



# 2025 Asset Management Plan

Environmental Services  
City of Brantford, Ontario



Prepared by: Infrastructure Planning Asset Management, Public Works  
Corporation of the City of Brantford, June 2025

## RECORD SHEET

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## RECORD SHEET

<b>Asset Management Document Set</b>	<b>Asset Group</b>	<b>First Issuance</b>	<b>Current Issuance</b>
<b>Strategic Asset Management Policy</b>	All	May 2019	May 2019
<b>Asset Management Plan Overview</b>	Core & Non-Core Assets	June 2024	June 2025
<b>Asset Management Plan, Core Assets</b>	Transportation	September 2021	June 2025
<b>Asset Management Plan, Core Assets</b>	Environmental Services	September 2021	This Document
<b>Asset Management Plan, Non-Core Assets</b>	Airport Cemetery Economic Development & Tourism Facilities Fire Fleet & Transit Forestry & Horticulture Golf Housing Human Resources IT Services Library Parks & Recreation Parking Police Records & Printing Solid Waste	June 2024	June 2025
<b>Asset Management Plan, Non-Core Assets</b>	JNH	TBD	TBD

# ASSET MANAGEMENT PLAN ENVIRONMENTAL SERVICES

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# ENVIRONMENTAL SERVICES INTRODUCTION

Environmental Services is divided into four (4) Asset Classes: Water, Wastewater, Stormwater, and Solid Waste.

The Solid Waste assets are reported on in a separate AMP document.

Per O.Reg 588/17, three (3) of these Asset Classes (Water, Wastewater, and Stormwater) are core assets and are defined as:

- Water - relates to the raw water storage, production, treatment, finished water storage, supply or distribution of water;
- Wastewater - relates to the collection, transmission, treatment or disposal of wastewater, which includes any wastewater asset that from time to time manages stormwater; and
- Stormwater - relates to the collection, transmission, treatment, retention, infiltration, control or disposal of stormwater.

**Table 1** below outlines which Asset Types are included under each Asset Class and will be reported on in this AMP. In addition, it is important to note that the AMP only includes assets owned by the City or Local Boards and does not include assets that are owned privately or by other organizations.

City staff from Engineering Services and Environmental Services support the capital rehabilitation and replacement of these assets. Maintenance of these assets is mainly supported by Environmental Services, with some assets in Stormwater being supported by Operational Services.

**Table 1: Asset Type Breakdown**

	Asset Class		
	Water	Wastewater	Stormwater
Asset Type:	Treatment	Treatment	Detention
	Distribution	Collection	Collection

# 1 ENVIRONMENTAL ASSETS

## 1.1. INTRODUCTION

The City of Brantford owns and maintains several assets under the Environmental asset class. The purpose of this section is to present specific information about the Environmental asset class to answer the questions posed in **Section 2** of the **Asset Management Plan (AMP) Overview Document**, and includes the following:

- Environmental Assets' Data Inventory and Condition Approach;
- Summary of Environmental Assets;
- Lifecycle Activities and Cost of Environmental Assets;
- Current and Proposed Environmental Assets' Levels of Service;
- Current and Proposed Environmental Assets' Performance; and
- Conclusion.

## 1.2. ENVIRONMENTAL ASSETS' DATA INVENTORY AND CONDITION APPROACH

Information related to the City's data collection methodologies as well as data confidence level definitions are defined in the **Asset Management Plan Overview Document**.

The City of Brantford has three (3) different approaches to establishing the inventory and condition for Environmental assets due to regulatory requirements, available resources, technologies, and budget restrictions:

- Condition assessments outsourced to consultants;
- Regular inspection programs conducted by City staff; and
- Estimated condition based on asset specific information.

A list of all condition assessments for all core assets can be found in **Table 7** in the **Asset Management Plan Overview Document**.

The origin of the water asset data for inventory, replacement cost, and condition, as well as data confidence in each are provided in **Table 2** below.

Table 2: Environmental Assets' Data Origin and Confidence Level

Asset Type	Inventory			Replacement Cost			Condition			Levels of Service		
	Inventory (incl. Quantity and Age) From	Data Confidence Level	Data Confidence Description	Replacement Cost From	Data Confidence Level	Data Confidence Description	Condition From	Data Confidence Level	Data Confidence Description	Levels of Service (LOS) From	Data Confidence Level	Data Confidence Description
<b>Water Treatment</b>	2018 Condition Assessment	Medium	Formal assessment but did not encompass all assets	2021 Costing Technical Memorandum for Master Servicing Plan	High	Formal estimate by Consultant	2018 Condition Assessment	Medium	Formal assessment but did not encompass all assets	Master Servicing Plan	Medium	Based on information which is formally tracked. Proposed based on formal forecast.
<b>Water Distribution</b>	2016 Condition Assessment GIS	High	Formal inventory with few unknowns. GIS inventory complete with assumptions.	Master Servicing Plan; City Calculated Unit Costs	Medium	Formal estimate by Consultant. City estimate based on unit costing for past projects or work years.	2015-2020 Condition Assessments; Annual Preventative Maintenance Program observations; Service Life; Minimum Size; Material; Number of Breaks*	Medium	Mix of formal assessments with few unknowns for some assets, and based on age or other marker of condition for other assets.	Master Servicing Plan; Staff Knowledge; Design Projects	Medium	Current LOS is based on information which is formally tracked. Proposed based on formal forecast but exact placement and quantity for proposed LOS is unknown as it will be partially based on developer applications.
<b>Wastewater Treatment</b>	2017 Condition Assessment and Strategic Plan	Medium	Inventory complete with some field assumptions.	2021 Costing Technical Memorandum for Master Servicing Plan	High	Formal estimate by Consultant	2017 Condition Assessment and Strategic Plan	Medium	Formal Condition Assessment but did not include all components.	Master Servicing Plan	Medium	Based on information which is formally tracked. Proposed based on formal forecast.
<b>Wastewater Collection</b>	2015 Condition Assessment GIS	High	Formal inventory with few unknowns. GIS inventory complete with assumptions.	Master Servicing Plan; City Calculated Unit Costs	Medium	Formal estimate by Consultant. City estimate based on unit costing for past projects or work years.	2015-2024 Condition Assessments; Service Life; Material; Internal Assessment Program	Medium	Mix of formal assessments with few unknowns for some assets, and based on age for other assets.	Master Servicing Plan; Staff Knowledge; Design Projects	Medium	Current LOS is based on information which is formally tracked. Proposed based on formal forecast but exact placement and quantity for proposed LOS is unknown as it will be partially based on developer applications.
<b>Stormwater Detention</b>	GIS Condition Assessments	Medium	GIS inventory is complete; assumption dates of new ponds can be uncertain.	Industry standard unit costs	Medium	Estimated based on approximate volume.	Condition Assessments; Internal Assessment Program; Service Life	Medium	Mix of formal assessments with few unknowns for some assets, and based on age for other assets.	Master Servicing Plan; Staff Knowledge	Low	Exact placement and quantity for proposed LOS requires further investigation in some areas. A high level forecast is included in the Master Servicing Plan. Exact placement, size and quantity for proposed LOS is unknown as it will be partially based on developer applications.
<b>Stormwater Collection</b>	GIS	Medium	GIS inventory mostly complete with assumptions. Some gaps for smaller assets such as service laterals.	Master Servicing Plan; City Calculated Unit Costs	Medium	Formal estimate by Consultant. City estimate based on unit costing for past projects or work years.	2017-2024 Condition Assessments; Service Life; Material; Internal Assessment Program	Medium	Mix of formal assessments with few unknowns for some assets, and based on age or other marker of condition for other assets.	Master Servicing Plan; GIS; Stormwater Model	Medium	Current LOS is based on information which is formally tracked. Proposed based on formal forecast but exact placement and quantity for proposed LOS is unknown as it will be partially based on developer applications.

\*In addition to service life, the City also defines poor condition watermain as watermain that has exceeded 3 breaks along a section of pipe or that is undersized (<150mm).

Per **Table 2** above, Environmental assets' inventory, condition and replacement cost data are typically at a High or Medium confidence level. The overall confidence level of all Environmental asset types and confidence categories is Medium.

Data related to treatment assets are typically at a Medium or High confidence level due to formal condition assessments and inventories having been completed by consultants. The Medium confidence level is typically in place for those assets which were last formally assessed more than five years ago.

The Distribution and Collection assets for water and wastewater are typically at a Medium or High confidence level due to internal assessment programs, formal condition assessments on some assets, and the Master Servicing Plan. Stormwater Detention and Collection assets are at a Medium confidence level. There is a lower confidence for the inventory of the detention assets as the assumption timing of storm ponds can vary greatly depending on the development which leads to some uncertainty in the accuracy of the inventory.

Level of Service estimates range from low to high confidence, with most asset types being at a medium confidence level. Stormwater Detention has a low confidence as the Master Servicing Plan had fewer concrete recommendations for this asset type as additional studies are required to solidify the recommended approach for stormwater management in the areas of future growth. The Collection and Distribution system assets are at a medium confidence level as the location and quantity of some of these assets will be partially based on developer applications. The Treatment assets are at a medium confidence level as the Master Servicing Plan has clear levels of service which need to be met. However, the exact timing of when these service levels will be required is partially dependent on developer applications.

### 1.2.1. SERVICE LIFE

Where condition assessments have not been completed, the condition has been estimated based on the estimated service life of the asset shown below in **Table 3**. The average overall estimated service life for assets can be found in **Table 5**.

**Table 3: Environmental Assets' Estimated Service Life**

<b>Asset Class</b>	<b>Asset</b>	<b>Estimated Service Life</b>
<b>Distribution</b>	Hydrants	75 years
<b>Distribution</b>	Valves	70 years
<b>Distribution</b>	Watermain Water Services	Asbestos Cement – 75 years Cast Iron – 65 years Copper – 50 years Ductile Iron - 65 years Galvanized Pipe - Polypropylene – 90 years Pre-Stressed Concrete Cylinder – 90 years PVC – 90 years PVC Bionax – 90 years Unknown – 75 years
<b>Distribution</b>	Water Services (from property line to watermain)	Copper – 50 years PEX (cross-linked polyethylene) – 90 years Unknown – 75 years
<b>Distribution</b>	Water Meters Curb Stops	15 years
<b>Collection</b>	Gravity Main Siphons WW Services SW Services	ABS (Acrylonitrile Butadiene Styrene) – 90 years Asbestos Cement – 75 years Cast Iron – 90 years Clay – 70 years Concrete – 100 years Ductile Iron – 65 years FRP (Fibreglass Reinforced Pipe) – 90 years HDPE (High Density Polyethylene) 90 years Steel – 90 years Polyethylene – 90 years PVC (Polyvinyl chloride) – 90 years Unknown – 75 years

<b>Asset Class</b>	<b>Asset</b>	<b>Estimated Service Life</b>
<b>Collection</b>	Forcemains	Asbestos Cement – 75 years PVC – 90 years Polyethylene – 90 years
<b>Distribution Collection</b>	Maintenance Holes Inlets Chambers Discharge Points Canal	100 years
<b>Collection</b>	Sluice Gates Natural Watercourses* Ditches* Municipal Drains*	75 years
<b>Collection</b>	Wastewater Pump Stations**	44 years
<b>Treatment</b>	Water Treatment Plant** Wastewater Treatment Plant**	60 years 61 years
<b>Distribution</b>	Pump Stations**	46 years
<b>Distribution</b>	Elevated Tanks**	46 years
<b>Detention</b>	Stormwater Pump Station**	44 years
<b>Detention</b>	Stormwater Pond Overflow Storage Area	50 years
<b>Detention</b>	Infiltration Gallery Canal Inlet Gates	25 years
<b>Collection</b>	Oil and Grit Separator	20 years

\*Timeframe estimated before major rehabilitation required to stream, drain or ditch slopes.

\*\* Buildings are composed of various sub-systems including structure, mechanical and electrical with different service lives. The estimated service life shown in the weighted average of the sub-system service lives.

## 1.2.2. CONDITION SCORING

For the purpose of this report and standardizing condition scores across all assets in the Asset Management Plan, the Condition Rating is defined by three (3) Condition Scores as outlined in the table below. For assets with formal consultant condition assessments, the conditions have been modified to fit into this model.

**Table 4: Condition Score Description**

<b>Condition Score</b>	<b>Condition Rating</b>	<b>Description</b>
<b>0 - 1.4</b>	Good	Assets in the system or network are in working order, have few, if any, deficiencies, and will not require repairs or replacement for 10+ years. Where condition data is not available, this category applies to assets which are within the first 40% of their estimated service life.
<b>1.5 - 2.4</b>	Fair	Asset in the system or network show general signs of deterioration, some elements may have significant deficiencies, and asset will likely require repairs/removal in the next 10 years. Where condition data is not available, this category applies to assets which are within 41% - 80% of their estimated service life.
<b>2.5 - 3</b>	Poor	Asset is below standard showing signs of significant deterioration, is in danger of imminent failure, and will require repair, replacement or removal within the next year. Where condition data is not available, this category applies to assets which have exceeded 80% of their estimated service life.

## 1.3. SUMMARY OF ENVIRONMENTAL ASSETS

The summary of assets for the Environmental Asset Class can be found below. The summary of assets includes: Quantity, Replacement Cost, Average Age, and Average Condition Score for each asset type in accordance with O. Reg 588/17.

### 1.3.1. TOTAL SUMMARY OF ASSETS

A table summarizing all environmental assets is included in **Table 5** below. Detailed information about each asset is included in individual sections. Calculations of averages have been weighted by the overall replacement value of assets. This means that assets of higher estimated replacement value will have a stronger influence on the average than if the average was calculated based on the number of assets.

The total replacement cost for all Environmental assets is approximately \$2,135.3M and they are a weighted average of 39 years old which is 50% of the overall average estimated service life of 78 years. Overall Environmental assets are in GOOD condition with a weighted average condition score of 1.2.

For **Table 5** an \* on a column title indicates average value weighted by replacement value. Due to the varying units for the distribution and collection assets, please refer to **Section 1.3.2** through **1.3.7** for asset quantities.

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**Table 5: Total Summary of Water Assets**

Asset	Quantity	Unit	Replacement Cost	Average Age (years)*	Average Estimated Service Life (years)*	% of Estimated Service Life Expended*	Average Condition Score*	Average Condition Description*
<b>Environmental Assets Total</b>			<b>\$2,135.3M</b>	<b>39</b>	<b>78</b>	<b>50%</b>	<b>1.2</b>	<b>GOOD</b>
Water Treatment	32	Count	\$221.2M	24	61	39%	0.9	GOOD
Water Distribution	Varies	Varies	\$506.9	38	72	53%	1.2	GOOD
Wastewater Treatment	26	Count	\$306.7M	46	61	75%	1.8	FAIR
Wastewater Collection	Varies	Varies	\$19.6M	40	80	50%	1.1	GOOD
Stormwater Detention	9,965	Sq. m.	\$3.2M	26	50	52%	1.7	FAIR
Stormwater Collection	Varies	Varies	\$14.8M	45	95	47%	1.1	GOOD

\*Denotes Weighted Average

### **1.3.2. WATER TREATMENT**

Water Treatment refers to assets which support the process of water purification to make it suitable for drinking. It involves removing contaminants such as bacteria, particles and chemicals to improve water quality and safety. It is achieved through a combination of physical, chemical and biological processes including: filtration, sedimentation, coagulation and flocculation, disinfection, aeration, Ultraviolet (UV) light treatment, ozone treatment and reverse osmosis.

The Water Treatment Plant Site contains 28 structures and four (4) canal & intake assets with a total replacement cost of \$221.2M. Assets are typically in Good condition with a weighted average condition score of 0.9. However, some structures, with lower replacement values, have been assessed in Fair or Poor condition.

The average age for the facilities is 24 years and was based on the construction year of the facility and is 39% of the average estimated service life of 61 years for all water treatment assets.

NO. OF ASSETS	REPLACEMENT COST	WEIGHTED AVG AGE (YEARS)	WEIGHTED AVG ESTIMATED SERVICE LIFE (YEARS)	WEIGHTED AVG CONDITION SCORE	WEIGHTED AVG CONDITION DESCRIPTION
32	\$221.2M	24	61	0.9	GOOD



Figure 1: Water Treatment Asset Summary by Condition and Quantity

### **1.3.3. WATER DISTRIBUTION**

Water Distribution refers to assets which support the movement of treated drinking water from the Water Treatment Plant to individual properties throughout the City. Watermains are pressurized pipes which consist of larger mains called transmission mains and smaller mains called distribution mains. The transmission mains deliver large volumes of water from the water treatment plant to distribution points such as water storage facilities, elevated tanks and pump stations. These facilities help maintain pressure in the distribution pipes and/or provide excess storage in the case of a drinking water shortage. The King George Elevated Storage Tank will be removed in 5-10 years as it has exceeded its estimated service life of 50 years

Distribution mains move water from the distribution points throughout the City running underneath roadways or within easements. Valves are located throughout the network on both transmission and distribution mains. They allow for the regulation of flow and pressure throughout the system, can direct water flow, prevent backflow and allow for the isolation of sections of the network for repairs or maintenance. Chambers are structures buried underground that contain valves which may require maintenance. They are typically used as Air Release, Valve, and Drain chambers or a combination of the three. Water hydrants are connected to the watermain and are used by firefighters to access water for extinguishing fires. In addition, water hydrants can also be used to flush water lines and maintain water quality.

Water services are smaller pipes that connect from the distribution mains to individual buildings or residences. Water services are owned by the City up until the property line, beyond the property line, it becomes the property owner's responsibility. The City has replaced the City-owned portion of lead water services due to potential health and safety concerns. However, residents could still have a lead service on their side of the property line. Water meters are installed at properties that are connected to the municipal water network and are used to measure the amount of water used by the customer for billing and performance tracking.

The Water Distribution assets, have a total replacement cost value of \$506.9M and include:

- 4 water pump stations
- 2 elevated storage tanks
- 1 bulk water station
- 515.2 kms of watermain
- 9,163 valves
- 257 valve chambers
- 3,015 water hydrants
- 44,942 water services
- 16,458 water curb stops
- 38,173 water meters

Water Distribution assets are in overall Good condition with a weighted average condition score of 1.2. The breakdowns of condition by asset subtype is shown in **Figure 2**. The average age for the City's Water Distribution assets is 38 years which is 53% of their weighted average estimated service life of 72 years.

Curb stops are estimated to be in overall poor condition. However, this has been calculated based on age and will be reviewed in future years as data collection improves during routine maintenance activities.

