, the new landscape of AM that aligns with ISO 55000 defines asset performance as the ability for an asset to fulfill its objectives or requirements. This means that the performance of an asset is directly proportional to the level of service it provides. Levels of service are also at the core of O.Reg. 588/17 which requires municipalities to understand the cost to achieve higher or lower levels of service.

3.1 Measuring Asset Performance

The Municipality’s asset inventory contains performance information for all infrastructure assets. This includes information related to both asset condition and asset function. The performance information is collected from a variety of sources, ranging from sophisticated technologies to investigate the assets to visual observations from qualified professionals.

All asset performance data is combined with the professional judgment of subject matter experts to establish the current performance of each asset as defined in Table 2 below.

Table 2: Asset Performance Rating Descriptions

PERFORMANCE CATEGORY	DESCRIPTION	STATE OF ASSET
Good	Asset performance meets or exceeds its objectives/requirements.	No Deficiencies
Fair	Asset performance is nearing the point where it will not meet its objectives/requirements.	Has Deficiencies
Poor	Asset performance is not meeting its objectives/requirements.	Requires Treatment (Spending)

3.2 Current Asset Performance

The current performance distribution of each asset group is provided in Figure 3. The proportion of assets in the poor performance category (i.e. are not meeting objectives/requirements) is greatest in the facilities asset groups.

The total replacement cost of the assets in the poor performance category is approximately \$400,000, which represents approximately 1% of the total asset portfolio (Table3). It should be noted that the spending required to restore these assets to the good performance category is not equal to the replacement costs, since some assets only require rehabilitation while others can require replacement with a more expensive asset.

The performance category of each asset is updated continually to reflect new asset data and changing asset performance objectives or requirements.

