The City of Saint John

2018 State of the Infrastructure Report

April 29, 2019

SAINT JOHN

City of Saint John

2018 State of the Infrastructure

Report Card

GROWTH AND COMMUNITY DEVELOPMENT

VALUATION	DEFICIT	LETTER GRADE	TREND
$129.6 M	$48.0 M	C-	↘

PUBLIC SAFETY

VALUATION	DEFICIT	LETTER GRADE	TREND
$69.1 M	$13.6 M	C+	↘

TRANSPORTATION AND ENVIRONMENT

VALUATION	DEFICIT	LETTER GRADE	TREND
$1073.3 M	$52.7 M	B	↘

SAINT JOHN WATER

VALUATION	DEFICIT	LETTER GRADE	TREND
$1443.5 M	$313.6 M	C+	↘

CORPORATE, FINANCE AND ADMINSITRATIVE

VALUATION	DEFICIT	LETTER GRADE	TREND
$15.4 M	$7.1 M	C-	↘

CITY OF SAINT JOHN

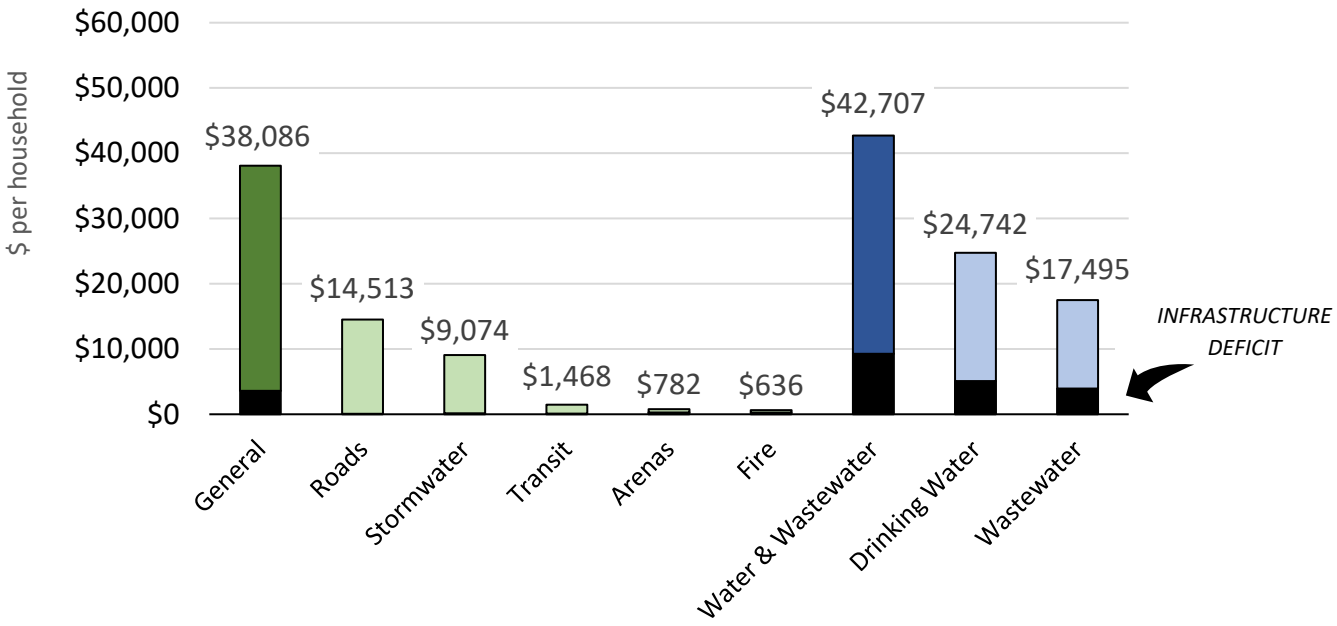
VALUATION	DEFICIT	LETTER GRADE	TREND
$2730.9 M	$435.0 M	C+	↘

City of Saint John

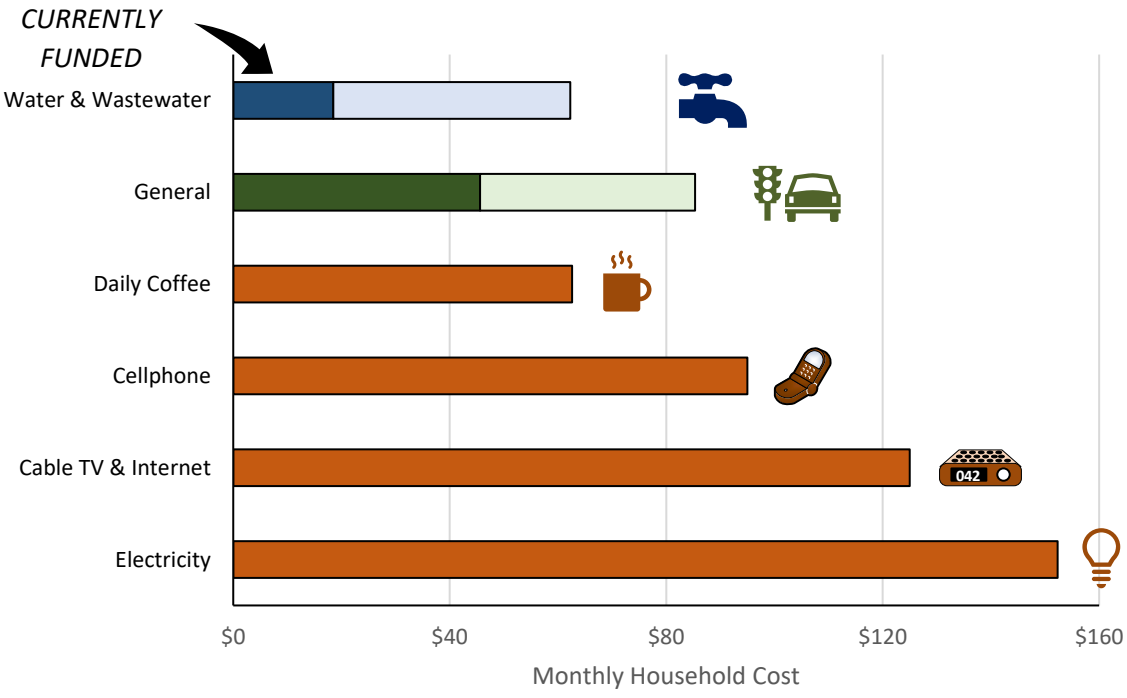
2018 State of the Infrastructure

Putting Things into Perspective

How much infrastructure do I own? What is my deficit?



How much does it cost to renew my infrastructure?



CITY OF SAINT JOHN
2018 State of the Infrastructure Report

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1. INTRODUCTION

1.1. Background

In 2016, the City of Saint John began developing and implementing an asset management (AM) program for all municipal assets to ensure the sustainable delivery of municipal services. Phase 1 of this program saw the development of an AM road map, AM Policy, and AM Strategy. Following these developments, the City published its inaugural State of the Infrastructure (SOTI) report to communicate the current state of infrastructure repair. This document is the second iteration of the SOTI report and contains significant improvements in the quality and reliability of information presented.

In addition to publishing a SOTI report, the City has been actively improving its asset management program by completing several key initiatives:

- Updating asset inventory data
- Establishing a condition rating framework
- Establishing a risk rating framework
- Reviewing asset management workflows and processes
- Reviewing organizational structures
- Reviewing data sharing processes
- Reviewing data management systems
- Establishing a Levels of Service and Key Performance Indicators program

1.2. Purpose

The purpose of the State of the Infrastructure (SOTI) Report is to communicate the state of repair of the City of Saint John's infrastructure assets essential to the delivery of public services. The report contains several indicators that will allow the comparison of the state of infrastructure repair across different service areas, within service sub-areas, and over time (when the SOTI report is produced in the future). The report also presents the sustainable funding requirement (the future investments needed to replace existing infrastructure at the end of its service life), a comparison of the sustainable funding requirement to the projected capital funding, a distribution of asset conditions, a risk "heat map" of the assets requiring replacement in the next 20 years, and an estimate of the funding required to replace these assets (and eliminate the current infrastructure deficit).

In general, the SOTI Report is intended to provide information to answer the six key asset management questions.

1. What do you have?
2. What is it worth?
3. What condition is it in?
4. What do you need to do to it?
5. When do you need to do it?
6. How much money do you need?

As the second iteration of the SOTI Report, this document provides a new benchmark which can be compared to the 2016 report. The 2018 SOTI Report represents a significant improvement in the accuracy and completeness of the underlying data, often causing dramatic changes in the results obtained. The 2016 SOTI Report relied solely on the City's Tangible Capital Asset Registry, an inventory maintained by the Finance and Accounting group. The 2018 Report goes beyond this single source of information, and compiles data and information from a variety of systems and stakeholders. As a result, the confidence in the results presented in the 2018 Report is much greater than the 2016 Report.

It is expected the City will produce SOTI Reports on an on-going basis at pre-defined intervals. As future iterations are produced, City residents will understand and see the impacts of infrastructure renewal programs, funding commitments, and advanced asset management practices. In the interpretation of this report, it should be noted the results presented are based on current, readily available asset data and information. As this asset data is likely still incomplete and not fully accurate (even with the improvements), the results are expected to be subject to change when the data quality is further refined and improved.

2. APPROACH

2.1. Asset Hierarchy

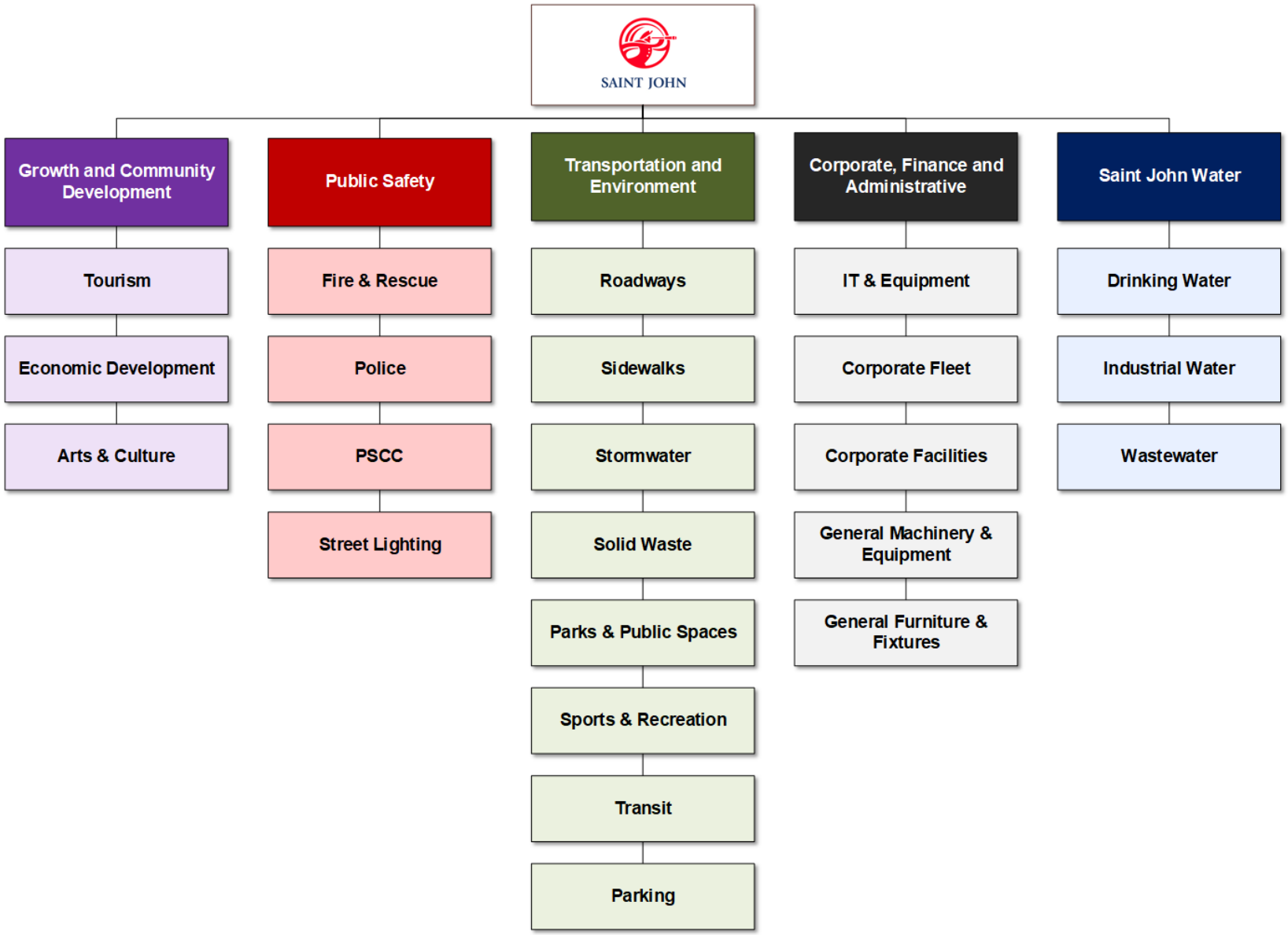
The City's assets are organized in a hierarchal format which arranges assets into various service areas (e.g. a water distribution main > water distribution network > drinking water > Saint John Water). The purpose of the hierarchy is to ensure asset data is collected and organized in a framework that will facilitate data access, information extraction and reporting, and decision making.

Asset hierarchies can be arranged to reflect organizational structure (e.g. public works, fleet maintenance, facilities management) or services provided (e.g. potable water, transportation, recreation). To ensure consistency with the existing service-based budgeting at the City and to streamline asset management decisions with the supporting budgeting process, a service-based asset hierarchy has been adopted.

The asset hierarchy is broken down into various "levels". Each level of the hierarchy demonstrates a different degree of asset complexity/detail for a service area. Most assets included in the asset inventory require 3 levels of complexity, while others, such as the Saint John Water assets, require an additional 2 levels, for a total of 5. Additional levels of detail can be added to the hierarchy to improve asset management decision making or incorporate operational requirements. The Service Areas and level 2 categories of the service-based asset hierarchy are shown in Figure 1 below, while the complete asset hierarchy is presented in Appendix A.

Note, the asset categories used in the 2018 SOTI Report have been slightly re-organized from the 2016 SOTI Report. These changes were made to accommodate an improved asset inventory with additional data resolution.

Figure 1 - Service-Based Asset Hierarchy



2.2. Replacement Costs

In the 2016 SOTI Report, **all** asset replacement costs were estimated by inflating the asset's original acquisition cost using the Canadian Consumer Price Index (CPI). For the 2018 Report, current replacement costs are estimated for all assets using one of three methods:

1. Historical contracts or tenders (inflated to current year dollars).
2. Engineering estimates.
3. Inflating original acquisition costs using relevant price indices.

All costs included in the SOTI Report are expressed in current year Canadian dollars. A complete summary of unit replacement costs used for each asset are listed in Appendix B.