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NO. OF ASSET SUBTYPES	REPLACEMENT COST	WEIGHTED AVG AGE (YEARS)	WEIGHTED AVG ESTIMATED SERVICE LIFE (YEARS)	WEIGHTED AVG CONDITION SCORE	WEIGHTED AVG CONDITION DESCRIPTION
8	\$506.9M	38	72	1.2	GOOD

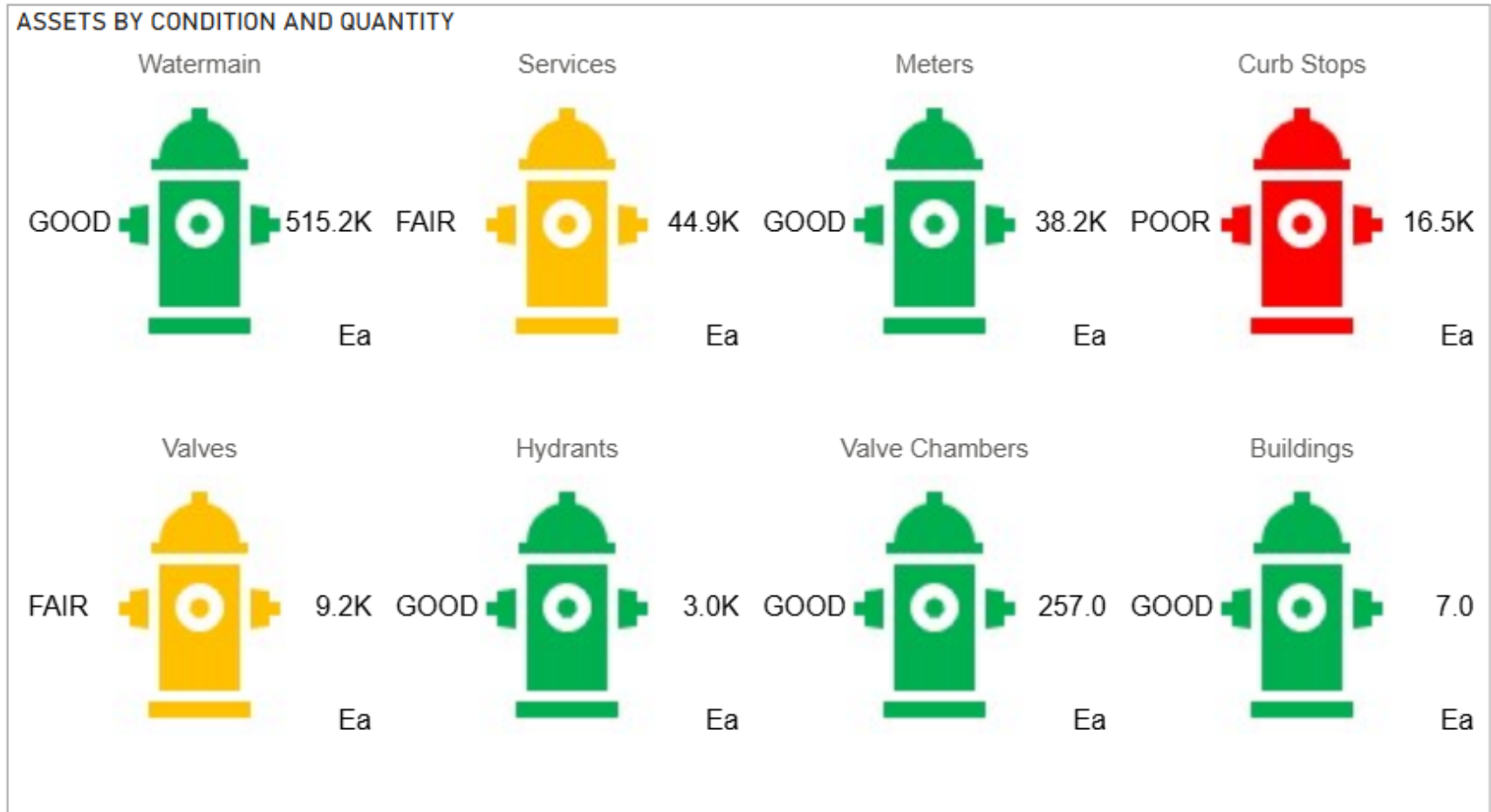


Figure 2: Water Distribution Asset Summary by Condition and Quantity

### **1.3.4. WASTEWATER TREATMENT**

Wastewater Treatment refers to assets which support the process of water purification to make it suitable for return to the environment. It involves removing contaminants such as bacteria, debris, particles and chemicals to improve water quality and safety. It is achieved through a combination of physical, chemical and biological processes. The City's wastewater treatment plant is a conventional activated sludge plant (primary and secondary treatment).

The Wastewater Treatment Plant is made up of 26 buildings with a total replacement cost of \$306.7M. Wastewater Treatment assets are in overall Fair condition with a weighted average condition score of 1.8. The breakdowns of condition by asset subtype is shown in **Figure 3**. The average age for the City's Wastewater Treatment assets is 46 years which is 75% of their weighted average estimated service life of 61 years.

NO. OF ASSETS	REPLACEMENT COST	WEIGHTED AVG AGE (YEARS)	WEIGHTED AVG ESTIMATED SERVICE LIFE (YEARS)	WEIGHTED AVG CONDITION SCORE	WEIGHTED AVG CONDITION DESCRIPTION
26	\$306.7M	46	61	1.8	FAIR



Figure 3 Wastewater Treatment Asset Summary by Condition and Quantity

### **1.3.5. WASTEWATER COLLECTION**

Wastewater Collection refers to assets which support the movement of wastewater from individual properties throughout the City to the wastewater treatment plant. The collection system pipes can be either forcemains which use pumps to move wastewater when gravity alone will be insufficient or gravity mains which use differences in elevation to allow wastewater to flow downhill. The gravity mains deliver large volumes of wastewater from individual properties to collection points such as pump stations or storage tanks. Pump Stations help move wastewater to higher elevations, through forcemains, enabling it to then flow by gravity through the next sections of the network. Storage tanks are used to store wastewater during peak flow periods or when pump stations are temporarily out of service to avoid overwhelming the capacity of the pipe network or the wastewater treatment plant.

Gravity and force mains move wastewater from the collection points throughout the City running underneath roadways or within easements. Maintenance holes (or manholes) are an underground structure which act as access points for the wastewater gravity mains so that they can be maintained or flushed (cleaned). A siphon is a pipe connected to the rest of the wastewater gravity system that carries wastewater flows under rivers or canals.

Wastewater laterals or services are smaller pipes that connect from the individual buildings or residences to the collection gravity mains. Wastewater laterals are owned by the City up until the property line, beyond the property line, it becomes the property owner's responsibility.

The Wastewater Collection assets, have a total replacement cost value of \$476.4M and include:

- 10 wastewater pump stations
- 5.0 kms of forcemain
- 444.7 kms of gravity main
- 6,464 wastewater maintenance holes
- 32,609 wastewater laterals
- 2.8 kms of siphons crossing under the Grand River

Wastewater Collection assets are in overall Good condition with a weighted average condition score of 1.1. The breakdowns of condition by asset subtype is shown in **Figure 4**. The average age for the City's Wastewater Collection assets is 40 years which is 50% of their weighted average estimated service life of 80 years.

NO. OF ASSET SUBTYPES	REPLACEMENT COST	WEIGHTED AVG AGE (YEARS)	WEIGHTED AVG ESTIMATED SERVICE LIFE (YEARS)	WEIGHTED AVG CONDITION SCORE	WEIGHTED AVG CONDITION DESCRIPTION
6	\$476.4M	40	80	1.1	GOOD



Figure 4 Wastewater Collection Asset Summary by Condition and Quantity

### 1.3.6. STORMWATER DETENTION

Stormwater Detention refers to those assets which support the holding of stormwater to improve water quality. It involves removing contaminants such as debris, sediments and pollutants through manual grates and settlement before the water is released back to the watershed. Stormwater ponds are an example of man-made detention infrastructure which are built to collect rainfall and surface runoff in developed areas where natural permeation is difficult. Infiltration galleries are buried structures used for collecting stormwater which allows water to seep naturally into the soil surrounding the gallery. Overflow storage areas are areas where water is expected to collect after heavy rain events before either infiltrating the surrounding soil or being slowly drained into the stormwater collection system through a nearby catchbasin.

There are currently 21 stormwater ponds in the City maintained by Environmental Services with a total replacement cost of \$13.5M. In addition some City properties, such as Oak Hill Cemetery and the Mohawk St Landfill own and maintain storm ponds within their property boundaries. These property specific ponds are included in the site works of the asset management plans (AMPs) for the respective property and are not included in this AMP.

There are currently two (2) infiltration galleries present in the City at the Water Treatment Plant site and three (3) overflow storage areas located throughout the City with a total replacement value of \$0.3M.

Stormwater Detention assets are in overall Fair condition with a weighted average condition score of 1.7. The breakdowns of condition by asset subtype is shown in **Figure 5**. The average age for the City's Wastewater Collection assets is 26 years which is 52% of their weighted average estimated service life of 50 years.

NO. OF ASSET SUBTYPES	REPLACEMENT COST	WEIGHTED AVG AGE (YEARS)	WEIGHTED AVG ESTIMATED SERVICE LIFE (YEARS)	WEIGHTED AVG CONDITION SCORE	WEIGHTED AVG CONDITION DESCRIPTION
3	\$13.8M	26	50	1.7	FAIR

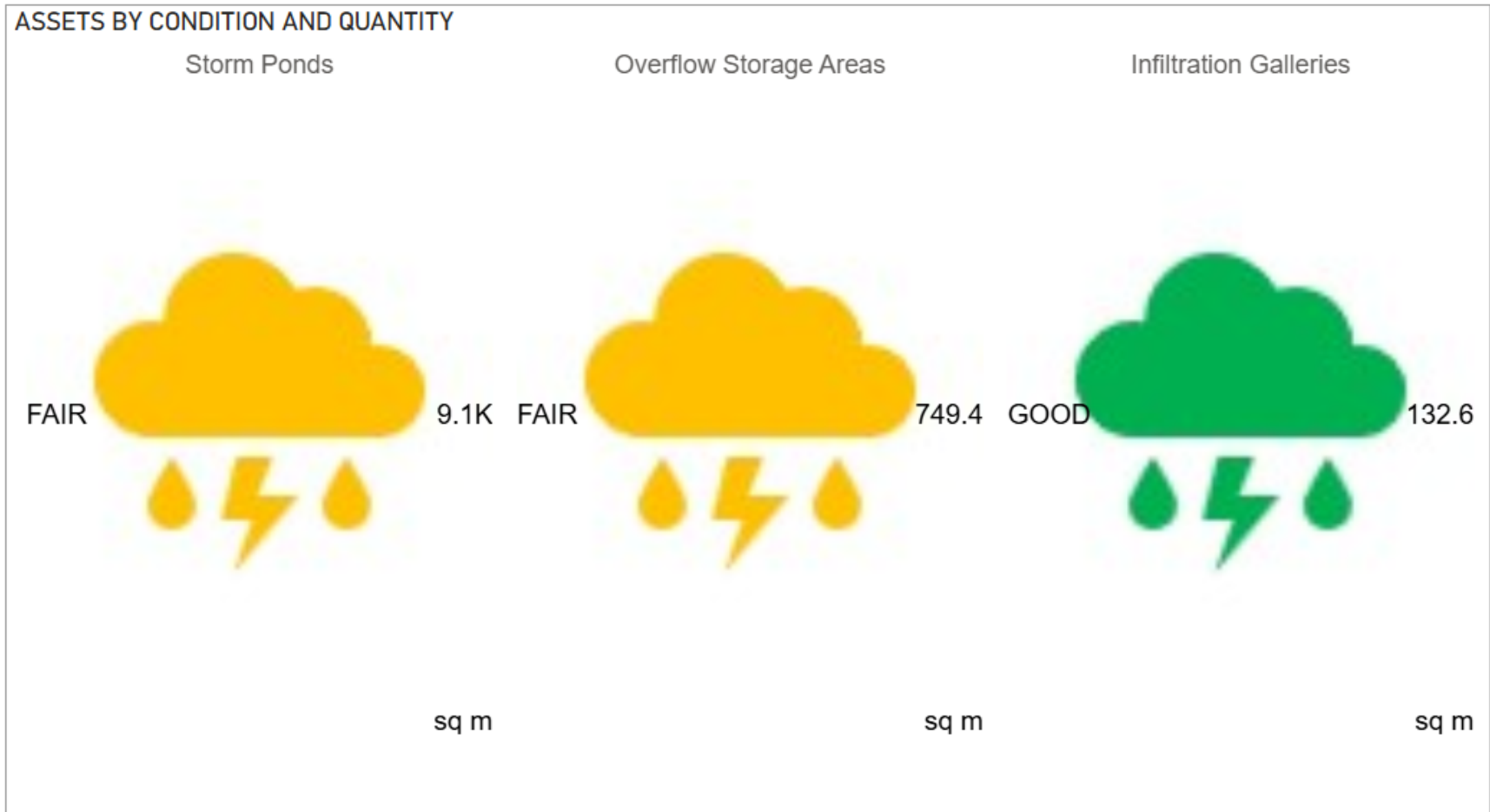


Figure 5 Stormwater Detention Asset Summary by Condition and Quantity

### **1.3.7. STORMWATER COLLECTION**

Stormwater Collection refers to assets which support the movement of stormwater from individual properties and the road right of way throughout the City to stormwater detention areas. The collection system pipes can be either forcemains which use pumps to move stormwater when gravity alone will be insufficient or gravity mains which use differences in elevation to allow stormwater to flow downhill. The gravity mains, natural watercourses, municipal drains and ditches deliver large volumes of stormwater from individual properties, or the roadway, to collection or detention points such as pump stations, stormwater ponds or other infiltration infrastructure such as trench chambers. Pump Stations help move stormwater to higher elevations, through forcemains, enabling it to then flow by gravity through the next sections of the network.

Natural watercourses, Municipal Drains, ditches, gravity mains and force mains move stormwater from the collection points throughout the City running underneath or beside roadways or within easements. Natural watercourses and Municipal Drains may pass through private land, with or without easements in place for maintenance access. Inlets are receptacles to collect stormwater and screen or settle out debris that may clog the stormwater system before entering the gravity main. The majority of inlets in the City are catchbasins, with a small number of standard inlets which are considered to be a segment of pipe. Maintenance holes (or manholes) are an underground structure which act as access points for the stormwater gravity mains so that they can be maintained or flushed (cleaned). An oil and grit separator is a maintenance hole fitted with a device which captures oil and sediment runoff from parking lots and roads to limit the amount of these pollutants entering the network and watershed. Outfalls are points in the City where the stormwater returns to the watershed. They are typically located along Municipal Drains, ditches or natural waterways.

Stormwater laterals or services are smaller pipes that connect from the individual buildings or residences to the collection gravity mains. Stormwater laterals are owned by the City up until the property line, beyond the property line, it becomes the property owner's responsibility.

There is a dike which runs throughout the City, along the Grand River which is owned by the Grand River Conservation Authority. Along the dike are flood gates which are used to allow the stormwater network to outlet into the Grand River, but allow for either automatic or manual closure if the Grand River rises above the flood gate level. This is to ensure that

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the river will not overload the stormwater network and cause flooding. The gates are owned, operated and maintained by the City.

Included in the stormwater collection system are culverts less than and greater than 3.0m. These assets are reported on within the Transportation AMP and are not included in this AMP.

The Stormwater Collection assets, have a total replacement cost value of \$610.3M and include:

- 1 stormwater pump station
- 0 kms of stormwater forcemain
- 468.2 kms of stormwater gravity main
- 13,114 stormwater inlets
- 6,726 stormwater maintenance holes
- 6,092 stormwater laterals (low data confidence, this amount is expected to be an undercount of the actual number)
- 35 oil & grit separators
- 41 flood gates
- 299 outfalls
- 93.5 kms of ditches
- 3.6 kms of Municipal Drains
- 131.6 kms of natural watercourses (excluding the Grand River)

Wastewater Collection assets are in overall Good condition with a weighted average condition score of 1.1. The breakdowns of condition by asset subtype is shown in **Figure 6**. The average age for the City's Wastewater Collection assets is 42 years which is 44% of their weighted average estimated service life of 95 years.

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NO. OF ASSET SUBTYPES	REPLACEMENT COST	WEIGHTED AVG AGE (YEARS)	WEIGHTED AVG ESTIMATED SERVICE LIFE (YEARS)	WEIGHTED AVG CONDITION SCORE	WEIGHTED AVG CONDITION DESCRIPTION
11	\$610.3M	42	95	1.1	GOOD

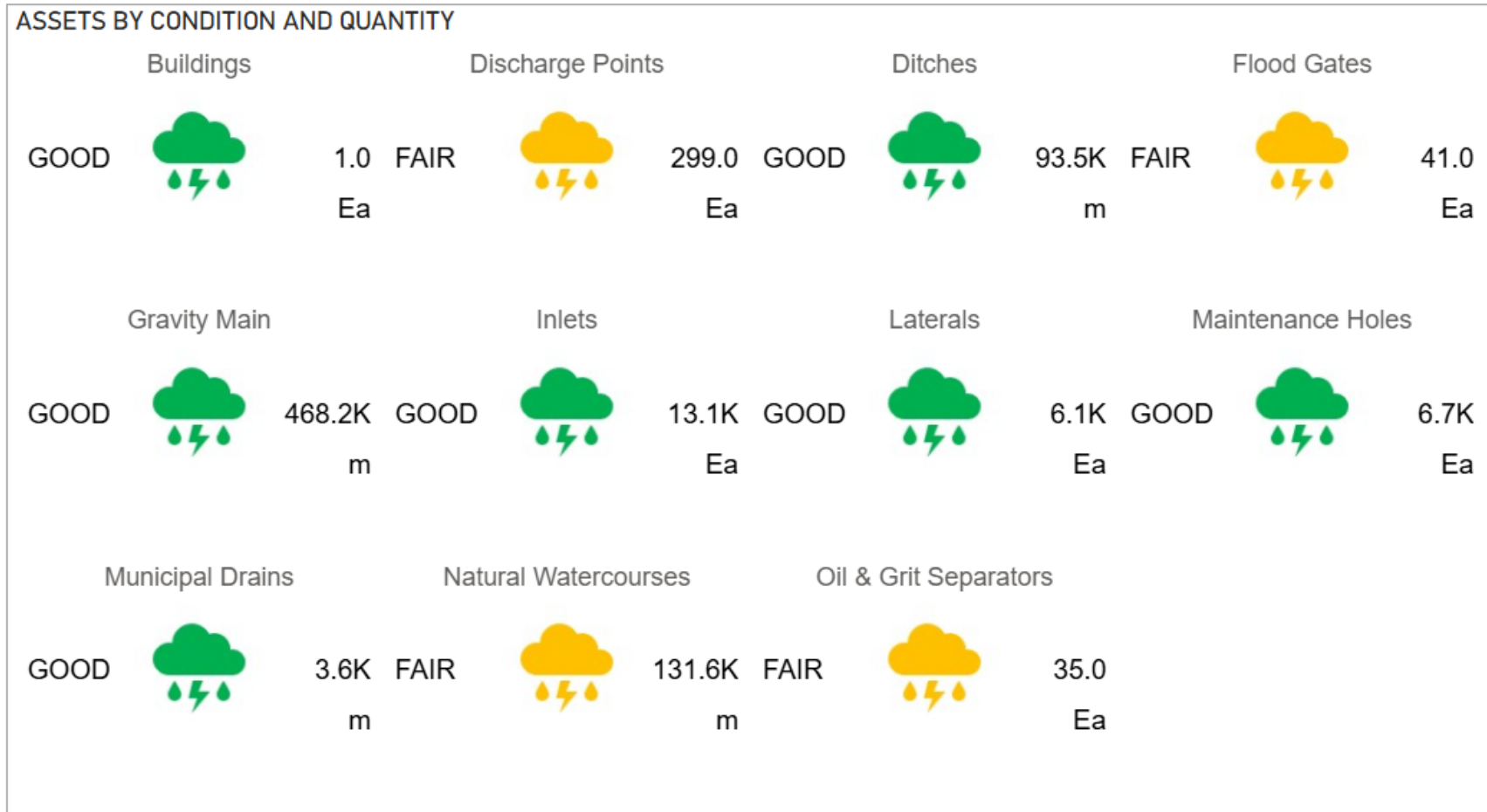


Figure 6 Stormwater Collection Asset Summary by Condition and Quantity

## 1.4. LIFECYCLE OF ENVIRONMENTAL ASSETS

The lifecycle of environmental assets is described under four (4) categories which are described in this section:

- Key Lifecycle Stages of Environmental Assets;
- Lifecycle Activities;
- Risks of Lifecycle Activities; and
- 10 Year Lifecycle Costs of Environmental Assets.