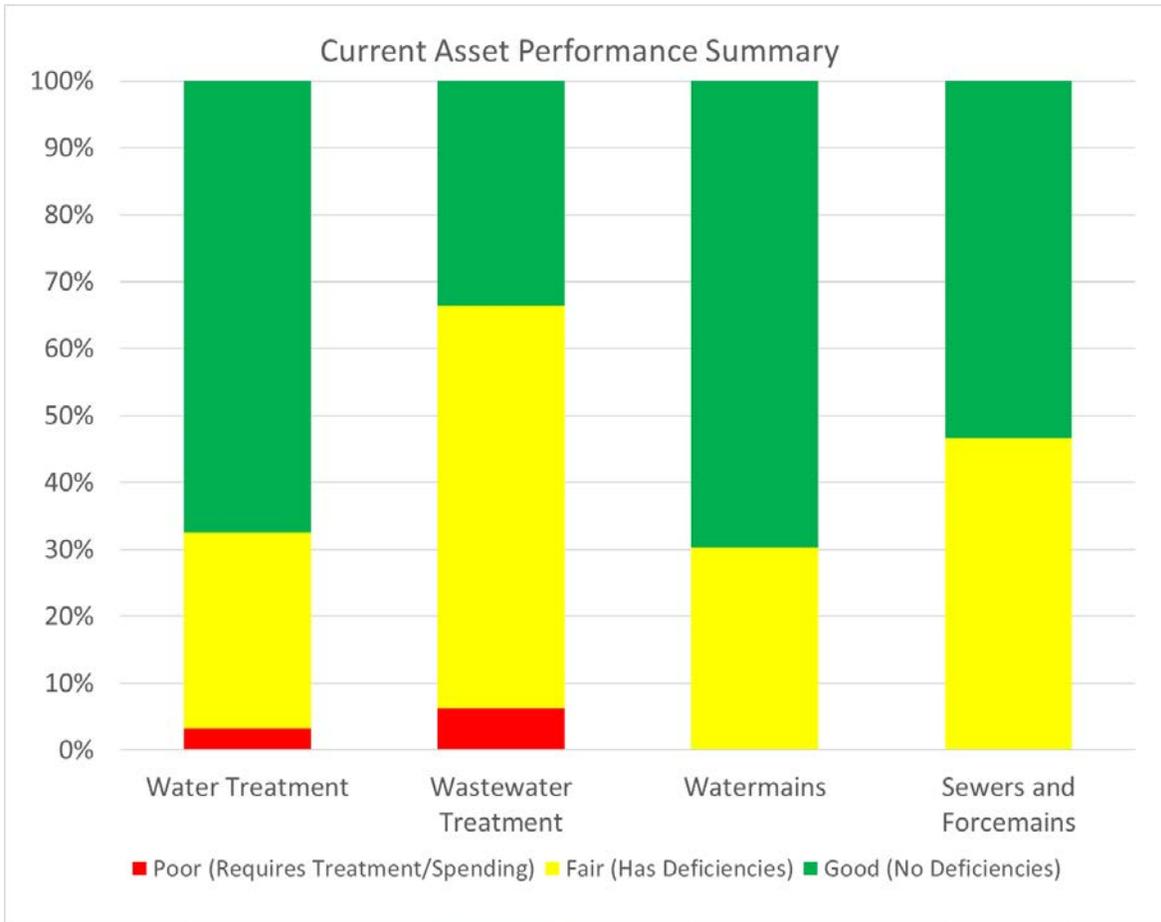


Figure 3: Current Performance Distribution

Table 3: Current Performance by Replacement Value

System	Good (No Deficiencies)	Fair (Has Deficiencies)	Poor (Requires Treatment/Spending)	Total
Water Treatment	\$1,689,501	\$732,001	\$81,000	\$2,502,502
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4 ASSET LIFECYCLE MANAGEMENT

4.1 Asset Lifecycle Activities Overview

An overview of typical asset lifecycle activities that are applied to public infrastructure is provided in Table 4. The spending forecasts in this section represent a combination of major maintenance, rehabilitation and replacement treatments.

Table 4: Typical Asset Lifecycle Activities

LIFECYCLE ACTIVITY	DESCRIPTION
Operational	Operational activities, routine preventative maintenance, studies on asset performance
(Major) Maintenance	Repairs and component replacement to maintain asset performance, typically costing between 5-10% of asset replacement value.
Rehabilitation	Project to extend asset service life, typically costing between 15% - 40% of asset replacement value.
Replacement	A project resulting in a replacement of an asset with one asset that meets top industry and community expectations.
New Asset	Construction or purchase of new assets that results in net growth of the asset inventory and an enhancement in service levels provided to the community.

4.2 Spending Forecast to Maintain Asset Performance

4.2.1 Approach

The analysis approach involves connecting real planned projects against specific assets where feasible and iteratively adjusting annual spending levels until the forecasted performance distribution will be relatively stable (i.e. the proportion of the asset network in the poor performance category is consistent).

For example, Figure 4 shows a scenario where there is not sufficient spending, resulting in the proportion of assets in the poor performance category increasing from 5% in 2021 to 90% in 2040, and a declining trend in the Network Average performance index.

It should be noted that this analysis approach applies to **existing assets** and is used to understand the cost to **maintain current asset performance** (level of service) expectations. The spending forecast to enhance asset performance is completed in a separate analysis.