2.3. Condition

The condition of each asset represents the current state of physical repair and is often used as an indicator for the relative time until corrective action (rehabilitation, or replacement) is required. A five-point rating scale is used to align the City of Saint John with the 2016 Canadian Infrastructure Report Card and provincial reporting recommendations. This simplified condition rating scale allows for comparative benchmarking between asset groups and is sufficiently detailed for high-level decision making. Descriptions of each condition rating (from 1 to 5) are shown in Table 1 below. In addition to the five-point rating scale, an additional condition rating category of "Unknown" has been added to account for assets with insufficient information available to properly estimate condition.

Table 1 - Condition Rating Descriptions

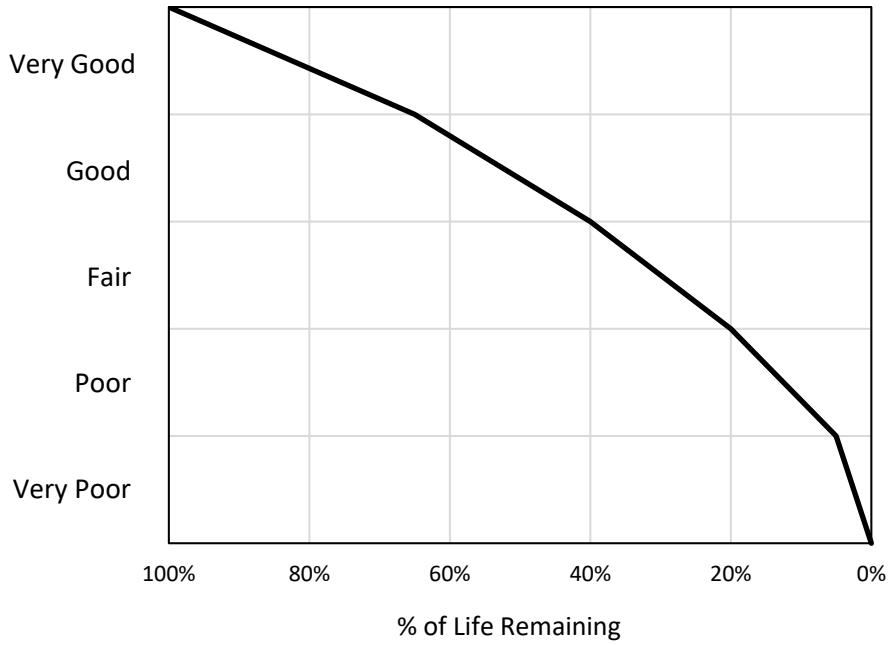
Condition Rating	Physical Condition	Expected Service Life
1 - Very Good	Excellent working condition. No signs of deterioration.	Like new.
2 – Good	Minor signs of deterioration.	Approaching or at mid-stage of life.
3 – Fair	Some elements exhibiting major deficiencies.	Beyond mid-stage of life.
4 - Poor	Significant deterioration with localized areas of failure.	Needs to be replaced/repaired in the short-term.
5 - Very Poor	Asset is beyond repair and, generally, has completed failed.	Needs to be replaced/repaired almost immediately.
0 – Unknown	*Insufficient information available to estimate condition.*	

The condition of assets in the City are determined using one of three methods:

1. Theoretical Condition – *using asset age and estimated useful life as a proxy*
2. Operator Experience – *relying on operator experience and knowledge of the asset*
3. Documented Observations – *systematic and documented observations of the asset*

The condition of most assets included in the 2018 SOTI Report are based on theoretical condition. Theoretical condition was calculated for these assets using a generalized asset deterioration curve, shown in Figure 2. This curve is intended to mimic the accelerated rate of deterioration an asset experiences towards the end of its useful life.

Figure 2 - Generalized Asset Deterioration Curve



Some assets' condition ratings were determined using documented observations. These condition ratings are much more reliable than those based on theoretical condition. Documented observations have been made for the following assets:

- Road Surfaces
- Retaining Walls
- Culverts
- Sanitary/Storm Sewers (approx. 15% included)

The total value of assets which have undergone actual documented observations represents approximately 10% of the City's total asset inventory.

Additional information on the methodologies and frameworks used to determine the condition of municipal assets is found in the City's "Condition Rating Manual".

2.4. Risk

2.4.1. Risk Rating

Risk ratings were used to determine which assets pose a significant threat to the delivery of services and are a priority for repair or renewal. Assets which are likely to fail and have a serious consequence of failure will score a higher risk rating than assets which are not likely to fail and/or have a minor consequence of

failure. A simple risk evaluation technique is used for all assets in the SOTI Report. This method uses both the probability and consequence of failure of an asset, and calculates the risk rating with the following equation:

$$Risk\ Rating = (Probability\ of\ Failure)\ x\ (Consequence\ of\ Failure)$$

Like condition, probability and consequence of failure are scored on a 1-5 rating scale. These ratings, and their associated descriptions, are shown in Table 2 below. Multiplying the values for probability and consequence of failure together yields a risk matrix, shown in Table 3. This risk framework is consistent with the "AM Risk Management Framework" adopted by the City.

Table 2 - Probability and Consequence Descriptions

Rating	Probability	Consequence
1	Improbable	Insignificant
2	Unlikely	Minor
3	Possible	Moderate
4	Likely	Major
5	Highly Probable	Catastrophic

Table 3 - Risk Rating Framework

			Consequence of Failure				
			Insignificant	Minor	Moderate	Major	Catastrophic
			1	2	3	4	5
Probability of Failure	Improbable	1	1	2	3	4	5
	Unlikely	2	2	4	6	8	10
	Possible	3	3	6	9	12	15
	Likely	4	4	8	12	16	20
	Highly Probable	5	5	10	15	20	25

Risk Category	
1	Insignificant
2	Low
3	Moderate
4	High
5	Extreme

As an example, an asset could have a high probability of failure of 5 but only have a small consequence of failure of 2. As a result, the asset would only score a risk rating of 10 and fall in the moderate risk category despite its high probability of failure (a section of sidewalk would fit this risk profile). This asset can be compared to a second asset with a lower probability of failure of 3, but a much higher consequence of failure of 5. This asset would score a higher risk rating of 15, fall in the substantial risk category, and would

be recognized as a more critical asset (a piece of disinfection equipment at the water treatment plant would fit this risk profile).

For the SOTI Report, the only risk event included is the risk of asset failure due to deterioration. To evaluate this risk, it is assumed the condition of an asset directly relates to its probability of failure. Additionally, the consequence of failure of all assets has been pre-determined by subjective input from City staff (see Appendix B for details) using the consequence of failure guide shown in Table 4. For future iterations of the SOTI Report, additional risk events such as extreme weather events influenced by climate change will be included.

Table 4 - Consequence Rating Guide

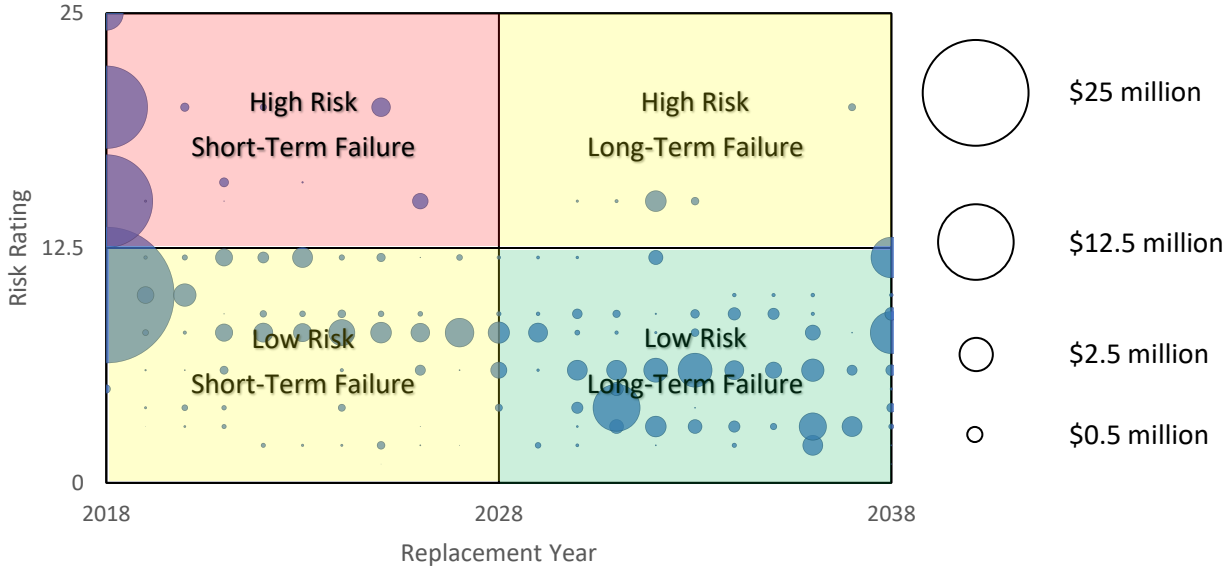
Consequence Rating	Recovery Cost	Health and Safety	Loss of Service	Environment
1 Insignificant	< $2,000	Negligible or no injury.	Small number of customers experiencing minor disruption.	Negligible or no environmental impact.
2 Minor	$2,000 - $20,000	Minor personal injury.	Small number of customers experiencing significant disruption.	Impact reversible within 3 months.
3 Severe	$20,000 - $100,000	Serious injury with hospitalization.	Significant localized service loss over an extended period.	Impact reversible within 1 year.
4 Major	$100,000 - $1M	Loss of life.	Major localized disruption over an extended period.	Impact reversible within 5 years.
5 Catastrophic	> $1M	Multiple loss of life or city-wide epidemic.	Major long-term city-wide disruption.	Impact not fully reversible.

Additional details of the methodologies and frameworks used to determine the condition of municipal assets is found in the City's "Risk Rating Manual".

2.4.2. Risk Heatmap

The risk heatmap figure illustrates the magnitude and severity of expected infrastructure investments. The heatmap is intended to provide an 'at-a-glance' perspective of the infrastructure priorities. The heatmap is a bubble chart with the asset risk rating (1-25) plotted against the current replacement year of an asset. Additionally, the size of each bubble indicates the total replacement cost of all assets in the respective risk rating and replacement year. An example heatmap is shown in Figure 3 below.

Figure 3 - Risk Heatmap Example Plot



2.5. Letter Grade

Each asset category and service area is assigned a letter grade to communicate the current state of infrastructure repair. These letter grades combine both condition and risk to yield a letter grade as defined in Table 5. Additionally, consideration is given for assets which score close to the threshold of another grade (see Figure 4). In this scenario, assets are given a + or – symbol to indicate if an asset is close to a better or worse grade.

Table 5 - Letter Grade State of Repair and Definitions

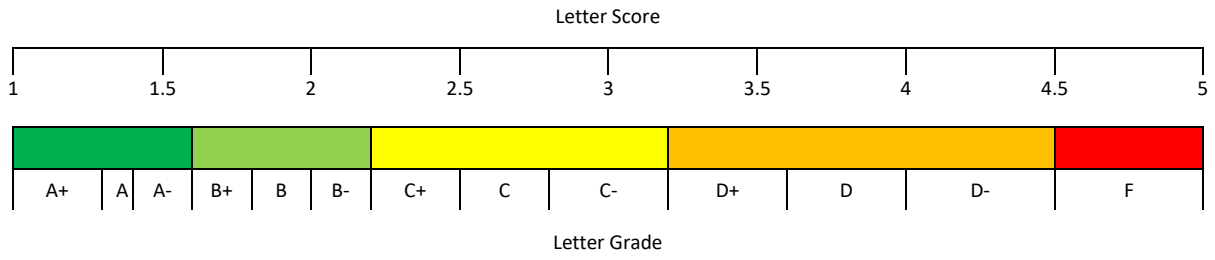
Letter Grade	State of Repair	Definition
A	Very Good	Fit for the future. Great condition, new or recently rehabilitated, little to no concern of risk.
B	Good	Adequate for now. Acceptable, generally approaching mid-stage of expected service life, low concern of risk.
C	Fair	Requires attention. Signs of deterioration, some elements exhibit deficiencies and moderate concern of risk which should be addressed in the short-term. Asset category is approaching the "cliff" and requires corrective action.
D	Poor	Increasing potential of affecting service. Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration and high concern of risk – could be catastrophic.
F	Very Poor	Unfit for sustained service delivery. Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable and very high concern of risk – asset should be attended to as soon as possible.

The letter grades of each service area are calculated using weighted condition rating and risk category values for each asset in the service area. Each asset is assigned a condition rating using a scale of 1 – 5 (as shown in Table 1), and a risk category value of 1-5 by normalizing the risk ratings of 1 – 25 (as shown in Table 3). The condition ratings and risk category values are used to calculate letter scores ranging from 1 to 5 using the following approach:

- a weighting of 75% condition and 25% risk was used to reflect the relative importance of risk in determining asset replacement priorities, and
- the condition ratings and risk category values for individual assets were weighted using replacement value to reflect the relative importance of more expensive assets on the delivery of services.

The letter score thresholds and associated letter grades are shown in Figure 4 below.

Figure 4 - Letter Grade Scoring



In the interpretation of the letter grades presented in this SOTI Report it should be noted the Canadian Infrastructure Report Card and similar reports prepared for other municipalities do not include risk in the calculation/assignment of letter grades. Although the increasing importance of external (i.e. non-age or deterioration driven) asset risks, such as the effects of climate change, in our opinion justifies the inclusion of risk in the calculation of letter grades, it does not allow the direct comparison of the City of Saint John's letter grades to letter grades of external sources.

2.6. Long-Term Financial Forecast

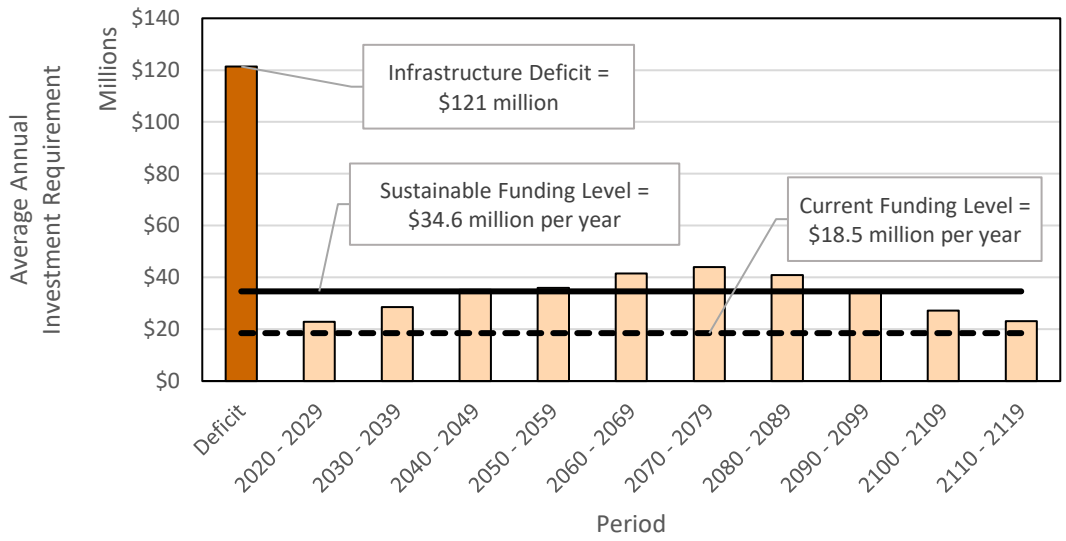
In addition to demonstrating the current state of infrastructure repair, the SOTI Report provides the reader with a high-level understanding of the long-term financial requirements to replace assets at the end of their useful lives. All forecasted cash flows presented in the long-term financial forecast are expressed in current year (2018) dollars and inflation is not accounted for in future cash flows.