### 1.4.1. KEY LIFECYCLE STAGES OF WATER ASSETS

The lifecycle of an asset refers to the following stages: Planning, Creation/Acquisition, Operations and Maintenance, Renewal/Disposal which are defined in the Main Body of the report. For environmental assets specifically our general process is as follows:

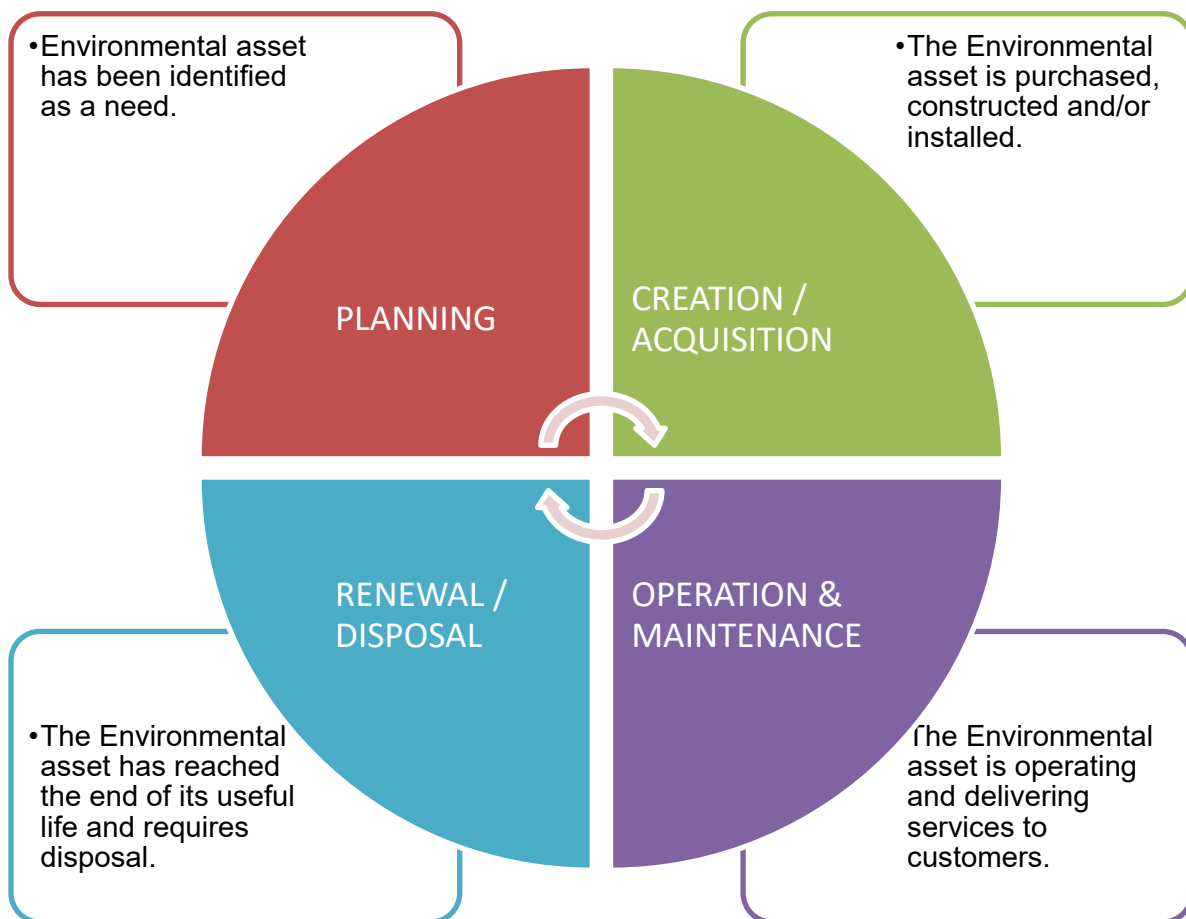


Figure 7: Lifecycle Stages of Environmental Assets

1. **Planning** –The Environmental asset has been identified as a need through the Official Plan, Master Servicing Plan, or due to an identified poor condition of an existing asset during a repair, condition assessment, maintenance report, site inspection, or desktop analysis. The asset is designed using all applicable codes and standards. Typically this phase also involves planning on how to optimize the value of the assets which may include: replacing neighbouring corridor assets at the same time, improving operating and maintenance efficiencies, upsizing or rerouting for growth. The business process for state of good repair for linear water assets is shown in **Figure 8**. The business process for state of good repair for linear wastewater assets is shown in **Figure 9**. The business process for state of good repair for linear stormwater assets is shown in **Figure 10**.
2. **Creation / Acquisition** – The cost and requirements for the new or replacement environmental asset are defined. The asset is purchased, constructed and/or installed. Extra care is taken at this stage to ensure the asset is constructed properly using all appropriate design standards and guidelines to avoid any premature repairs or replacements due to installation errors.
3. **Operation and Maintenance** – The environmental asset is operating and delivering services to customers. Maintenance (Lifecycle) Activities are completed on the asset at specific time intervals as shown in **Table 6** to prevent premature failures of the asset. Additional monitoring and potential improvements are evaluated during this process.
4. **Renewal / Disposal** – The environmental asset has reached the end of its useful life, is in poor condition, and/or is underperforming, and requires disposal. The disposal considers the effect on customers such as required detouring or service disruptions which are taken into account in the Planning stage thereby restarting the cycle. The City follows industry standards when disposing of these assets.

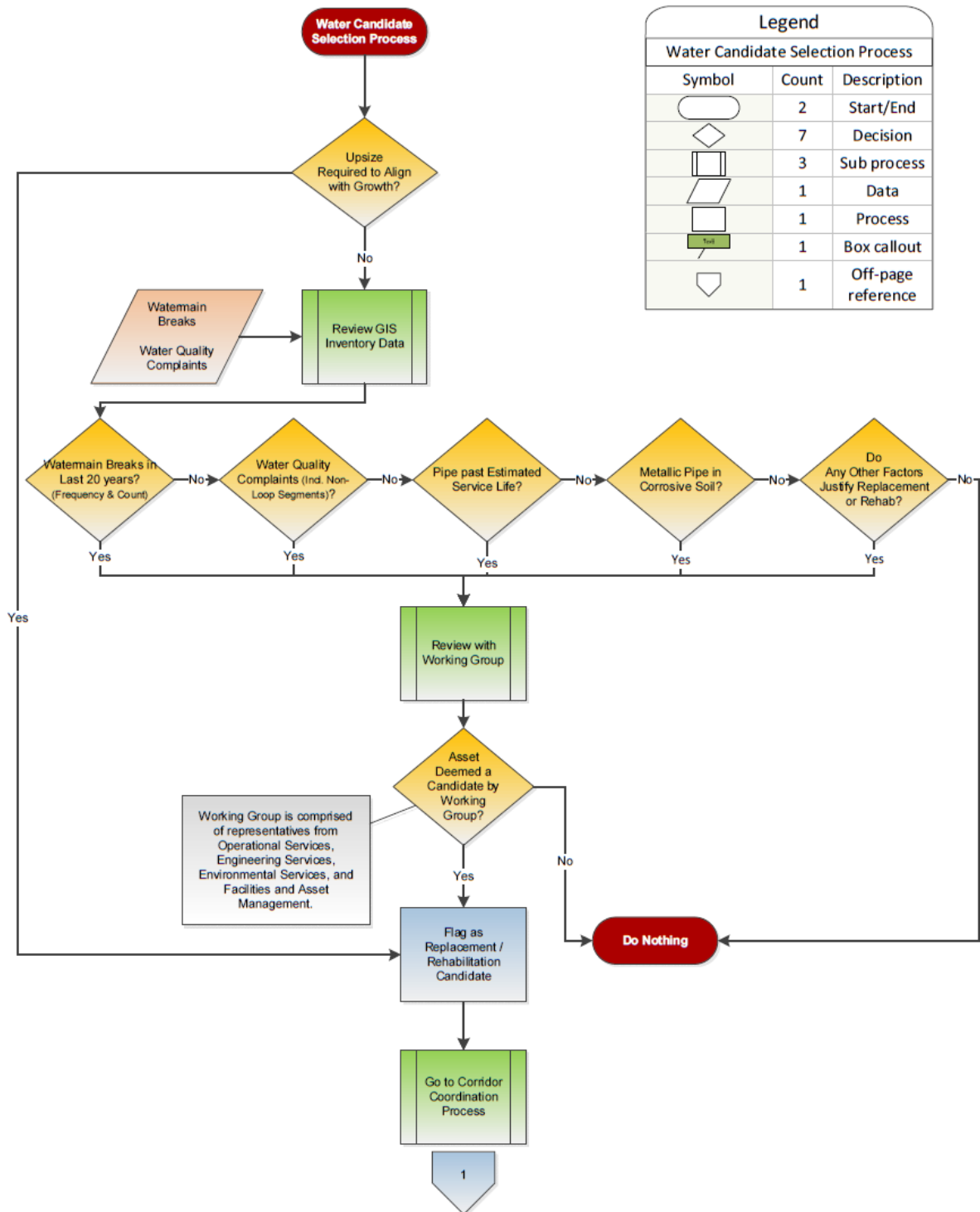
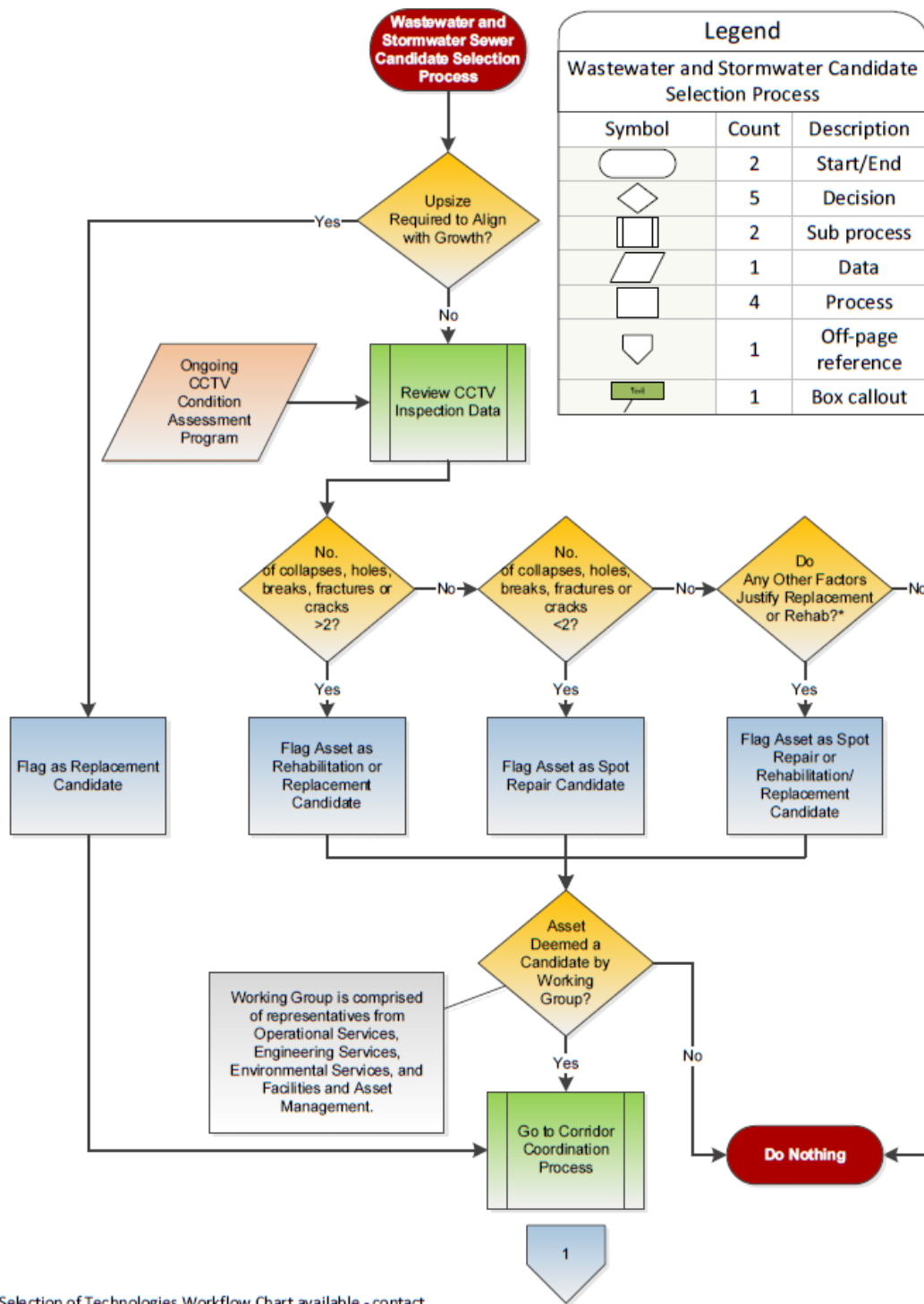
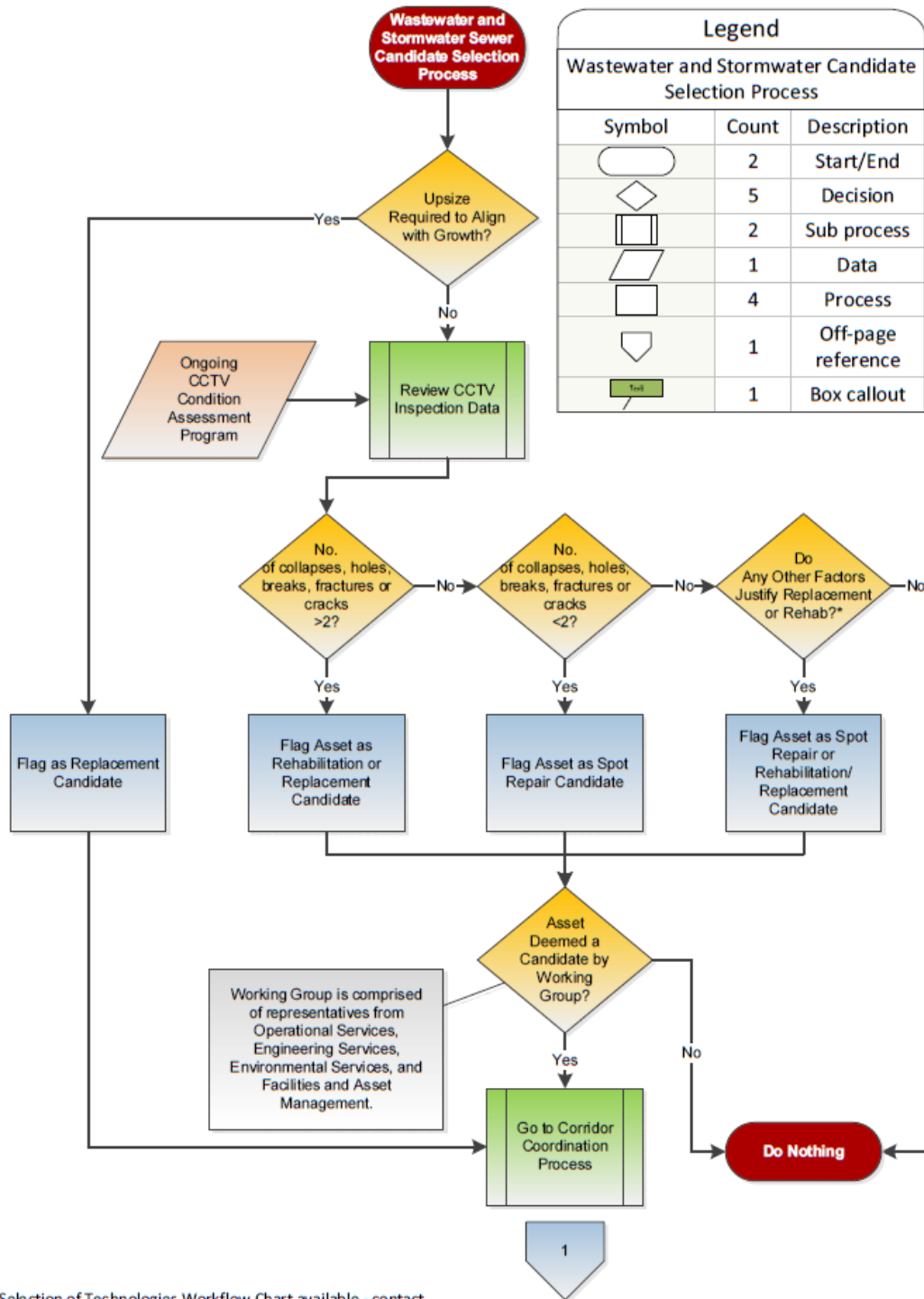


Figure 8: Water Linear Assets Business Process



\*Selection of Technologies Workflow Chart available - contact Capital Planning

Figure 9: Wastewater Linear Assets Business Process



\*Selection of Technologies Workflow Chart available - contact Capital Planning

Figure 10: Stormwater Linear Asset Business Process

### **1.4.2. LIFECYCLE ACTIVITIES**

A list of the planned Lifecycle Activities, annual cost, and frequency for each Environmental Asset Class can be found in **Table 6** below. These activities are currently being undertaken to maintain Environmental assets and therefore maintain the current levels of service.

Lifecycle activities occur on each of our Environmental asset classes. Water asset activities are dictated by the Safe Drinking Water Act, 2002, the Drinking Water Works Permit and O. Reg. 453/07. Wastewater and Stormwater activities follow the Ontario Water Resources Act and the Environmental Protection Act. Certain Stormwater and Wastewater assets require Environmental Compliance Approvals (ECAs).

Environmental assets are mostly maintained by staff from Environmental Services. Some maintenance of storm catchbasins, ditches and outfalls is performed by Operational Services. Activities are currently tracked through a combination of Cartegraph (AIM), the public works work management system; Avantis, which is in the process of being phased out, the City's utility billing system, Excel and paper work orders. When all activities on these assets are integrated into Cartegraph, the City will have a better understanding of the frequency and costs associated with these activities.

Due to data limitations at this time, the City will maintain the lifecycle activities which have been performed in the past and activities listed will be updated as improved data becomes available. Further discussion regarding Environmental proposed Levels of Service can be found in **Section 1.5.5 Proposed Levels of Service Discussion**. Costing in **Table 6** is based predominately on the operating budget, some repair or replace activities may also receive funding from the capital budget. The variance in cost for the same lifecycle activities for different asset types is partially attributable to whether the staff cost could be determined. The City will work to standardized the inclusion of staff costs and capital costs, where applicable, in individual lifecycle activities in future iterations of the AMP.