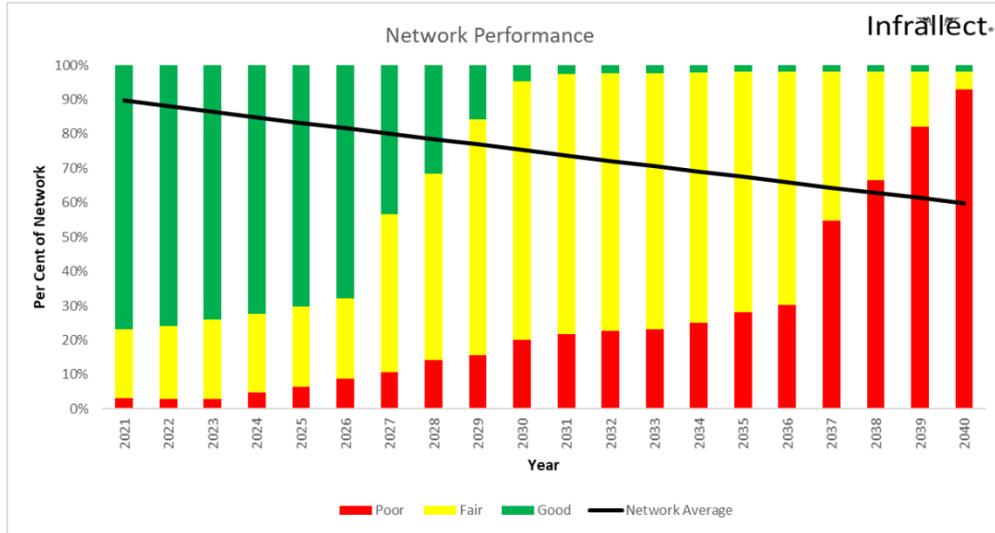


Figure 4: Sample Performance Forecast

4.2.2 Results by Individual Asset Group

The performance forecasts for each asset group are provided in Figure 5 to Figure 8.