The forecasts have been generated to demonstrate the annual investment requirements over a 100-year period and compare this value to current funding levels. A 100-year evaluation period was selected to ensure the replacement cycle of the longest lasting assets are captured. From there, the average annual investment requirement is determined. This average is recognized as the "Sustainable Funding Requirement" and is the annual average investment requirement to replace all assets at the end of their useful lives and eliminate the current infrastructure deficit over a 100-year period. This metric is compared to planned funding levels, with the difference between the two recognized as the "Investment Gap (or Surplus)". This measures what increase (or decrease) in average annual funding is required to sustainably replace assets at the end of their useful lives.

Additionally, the long-term financial forecast highlights the current infrastructure deficit – the total value of assets which are at or beyond their useful life. The infrastructure deficit is presented throughout the report as a high-level proxy for the "catch-up" requirements of each asset type. However, it is important to recognize an asset is only in a deficit position if it has *exceeded its estimated useful life*. Some assets, such as road surfaces, will never reach the end of their useful life if properly maintained. For these assets, timely preventative maintenance and rehabilitation practices will minimize the total life cycle-cost and will ensure the asset never reaches a deficit position. For this reason, we caution the reader not to interpret the infrastructure deficit as an indication of the overall condition of an asset type nor as an investment requirement to restore the entire asset type to like-new condition.

An example long-term financial forecast is shown in Figure 5.

Figure 5 - Long-Term Financial Forecast Example



Note, the long-term financial forecasts presented assume an asset is replaced at the end of its useful life with a similar asset (size and quality). However, it is likely that some assets will not undergo full replacement, but instead will be rehabilitated and/or repaired to extend their useful life, likely reducing the average annual investment required. Additionally, some assets may be replaced with an asset which is not identical in order to meet current service objectives. A full list of assumptions used for asset useful lives and replacement costs are found in Appendix B.

2.7. Trend Arrow

The long-term financial forecasts are then used to produce a simplified "Trend Arrow". This arrow indicates the expected trend in infrastructure state of repair given planned funding commitments and is determined using the current investment gap (or surplus). Combining these two criteria produces the funding ratio, defined below.

$$Funding\ Ratio = \frac{Planned\ Funding\ Level}{Sustainable\ Funding\ Requirement}$$

This ratio will determine the slope of the trend arrow, as described in Table 6. Please note the slope of the trend arrow is continuously variable (using a linear scale) between a slope of +60° and -60° from horizontal.

Table 6 - Trend Arrow Descriptions

Trend Arrow	Funding Ratio	Description
	> 150%	Asset state of repair rapidly improving. Historical and current funding is well above the sustainable funding requirement.
	100%	No change expected in asset state of repair. Historical and expected funding meets the sustainable funding requirement.
	< 50%	Asset state of repair rapidly deteriorating. Historical and current funding is well below the sustainable funding requirement.

The slope of the trend arrow indicates the degree to which historical funding is above/below the sustainable funding requirement, up to the limits defined above. As an example, if the funding ratio is determined as 125% the slope of the arrow will be +30°.

2.8. Confidence Band

The information presented in the SOTI Report is based on the best readily available data and information for individual assets. As the summary information presented in the SOTI Report is sensitive to the accuracy and completeness of the asset data, confidence bands have been produced for all service areas in the SOTI Report.

The confidence bands illustrate two things. Firstly, as more data is included and more sophisticated methods are used to determine the infrastructure's state of repair, the results obtained are expected to change. This change will not be due to an increased deterioration or betterment of infrastructure, it will simply be due to an increase in data accuracy and completeness. The confidence bands provide context for these sudden increases or decreases in infrastructure state of repair and results. Secondly, the confidence bands identify areas for data improvement. The City can use confidence bands to identify which asset groups require improvements in data quality to produce more certain results. An example confidence band is shown in Figure 6 below. To assist in the interpretation of confidence bands, Table 7 and Table 8 have been developed.

Figure 6 - Example Confidence Band

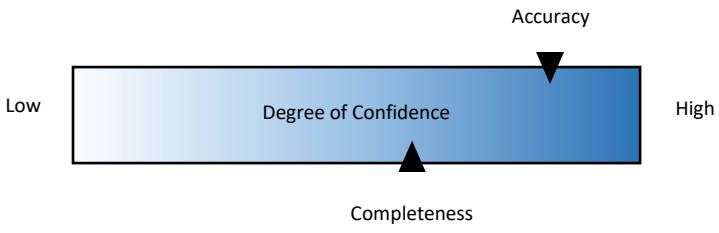


Table 7 - Data Accuracy Descriptions

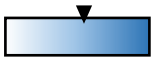
Accuracy	Figure	Criteria
Very Low		Assets have limited data available. Replacement cost and useful life are based off generalized unit costs. There are no in-service years available to estimate condition.
Low		Asset data is available for some assets. Where possible, replacement cost and useful life are estimated based on asset properties. Condition is only determined by using age as a proxy
Moderate		Asset data is available for most assets. Where possible, replacement cost and useful life are estimated based on asset properties. Condition is estimated using a combination of age as a proxy and documented observations.
High		Asset data is available for all assets. Replacement cost and useful life are estimated based on asset properties. Most asset condition ratings are estimated using documented observations.
Very High		Asset data is available for all assets. Replacement cost and useful life are estimated based on asset properties. All asset condition ratings are based on documented observations.

Table 8 - Data Completeness Descriptions

Completeness	Figure	Criteria
Very Low		0 - 20% of assets are included
Low		20 – 40% of assets are included
Moderate		40 – 60% of assets are included
High		60 – 80% of assets are included
Very High		80 – 100% of assets are included

3. RESULTS

State of the Infrastructure reports have been generated for the following areas:

1. City of Saint John (overall)
2. Saint John Water
3. General Fund
    a. Growth & Community Development
    b. Public Safety
    c. Transportation & Environment
    d. Corporate, Finance & Administrative

Each area report contains key information such as total replacement value, infrastructure deficit, letter grade, long-term financial forecast, risk heatmap, trend arrow and confidence band. This information will communicate the current state of infrastructure repair and the necessary funding to maintain or improve it.

City of Saint John

Replacement Value	Infrastructure Deficit	Letter Grade	Trend
$2730.9 M	$435.0 M	C+	

Overview

As Canada's oldest incorporated city and New Brunswick's largest municipality, the City of Saint John has been providing municipal services to local citizens for more than two centuries. Key service areas for the City include Growth & Community Development, Public Safety, Transportation & Environment, Saint John Water, and Corporate, Finance & Administrative.

The City of Saint John relies on a variety of facility, water, wastewater, roadway, structures, stormwater, parks, recreation, and fleet assets to support the delivery of municipal services. Valuation results of the five (5) major service areas in the City of Saint John are shown in Table 9.

Table 9 - City of Saint John Asset Valuations

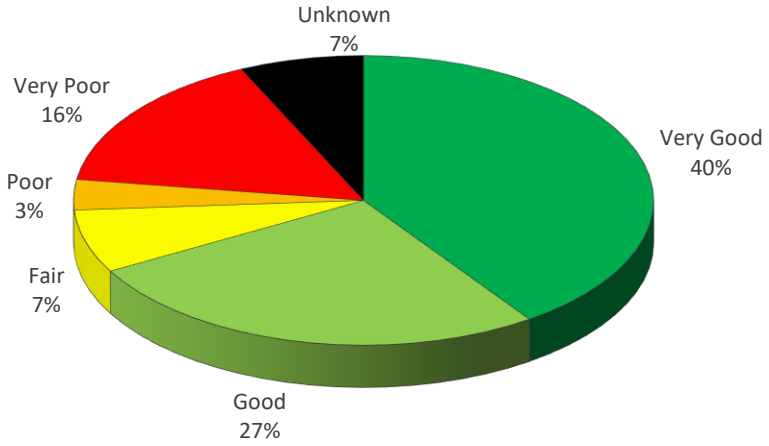
Asset	Replacement Value	Infrastructure Deficit	Letter Grade
Growth & Community Development	$129,646,291	$47,962,628	C-
Public Safety	$69,077,926	$13,641,277	C+
Transportation and Environment	$1,073,263,922	$52,650,571	B
Saint John Water	$1,443,539,753	$313,581,339	C+
Corporate, Finance & Administrative	$15,357,854	$7,137,891	C-
Total	**$2,730,885,747**	**$434,973,706**	**C+**

Condition

Condition ratings represent the current state of physical repair and are often used as an indicator for the relative time until corrective action is required. Condition ratings for the City of Saint John's assets are rate on a 1 – 5 scale with 1 indicating an asset in Very Good condition, and 5 indicating an asset in Very Poor condition.

The replacement value-weighted average condition for the City of Saint is 2.22 out of 5.00 with assets generally being recognized as being in Good to Fair condition. However, 19% of the City's assets are in a Poor or worse condition and there is insufficient information to estimate the condition of 7% of the City's assets, as shown in Figure 7.

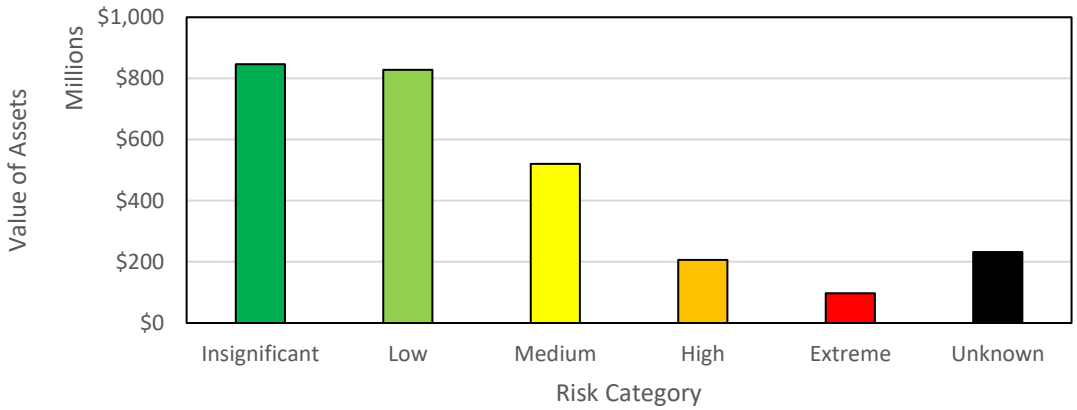
Figure 7 - City of Saint John Condition Distribution



Risk

Results of the initial risk assessment suggest the City of Saint John assets exhibit a "Medium" risk profile. There are a large amount of assets (4% of the total asset valuation) in the "Extreme" risk category which should be investigated immediately. These high-risk assets are primarily composed of water transmission mains. A distribution of the total value of assets in each of the risk categories is shown in Figure 8.

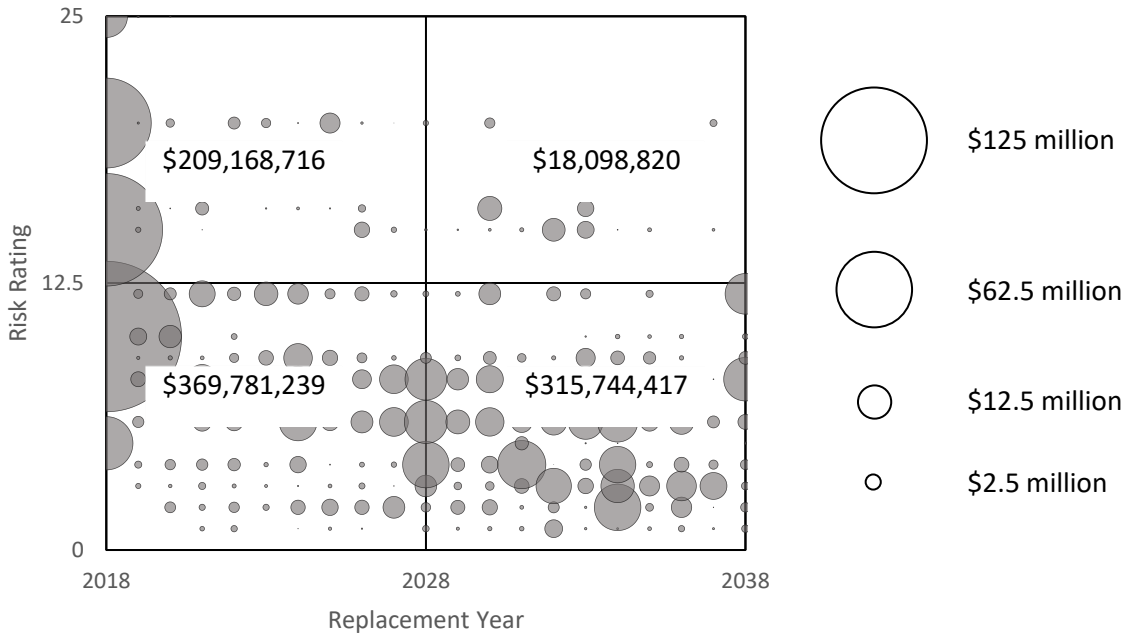
Figure 8 - Distribution of City of Saint John Asset Risks



A risk heatmap has been generated for the City of Saint John to demonstrate the relative timing and investment requirement for the City's assets. Assets on the left side of the x-axis are to be replaced in the short-term, while assets in the upper half of the y-axis are relatively higher risk assets.

In summary, the City has a significant amount of both higher and lower risk assets requiring investments in the immediate future. Future investments are relatively consistent, with no major grouping or "waves" of investments anticipated. Most investment requirements are in the short-term, and there are assets in an Extreme risk category which should be investigated immediately.