Table 6: Lifecycle Activities for Environmental Assets

Asset Type	Asset SubType	Lifecycle Activity	Annual Cost*	Frequency	Completed by
Water	Watermain	Flushing	\$4,690,000	Dead ends twice per year and biweekly in areas with low chlorine residual, and As Needed after shutdown.	Water Distribution and Wastewater Collection
		Repairs		As Needed	Water Distribution and Wastewater Collection
	Water Valves	Exercise & Inspection		5 years	Water Distribution and Wastewater Collection
		Repairs		As Needed	Water Distribution and Wastewater Collection
	Water Service	Exercise shut off (>38mm)		As Needed	Water Distribution and Wastewater Collection
		Repairs		As Needed	Water Distribution and Wastewater Collection
	Automatic Flushers (encompassed under Valves)	Inspection		Biweekly	Water Distribution and Wastewater Collection
		Repairs		As Needed	Water Distribution and Wastewater Collection
	Hydrants	Inspection		Annually	Water Distribution and Wastewater Collection
		Painting		5 year rotation	Water Distribution and Wastewater Collection
		Repairs		As Needed	Water Distribution and Wastewater Collection
	Water Meters	Inspection		>3" annually	Water Distribution and Wastewater Collection
		Calibration / Testing		>3" annually	Water Distribution and Wastewater Collection
		Seasonal Removal / Install		Annually	Water Distribution and Wastewater Collection, Parks Services
		Repairs	As Needed	Water Distribution and Wastewater Collection	
	Water Treatment Plant	Condition Assessment	\$100,000	Periodic	Asset Management
		Utilities	\$950,000	Daily	Water Operations
		Chemicals	\$1,170,000	Per Operating Procedures	Water Operations
		Repairs	\$7,565,000	As Needed	Water Operations Contractor
		Operations & Maintenance		Per Operating Procedures	Water Operations
Bulk Water Station	Backflow Inspection	\$380,000	Annually	Water Distribution and Wastewater Collection	

Asset Type	Asset SubType	Lifecycle Activity	Annual Cost*	Frequency	Completed by
		Winter Check Inspection		Seasonally	Water Distribution and Wastewater Collection
		Repairs		As Needed	Water Distribution and Wastewater Collection
	Pump Stations	Operations & Maintenance		Per Operating Procedures	Water Operations
		Condition Assessment		\$75,000	Periodic
Wastewater	Pump Station	Operations & Maintenance	\$115,000	Based on SOP intervals	Wastewater Operations
		Repairs		As Needed	Wastewater Operations
	WWTP	Operations & Maintenance Activities	\$4,477,000	Based on SOP intervals	Wastewater Operations
		Repairs		As Needed	Wastewater Operations
		Utilities	\$1,000,000	Daily	Wastewater Operations
		Chemicals	\$1,535,000	Per Operating Procedures	Wastewater Operations
	Forcemain	Condition Assessment	\$75,000	As Needed	Contracted Service - Water Distribution and Wastewater Collection
		Repairs	\$4,735,000	As Needed	Contracted Service - Asset Management
	Gravity Main	Spot Repairs		As needed	Contracted Service - Water Distribution and Wastewater Collection
		Lining		As needed	Contracted Service – Design & Construction
		Cleaning		1 every 5 years	Water Distribution and Wastewater Collection
		Grouting		As needed	Water Distribution and Wastewater Collection
		CCTV Inspection		1 every 10 years	Contracted Service - Asset Management
		Reaming		As needed	Water Distribution and Wastewater Collection
		Root Cutting		As needed	Water Distribution and Wastewater Collection
		Wastewater Services		Lining	As needed

Asset Type	Asset SubType	Lifecycle Activity	Annual Cost*	Frequency	Completed by
		Top Hat Installation		As needed	Contracted Service - Water Distribution and Wastewater Collection
		CCTV Inspection		As needed	Contracted Service - Asset Management
		Repairs		As needed	Water Distribution and Wastewater Collection
	Maintenance Holes	Inspection		Visual inspection as entered	Water Distribution and Wastewater Collection
		Repairs		As needed	Water Distribution and Wastewater Collection
		Seal		As needed	Contracted Service - Water Distribution and Wastewater Collection
		Flow Monitoring		\$19,000 per location	As needed
		CCTV Inspection and Cleaning		\$4.21/m	As needed
Siphons	Critical Siphons Inspection and Cleaning	Included in \$4,735,000 cost above	Every 2 Weeks	Water Distribution and Wastewater Collection	
Stormwater	Stormwater Sewer	CCTV Inspection	\$4.21/m	1 every 10 years	Contractor
		Flow Monitoring	\$19,000 per location	As needed	Contracted Service - Asset Management
		Grouting	\$1,438,000	As needed	Water Distribution and Wastewater Collection, Contractor
		Cleaning		1 every 10 years	Water Distribution and Wastewater Collection, Contractor
		Repairs		As needed	Water Distribution and Wastewater Collection, Contractor
	Pump Station	Operations & Maintenance	\$85,000	Per Standard Operating Procedures	Wastewater Operations
		Repairs		As needed	Wastewater Operations
	Stormwater Service	Cleaning	Included in \$1,438,000 above	As needed	Water Distribution and Wastewater Collection, Contractor
CCTV Inspection		As needed		Water Distribution and Wastewater Collection,	

Asset Type	Asset SubType	Lifecycle Activity	Annual Cost*	Frequency	Completed by	
					Contractor	
		Repairs		As needed	Water Distribution and Wastewater Collection	
	Inlet	Catchbasin Cleaning		Once every 5 years	Water Distribution and Wastewater Collection, Contractor	
		Catchbasin Internal Inspection		When cleaned	Water Distribution and Wastewater Collection, Contractor	
		Catchbasin Grate Cleaning		\$2,000 per day	Once per year	Operational Services
		Critical (Hot Spot) Catchbasins Cleaning		\$2,000 per day	Before weather event	Operational Services
	Manholes	Inspection and Cleaning	Included in \$1,438,000 above	As needed	Operational Services	
		Repairs		As needed	Water Distribution and Wastewater Collection, Operational Services	
	Oil and Grit Separator	Inspection	Included in \$1,438,000 above	Twice per year	Water Distribution and Wastewater Collection	
		Cleaning		As needed	Water Distribution and Wastewater Collection	
	Flood Gate	Status Inspections	\$12,000	Monthly	Operational Services	
		Exercise Valves	\$16,000	2x per year	Operational Services	
		Repairs		As needed	Operational Services, Contractor	
		Operate Gates	\$19,000	As needed	Operational Services	
		Formal Condition Assessment	\$100,000	Periodic	Asset Management, Operational Services	
	Stormwater Ponds	Inspections	\$70,000	Visual quarterly	Water Distribution and Wastewater Collection	
		Cleaning		As needed	Water Distribution and Wastewater Collection	
		Grass Cutting		5 times per year	Water Distribution and Wastewater Collection	
		Debris Removal		As needed	Operational Services	

Asset Type	Asset SubType	Lifecycle Activity	Annual Cost*	Frequency	Completed by
		Repairs		As needed	Water Distribution and Wastewater Collection Contractor
		Condition Assessments	\$7,000 per pond	As needed	Contractor, Asset Management
	Ditches	General Maintenance	\$5,000 – 8 hour day	Ad Hoc	Operational Services
		Inspection	\$1,200 per day	Twice per year	Operational Services
		Condition Assessment	\$100,000	As needed	Contractor, Asset Management
		Reshaping & Repairs	\$10,000 per day	As needed	Operational Services, Contractor
		Cleaning & Debris Removal	\$1,200 per day	As needed	Operational Services
		Cleaning & Debris Removal	\$1,200 per day	2x per year	Operational Services
	Outfalls	Creek Maintenance Tree removal	\$6,000 per day	Every 3 months	Operational Services
		Repairs	\$25,000	As needed	Operational Services
		Condition Assessment	Included in ditches Condition Assessment cost	As needed	Contractor, Asset Management

\*2025 Annual Cost is typically based on the operating cost reported through NWWBI (National Water and Wastewater Benchmarking Initiative) inflated to 2025 as required. Where an NWWBI value is unavailable, an average of the 3 year cost estimates presented in the 2025 Operating Budget is used instead.

### 1.4.3. RISKS OF LIFECYCLE ACTIVITIES

The identified lifecycle activities in **Table 6** above are the current and proposed lifecycle activities taken on by City staff or hired contractors. Some risks associated with these activities include:

- **Traffic Accidents** - when performing maintenance in the vicinity of travelling vehicles, there is a risk of a traffic accident. This is mitigated by implementing a traffic control plan and wearing high visibility clothing during maintenance activities in the right of way;
- **Falling** – Some activities require working from heights and there is a risk of falling. This risk is mitigated by having maintenance personnel trained on all equipment and having fall arrest training where required.
- **Operator Error** – When operators are operating equipment, there is a risk of an operator related accident. This risk is mitigated by ensuring all operators have the required licenses and are trained on equipment.
- **Confined Space** - There are always risks associated with confined space entries, technicians are trained and standard operating procedures are followed to complete the task safely.
- **Equipment Failure** - Equipment failure can occur during maintenance activities and this is mitigated by ensuring preventative maintenance is completed at regular intervals.
- **Contamination** – When completing maintenance there is a possibility of contaminating drinking water or nearby water sources. Contamination can occur as a result of soil containing heavy levels of petroleum or other natural contaminants. This risk is mitigated by following standard operating procedures such as keeping positive pressure on the watermain. If contamination does occur, additional standard operating procedures are to be followed.
- **Utility Impact** – When digging into soil to locate a buried asset, there is a possibility of hitting a buried utility line. This is mitigated by ensuring locates are completed prior to digging.
- **Non-Accessible Easements** – There are a number of easements in the City which are considered non-accessible due to private obstructions (e.g. sheds) or natural terrain and affect the City's ability to complete preventative maintenance. The City is currently working to secure contracts to have roadways built at each location to access these assets.
- **Major Storm Events** – Ground conditions during storm events may make completing certain maintenance activities difficult on storm assets. This is mitigated by completing maintenance before the storm event occurs by monitoring weather patterns.

However, if these activities were not completed, the risks would include:

- **Safety Hazards to Environment and People** due to undetected issues posing safety risks if inspections were not completed in a timely fashion or safety risks which were not remedied promptly (e.g. oil and grit separator failure);
- **Service Disruptions or Backups** due to premature failures that could have been mitigated with preventative maintenance (e.g. valve failure from not exercising valves, debris in stormwater sewer causing backups);
- **Water Quality Issues** due to lack of upkeep of assets (e.g. failing chlorine residuals due to no watermain flushing);
- **Fire Safety Issues** due to lack of upkeep of hydrants (e.g. hydrant or valve failing in an emergency because it hasn't been maintained, substandard size doesn't allow fire flow).
- **Unscheduled Service Disruptions** due to sudden closure of asset (e.g. sink hole forming due to damaged storm sewer)
- **Flooding of nearby Infrastructure** due to blocked catchbasin which was not cleared;
- **Regulatory Non-Compliance** due to failure to maintain key systems resulting in regulatory standards which are not met;
- **Negative Reputation** due to poor or deteriorating conditions of highly visible assets such as elevated storage tanks damaging the City's reputation and making it difficult to attract investment and/or residents; and
- **Increased Cost** due to reactive repairs which could have been avoided with preventative maintenance.

#### 1.4.4. 10 YEAR LIFECYCLE COSTS OF ENVIRONMENTAL ASSETS

**Figure 11** below outlines the 10 year lifecycle costs of environmental assets. As shown in the figure, the work required for the proposed LOS exceeds the work required to maintain the current LOS. The water treatment plant has been identified as requiring expansion to meet the anticipated needs of growth which is partly why the proposed LOS for that asset type is much higher than the others in the first couple of years.

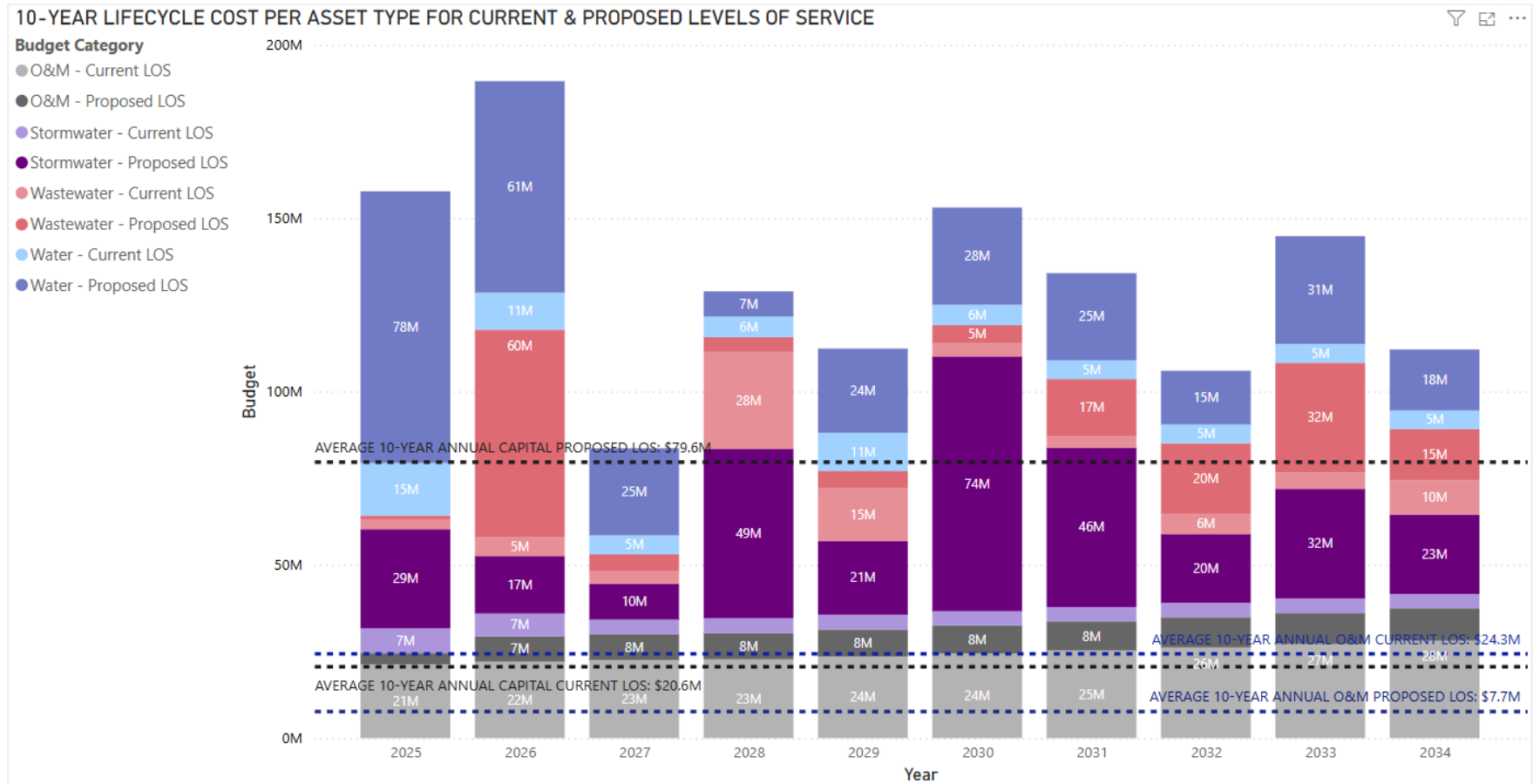
This graph includes the lifecycle cost for the assets which support the Current Levels of Service (LOS) and the assets required to support the Proposed LOS.

Based on the information presented in **Figure 11**, the total annual average capital costs for the next 10 years needed to maintain the current LOS of these Environmental assets are \$20.6M. The total annual average capital costs for the next 10 years needed to achieve the proposed LOS are \$79.6M. The average annual Operation and Maintenance costs to maintain the current level of service are \$24.3M. The average annual additional Operation and Maintenance costs to maintain the proposed level of service are \$7.7M. To determine the total estimated operating costs in a given year, the proposed LOS operating costs should be added to the current LOS operating costs. Therefore it is recommended that the City invest \$100.2M in Environmental assets annually for capital work to maintain the current LOS and achieve the proposed LOS. It is recommended that \$32.0M be invested annually for operating costs to maintain the current LOS and achieve the proposed LOS.

It is important to note that this figure and associated costing was developed separately from other corridor assets (i.e. watermain & services, wastewater gravity pipe, maintenance holes, & services, and roadway), in reality these assets would be considered in tandem when considering a corridor section in the City in order to obtain cost efficiencies during design and construction where possible.

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**Figure 11: 10-Year Lifecycle Cost Per Environmental Asset Type for Current & Proposed Levels of Service**

**Notes:**

- O&M Costs are estimated based on the 2025 Preliminary Operating Budget and are inflated by 3.8% each year.
- For assets where no formal capital forecast was available, the replacement year is based on the estimated remaining service life of each asset or the condition assessment of each asset, as applicable.
- Assets with formal condition assessments which contained forecasting (i.e. Pump Stations) were included based on the estimated replacement/repair year in those assessments.

Per **Figure 12** below, the existing 10-year forecast from 2025 – 2034, further explained in **Section 8.3** of the **Asset Management Plan Overview Document** , indicates that the City is currently planning to spend an average of \$52.5M on environmental assets capital work annually, and as noted above, the required 10-year average amount is \$100.2M to maintain the current LOS and achieve the proposed LOS for these assets. Therefore, there is an annual funding gap of \$47.7M for Environmental assets. The impacts resulting from these funding gaps will be monitored and reported as appropriate.

The City of Brantford is currently moving to a four (4) year budget cycle and departments will complete long term planning as opposed to annual planning for projects within this time period. The Prioritization Matrix explained in **Section 9** of the **Asset Management Plan Overview Document** has also been implemented which will help departments confirm priority projects. It is anticipated that the new process for the City's 2024 budget cycle will help departments prepare and request funding in advance of significant replacement costs for assets reaching the end of their useful life.

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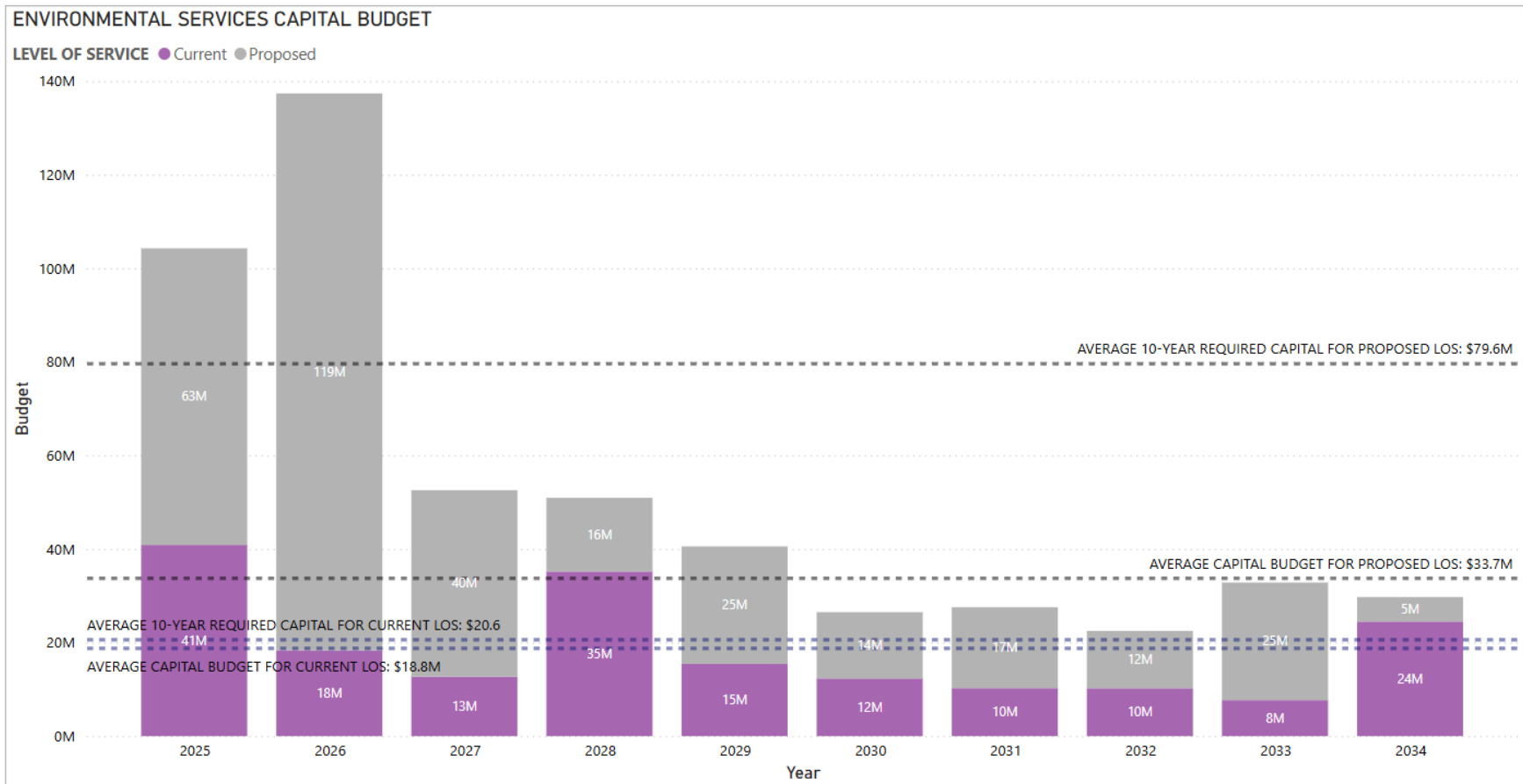


Figure 12: Existing Capital Budget Forecast from 2025 – 2034 for Environmental Assets

## 1.5. CURRENT & PROPOSED LEVELS OF SERVICE

### 1.5.1. O.REG 588/17 CUSTOMER LEVELS OF SERVICE

The customer levels of service as dictated by O. Reg 588/17 are described below.