Figure 5: Water Treatment Performance Forecast

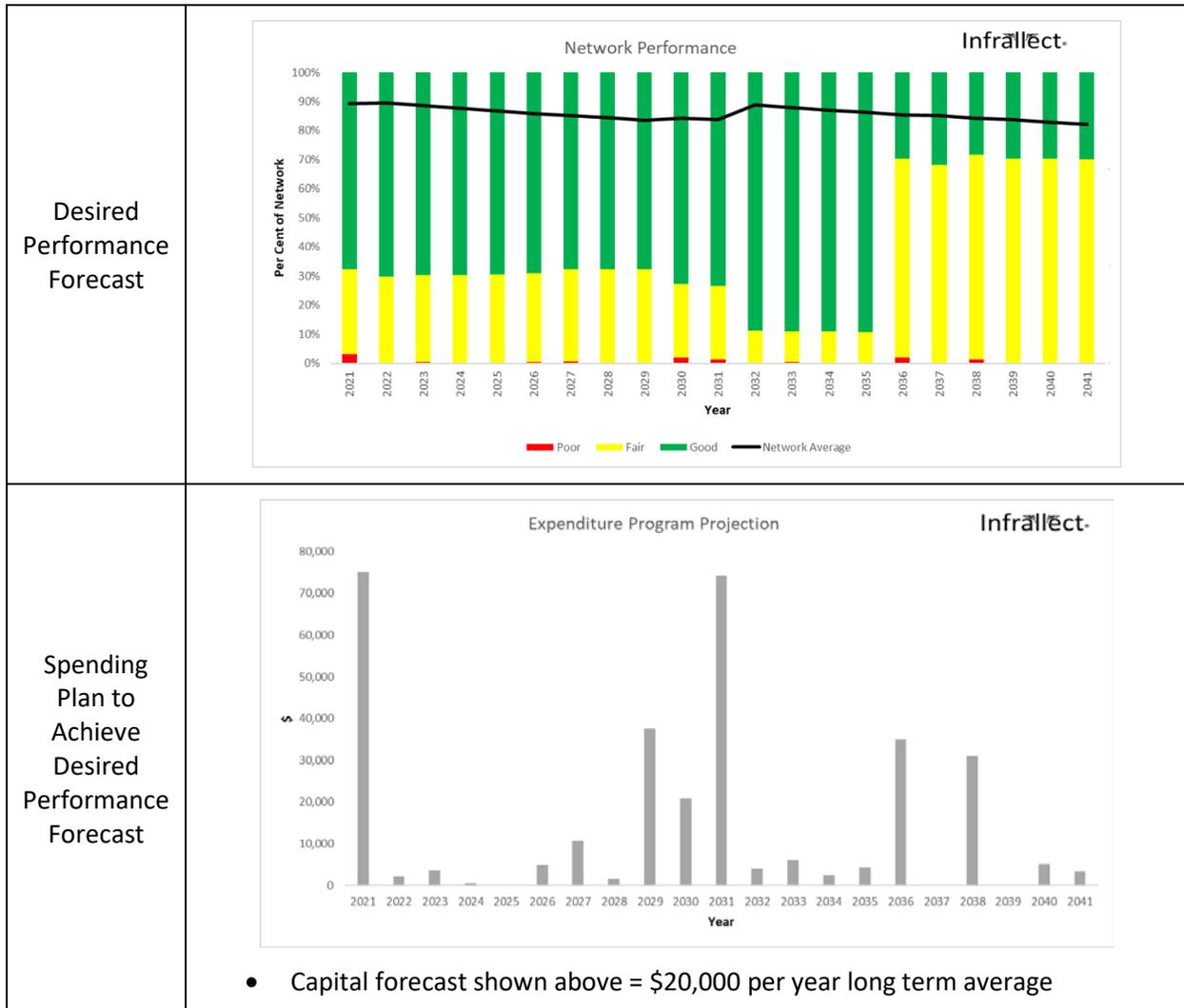


Figure 6: Wastewater