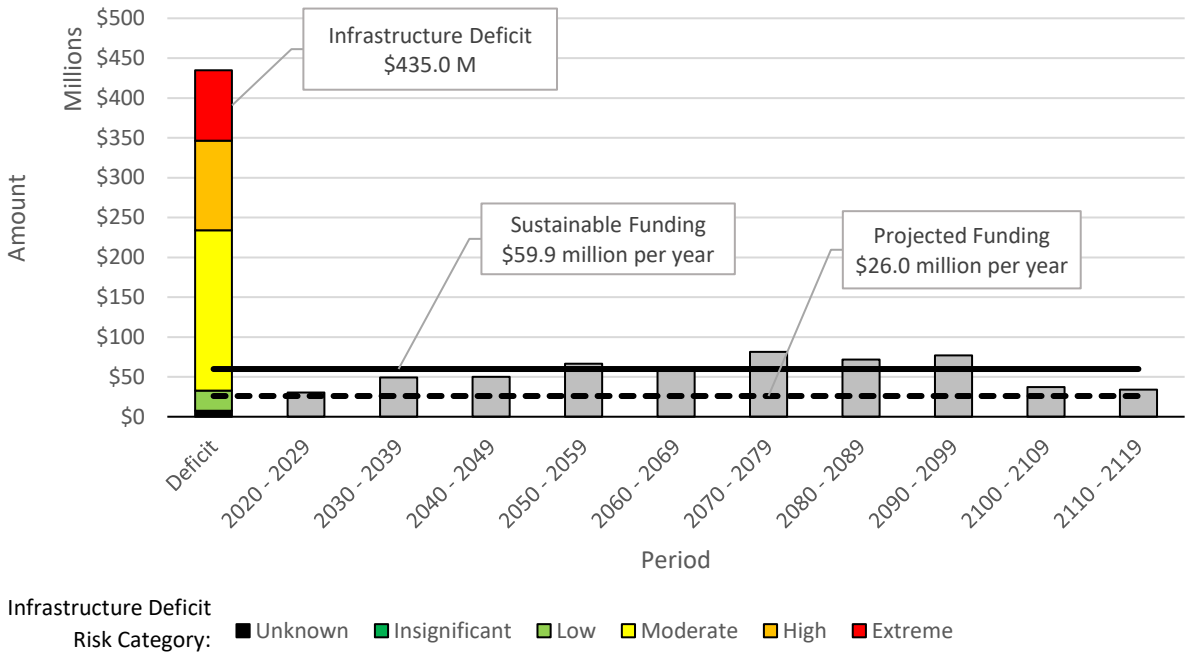
Figure 9 - City of Saint John Risk Heatmap



Long-Term Financial Forecast

Results of the City of Saint John's long-term financial forecast are shown in Figure 10. The City has a current infrastructure deficit of $435.0 million and a sustainable funding requirement of $59.9 million per year. Projected capital funding levels (2020 – 2023) for the City are $26.0 million per year. In total, this represents a funding gap of $33.9 million per year. Projected funding levels would need to be increased by 130% to achieve the sustainable funding requirement.

Figure 10 - City of Saint John Long-Term Financial Forecast

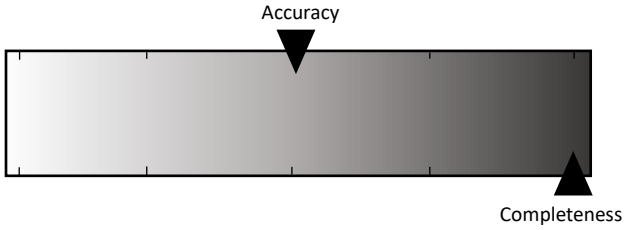


Confidence Band

The confidence of results presented for the City of Saint John assets are recognized to be complete and moderately accurate. This represents a significant improvement from the 2016 Report, where both the completeness and accuracy of results were recognized as low. In summary, 80 - 100% of the assets are estimated to be included and asset parameter data is available for most assets. Replacement cost and useful life are estimated based on asset parameters (where available) and condition is estimated using a combination of age as a proxy and documented observations.

Improvements in the accuracy and completeness of asset data and information resulted in an increase in the total asset valuation from the 2016 SOTI Report for the City of Saint John. This increase is primarily attributed to improved completeness of water and sewer main data and improved accuracy of unit replacement costs. The data used to generate the 2016 SOTI Report is only sourced from the City's Financial Tangible Capital Asset (TCA) Registry, whereas the 2018 Report relies on a combination of higher quality data sourced from the various information management systems used to manage the City's assets (e.g. GIS, MicroPaver, ...).

Figure 11 - City of Saint John Confidence Band



Saint John (General Fund)

Replacement Value	Infrastructure Deficit	Letter Grade	Trend
$1287.3 M	$121.4 M	B	↘

Overview

The City of Saint John General Fund includes all services except those provided by Saint John Water. Service areas include Transportation and Environment, Growth & Community Development, Public Safety, and Corporate, Finance & Administrative.

The City of Saint John relies on a variety of facility, roadway, structures, stormwater, parks, recreation, and fleet assets to support the delivery of municipal services. Valuation results of the major service areas in the City of Saint John General Fund are shown in Table 10.

Table 10 – General Fund Asset Valuations

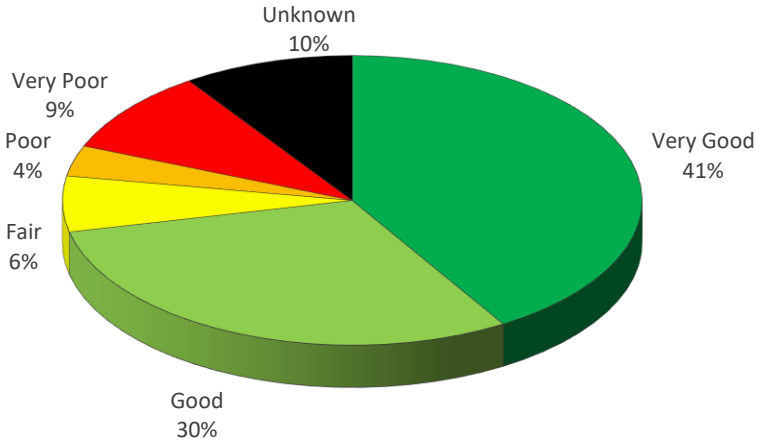
Asset	Replacement Value	Infrastructure Deficit	Letter Grade
Growth & Community Development	$129,646,291	$47,962,628	C-
Public Safety	$69,077,926	$13,641,277	C+
Transportation and Environment	$1,073,263,922	$52,650,571	B
Corporate, Finance & Administrative	$15,357,854	$7,137,891	C-
Total	**$1,287,345,993**	**$121,392,368**	**B**

Condition

Condition ratings represent the current state of physical repair and are often used as an indicator for the relative time until corrective action is required. Condition ratings for the City of Saint John's assets are rate on a 1 – 5 scale with 1 indicating an asset in Very Good condition, and 5 indicating an asset in Very Poor condition.

The replacement value-weighted average condition for the General Fund is 2.00 out of 5.00 with assets generally being recognized as being in a Good condition. However, 13% of the City's General Fund assets are in a Poor or worse condition and there is insufficient information to estimate the condition of 10% of the assets, as shown in Figure 12.

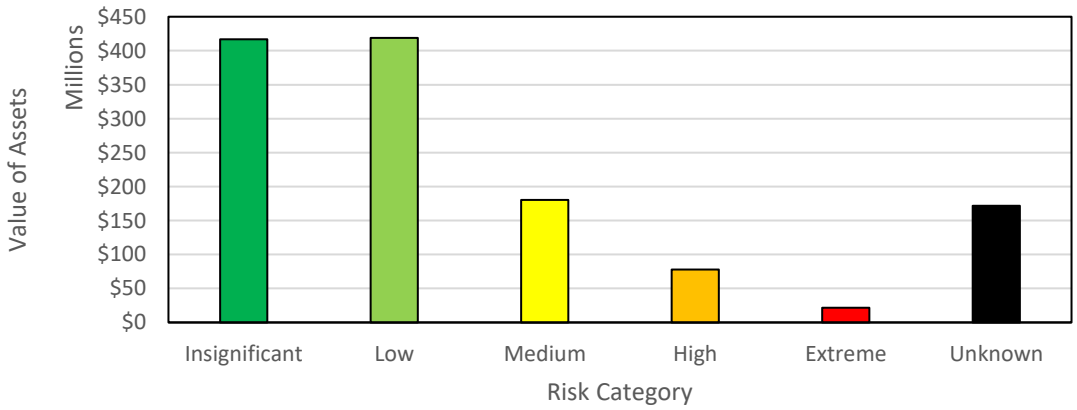
Figure 12 – General Fund Condition Distribution



Risk

Results of the initial risk assessment suggest the General Fund assets exhibit a "Low" risk profile. There are a small amount of assets (1% of the total asset valuation) in the "Extreme" risk category which should be investigated immediately. These high-risk assets are primarily composed of recreational facilities. A distribution of the total value of assets in each of the risk categories is shown in Figure 13.

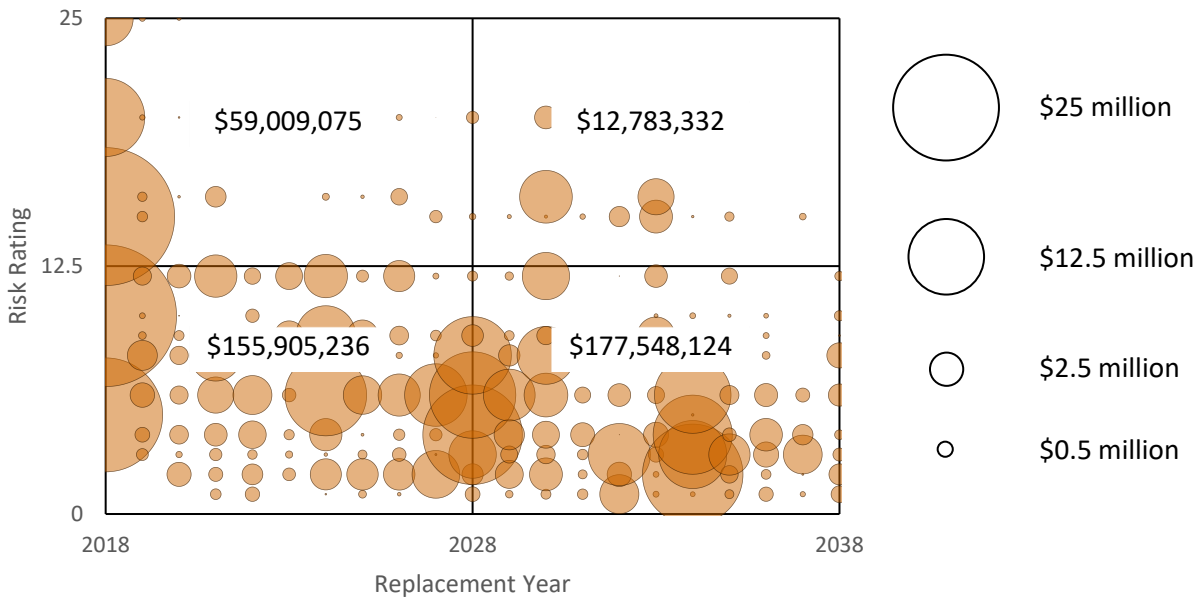
Figure 13 - Distribution of General Fund Asset Risks



A risk heatmap has been generated for the General Fund to demonstrate the relative timing and investment requirement for the category's assets. Assets on the left side of the x-axis are to be replaced in the short-term, while assets in the upper half of the y-axis are relatively higher risk assets.

In summary, the General Fund has a significant amount of both medium and lower risk assets requiring investments in the immediate future. Future investments are not uniform, with a significant quantity of investments anticipated from 2026 - 2032. However, most investment requirements are in the short-term, and there are some assets in an Extreme risk category which should be investigated immediately.

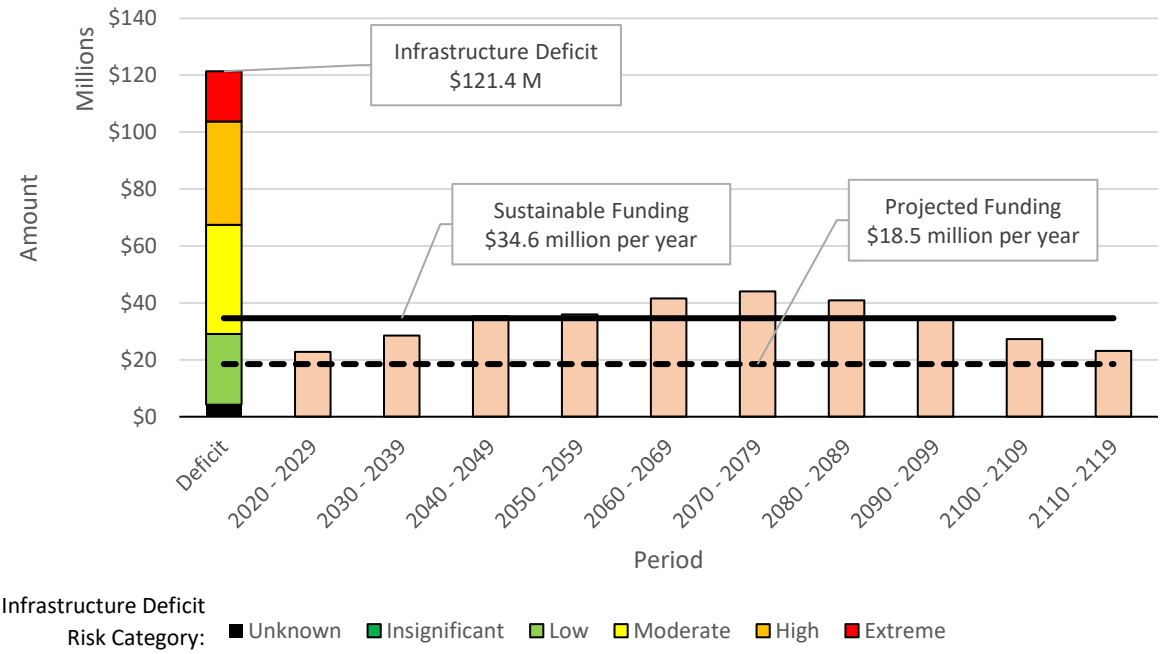
Figure 14 – General Fund Risk Heatmap



Long-Term Financial Forecast

Results of the General Fund's long-term financial forecast are shown in Figure 15. The General Fund has a current infrastructure deficit of $121.4 million and a sustainable funding requirement of $34.6 million per year. Projected capital funding levels (2020 – 2023) for the General Fund average $18.5 million per year. In total, this represents a funding gap of $16.1 million per year. Projected funding levels would need to be increased by 87% to achieve the sustainable funding requirement.

Figure 15 – General Fund Long-Term Financial Forecast

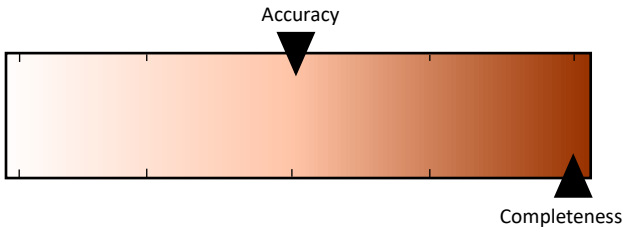


Confidence Band

The confidence of the results presented for the General Fund assets are recognized to be complete and moderately accurate. In summary, 80 – 100% of assets are estimated to be included and up to date asset parameter data is available for most assets. Replacement cost and useful life are estimated based on asset parameters (where available) and condition is estimated using a combination of age as a proxy and documented observations.

Improvements in the accuracy and completeness of asset data resulted in an increase in total valuation (increase in roadway, sidewalk, and storm line unit replacement costs), a decrease in total valuation for Growth and Community Services (Market Square component completeness), an improvement in the overall condition (use of Pavement Condition Index rating to determine the condition of roadways), and a reduction in the sustainable funding requirement (extension of useful life of roadway bases and storm lines from 40 to 80 years).

Figure 16 – General Fund Confidence Band



Saint John Water

Replacement Value	Infrastructure Deficit	Letter Grade	Trend
$1443.5 M	$313.6 M	C+	↘

Overview

Saint John Water supports the community in achieving its long-term vision and goal for safe, clean drinking water. Services are delivered to enhance the quality of drinking water and protect the natural environment with the treatment of wastewater. Major asset types include watermains, sanitary and combined sewer mains, water and wastewater treatment facilities, sanitary lift stations, storage reservoirs and water pumping stations. Total asset quantities and valuation for major asset types are highlighted in Table 11.