1. *Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system.*

Approximately 97.6% of properties are connected to the municipal water system. A map of the connected properties can be found in **Figure 13**. Areas not connected to the municipal water system are typically rural areas and empty lots. The municipal water system in Tutela Heights transitioned to the City system from the County system in late 2024.

The City is currently anticipating a large amount of growth within the boundary expansion lands obtained from the Count of Brant in 2017. It is currently anticipated that all newly built areas will connect to the municipal water system. This will result in an overall increase to 98.0% of properties being connected to the municipal water system. The exact timing of development is currently unknown. The full 2051 anticipated built out area is included here as a substantial portion may be completed in the next 10 years. Depending on market conditions, it may take until the 2051 planning horizon for all anticipated new structures to be required and built. Future iterations of the AMP will recalculate the percentage based on actual new properties built to date and the updated forecasted timing. The anticipated properties connected to the municipal water system in 2034 are shown in **Figure 14**.

2. *Description, which may include maps, of the user groups or areas of the municipality that have fire flow.*

Based on the 2020 Master Servicing Plan (MSP), approximately 86% of properties have known fire flow available, however, there are some unknowns in this MSP data and so it is anticipated that a higher percentage of properties have fire flow than what is represented. Although it has been shown that where hydrants are connected, fire flow is available, during the MSP, there were junctions where fire flow deficiencies were identified and these junctions can be found in **Figure 15**.

It is important to note that the City also has an agreement with the County of Brant for the use of tankers for areas that are not serviced by hydrants. The City is currently applying for the superior water shuttle certification through Fire Underwriters Survey (FUS), and once that rating is obtained, non-hydrant

services areas will be considered to be serviced the same as hydrant serviced areas. The anticipated fire flow deficiencies in 2034 are shown in **Figure 16**.

The growth areas are anticipated to have adequate fire flow once new infrastructure servicing these areas is installed.

3. *Description of boil water advisories and service interruptions.*

There have been three (3) boil water advisories (BWAs) over the last three (3) years at the City of Brantford. The most recent BWA was in August 2023 and was due to contamination from a construction project, and not due to infrastructure deficiencies. There were 19 watermain breaks in 2024 which resulted in service interruptions. The majority of service disruptions took one (1) day or less to resolve.

4. *Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system.*

Approximately 89% of properties are connected to the municipal wastewater system. A map of the connected properties can be found in **Figure 17**. Areas not connected to the municipal wastewater system are typically rural areas recently acquired during the boundary expansion which are connected to a septic system, or are empty lots. It can also be seen in **Figure 17** that there are areas which are likely serviced but are currently unknown in GIS, mostly in newer subdivision areas. These areas will be included in future iterations of the AMP.

The City is currently anticipating a large amount of growth within the boundary expansion lands obtained from the Count of Brant in 2017. It is currently anticipated that all newly built areas will connect to the municipal wastewater system. However, some existing built out areas, currently on septic, may remain on septic beyond the 2034 time period of this AMP. This will result in an overall increase to 93% of properties being connected to the municipal wastewater system. The exact timing of development is currently unknown. The full 2051 anticipated built out area is included here as a substantial portion may be completed in the next 10 years. Depending on market conditions, it may take until the 2051 planning horizon for all anticipated new structures to be required and built. Future iterations of the AMP will recalculate the percentage based on actual new properties built to date and the updated forecasted timing. The anticipated properties connected to the municipal wastewater system in 2034 are shown in **Figure 18**.

5. *Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes.*

The City of Brantford does not contain any combined sewers and so overflow structures necessary for combined sewers during storm events are not applicable.

Although there are no combined sewers in the City, there are areas where potential overflows from stormwater into wastewater may occur, which the City is actively locating and repairing/replacing where found.

6. *Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches.*

The City of Brantford does not contain any combined sewers and so the frequency and volume of overflows necessary for combined sewers during storm events are not applicable.

7. *Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes.*

Inflow and infiltration from stormwater into wastewater pipes is an issue in most wastewater networks. When stormwater enters a wastewater pipe, it can cause the wastewater system to exceed its design capacity because the network and treatment plant were not designed to handle the additional, large flows often caused by storm events. Although wastewater systems in Brantford are not directly connected to the storm system (i.e. no combined sewers), stormwater can infiltrate into the wastewater system in the following ways:

#### Infiltration

- Holes, cracks & defective joints in the gravity main pipes especially at low points in the system (e.g. at pump stations) can allow groundwater infiltration;
- Leaky maintenance hole covers can allow rainwater into wastewater maintenance holes.

#### Inflow

- Illegal sump pump, downspout, and drain connections directly pumped into wastewater main instead of storm.

8. *Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described above.*

If enough stormwater gets into the wastewater network, the design capacity of the network (including pipe size, pump station capacity, plant capacity) can be overloaded, and/or silt from stormwater runoff can clog piping, both of these can cause backups through the wastewater gravity main into the wastewater service or causing overflows into streets through the connected maintenance holes.

The City avoids the above scenario by:

- Ensuring Inflow & Infiltration (I&I) is considered during the design stage for any new wastewater infrastructure;
- Installing level monitors at strategic locations in the City to warn of surcharges in the network and responding appropriately if the monitors show dangerously high levels;
- Implementing an annual flow monitoring program in wastewater catchment areas to see if the City needs to increase design capacity in certain areas;
- Monitoring I&I by installing rain gauges throughout the City to compare our wastewater flows during wet weather conditions;
- A future implementation is to incorporate new maintenance hole covers to prevent infiltration from leaky maintenance hole lids.

9. *Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system.*

Municipal wastewater treatment facilities in Ontario are required to be in compliance with effluent (outflow of treated water to natural water body) limits issued by the Ministry of Environment, Conservation and Parks (MECP). The MECP issues Environmental Compliance Approvals (ECAs) to wastewater treatment facilities in the province. The ECA outlines a number of items but most notably are the effluent limits. In the case of the Brantford WWTP, the City has limits for carbonaceous Biochemical Oxygen Demand (cBOD5), Total Suspended Solids (TSS) and Total Phosphorus (TP). These limits have been maintained at the same level by the Ministry for many years and are achieved with modern technologies and operator skillsets. As a result, the Brantford WWTP has been in compliance for many years, and is also well below the current effluent limits. This data is summarized in the Annual Wastewater Report that is submitted to MECP. Based on some upcoming projects in the 10 year capital forecast, an amendment to the ECA may be required which could lower the effluent limits.

*10. Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system*

The City of Brantford is bisected by the Grand River, and as a result, there is a floodplain along the length of the river. The floodplain included in **Figure 19** is provided by the Grand River Conservation Authority (GRCA), and shows the approximate limits of the floodplain. A 16.9km levee exists along the river, which is owned by GRCA. The levee includes 41 flood gates along its length, which are operated and maintained by the City of Brantford. The GRCA and City of Brantford have a maintenance agreement for how maintenance activities occur on these assets. The levee and flood gates protect surrounding properties in the floodplain during a flood event. These flood gates are typically open in non-emergencies to outlet stormwater to the Grand River, but they are closed in flood emergencies where the river exceeds the height of the gates so that the flood waters do not enter and overwhelm the municipal system causing flooding.

The City is currently anticipating a number of development projects within areas protected by the levee system. To ensure concerns associated with building in the flood plain are addressed the City's Official Plan includes Special Policy Areas 1 and 2, as shown in **Figure 20**. These policy areas include provisions such as basements and crawlspaces not being permitted in new developments, set minimum elevations for the first floor, and requirements for the mechanical and electrical service equipment to be installed above the first floor elevation.

In addition, based on **Figure 21** it can be seen that the municipal network is rated for two (2) and five (5) year storms depending on the area of the City. It is a City initiative to upgrade the areas rated for two (2) year storms to five (5) year storms. By 2034 it is expected that a number of locations will be upgrade as shown in **Figure 22**. In addition, ditches which collect overland flow throughout the City are rated for 100 year storms and further increase protection in areas where they are present.

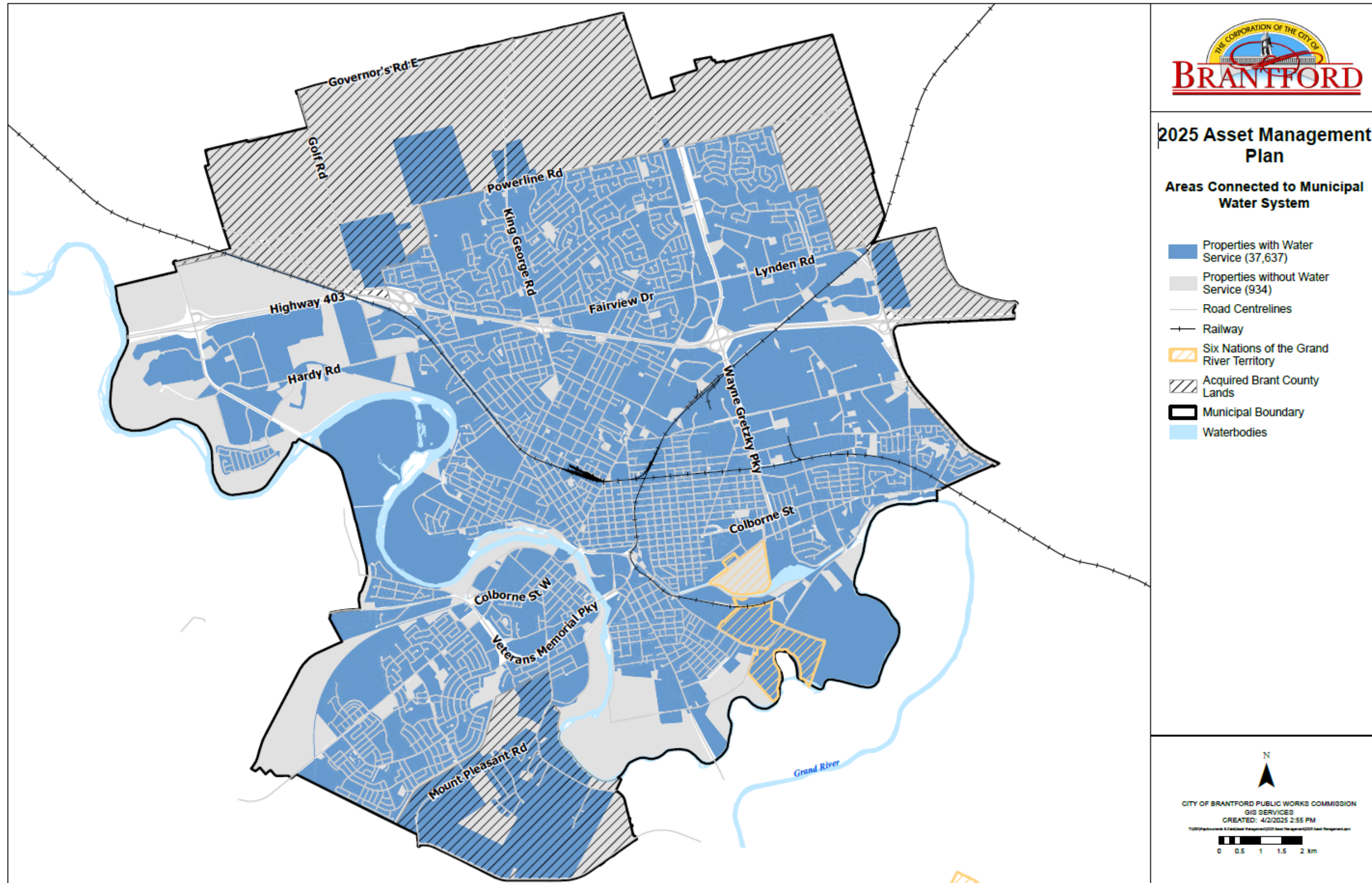


Figure 13: Map of Areas connected to municipal water system

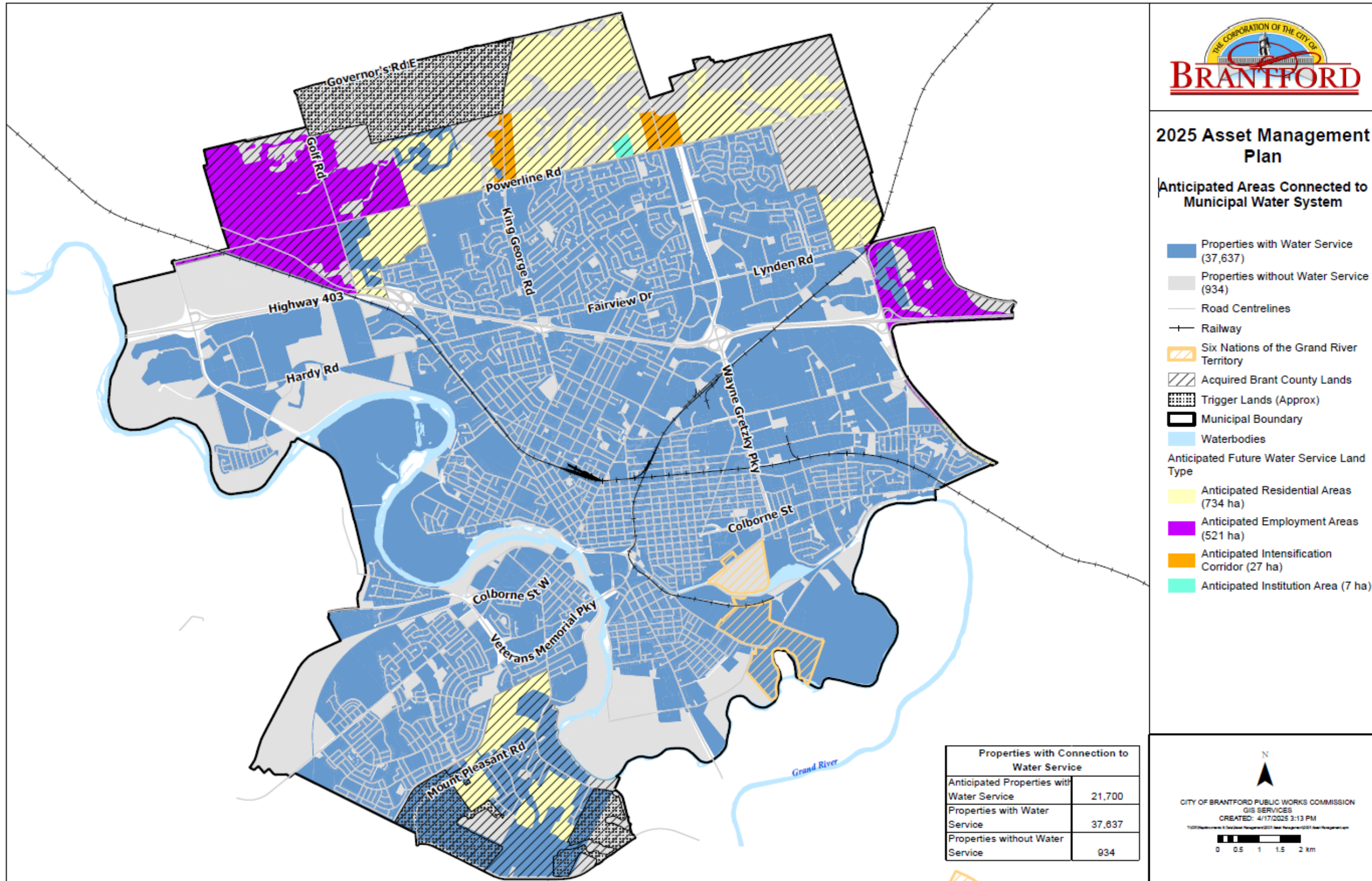


Figure 14 Anticipated Map of Areas Connected to the Municipal Water System in 2034