Treatment Performance Forecast

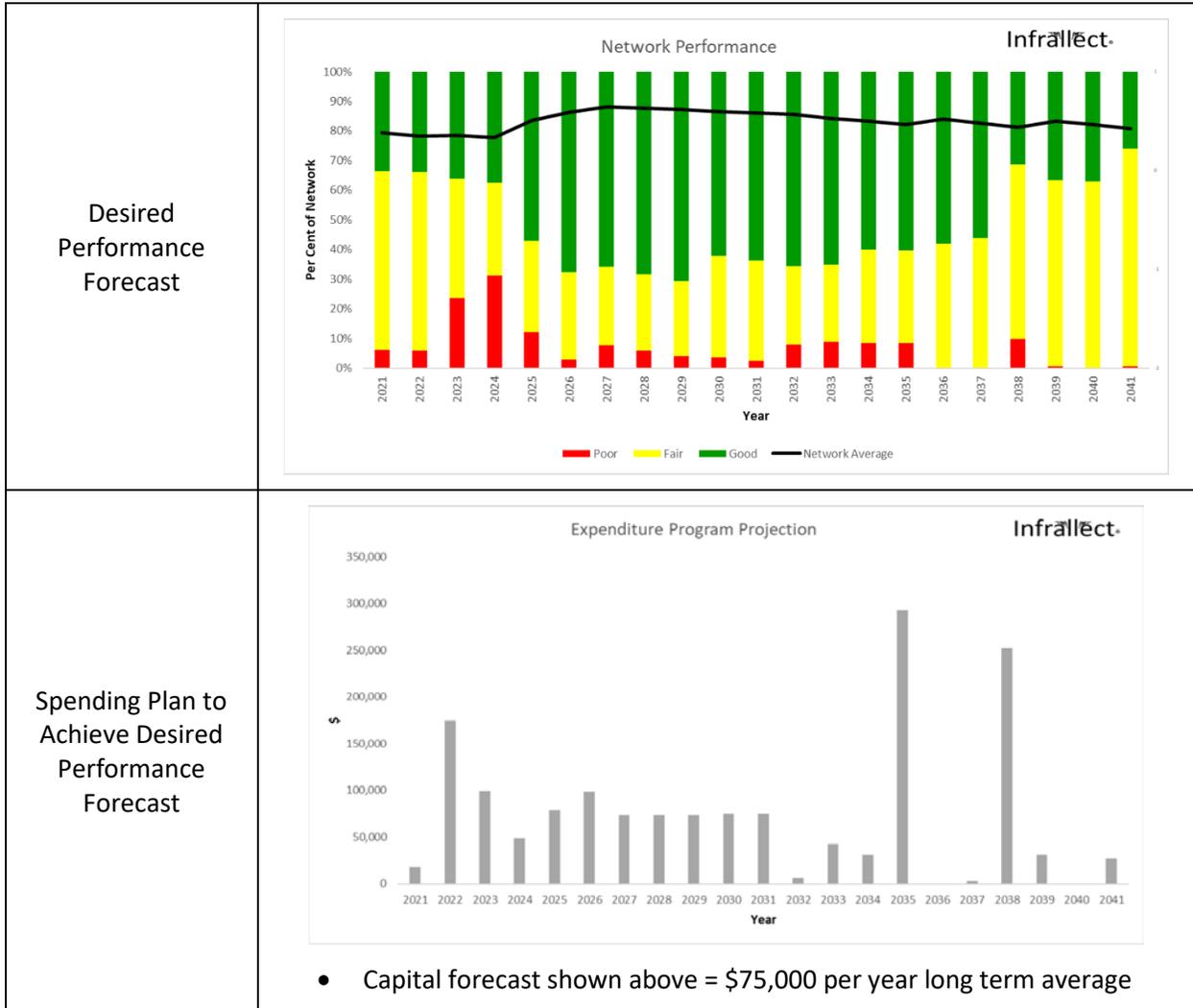
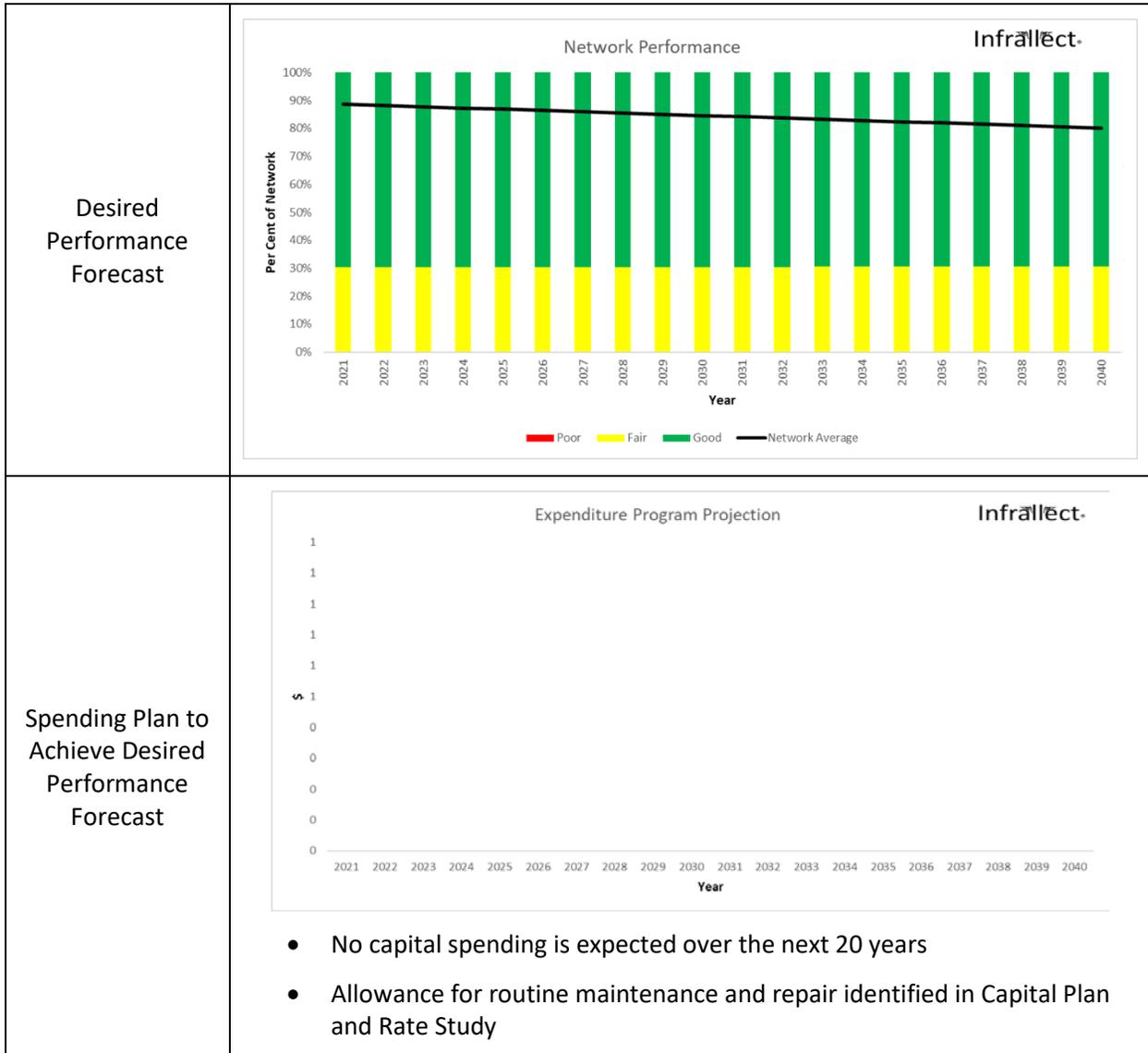