Table 11 – Saint John Water Asset Quantities and Valuations

Asset	Quantity	Replacement Value	Infrastructure Deficit	Letter Grade
Industrial Water		$10,110,454	$6,286,339	D
Industrial Water Pumping Stations	1	$5,285,331	$4,629,076	D-
Industrial Water Dam & Spillways	2	$3,167,860	$0	B+
Industrial Water Treatment Facilities	2	$1,657,263	$1,657,263	F
Drinking Water		$836,311,060	$171,933,917	C+
Drinking Watermains	517.5 km	$766,892,743	$162,477,585	C
Drinking Water Pumping Stations	13	$21,152,664	$3,186,196	B-
Drinking Water Storage Reservoirs	8	$22,490,736	$4,314,491	C-
Other Drinking Water Assets		$25,774,916	$1,955,646	*NA*
Wastewater		$591,339,323	$133,227,697	B-
Sanitary Sewer Lines	315.6 km	$310,899,794	$17,928,937	B+
Combined Sewer Lines	78.7 km	$95,582,766	$95,582,766	F
Sanitary Forcemains	49.9 km	$48,291,747	$0	A
Wastewater Treatment Facilities	6	$75,938,930	$9,669,434	B
Sanitary Lift Stations	68	$60,029,961	$9,820,429	B-
Other Wastewater Assets		$596,125	$226,131	*NA*
Shared Assets		$5,778,916	$2,133,386	C-
Fleet		$4,195,782	$1,459,302	C-
Machinery and Equipment		$833,152	$514,441	D+
SCADA		$749,983	$159,643	B-
Total		**$1,443,539,753**	**$313,581,339**	**C+**

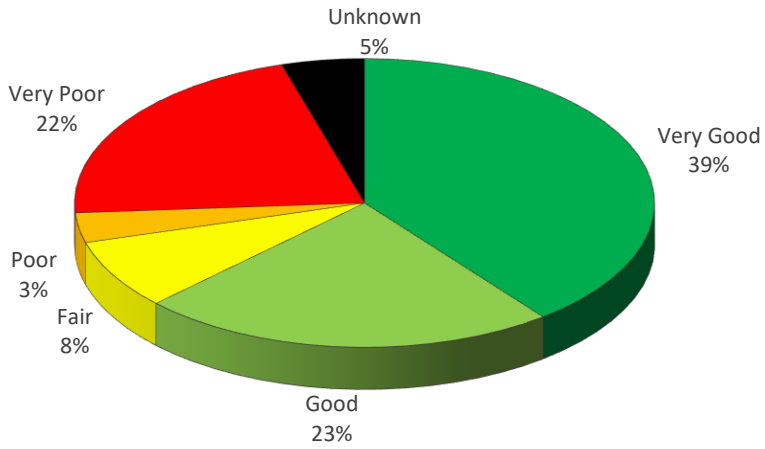
Note: The Saint John Water asset inventory does *not* include the newly constructed water treatment facility as part of the Safe, Clean Drinking Water program. The City is not responsible the replacement and/or repair of the assets located on this site until the facility is handed back over to the City at the end of the contract term. However, the associated linear infrastructure renewal projects completed in parallel with the construction of the water treatment facility have been included and the asset inventory is mostly complete.

Condition

Condition ratings represent the current state of physical repair and are often used as an indicator for the relative time until corrective action is required. Condition ratings for the City of Saint John's assets are rate on a 1 – 5 scale with 1 indicating an asset in Very Good condition, and 5 indicating an asset in Very Poor condition.

The replacement value-weighted average condition for Saint John Water is 2.41 out of 5.00 with assets generally being recognized as being in Good to Fair condition. However, 25% of Saint John Water assets are in a Poor or worse condition and there is insufficient information to estimate the condition of 5% of the assets, as shown in Figure 17.

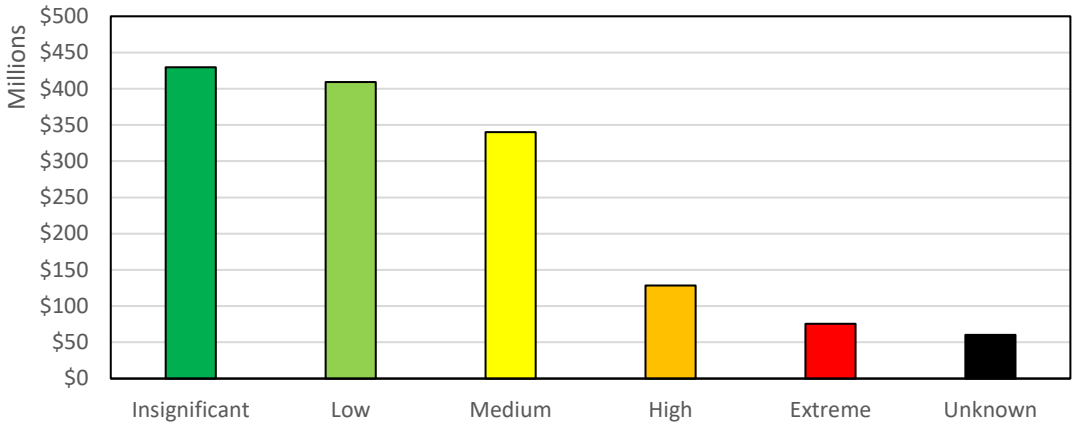
Figure 17 – Saint John Water Condition Distribution



Risk

Results of the initial risk assessment suggest Saint John Water assets exhibit a "Medium to High" risk profile. There are a large amount of assets (5% of the total asset valuation) in the "Extreme" risk category which should be investigated immediately. These high-risk assets are primarily composed of watermains. A distribution of the total value of assets in each of the risk categories is shown in Figure 18.

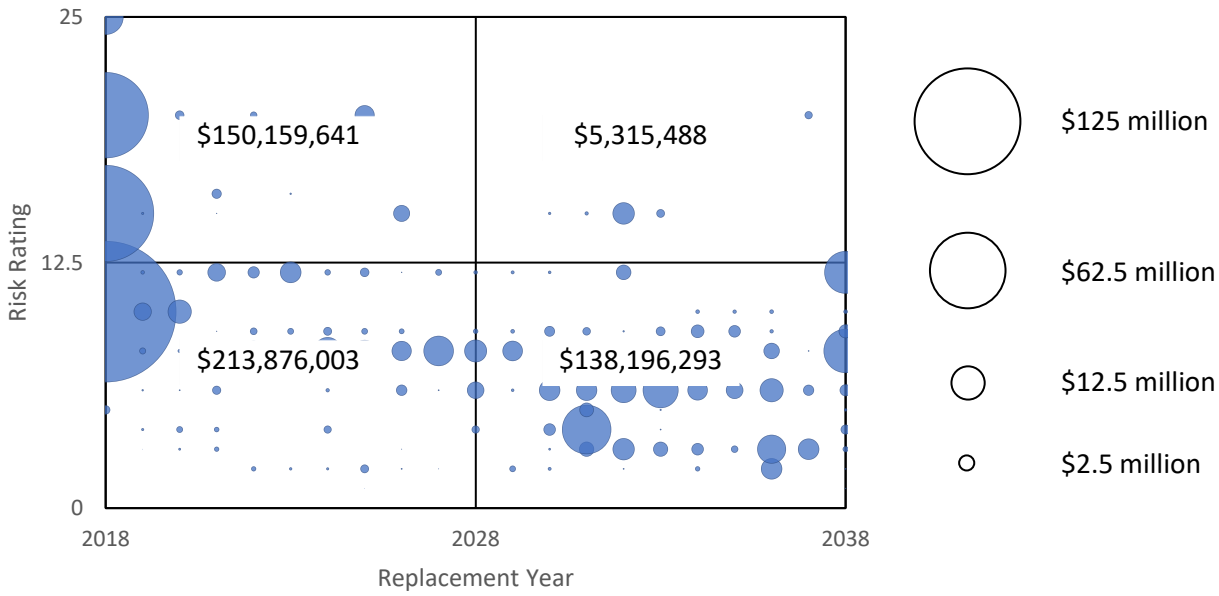
Figure 18 - Distribution of Saint John Water Asset Risks



A risk heatmap has been generated for Saint John Water to demonstrate the relative timing and investment requirement for the category's assets. Assets on the left side of the x-axis are to be replaced in the short-term, while assets in the upper half of the y-axis are relatively higher risk assets.

In summary, the General Fund has a significant amount of both high and medium risk assets requiring investments in the immediate future. Future investments are relatively minor but not uniform, with a significant quantity of investments anticipated in 2030 - 2035. However, most investment requirements are in the short-term, and there are some assets in an Extreme risk category which should be investigated immediately.

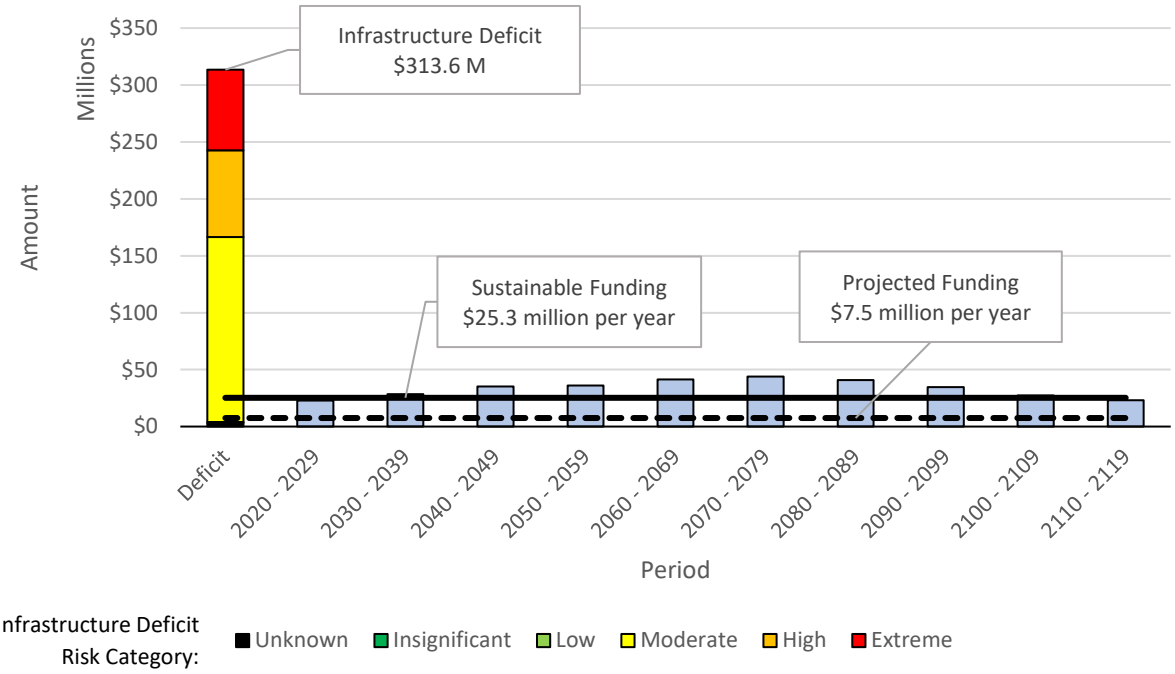
Figure 19 – Saint John Water Risk Heatmap



Long-Term Financial Forecast

Results of Saint John Water's long-term financial forecast are shown in Figure 20. Saint John Water has a current infrastructure deficit of $313.6 million and a sustainable funding requirement of $25.3 million per year. Projected capital funding levels (2020 – 2023) for Saint John Water are $7.5 million per year. In total, this represents a funding gap of $17.8 million per year. Projected funding levels would need to be increased by 237% to achieve the sustainable funding requirement.

Figure 20 – Saint John Water Long-Term Financial Forecast

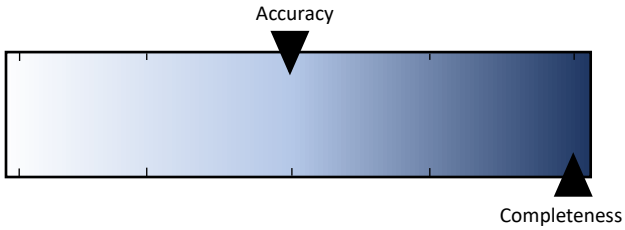


Confidence Band

The confidence of the results presented for Saint John Water assets are recognized to be complete with low accuracy. In summary, 80 – 100% of assets are estimated to be included, and up to date asset parameter data is available for most assets. Replacement cost and useful life are estimated based on asset parameters (where available) and condition is estimated using a combination of age as a proxy and documented observations. Most data for the water and wastewater facilities is likely outdated and inaccurate, and there are some outstanding watermain capital projects which have not been updated in the asset inventory. It is anticipated the overall condition of the Saint John Water assets will improve as the asset inventory data is updated.

Improvements in the accuracy and completeness of asset data resulted in a significant increase in the total valuation of Saint John Water assets when compared to the 2016 SOTI Report. The primary driver for this change is an increase in the completeness of water and sewer mains and improved accuracy in the unit replacement costs of pipe. While the infrastructure deficit is still significant, it is anticipated this will decrease as additional improvements in the accuracy of watermains and sewermains in-service year are made.

Figure 21 – Saint John Water Confidence Band



Growth and Community Development

Replacement Value	Infrastructure Deficit	Letter Grade	Trend
$129.6 M	$48.0 M	C-	↘

Overview

The Growth and Community Development program supports the long-term vision and goal of a diverse, vibrant, resilient, environmentally sound economy. The service provides guidance, direction and support for development that enhances quality of life for residents by working to create places where people want to live, work and invest. Significant assets include Market Square, Harbour Station, Harbour Passage and the City Market. Results for the major assets are shown in Table 12.

Note, a significant portion of the current infrastructure deficit is attributed to Market Square. Results are expected to change dramatically as additional improvements in the quality and reliability of this facility's information is made. Additionally, the total replacement cost of both Market Square and Harbour Station is undervalued. It is anticipated the total replacement cost of these facilities will increase as data quality improvements are made.

Table 12 - Growth and Community Development Asset Valuations

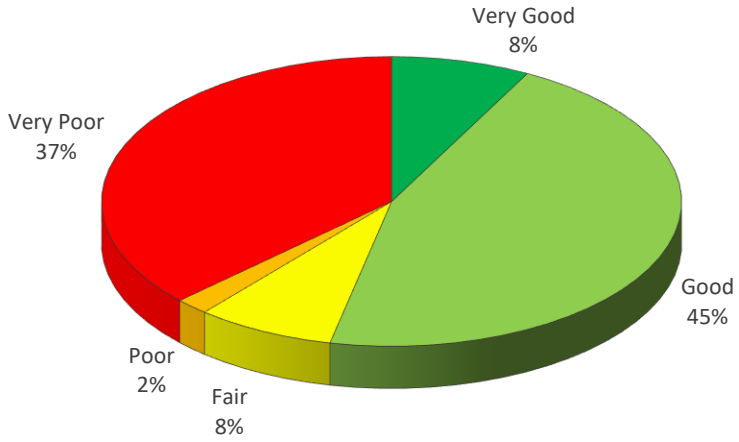
Asset	Replacement Value	Infrastructure Deficit	Letter Grade
Market Square	$83,406,016	$36,937,012	D+
Harbour Station	$24,957,544	$5,232,917	C-
Harbour Passage	$9,016,568	$400,220	B
City Market	$7,966,408	$3,705,469	D+
Arts & Culture Facilities	$2,539,761	$1,030,382	D+
Visitor Information Centers	$794,064	$456,770	D
Tourism Facilities	$553,800	$163,940	C+
Industrial Parks	$412,130	$35,919	B
Total	**$129,646,291**	**$47,962,628**	**C-**

Condition

Condition ratings represent the current state of physical repair and are often used as an indicator for the relative time until corrective action is required. Condition ratings for the City of Saint John's assets are rate on a 1 – 5 scale with 1 indicating an asset in Very Good condition, and 5 indicating an asset in Very Poor condition.