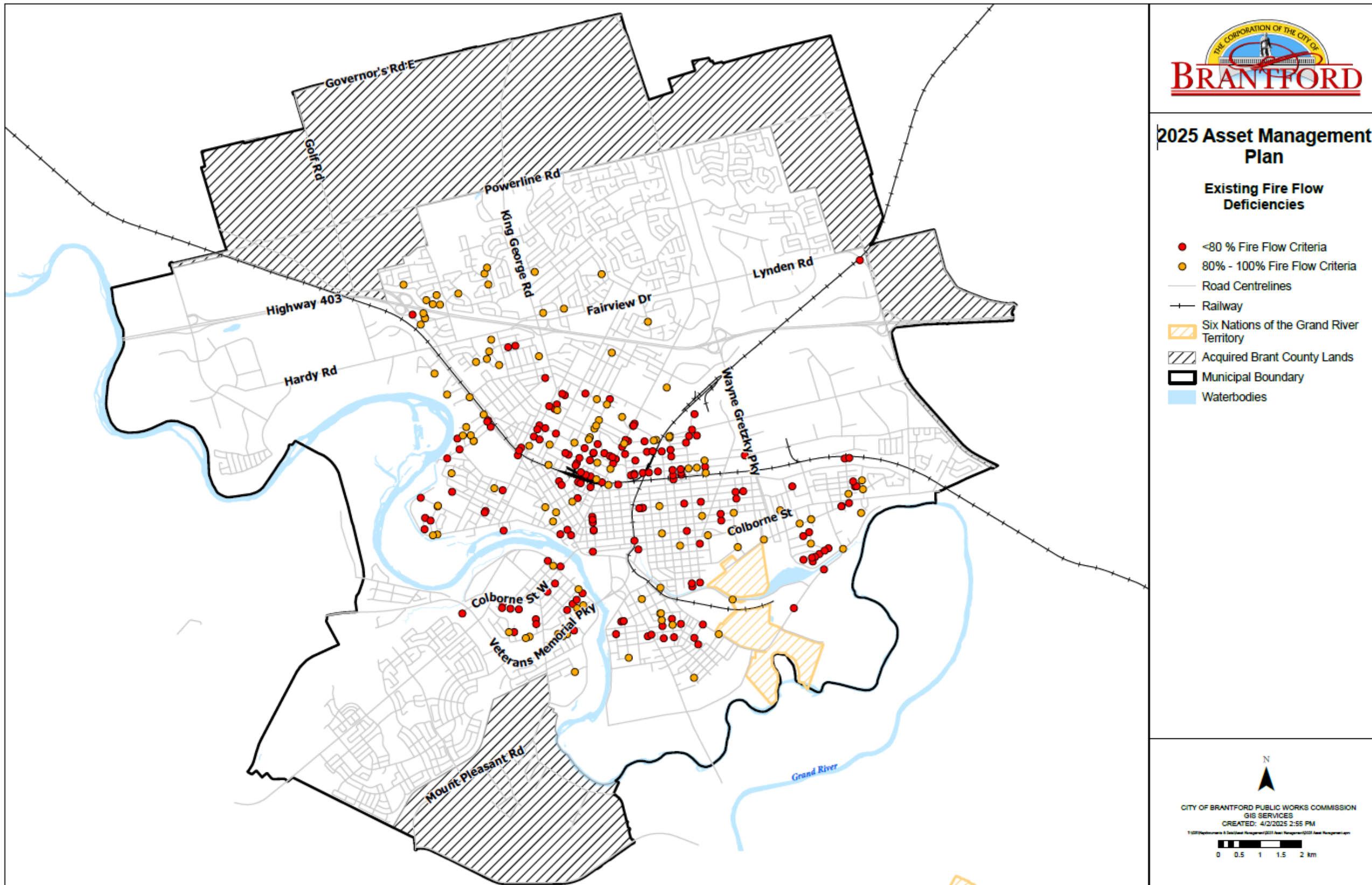


Figure 15: Map of existing fire flow deficiencies

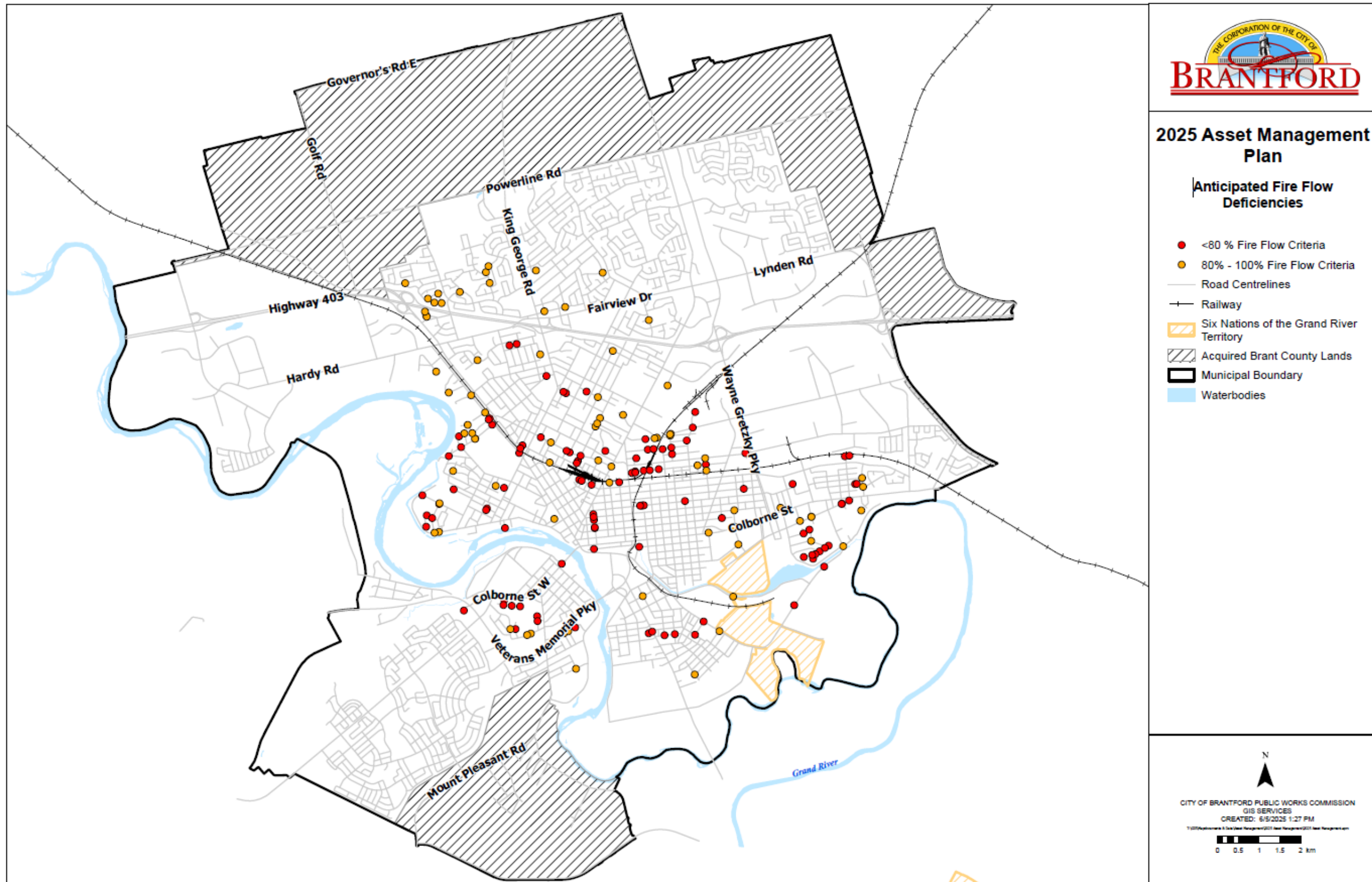


Figure 16 Anticipated Fire Flow Deficiencies in 2034

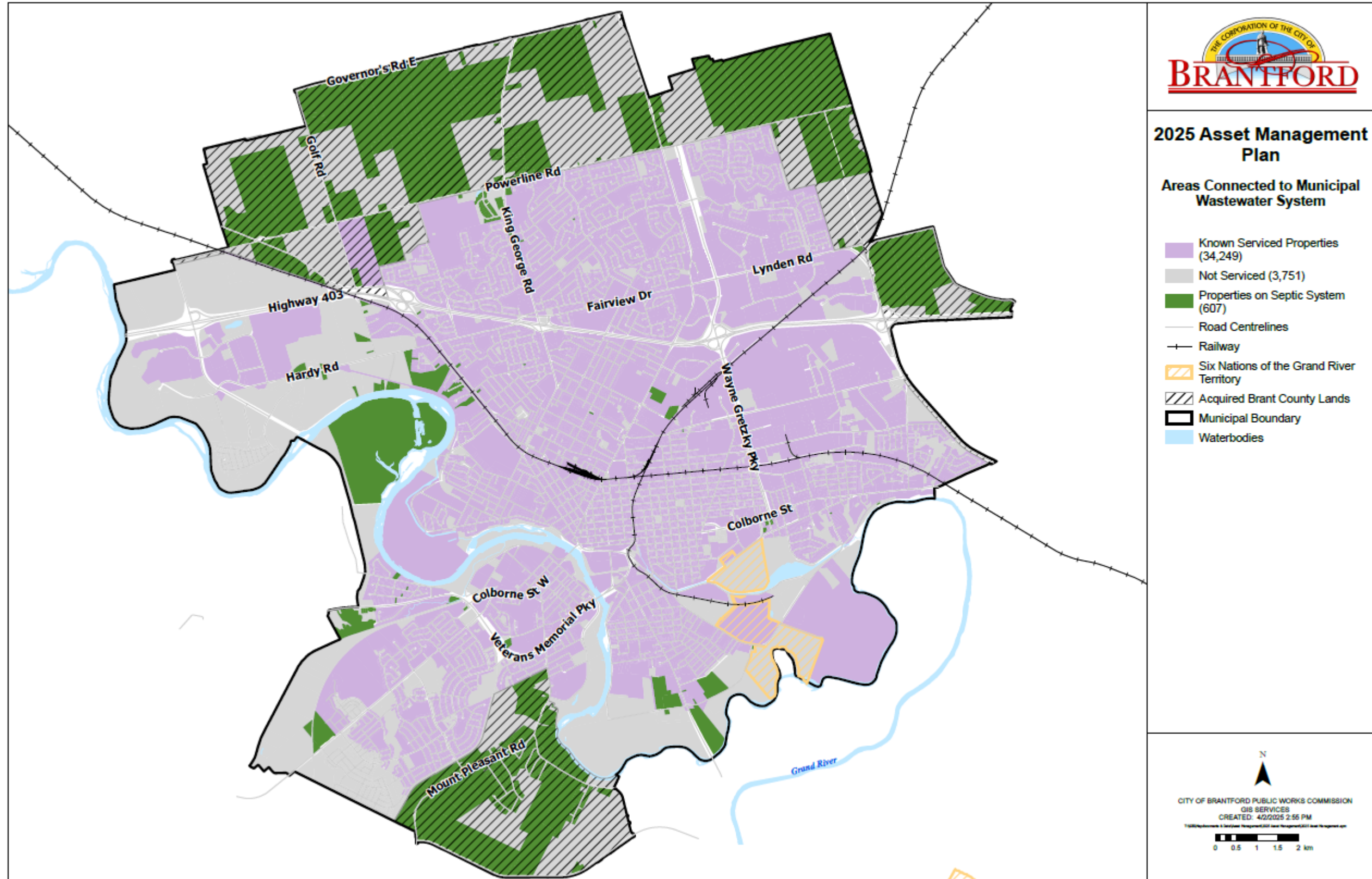


Figure 17: Areas connected to the municipal wastewater system

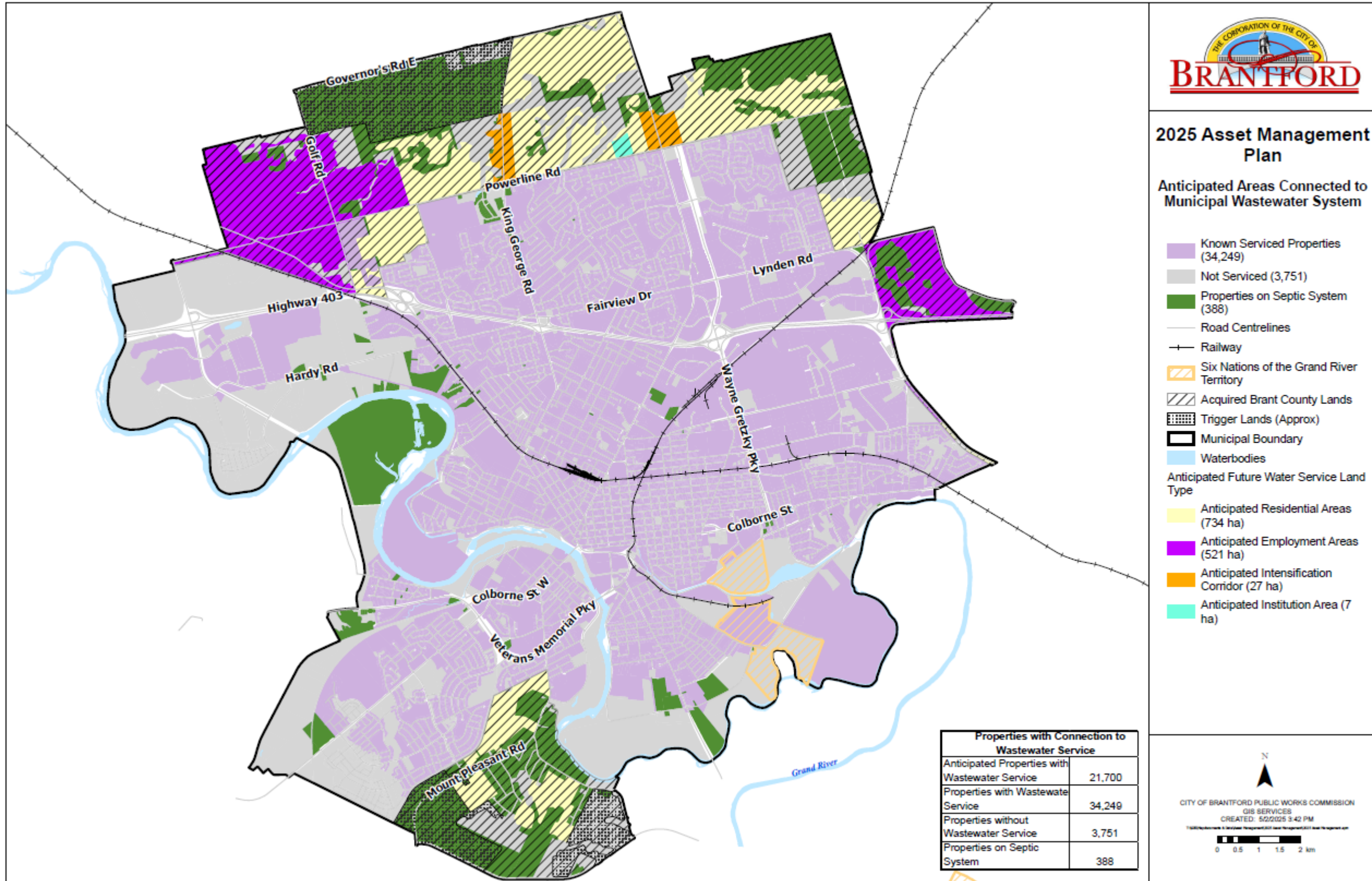


Figure 18 Anticipated Map of Areas Connected to the Municipal Wastewater System in 2034