Figure 7: Watermains Performance Forecast



4.2.3 Summary Results

The summary of spending needs is provided in Figure 9. The average annual spending levels to maintain current asset performance expectations is approximately \$95,000 per year. This spending is for replacement, rehabilitation or major repair of infrastructure assets that are considered capital expenditures in the Municipality. Additional spending for operational activities and small repairs are captured in the Municipality’s operational cost centres.

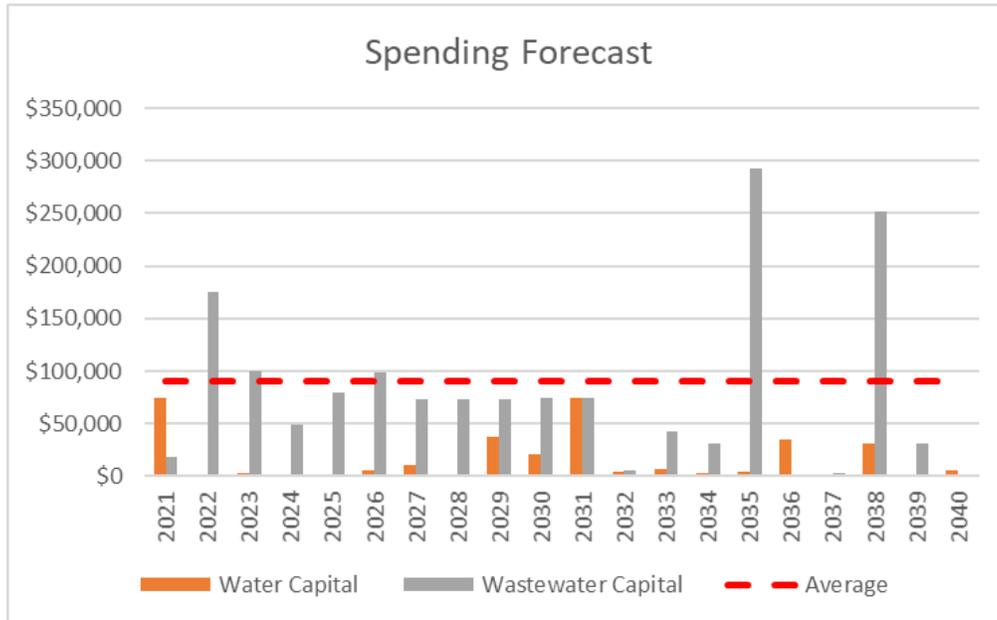


Figure 9: Spending Forecast Summary to Maintain Current Asset Performance

4.3 Risk Management

The approach to managing risk in this AMP is to consider the overall criticality of each asset related to the role it plays in providing services to the community. This is completed by understanding the required performance of each asset based on its location, function, size, etc. This understanding is then used to judge when an asset is not meeting its objectives or requirements based on the available technical performance indicators and expert subject matter judgement. More critical assets have higher performance expectations, while less critical assets have lower performance expectations.

4.4 Spending Analysis to Enhance Asset Performance

There are no projects that have been identified to enhance asset performance expectations. The Municipality will continue to monitor changing asset performance expectations from both a community and technical perspective. Future updates to the AMP will capture any new projects identified to meet enhanced asset performance expectations when this information becomes available.

4.5 Managing Climate Change

The expected impacts of climate change have been considered and included throughout the analysis used in this AMP. This includes consideration of climate change when establishing the current performance category of an asset, forecasting the deterioration rate of an asset, or establishing the lifecycle activities completed on an asset.