The replacement value-weighted average condition for Growth and Community Development is 3.15 out of 5.00 with assets generally being recognized as being in a Fair condition. However, 39% of the City's Growth and Community Development assets are in a Poor or worse condition as shown in Figure 22.

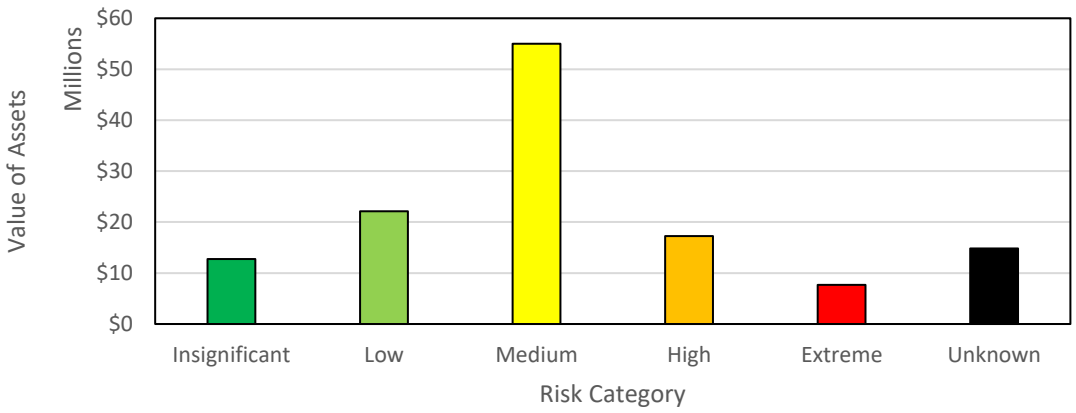
Figure 22 - Growth and Community Development Condition Distribution



Risk

Results of the initial risk assessment suggest the Growth and Community Development assets exhibit a "Medium" risk profile. There are a large amount of assets (6% of the total asset valuation) in the "Extreme" risk category which should be investigated immediately. These high-risk assets are primarily composed of Market Square and Harbour Station facility components. A distribution of the total value of assets in each of the risk categories is shown in Figure 23. The Growth and Community Development risk profile is atypical and is primarily attributed to a significant portion of assets with a moderate consequence of failure are at the end of their useful lives.

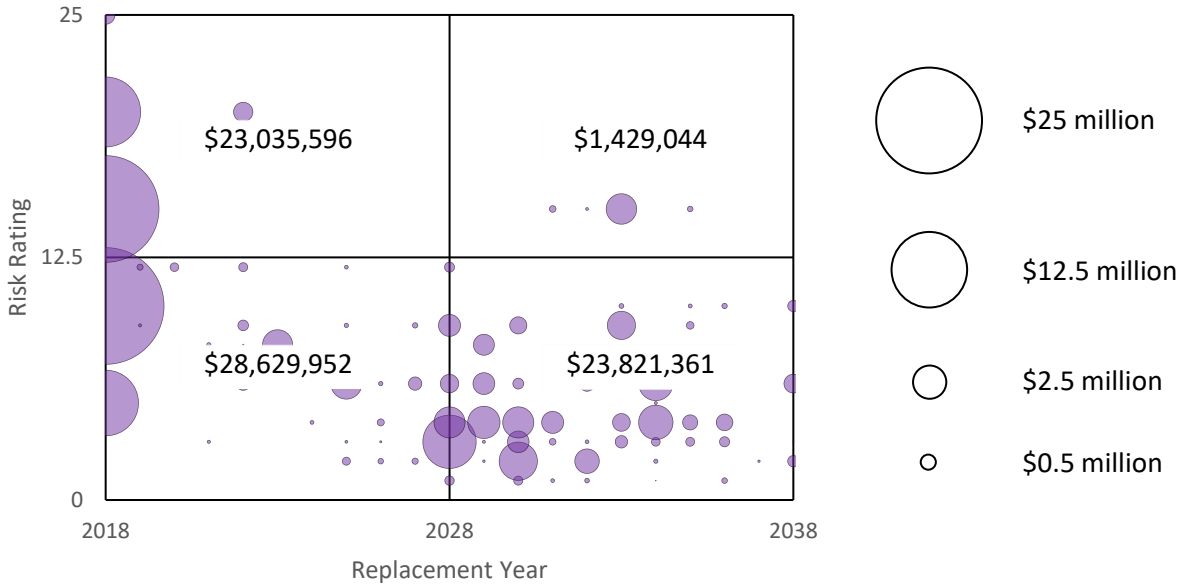
Figure 23 - Distribution of Growth and Community Development Asset Risks



A risk heatmap has been generated for Growth and Community Development to demonstrate the relative timing and investment requirement for the category's assets. Assets on the left side of the x-axis are to be replaced in the short-term, while assets in the upper half of the y-axis are relatively higher risk assets.

In summary, Growth and Community Development has a significant amount of both high and medium risk assets requiring investments in the immediate future. There are very few investments required in the next 10 years, with a substantial wave of investments anticipated from 2028 – 2030. However, most investment requirements are in the short-term, and there are some assets in an Extreme risk category which should be investigated immediately.

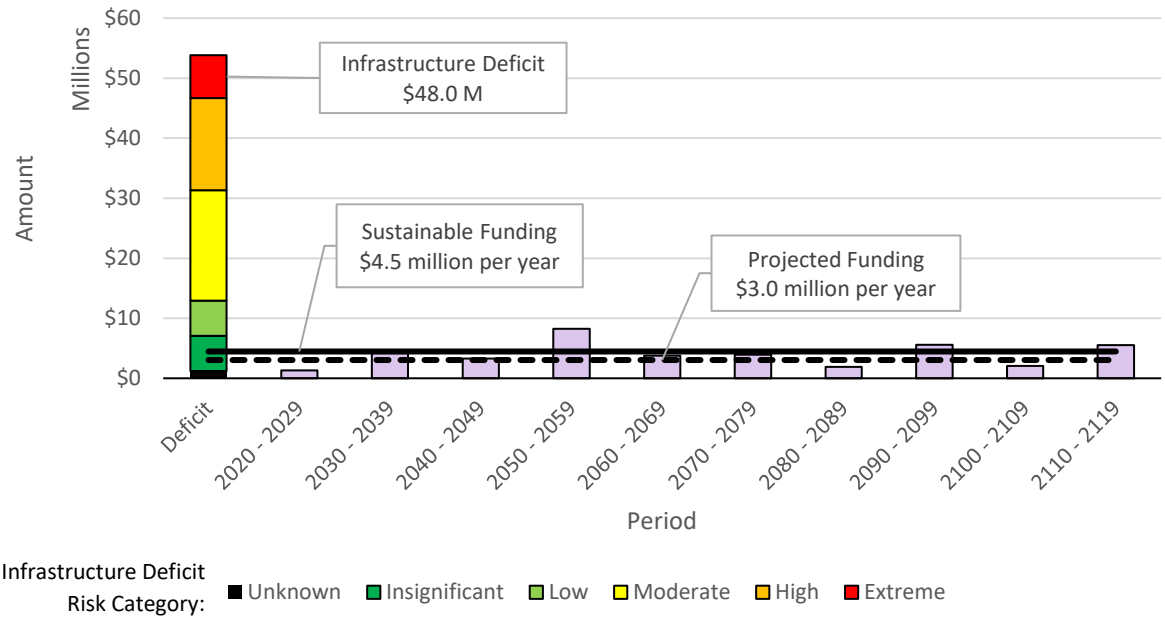
Figure 24 - Growth and Community Development Risk Heatmap



Long-Term Financial Forecast

Results of Growth and Community Development's long-term financial forecast are shown in Figure 25. Growth and Community Development has a current infrastructure deficit of $48.0 million and a sustainable funding requirement of $4.5 million per year. Projected capital funding levels (2020 – 2023) are $3 million per year. In total, this represents a funding gap of $1.4 million per year. Projected funding levels would need to be increased by 47% to achieve the sustainable funding requirement.

Figure 25 - Growth and Community Development Long-Term Financial Forecast

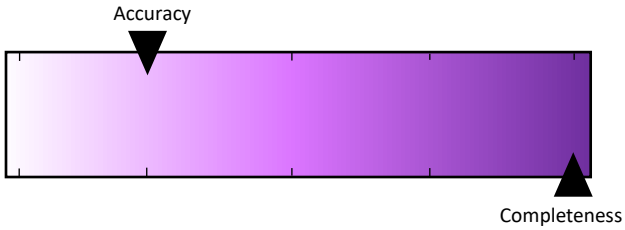


Confidence Band

The confidence of the results presented for the Growth and Community Development assets are recognized as complete but with poor accuracy. In summary, 80 – 100% of assets are estimated to be included, but up to date asset parameter data is limited. Replacement cost and useful life are estimated based on asset parameters (where available) and condition is estimated using age as a proxy.

Improvements in the accuracy and completeness of asset resulted in a decrease in the total valuation and a slight improvement in the overall condition. These changes are primarily attributed to the improved accuracy and completeness of the Market Square and City Market facility components' age, replacement cost and useful life. However, much of the data is still based on the Financial Tangible Capital Asset (TCA) Registry and significant changes are anticipated as the City improves its confidence in facility asset data.

Figure 26 – Growth and Community Development Confidence Band



Public Safety

Replacement Value	Infrastructure Deficit	Letter Grade	Trend
$69.1 M	$13.6 M	C+	

Overview

The Public Safety service supports the Community in achieving its long-term vision of being a safe, livable community. The program helps to improve the quality of life with a focus on creating safe neighborhoods that provide opportunities for individuals to develop and grow together through recreation, cultural and leisure activities and community involvement. Significant asset types include fire and police fleet, fire and police equipment, fire and police facilities, public safety communications center (PSCC) and street lighting. Total asset quantities and valuations for assets are shown in Table 13.

Table 13 – Public Safety Asset Quantities and Valuations

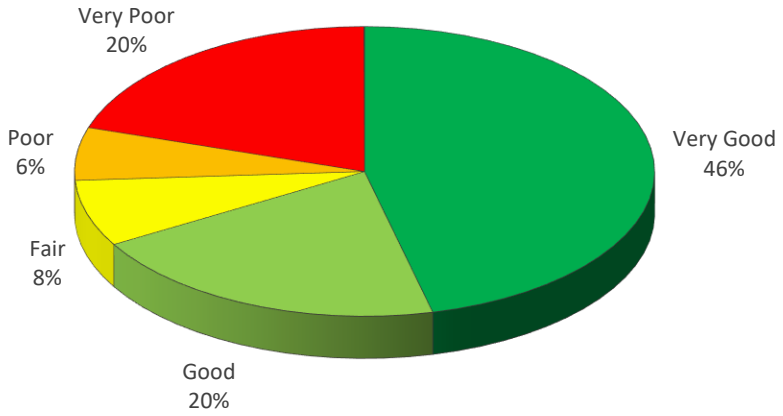
Asset	Quantity	Replacement Value	Infrastructure Deficit	Letter Grade
Fire & Rescue		$21,486,420	$8,634,371	D+
Fire Facilities	9	$9,858,833	$5,139,871	D
Fire Fleet	34	$8,164,966	$1,623,258	C-
Fire Machinery & Equipment	230	$3,462,621	$1,871,241	D
Police		$39,819,783	$3,149,728	A-
Police Facilities	1	$35,457,985	$0	A+
Police Fleet	68	$2,429,269	$1,575,762	D
Police Machinery & Equipment	79	$1,932,529	$1,573,967	D-
PSCC		$692,293	$320,593	D+
Street Lighting	1,041	$7,079,430	$1,536,585	C-
Total		**$69,077,926**	**$13,641,277**	**C+**

Condition

Condition ratings represent the current state of physical repair and are often used as an indicator for the relative time until corrective action is required. Condition ratings for the City of Saint John's assets are rate on a 1 – 5 scale with 1 indicating an asset in Very Good condition, and 5 indicating an asset in Very Poor condition.

The replacement value-weighted average condition for Public Safety is 2.33 out of 5.00 with assets generally being recognized as being in Good condition. However, 26% of the City's Public Safety assets are in a Poor or worse condition, as shown in Figure 27.

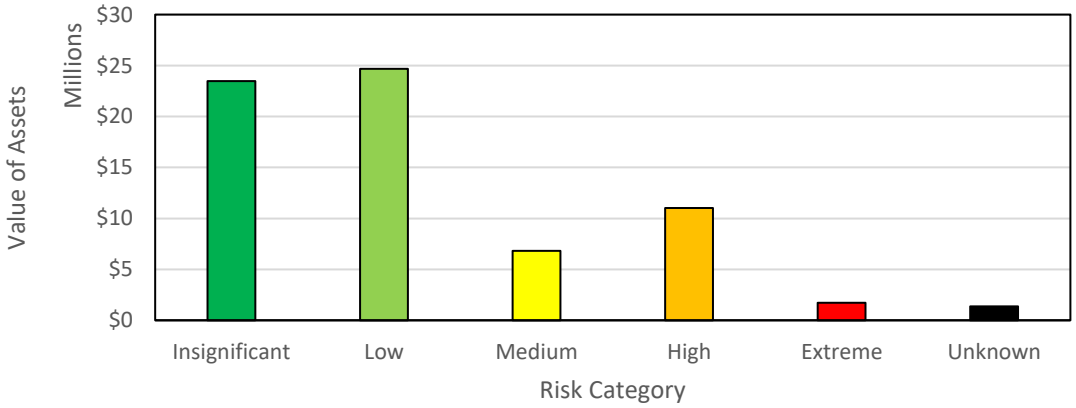
Figure 27 – Public Safety Condition Distribution



Risk

Results of the initial risk assessment suggest the Public Safety assets exhibit a "Medium-High" risk profile. There are a small amount of assets (2% of the total asset valuation) in the "Extreme" risk category which should be investigated immediately, and a larger amount of assets (16% of the total asset valuation) in the "High" risk category. These high-risk assets are primarily composed of fire facility components and fire fleet. A distribution of the total value of assets in each of the risk categories is shown in Figure 28.