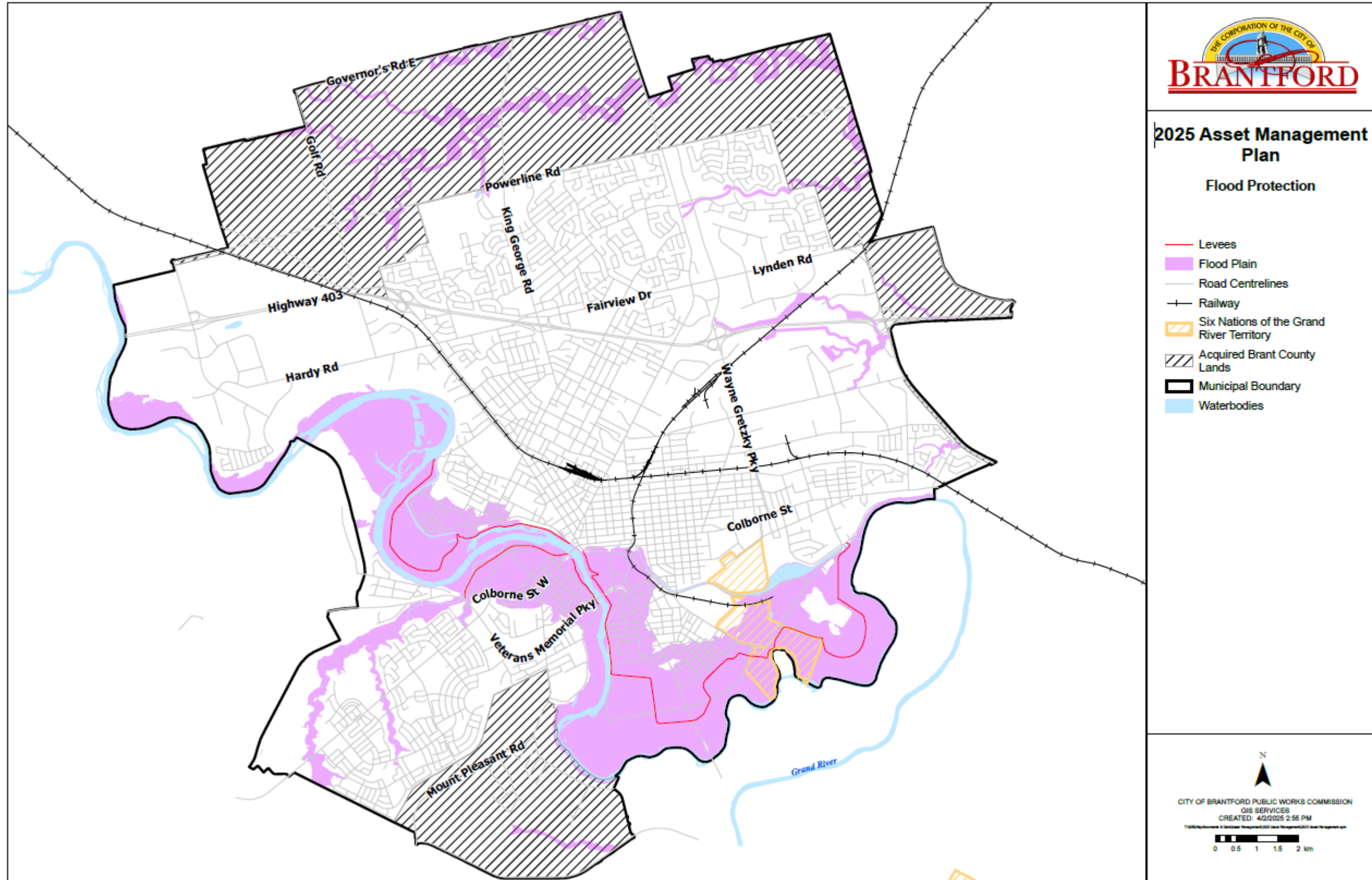


Figure 19: Flood Protection Map

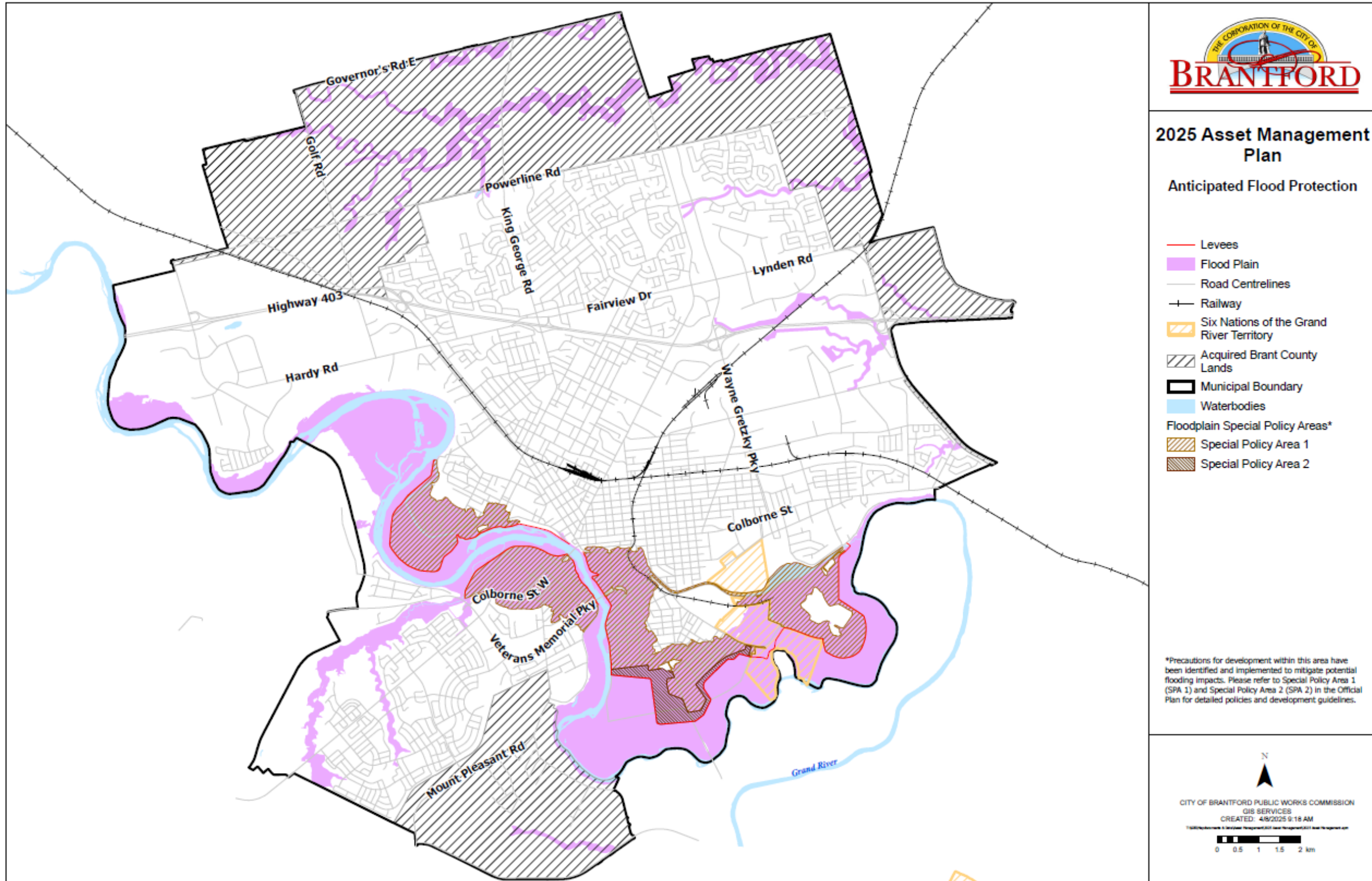


Figure 20 Anticipated Flood Protection Map in 2034

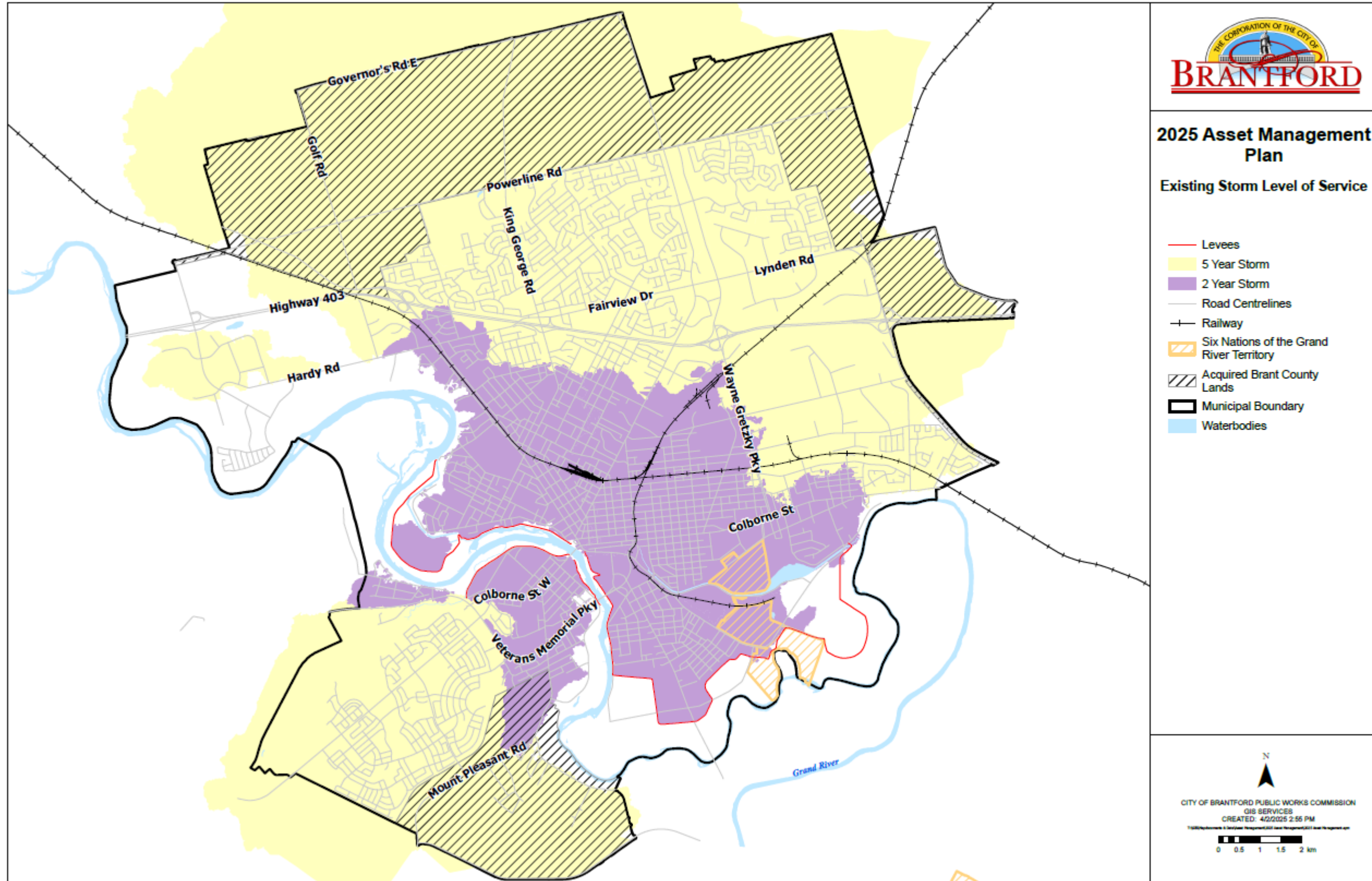


Figure 21: Existing Stormwater Network Level of Service

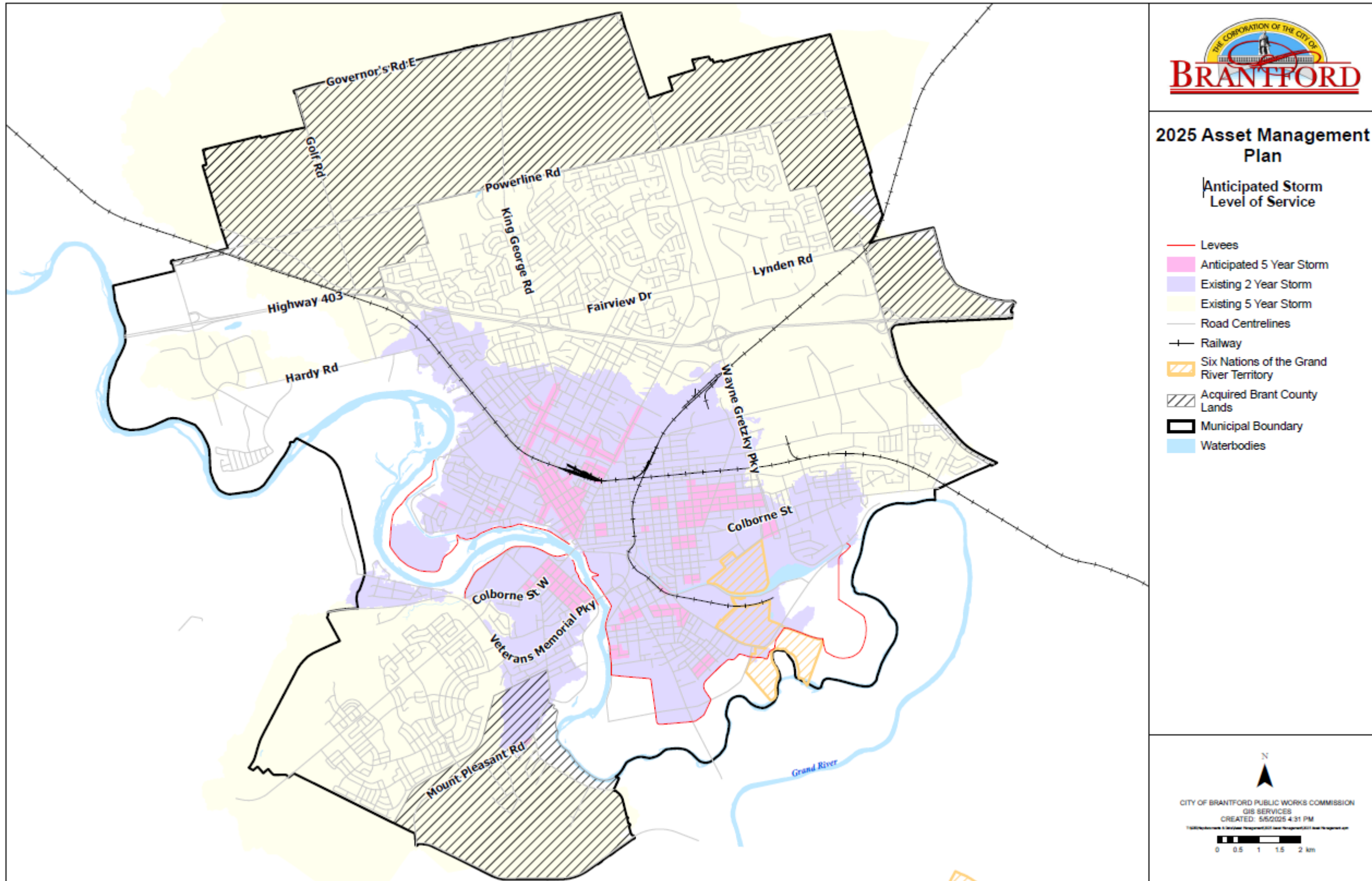


Figure 22 Anticipated Stormwater Network Level of Service in 2034

**1.5.2. O.REG 588/17 TECHNICAL LEVELS OF SERVICE**

The technical levels of service as dictated by O. Reg 588/17 can be found in **Table 7** below.

**Table 7: O.Reg 588/17 Water Technical Levels of Service**

Service	Service attribute	Technical levels of service (technical metrics)	Current LOS		Proposed LOS										LOS Option
			2019	2020	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Water	Scope	1. Percentage of properties connected to the municipal water system.	94.1%	93.7%	97.6%	97.6%	97.7%	97.7%	97.8%	97.8%	97.9%	97.9%	98.0%	98.0%	Increase
		2. Percentage of properties where fire flow is available.	N/A	86.4%	86.9%	87.7%	88.5%	89.3%	90.1%	90.9%	91.7%	92.5%	93.3%	94.3%	Increase
	Reliability	1. 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 connection days of 30,444 connected properties	0 connection days of 30,661 connected properties	0	0	0	0	0	0	0	0	0	0	Maintain
		2. 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.	3,638 connection days*	4,086 connection days*	742 connection days*	1,000 connection days*	1,000 connection days*	1,000 connection days*	1,000 connection days*	1,000 connection days*	1,000 connection days*	1,000 connection days*	1,000 connection days*	1,000 connection days*	Maintain
Wastewater	Scope	Percentage of properties connected to the municipal wastewater system.	93.4% of 32,363 properties	93.0% of 32,717 properties	88.7%**	88.9%	90.0%	90.1%	90.3%	90.5%	90.7%	90.8%	90.9%	91.0%	Increase
	Reliability	1. 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.	Not Applicable (N/A)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		2. 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	0	0	0	0	0	0	0	0	0	0	0	Maintain
		3. 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	0	0	0	0	0	0	0	0	0	0	0	Maintain
Stormwater	Scope	1. Percentage of properties in municipality resilient to a 100-year storm.	N/A	55.4%	55.4%***	57.0%	57.8%	57.8%	57.8%	57.8%	57.8%	58.6%	59.0%	60.0%	Increase
		2. Percentage of the municipal stormwater management system resilient to a 5-year storm.	N/A	52.3%	56.3%	56.8%	57.2%	57.7%	58.2%	58.7%	59.2%	59.7%	61.2%	61.2%	Increase

\*Connection days is defined as "the number of properties connected to a municipal system that are affected by a service issue, multiplied by the number of days on which those properties are affected by the service issue".

\*\*Due to improved WW service data, number of properties decreased in 2025 from 2020.

\*\*\*Number comes from the MSP, next update is expected in Fall 2025 so targets are expected to change by the next iteration of the AMP. Level of service is expected to improve as new development areas are constructed due to more stringent criteria for stormwater management.

### 1.5.3. MUNICIPALLY DEFINED CUSTOMER LEVELS OF SERVICE

The customer levels of service are defined in **Section 6.2** of the **Asset Management Plan Overview**. For Environmental assets, the asset specific interpretation of these levels of service is defined below in **Table 8**.

**Table 8: Municipally Defined Customer Levels of Service**

<b>Customer Level of Service</b>	<b>Definition</b>
<b>Accessibility</b>	Environmental assets should be accessible to all customers connected to the municipal water, wastewater and stormwater networks without barriers in place.
<b>Quality</b>	Environmental assets should deliver their intended purpose at a certain quality, assets should have sufficient capacity and be in a state of good repair.
<b>Cost Efficiency</b>	Environmental assets should be operated efficiently with extra care to minimize costs.
<b>Safety</b>	Environmental assets should be both safe to use and promote community safety, and customers should feel safe using these services.
<b>Environmental Sustainability</b>	Environmental assets should be operating as environmentally as possible and also be promoting sustainable lifestyles.
<b>Reliability</b>	Environmental assets should be available to customers connected to the municipal networks when needed.
<b>Responsiveness</b>	Environmental assets should be fixed promptly when unavoidable service disruptions occur.

In addition, the following seven (7) qualitative metrics for water distribution and treatment are used in the National Water and Wastewater Benchmarking Initiative (NWWBI) and are used in addition to the above defined Levels of Service to measure KPIs:

- Ensure Adequate Capacity
- Have Satisfied and Informed Customers
- Meet Service Requirements with Economic Efficiency
- Protect Public Health and Safety
- Protect the Environment
- Provide a Safe and Productive Workplace
- Provide Reliable Service and Infrastructure

#### **1.5.4. MUNICIPALLY DEFINED TECHNICAL LEVELS OF SERVICE**

The technical levels of service for environmental assets have been adopted based on the above defined customer levels of service in **Table 9**. The customer levels of service with the corresponding technical levels of service and KPI metrics are defined below in **Table 9**. Much of the data is based on information required for the National Water and Wastewater Benchmarking Initiative (NWWBI).

The work management project, when fully deployed, will also assist the City with identifying and adding additional KPIs in future iterations because a system will be available to formally track this data.

Table 9: Level of Service (LOS) KPIs

Customer Level of Service	Asset Class	Technical LoS	Units	2020	2023	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	LOS Option
Accessibility	Water	See Table 7 – Scope 1														
	Wastewater	See Table 7 – Scope 1														
	Stormwater	See Table 7 – Scope 1 & 2														
Quality	Water Treatment	Average value of Nitrate-Nitrogen in Treated Water Samples	mg/L	4.2	4.6	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	Increase
	Water Distribution	# of Water Pressure Complaints	Count	58	77	78	79	80	81	82	83	84	85	86	87	Maintain
	Wastewater Treatment	# of odour complaints	Count	0	0	0	0	0	0	0	0	0	0	0	0	Maintain
	Wastewater Collection	# of blockage complaints	Count	204	95	150	152	156	159	162	165	168	172	175	179	Maintain
	Stormwater Detention & Collection	# of flood investigations	Count	N/A	65	70	70	70	70	70	70	70	70	70	70	Maintain
Cost Efficiency	Water Treatment	Annual O&M Cost per ML of Water Treated	\$ per ML	\$873.86 /ML	\$745.59 /ML	\$773.92 /ML	\$803.33 /ML	\$833.86 /ML	\$865.54 /ML	\$898.44 /ML	\$932.58 /ML	\$968.01 /ML	\$1,004.80 /ML	\$1,042.98 /ML	\$1,082.61 /ML	Maintain
	Water Distribution	% of meter reads requiring a site visit	Percent	100%	100%	55%	5%	5%	3%	3%	2%	2%	1%	1%	<1%	Maintain
	Wastewater Treatment	Cost of Biosolids Disposal	\$ per tonne	\$339.55	\$289.83	\$300.85	\$312.28	\$324.15	\$336.46	\$349.25	\$362.52	\$376.3	\$390.60	\$405.44	\$420.85	Maintain
	Wastewater Collection	Cost per length of Inspecting mains with CCTV	\$ per km	\$6,641.02	\$7,431.29	\$7,713.68	\$8,006.80	\$8,311.06	\$8,626.88	\$8,954.70	\$9,294.98	\$9,648.19	\$10,014.82	\$10,395.38	\$10,790.40	Maintain
	Stormwater Detention	Cost per cu. m to remove sediment from ponds	\$ per cu. m	Not currently tracked, will be reviewed for future AMPs.												
	Stormwater Collection	Cost per km of storm sewer cleaning	\$ per km	\$3,891.36	\$4,539.24	\$4,711.73	\$4,890.78	\$5,076.63	\$5,269.54	\$5,469.78	\$5,677.63	\$5,893.38	\$6,117.33	\$6,349.79	\$6,591.08	Maintain
Safety	Water Treatment	# of days with E. coli found in water samples tested	Count	0	0	0	0	0	0	0	0	0	0	0	0	Maintain
	Water Distribution	# of property owner lead services	Count	2,490	N/A	2,182	2,082	1,982	1,882	1,782	1,682	1,582	1,482	1,382	1,282	Increase
	Wastewater Treatment	Average # of safety training hours per employee	Hours	23	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	Maintain
	Wastewater Collection	Average # of safety training hours per employee	Hours	10.3	4.7	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.8	9.0	Maintain
	Stormwater Detention & Collection	Average # of safety training hours per employee	Hours	N/A	1.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	Maintain
Environmental Sustainability	Water Treatment	Mass of dry solids in total solid waste	Dry Tonnes	2,737	2,232	2,530	2,580	2,640	2,690	2,740	3,230	3,290	3,360	3,430	3,500	Maintain
	Water Distribution	Infrastructure Leakage Index (ILI)	Index	1.41	1.65	1.4	1.2	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	Increase
	Wastewater Treatment	% of non-compliance days used in year	Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	Maintain
	Wastewater Collection	# of reported overflows due to capacity limitations	Count	0	0	0	0	0	0	0	0	0	0	0	0	Maintain
	Stormwater Detention	Not currently tracked, will be reviewed for future AMPs.														
	Stormwater	# of spills in stormwater	Count	23	13	15	15	15	15	15	15	15	15	15	15	Maintain

Customer Level of Service	Asset Class	Technical LoS	Units	2020	2023	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	LOS Option
	Collection	system														
Reliability	Water Treatment	Total raw water storage capacity	ML	51	35	35	35	35	35	35	35	38	38	38	38	Maintain
	Water Distribution	Number of Service Repairs/Replacements	Count	N/A	29	30	30	31	31	32	32	33	33	34	34	Maintain
	Wastewater Treatment	Annual volume of effluent disinfected	ML	11,882	13,198	13,462	13,731	14,006	14,286	14,572	14,863	15,160	15,464	15,773	16,088	Maintain
	Wastewater Collection	Number of Connections with Sanitary Flooding	Count	34	41	38	38	39	40	41	41	42	43	44	45	Maintain
	Stormwater Detention	Number of visual inspections of pump stations	Count	52	52	52	52	52	52	52	52	52	52	52	52	Maintain
	Stormwater Collection	Percent of Catchbasin sumps cleaned	%	26%	32%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Responsiveness	Water Treatment	Hours of attended operations	Hours per day	24	24	24	24	24	24	24	24	24	24	24	24	Maintain
	Water Distribution	% of Emergency Responses After Hours started within 30 mins	Percent	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	Maintain
	Wastewater Treatment	Hours of attended operations	Hours per day	8	8	8	8	8	8	8	8	8	8	8	8	Maintain
	Wastewater Collection	% of Emergency Responses After Hours started within 30 mins	Percent	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	Maintain
	Stormwater Detention	Hours of attended operations	Hours per day	8	8	8	8	8	8	8	8	8	8	8	8	Maintain
	Stormwater Collection	% of Emergency Responses After Hours started within 30 mins	Percent	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	Maintain

\*Data from NWWBI for 2020 & 2023. 2024 data not yet completed at the time of finalizing this report.

### 1.5.5. PROPOSED FUTURE LEVEL OF SERVICE TARGETS

For the purpose of this report and the discussion surrounding proposed future levels of service targets, there are three (3) possible options defined in **Table 10** including the risks associated with those options to the long term sustainability of the municipality.

**Table 10 Technical Levels of Service KPIs**

<b>Level of Service Development Options</b>	<b>Description</b>	<b>Risk Associated with Options</b>
Decrease Level of Service	<p>Decreasing the level of service should result in cost savings in the short term.</p> <p>E.g. Flushing is completed once every 3 weeks.</p>	<p>In some circumstances, decreasing the level of service may have little impact to the overall customer experience. In others, decreasing the level of service may result in a decreased level of customer satisfaction and could lead to safety concerns and possible damage to the City’s reputation.</p> <p>Decreasing the level of service too much for an extended period of time may result in higher costs for repairs or closure of certain assets over the long-term.</p>
Maintain Level of Service	<p>Maintaining the level of service should maintain costs with increases anticipated to reflect inflation or growth. Customer experience would also be anticipated to remain the same as well as the City’s reputation.</p> <p>E.g. Flushing is completed once every 2 weeks.</p>	<p>If the current levels of service match customer expectation and regulatory requirement, maintaining them would typically be the recommended approach.</p> <p>However if the current levels of service do not match customer expectations or regulatory requirements, then maintaining them may not be the recommended approach. Similarly, City reputation may not match with what the City would prefer. If a low level of service is maintained for too long it may lead to health and safety concerns.</p>
Increase Level of Service	<p>Increasing the level of service should result in enhanced customer experience and City reputation.</p> <p>E.g. Flushing is completed every week.</p>	<p>Increasing service would involve increased costs. Increasing the level of service too much, for an extended period of time, may become financially unsustainable for the City.</p>

Each of the technical levels of service (LOS) have been examined to see if and/or how the proposed LOS differ from the current levels of service. The majority will be following the maintain level of service option with an anticipated 2% or 3.8% increase per year. For the Quality measures this is partially due to most of these LOS being based on complaints submitted by the public. Large fluctuations in the number of customer complaints for these assets is not anticipated at this time. The number will be marginally impacted by the expected growth over the next 10 years, as it is anticipated that a substantial portion of the new population will be in areas with new or substantially rehabilitated infrastructure which will be providing a higher LOS than infrastructure in more established neighbourhoods. As a trend line is built up, this will be refined in future iterations of the AMP.