The most prominent climate factors impacting the Municipality's water and wastewater infrastructure are severe wet weather events and prolonged periods of heat or drought:

- *Climate Factor 1 - Severe Wet Weather Events*

Severe wet weather events put added strain on the wastewater collection and treatment systems. This strain can lead to additional overflows or a reduction in treatment effectiveness. At this point, no specific performance deficiencies are noted and no projects have been identified to address this climate factor. The Municipality should continue to monitor the impacts of severe wet weather events on the wastewater collection and treatment system.

- *Climate Factor 2 – Periods of Prolonged Heat or Drought*

This climate factor can lead to more days of high peak water demand and reductions to the water available in the source aquifers. At this point, no specific performance deficiencies have been identified with respect to water supply, water storage, or water pumping capacities in relation to this climate factor. The Municipality should continue to monitor the impacts of periods of prolonged heat or drought on the water supply and storage system.

5 FINANCING STRATEGY

The Municipality completed a Water and Wastewater Rate Study (OCWA; 2022) to establish the financial strategy to fund the asset expenditures identified in Section 4. The Rate Study is a comprehensive 20 year analysis based on the current financial situation of the Municipality (i.e., current revenues, expenditures, reserves and debt levels) and a forecast of capital and operation expenditures.

The Rate Study concluded that the Municipality is in position to fund the capital expenditures identified in this report through reasonable rate increases. Please refer to the Rate Study for details on the Municipality's financing strategy.

6 DISCUSSION AND NEXT STEPS

This AMP represents the tactical output of a corporate management system. The corporate management system is the series of interconnected processes that work together to realize value from assets. This AMP has been developed using the best available asset and financial information. The AMP is a living document that should be updated on a periodic basis to reflect new information and changing community priorities.

6.1 Monitoring Asset Performance

Moving forward, the Municipality is required by Regulation to provide an annual update on the progress of the AMP. The practical steps to complete these activities are as follows:

1. Each year, the asset inventory is updated with the best available asset data. This ensures that assets are added/removed as appropriate and any new technical performance indicator data is used to adjust the current performance category of assets.
2. Each year, current asset performance is updated based on the best available information.
3. Each year, the spending analysis is updated to understand what assets money was spent on and to connect planned spending to assets or asset networks.

These three steps will be used to update the forecast performance versus spending analysis. Over time, the Municipality will be able to see connections between the changing performance and annual spending levels. This will increase the confidence of the Municipality's AMPs each year.

6.2 Roadmap for Enhancing Asset Management Processes

The following points provide a roadmap to enhance asset management planning processes in the Municipality:

1. Continue to maintain the inventory of all assets owned. This should be at the granularity of typical asset renewal spending decisions (i.e. all sidewalks on a road as one asset versus individual sidewalk bays as separate assets). Asset inventories should be comprehensive of all assets in an asset network.
2. Continue to strengthen the connection between actual or planned spending and specific assets (or asset networks). This will provide greater line of sight from the current or planned spending and the resulting performance improvement in an asset or asset network.
3. Continue to strengthen the quality of asset-centric performance indicator data that is available to measure the current performance of assets and asset networks. All asset performance indicators are based on a measure of the severity and extent of an assets' deficiency that is related to an attribute of the service. Specific data fields to collect have not been provided - the staff responsible for each subject matter expert group should collect the appropriate performance indicator data to be able to compare asset performance to asset expectations.
4. Engage the community to understand their current perspective on the performance of assets and asset networks. This understanding can be used to calibrate the current performance of the asset networks and to prioritize the allocation of funding to improve the performance of asset networks relative to community expectations.

Appendix A – Performance Indicator Tracking

Name	System Type	Indicator	Number of Occurrences		
			2018	2019	2020
Alvinston Water	Water Treatment	Boil Water Advisory	0	0	0
		Adverse Water Quality Incidents	0	0	0
		Watermain Breaks	0	1	0
Alvinston Wastewater	Waste Water Treatment	Effluent Non-Compliance	CBOD = 2 Total Phosphorus = 10 Total Chlorine Residual = 77 Design Flow = 2	Total Phosphorus = 4 Total Chlorine Residual = 28 Design Flow = 1	Total Chlorine Residual = 15 Design Flow = 8
		Bypass event	0	0	0
		Spill event	0	0	0
		Community Complaint	0	0	Sewer Backup = 1