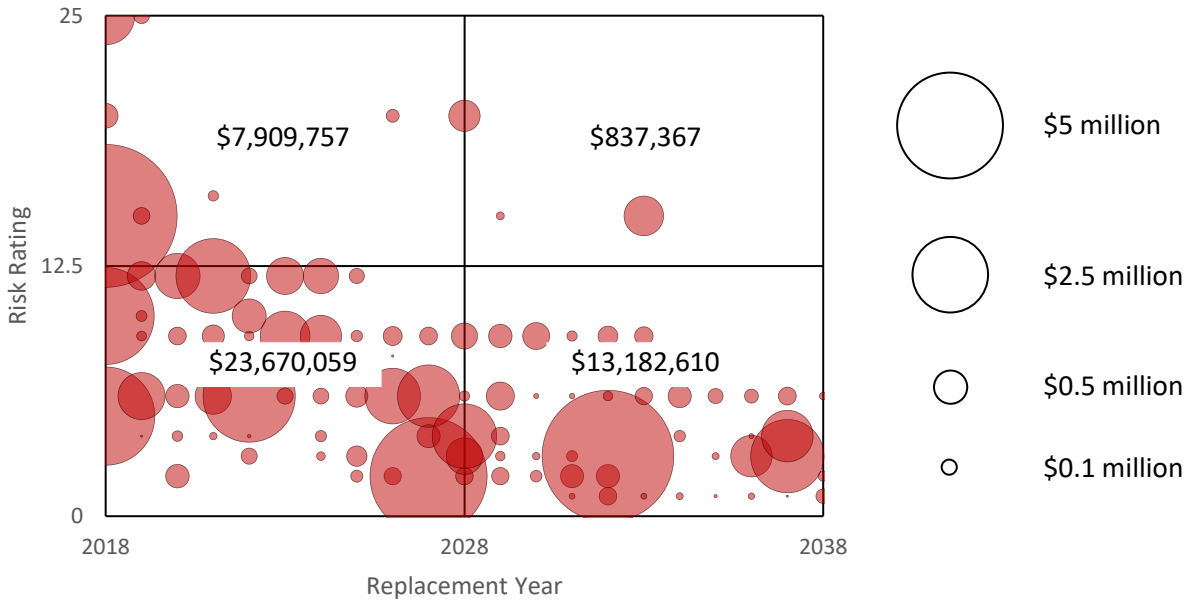
Figure 28 - Distribution of Public Safety Asset Risks



A risk heatmap has been generated for Public Safety to demonstrate the relative timing and investment requirement for the category's assets. Assets on the left side of the x-axis are to be replaced in the short-term, while assets in the upper half of the y-axis are relatively higher risk assets.

In summary, Public Safety has a uniform investment requirement over the next 20 years. Most investments are medium to low risk, with some higher risk assets interspersed. However, there are still substantial investments required in the short-term and there are some assets in an Extreme risk category which should be investigated immediately.

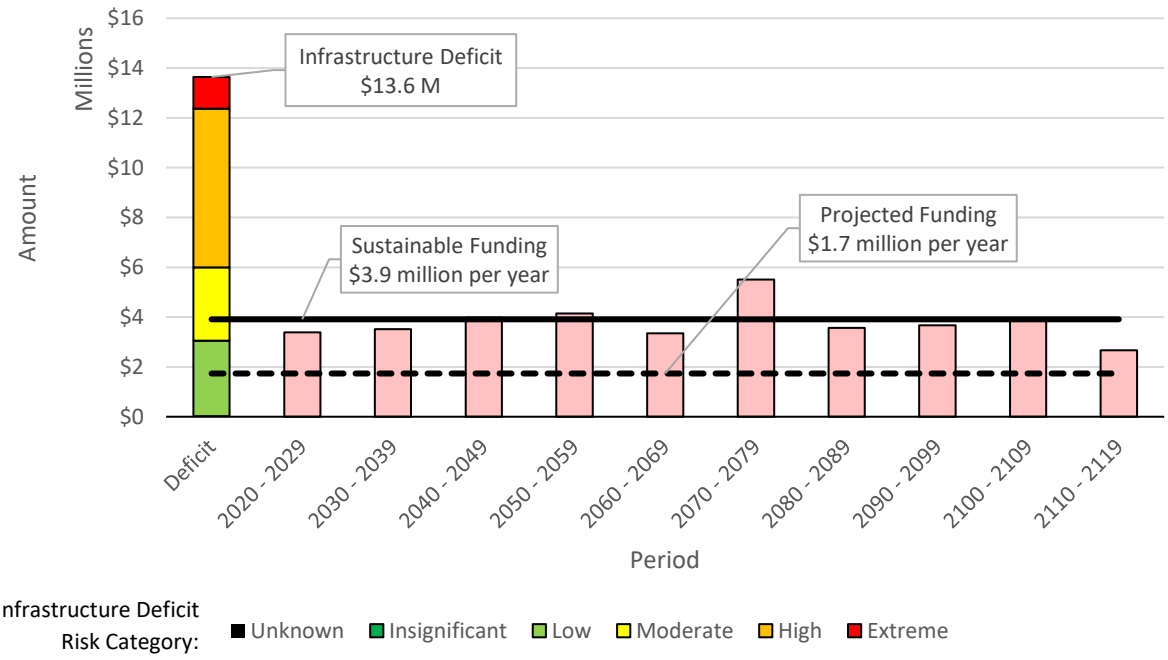
Figure 29 – Public Safety Risk Heatmap



Long-Term Financial Forecast

Results of Public Safety's long-term financial forecast are shown in Figure 30. Public Safety has a current infrastructure deficit of $13.6 million and a sustainable funding requirement of $3.9 million per year. Projected capital funding levels (2020 – 2023) are $1.7 million per year. In total, this represents a funding gap of $2.2 million per year. Projected funding levels would need to be increased by 125% to achieve the sustainable funding requirement.

Figure 30 – Public Safety Long-Term Financial Forecast

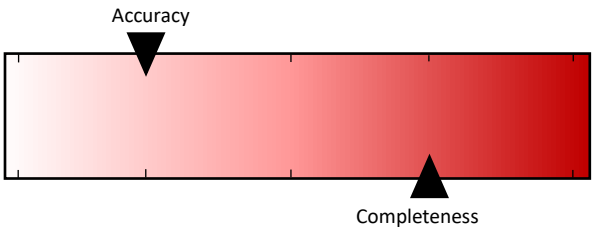


Confidence Band

The confidence of the results presented for the Public Safety assets are recognized to mostly complete with limited accuracy. In summary, 60-80% of assets are estimated to be included and up to date asset parameter data is limited. Replacement costs are only based on an escalation of original acquisition costs and estimated useful life is assumed equal to the accounting amortization period.

There are no major data quality differences between the 2018 and 2016 SOTI Report results. This is because both reports results are based on the City's Financial Tangible Capital Asset (TCA) Registry, without any review of historical records, only the additions and disposals of known assets.

Figure 31 – Public Safety Confidence Band



Transportation and Environment

Replacement Value	Infrastructure Deficit	Letter Grade	Trend
$1073.3 M	$52.7 M	B	↘

Overview

The Transportation and Environment program supports the community in achieving its long-term vision and goal of creating a green, attractive city where people can get around safely and easily. Services provide convenient and efficient modes of transportation and protect the environment through the maintenance of parks and public spaces. Significant asset types include roadways, sidewalks, storm water, solid waste, parks & public spaces, sports & recreation, transit and parking. Total asset quantities and valuation for major asset types are highlighted in Table 14.

Table 14 – Transportation and Environment Asset Quantities and Valuations

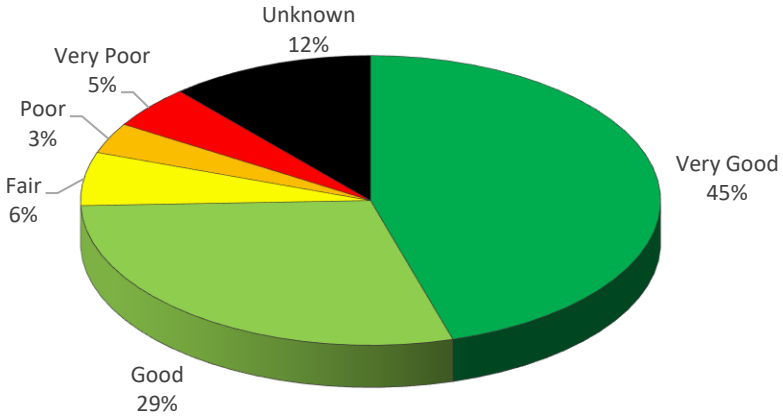
Asset	Quantity	Replacement Value	Infrastructure Deficit	Letter Grade
Road Network	1,392 lane-km	$490,562,239	$2,453,649	B+
Retaining Walls	194	$6,906,278	$598,624	C+
Sidewalk Surfaces	372.6 km	$50,081,586	$2,396,392	A-
Culverts	1,113	$7,272,166	$21,865	B
Storm Lines	318.8 km	$299,427,100	$5,045,296	B+
Solid Waste	7	$1,210,413	$0	B
Parks & Public Spaces	39	$39,952,085	$3,851,853	B
Arenas	5	$26,438,521	$9,244,452	D+
Community Centers	4	$6,703,505	$2,308,046	C
Outdoor Sports Fields & Facilities	29	$8,838,490	$2,275,343	C+
Playgrounds	37	$6,111,650	$1,844,731	C+
Pool & Swimming Facilities	1	$9,494,607	$2,274,216	C
Transit Facilities	1	$27,092,809	$0	B+
Transit Fleet	53	$19,603,446	$1,963,774	C+
Parking Facilities	2	$22,323,360	$808,144	*NA*
Parking Lots & Spaces	28	$2,262,850	$2,056,335	D
Other Transportation and Environment		$48,982,816	$15,507,852	*NA*
Total		**$1,073,263,922**	**$52,650,571**	**B**

Condition

Condition ratings represent the current state of physical repair and are often used as an indicator for the relative time until corrective action is required. Condition ratings for the City of Saint John's assets are rate on a 1 – 5 scale with 1 indicating an asset in Very Good condition, and 5 indicating an asset in Very Poor condition.

The replacement value-weighted average condition for Transportation and Environment is 1.79 out of 5.00 with assets generally being recognized as being in Good condition. However, 8% of the City's Transportation and Environment assets are in a Poor or worse condition and there is insufficient information to estimate the condition of 11% of the assets, as shown in Figure 32.

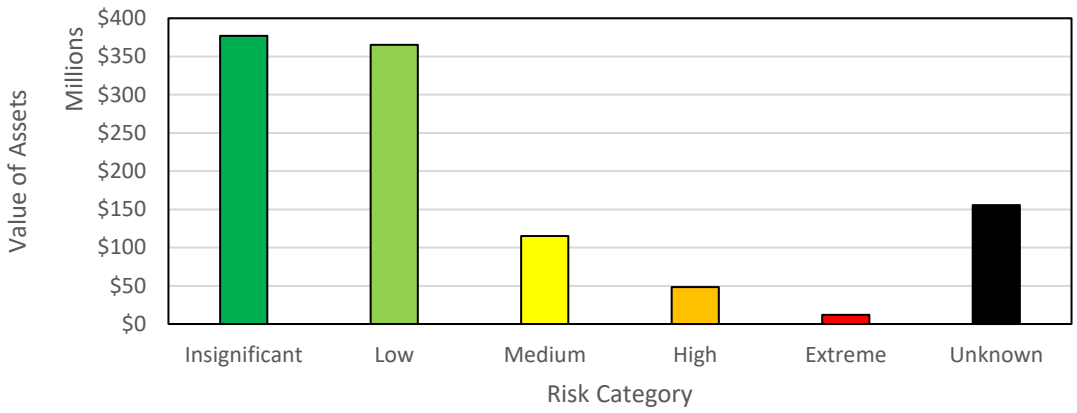
Figure 32 – Transportation and Environment Condition Distribution



Risk

Results of the initial risk assessment suggest the Transportation and Environment assets exhibit a "Low" risk profile. There is a small amount of assets (1% of the total asset valuation) in the "Extreme" risk category which should be investigated immediately. These high-risk assets are primarily composed of recreational facilities (e.g. arenas, parks, pools). A distribution of the total value of assets in each of the risk categories is shown in Figure 33.

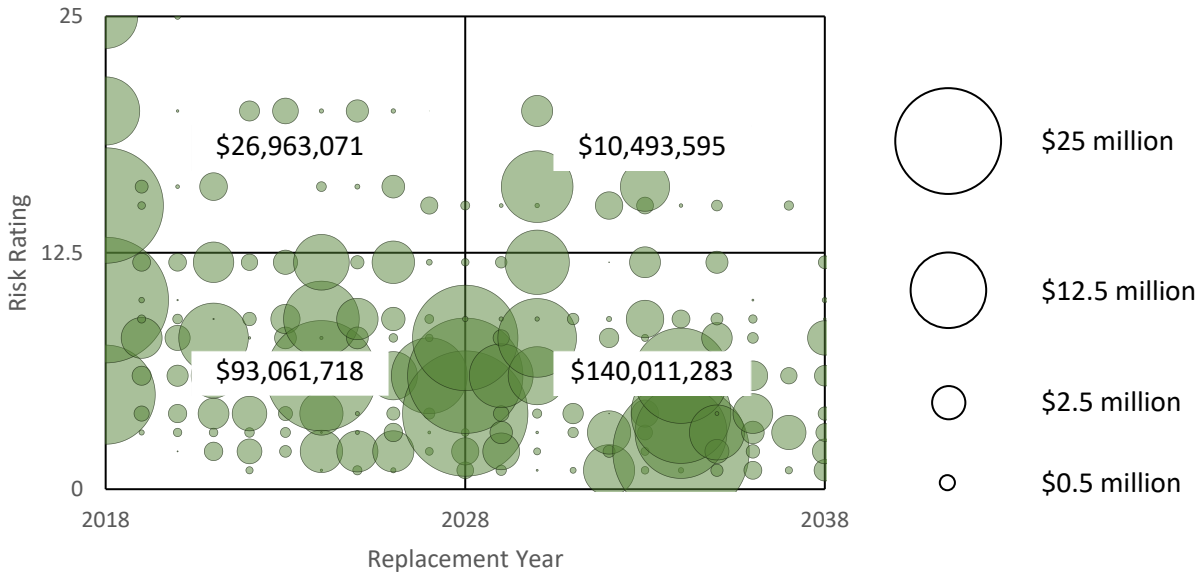
Figure 33 - Distribution of Transportation and Environment Asset Risks



A risk heatmap has been generated for the Transportation and Environment to demonstrate the relative timing and investment requirement for the category's assets. Assets on the left side of the x-axis are to be replaced in the short-term, while assets in the upper half of the y-axis are relatively higher risk assets.

In summary, Transportation and Environment has a uniform investment requirement over the next 20 years, with a concentration of investments required in the short-term and in the years 2025 - 2032. Most investments are medium to low risk, with some higher risk assets interspersed. However, there are still substantial investments required in the short-term and there are some assets in an Extreme risk category which should be investigated immediately.