Some LOS, such as the one for % of meter reads requiring a site visit, may appear to be following a decreasing LOS as the measured amount drastically decreases over the 10 year time period. However while the site visit readings will decrease the automatic readings from new meter technology will increase. Overall this will maintain the LOS for readings but in a more cost efficient manner. Another example is the average value of nitrate-nitrogen in treated water samples. With the installation of new reverse osmosis equipment at the treatment plant, the level of nitrates is expected to decrease. However this increases the overall LOS being provided by the treatment plant.

The majority of LOS will be following the Maintain approach over the next 10 years. In some areas this is despite the fact that the quantity of overall assets is expected to increase. For example, all metrics under the Reliability category are showing an increase in overall quantity but the LOS approach is Maintain. This is due to the next 10 years being anticipated to be a period of substantial growth in population and developed area. This will result in the need for more Environmental assets, increasing the quantity. However it is not anticipated the LOS provided by the assets will change, instead the overall area which is serviced by the assets will increase. In addition, it is anticipated that there will be a lag in the necessary operating budget increases. This will result in the City either maintaining the current LOS or result in a decrease in LOS as the same resources for maintenance are required to operate and maintain an increasing number of assets.

It is important to note that customer preferences and expectations do not always align with internal technical targets. A consideration of this section is linking the customer and technical LOS to determine areas where different LOS could be proposed. As previous survey results have a low level of data confidence, it is difficult to make any conclusive decisions based on this initial survey. Future iterations of the AMP will strive to improve the survey data confidence and allow for better alignment.

### 1.5.6. AFFORDABILITY AND ACHEIVABILITY CONFIDENCE

To determine whether the proposed levels of service are achievable and if the City can afford the proposed level of service **Table 11** has been developed to review confidence in the proposed levels of service.

Table 11 Affordability and Achievability Confidence

Customer Level of Service	Number of Technical LOS	Achievability Confidence	Achievability Description	Affordability Confidence	Affordability Description
O.Reg. 588/17 Water	4	Medium	The targets are expected to be achievable as the City is very close to reaching the 2034 target. However as achieving the target is heavily impacted by the rate at which development projects are completed. The actual timing of growth will also impact the achievability of metrics in this section in the indicated timelines. As the number of existing water assets repaired each year decrease due to budget pressures it is anticipated that the number of connection days for boil water advisories or watermain breaks may exceed the proposed LOS for these measures.	Medium	The timing of the new arterial and collector roads, and their associated water infrastructure may be subject to change. If too many of the new roads are required within a smaller time window it is anticipated that resourcing limitations for both staff and funding will result. This would make the proposed levels of service for the associated water assets less affordable. Potential changes to the municipal ability to collect Development Charges by the Federal or Provincial governments is also expected to impact the affordability of growth related water projects.
O.Reg. 588/17 Wastewater	4	Medium	The targets are expected to be achievable. However some targets will be heavily impacted by the rate at which development projects are completed. The actual timing of growth will also impact the achievability of metrics in this section in the indicated timelines. As climate change impacts the local weather patterns, it is expected that the duration and intensity of storms will change. This may result in an inability to maintain the targeted number of effluent violations compared to the total number of properties connected to the municipal wastewater system.	Medium	The timing of the new arterial and collector roads, and their associated water infrastructure may be subject to change. If too many of the new roads are required within a smaller time window it is anticipated that resourcing limitations for both staff and funding will result. This would make the proposed levels of service for the associated water assets less affordable. Potential changes to the municipal ability to collect Development Charges by the Federal or Provincial governments is also expected to impact the affordability of growth related water projects.
O.Reg. 588/17 Stormwater	2	Medium	The targets are expected to be achievable. However some targets will be heavily impacted by the rate at which development projects are completed. The actual timing of growth will also impact the achievability of metrics in this section in the indicated timelines. As climate change impacts the local weather patterns, it is expected that the duration and intensity of storms will change. This may result in an inability to maintain the targeted resiliency for 5 and 100 year storms.	Low	The timing of the new stormwater infrastructure is influenced by development in the growth areas and may be subject to change. If too many of the new stormwater projects are required within a smaller time window it is anticipated that resourcing limitations for both staff and funding will result. This would make the proposed levels of service for the associated stormwater assets less affordable. Many of the stormwater projects identified in the Master Servicing Plan are not included in the 10-year capital budget. This results in a low confidence in the affordability of the stormwater metrics. Potential changes to the municipal ability to collect Development Charges by the Federal or Provincial governments is also expected to impact the affordability of growth related water projects.
Accessibility	0	N/A	N/A	N/A	N/A
Quality	5	High	By maintaining current levels of service and minimally increasing targets the proposed levels of service are expected to be achievable. High confidence has been selected as the increase in population is expected to be in areas with new infrastructure so	High	As most of these measures are complaint based, and they are not forecast to drastically increase, it is expected that current operating budgets will be sufficient as long as they are increased for inflation.

Customer Level of Service	Number of Technical LOS	Achievability Confidence	Achievability Description	Affordability Confidence	Affordability Description
			the number of complaints is not expected to increase in the short to medium term.		
Cost Efficiency	6	Medium	Many of the metrics in this area are cost based. Medium confidence has been selected due to current uncertainties in world economic trade.	Medium	Due to current uncertainties in world economic trade, medium confidence has been selected.
Safety	5	High	Three of the five metrics in this area are the average number of safety training hours per employee. It is possible that future changes in regulation will result in a need for increased training however it is not anticipated to exceed the targets at this time.	High	As the metrics in this area are related to health and safety it is anticipated that their funding would be prioritized should a future shortfall be identified.
Environmental Sustainability	6	Medium	Many of the metrics in this section are subject to behaviour by 3 <sup>rd</sup> parties and/or weather patterns. Based on past performance they are expected to be achievable but change in behaviour or weather patterns will have a strong influence on the metrics in this section.	High	Existing budgets with increases tied to inflation are expected to be sufficient to achieve the metrics in this section. Should any of these look to be drastically varying from their targets it is expected that any corrective measures would be prioritized for emergency funding.
Reliability	6	High	The actual timing of growth may impact the achievability of metrics in this section in the indicated timelines and may result in variations from some targets.	Medium	Drastic increases to the targets due to changes in timing of growth projects may impact the affordability of some metrics. The most likely impacted metric would be the one for Wastewater Treatment.
Responsiveness	6	High	All metrics in this section have been achieved and maintained at the same targets for many years. Growth is not expected to impact the past trend as newer infrastructure is generally less likely to require emergency repairs.	High	Existing budgets with increases tied to inflation are expected to be sufficient to achieve the metrics in this section.

It is important to note that while the proposed service level change may appear affordable when viewed in isolation of this plan specifically, when it is examined in the context of the overall budget, these levels may not be achievable and would be considered unaffordable. As service level data continues to be collected, staff will also continue to review the achievability and affordability of the levels of service proposed within the future iterations of this plan.

### 1.5.7. LEVEL OF SERVICE LIFECYCLE COST CONSIDERATIONS

Proper considerations should be made for the most cost effective methods that can be undertaken to achieve the lowest cost possible with a chosen level of service. **Table 12** below includes the lifecycle options available and the associated risks with the chosen options.

**Table 12 Lifecycle Options and Associated Risks**

<b>Lifecycle Options</b>	<b>Description</b>	<b>Risks Associated if Undertaken</b>	<b>Risks Associated if Not Undertaken</b>
Planning	Consideration is made regarding the asset involving City Master plans and the needs of internal and/or external customers.	Planning activities may extend project timeline.	If planning activities were not undertaken there is a risk missing something that was needed
Operation & Maintenance	The asset is providing benefits to the community and operation and maintenance activities (see <b>Table 6</b> ) are completed on the asset at specific time intervals to prevent premature failures of the asset.	Completing operation & maintenance activities may mean that there is limited or no access to the asset for a period of time.	If O&M activities were not undertaken the asset would have premature failures, become unsafe and would cost the City more to repair or would have to be closed/removed.
Repair	The asset or a portion of the asset is no longer functioning appropriately, and a repair is needed.	Completing repair activities may mean that there is limited or no access to the asset for a period of time.	If repair activities were not undertaken the asset would no longer function as it should and would affect service levels. The asset would eventually deteriorate and need to be closed.
Replace	The asset has reached the end of its useful life and needs to be replaced to maintain service levels.	Replacing the asset may mean limited or no access to the asset during a period of time.	If replacement activities were not undertaken the asset would no longer function as it should and would affect service levels. The asset would need to be closed and eventually removed.
Remove	The asset has reached the end of its useful life or is no longer required to	Removing the asset may lead to a reduction in service levels.	The asset may be unsafe and could lead to health and safety concerns if not

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	meet the appropriate service level and is removed.		removed.
Install New/Expand	A new asset or extension to an existing asset is purchased and installed.	Installing a new asset may lead to increase costs which could lower service levels.	If a new asset is not installed this may lead to an eventual reduction in service levels.

Note: The full lifecycle stages for these assets can be found in Section 1.4.1 and the list of specific lifecycle activity options is located in Section 1.4.2 of this AMP.

Depending on the level of service being considered, the most cost effective method that should be undertaken to achieve the lowest cost associated with the specific level of service may actually be a combination of lifecycle activities. The combination selected will be based on that specific asset and the activities that are likely to give the lowest cost while maintaining the chosen service level.

## **1.6. CURRENT & FUTURE ASSET PERFORMANCE**

The current and proposed asset performance for Environmental assets has been separated into three (3) categories for this section of the report:

1. Energy Performance;
2. Operating Performance; and
3. Sustainability Performance

### **1.6.1. ENVIRONMENTAL FACILITY CURRENT & PROPOSED ENERGY PERFORMANCE**

The City of Brantford has a Corporate Energy Management Plan (CEMP) which emphasizes energy efficiency within the City. The goals of the CEMP are to reduce energy use, energy intensity, and greenhouse gas (GHG) emissions in City Facilities. In addition, through the City's Climate Change Action Plan and Climate Lens Tool explained in **Section 10** of the **Asset Management Plan Overview Document**, the City has been working to improve our facilities' energy efficiency and reduce the associated carbon footprint.

Under the CEMP, annual energy management data is reported, but has a reporting delay of two (2) years. **Table 13** contains data from the 2023 Corporate Energy Management Report (CEMR), which is available on the City's website. The average Energy Use Intensity (GJ/sq m) for all City buildings is 11.2 GJ/sq m.

Table 13: Current Energy Performance of Water Facilities

Facility	Address	Electricity (kWh)*	Natural Gas (m3)*	Total GHG Emissions (T CO2e)*	Annual Flow (Mega Litres)	Source Energy Use Intensity (GJ/sq m)*
<b>TOTAL</b>	-	17,898,234	396,183	1,266.60	45,694	-
<b>AVERAGE</b>	-	994,346	99,046	70.37	2,856	38.92
<b>Water Treatment Plant</b>	324 Grand River Ave	7,711,862	142,794	491.80	12,058	10.16
<b>Albion Booster Station</b>	180 Albion St	54,491	N/A	1.50	84	0.39
<b>Tollgate Booster Station</b>	106 Tollgate Rd	509,325	N/A	14.30	1,691	361.16
<b>Park Rd Pump Station</b>	310 Campbell St	588,162	3,556	23.30	2,706	4.33
<b>Northwest Pump Station</b>	5 Kraemer's Way	1,087,228	25,258	79.20	3,019	8.82
<b>WW Treatment Plant</b>	385 Mohawk Rd	6,698,091	224,575	621.50	15,183	9.56
<b>WW Biosolids</b>	384 Mohawk Rd	125,781	N/A	3.50	N/A	7.31
<b>Empey P.S.</b>	50 Empey St	203,878	N/A	5.70	5,663	8.31
<b>Woodlawn P.S.</b>	85 Woodlawn Rd	43,637	N/A	1.20	334	4.66
<b>Somerset P.S.</b>	87 Somerset Rd	64,664	N/A	1.80	1,308	5.41
<b>Greenwich P.S.</b>	220 Greenwich St	241,072	N/A	6.80	2,575	10.01
<b>Fifth Ave P.S.</b>	25 Fifth Ave	63,970	N/A	1.80	526	5.22
<b>St Andrews P.S.</b>	119 St Andrews Dr	29,296	N/A	0.80	84	5.52
<b>Northridge P.S.</b>	8-14 Lawren S Harris	39,364	N/A	1.10	128	2.12
<b>Johnson P.S.</b>	4 Hansford Dr	38,726	N/A	1.10	320	2.57
<b>Alexander P.S.</b>	24 Alexander Dr	16,294	N/A	0.50	23	0.92
<b>Stauffer P.S.</b>	87 Stauffer Rd	27,254	N/A	0.80	43	2.20
<b>Stormwater P.S.</b>	59 Icomm Dr	355,139	N/A	9.90	N/A	251.83

\*Based on information provided in the 2023 Corporate Energy Management Report

### 1.6.2. CURRENT OPERATING PERFORMANCE

**Table 14** contains criteria by which the City’s Environmental assets’ operating performance can be assessed. N/A in the table below indicates a metric which is currently unavailable. The City will work to gather sufficient information to begin reporting on additional metrics in future iterations of the AMP.

**Table 14 Environmental Operating Performance**

		Current Performance	Proposed Performance									
Asset Type	Performance Measurement		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Water Treatment	% of Total Abstracted Water which is Treated	86%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Water Distribution	Average Operating Pressure	56 m of head	52m of head	52m of head	52m of head	52m of head	52m of head	52m of head	52m of head	52m of head	52m of head	52m of head
Wastewater Treatment	% of Biogas produced which is not used (flared)	51%	50%	50%	50%	50%	50%	50%	45%	44%	43%	42%
Wastewater Collection	Annual Average Flow	41.6 ML/day	42	42.8	43.7	44.6	45.5	46.4	49.4	52.5	57.1	61.0
Stormwater Detention	Not currently tracked, will be reviewed for future AMPs.											
Stormwater Collection	Not currently tracked, will be reviewed for future AMPs.											

### 1.6.3. ENVIRONMENTAL SUSTAINABILITY PERFORMANCE

To determine if the City is able to provide sustainable service delivery for the Environmental assets, the **Asset Sustainability Index (ASI)** is utilized. It is calculated by taking the amount the City is proposing to spend on Levels of Service (LOS) and dividing it by the amount the City is projected as needing to spend to maintain the LOS. The ASI can be calculated for the Current LOS, the Proposed LOS or the combination of the two. It can be for Capital costs, Operating & Maintenance (O&M) costs or a combination of the two.

**Table 15** shows the ASI for the various scenarios and the final combined for the different asset categories. The ASI is used as a high-level assessment of whether the City is accommodating asset renewals in an optimal and cost-effective manner based on timing and relative to financial constraints. It is also an indicator of the risk the City is accepting and targeted service levels it wishes to maintain.

**Table 15 Asset Sustainability Index**

	<b>Current LOS</b>	<b>Proposed LOS</b>	<b>Combined LOS</b>
Capital Costs	91%	42%	52%
O&M Costs*	N/A	N/A	N/A
Combined Costs	-	-	52%

\* Due to the way the O&M costs are derived at this time, the ASI for O&M costs has not been included in this iteration of the AMP. It is expected to be included in future iterations as the O&M data tracking on an asset class specific basis improves.

To ease understanding the ASI is reported as a percentage:

- An ASI of 100% is considered to be the best as it indicates that expenditures match what is needed to sustain levels of service. This is more efficient as it preserves infrastructure for the lowest cost over time.
- Above 100% funding should be reviewed as it suggests that the City is spending more than necessary, which may be an inefficient distribution of resources. In some circumstances this may be appropriate on a temporary basis to reduce backlogs of overdue repairs and/or replacements.
- Below 100% indicates a funding shortfall, meaning the City is not investing enough to maintain levels of service. If not addressed, this gap can lead to declines in levels of service over time.

The Environmental ASI of 52% is slightly below the Combined LOS ASI for all assets of 61%. Most of the shortfall is occurring in the proposed levels of service projects for the stormwater assets. If the stormwater assets were excluded then the combined capital ASI for water and wastewater assets would be 74% with the Current LOS being 102% and the Proposed LOS being 65%.

## 1.7. DISCUSSION & CONCLUSIONS

In conclusion, the City of Brantford operates and maintains many Environmental assets. These assets are typically in overall Good condition with a total estimated replacement cost of approximately \$2,135.3M. The data confidence is Medium for Condition, Inventory, Replacement Cost and Level of Service data.

The lifecycle stages for Environmental assets includes: Planning, Creation, Operation and Maintenance, and Disposal. During the Planning stage, the City identifies the need for the asset; during the Creation stage the asset is purchased and installed or constructed; during the Operation and Maintenance stage, the asset is operating and lifecycle activities (i.e. hydrant flushing) occur on each of our assets to maintain the state of good repair; and the Disposal stage is when the asset has reached the end of its useful life or is underperforming and requires disposal.

Lifecycle activities are currently typically tracked through a combination of email, excel, Avantis, and Cartegraph (AIM). For more information on key database applications and work order management, please refer to **Section 4.2** and **Section 7**, respectively, in the **AMP Overview document**. As the City expands its implementation of its work order system, the frequency and costs associated with specific activities will be better represented.

It is estimated based on the average annual cost in the 10 Year Life Cycle Costing that the City should be spending an average \$100.2M annually for capital Environmental asset costs and should be spending an average of \$32.0M annually on Operating and Maintenance on these assets. The City is currently proposing to spend an average of \$52.5M annually on capital for the Environmental assets'. This results in a funding gap of \$47.7M from the forecasted capital need for Current and Proposed LOS. The City is currently proposing to spend \$24.3M annually on Operating and Maintenance resulting in a funding gap of \$7.7M.

Current and Proposed Levels of Service have been identified for Environmental assets. Generally most Levels of Service defined in O.Reg. 588/17 will be following the Increase or Maintain option for the next 10 years. Most Municipally defined Levels of Service will be following the Maintain option for the next 10 years. In some areas while the option followed is considered the maintain option, the quantity of the overall assets is expected to increase. This is due to the next 10 years being anticipated to be a period of substantial growth in population and developed area. This will result in the need for more Environmental assets, increasing the quantity. However it is not anticipated the level of service provided by the assets will change, instead the overall area which is serviced by the assets will increase.

Considered in isolation the Proposed Levels of Service have a Medium to High Confidence for Achievability and Affordability. Except that the affordability of the Stormwater O.Reg. 588/17 defined technical levels of service has a low confidence. When examined in the context of the overall budget, these levels of service may not be achievable and may be considered unaffordable.

Asset performance is separated into energy, operating and sustainability performance in the Environmental Asset Management Plan (AMP). For energy performance, currently water, wastewater and stormwater facilities are tracked as part of the Corporate Energy Management Plan. The average Energy Use Intensity for all City buildings is 11.2 GJ/sq m. The average Energy Use Intensity for the Environmental buildings is 38.92 GJ/sq m.

For Operating performance, the City has identified a number of performance measurements for water and wastewater. Measurements for stormwater will be developed for future iterations of the AMP.

For Sustainability performance, the Combined Capital Level of Service Asset Sustainability Index (ASI) is 52%. This is slightly below the ASI for all assets of 61%. If stormwater assets are ignored then the ASI would be 74%. Increased funding or a change to levels of service will be required to achieve the target ASI of 100%.

The next iteration of this Environmental AMP document, due in 2030, will be revised to include updated and new information obtained over the next five years.