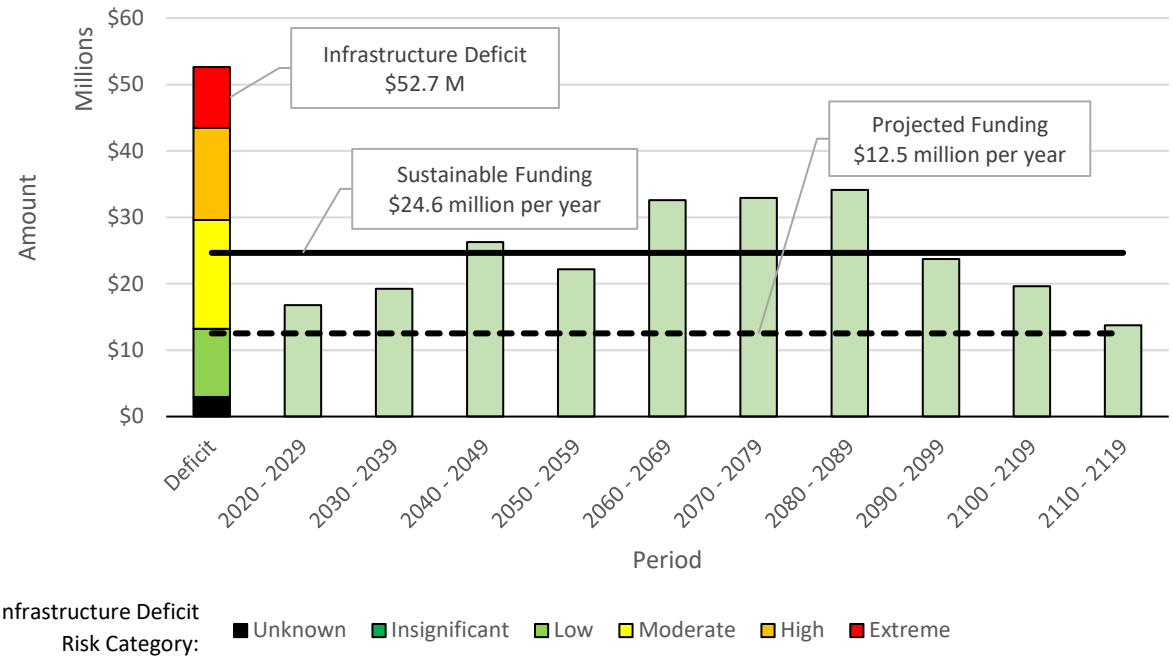
Figure 34 - Transportation and Environment Risk Heatmap



Long-Term Financial Forecast

Results of Transportation and Environment's long-term financial forecast are shown in Figure 35. Transportation and Environment has a current infrastructure deficit of $52.7 million and a sustainable funding requirement of $24.6 million per year. Projected capital funding levels (2020 – 2023) are $12.5 million per year. In total, this represents a funding gap of $12.1 million per year. Projected funding levels would need to be increased by 97% to achieve the sustainable funding requirement.

Figure 35 – Transportation and Environment Long-Term Financial Forecast

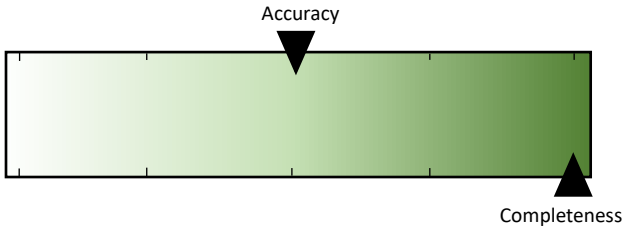


Confidence Band

The confidence of the results presented for the Transportation and Environment assets are recognized to be complete and moderately accurate. In summary, 80-100% of assets are estimated to be included and asset parameter data is available for most assets. Replacement cost and useful life are estimated based on asset parameters (where available) and condition is estimated using a combination of age as a proxy and documented observations.

Improvements in the accuracy and completeness of asset data (compared to the 2016 SOTI Report) resulted in an overall increase in the total valuation of assets. This increase in valuation is primarily attributed to an increase in roadway, sidewalk, and storm line unit replacement costs. Secondly, there is an improvement in the overall condition. This is primarily attributed to the use of Pavement Condition Index ratings to determine the condition of road surfaces, and an extension of useful life of roadway bases and storm lines from 40 to 80 years. Lastly, the sustainable funding requirement has reduced, again attributed to an increase in the useful life of roadway bases and storm lines.

Figure 36 - Transportation and Environment Confidence Band



Corporate, Finance and Administrative

Replacement Value	Infrastructure Deficit	Letter Grade	Trend
$15.4 M	$7.1 M	C-	↘

Overview

The Corporate, Finance & Administrative service area combines both Corporate and Finance & Administrative services hard assets into a single service area. Corporate services provide administrative support and policy and procedural advice to the elected Common Council. The service maintains, protects and responds to staff and public inquiries regarding the official and permanent records of the City. The Finance and Administrative Service focuses on responsible financial management and sustainable life-cycle management of the City's physical assets, including fleet, real estate, purchasing and materials management. Significant assets include IT & Equipment, Corporate Fleet, Corporate Facilities, General Machinery & Equipment and General Furniture & Fixtures. Results for each asset type is shown in Table 15.

Table 15 - Corporate, Finance and Administrative Asset Quantities and Valuations

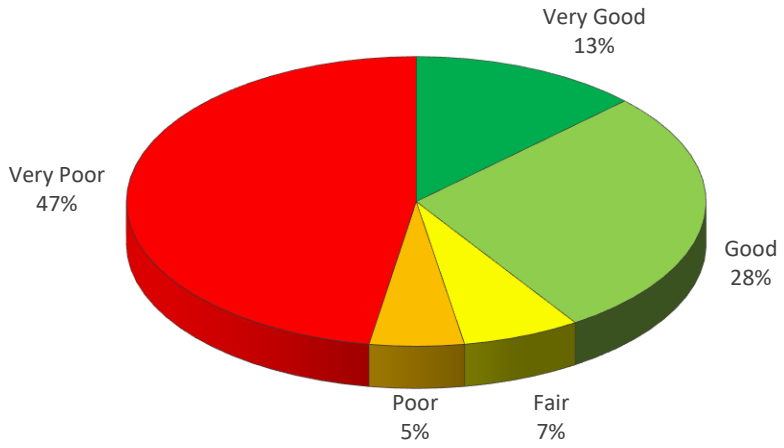
Asset	Quantity	Replacement Value	Infrastructure Deficit	Letter Grade
Corporate Facilities	7	$9,256,273	$4,457,507	D+
Corporate Fleet	34	$1,330,078	$574,787	C-
IT & Equipment	296	$4,029,910	$1,689,683	C-
General Furniture & Fixtures	4	$465,086	$298,450	D+
General Machinery & Equipment	20	$276,508	$117,463	C
Total		**$15,357,854**	**$7,137,891**	**C-**

Condition

Condition ratings represent the current state of physical repair and are often used as an indicator for the relative time until corrective action is required. Condition ratings for the City of Saint John's assets are rate on a 1 – 5 scale with 1 indicating an asset in Very Good condition, and 5 indicating an asset in Very Poor condition.

The replacement value-weighted average condition for Corporate, Finance and Administrative is 3.46 out of 5.00 with assets generally being recognized as being in Fair to Poor condition. 53% of the City's Corporate, Finance and Administrative assets are in a Poor or worse condition, as shown in Figure 37.

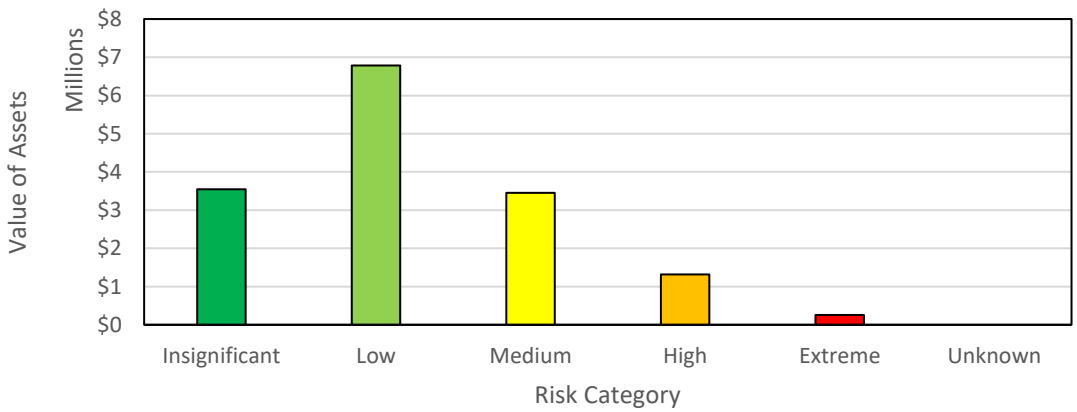
Figure 37 - Corporate, Finance & Administrative Condition Distribution



Risk

Results of the initial risk assessment suggest the Corporate, Finance and Administrative assets exhibit a "Low-Medium" risk profile. There are a small amount of assets (2% of the total asset valuation) in the "Extreme" risk category which should be investigated immediately. These high-risk assets are primarily composed of corporate facility components. A distribution of the total value of assets in each of the risk categories is shown in Figure 38.

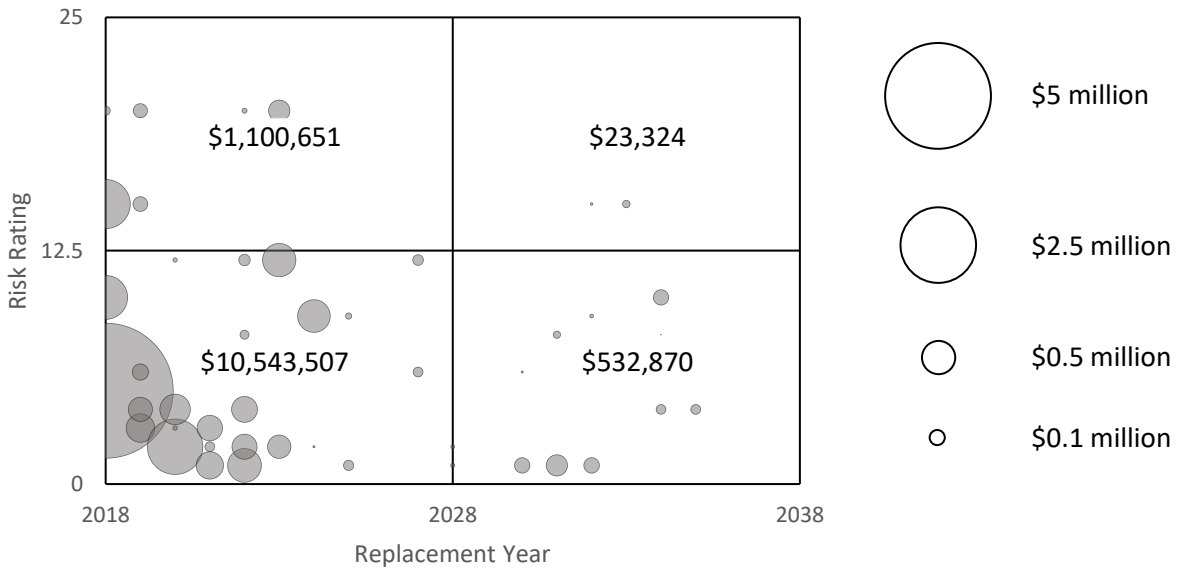
Figure 38 - Distribution of Corporate, Finance and Administrative Asset Risks



A risk heatmap has been generated for Corporate, Finance and Administrative to demonstrate the relative timing and investment requirement for the category's assets. Assets on the left side of the x-axis are to be replaced in the short-term, while assets in the upper half of the y-axis are relatively higher risk assets.

In summary, most investment requirements for Corporate, Finance and Administration are in the short-term, with relatively minor investments anticipated over the next 20 years. Most investments are low risk, with some higher risk assets interspersed. However, there are some assets in an Extreme risk category which should be investigated immediately.

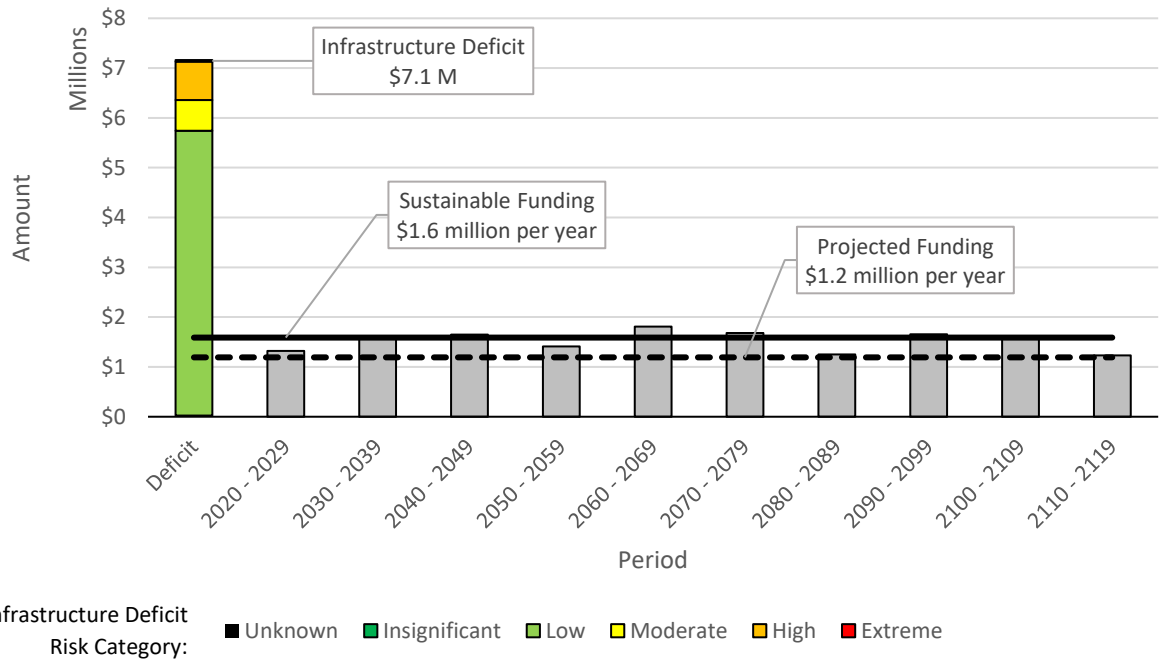
Figure 39 - Corporate, Finance and Administrative Risk Heatmap



Long-Term Financial Forecast

Results of Corporate, Finance and Administrative long-term financial forecast are shown in Figure 40. Corporate, Finance and Administrative has a current infrastructure deficit of $7.1 million and a sustainable funding requirement of $1.6 million per year. Projected capital funding levels (2020 – 2023) are $1.2 million per year. In total, this represents a funding gap of $0.4 million per year. Current funding levels would need to be increased by 33% to achieve sustainable funding.

Figure 40 - Corporate, Finance and Administrative Long-Term Financial Forecast

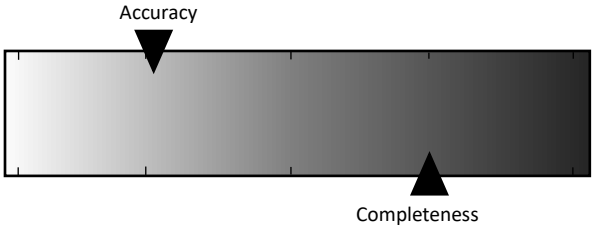


Confidence Band

The confidence of the results presented for the Corporate, Finance and Administrative assets are recognized to mostly complete with limited accuracy. In summary, 60-80% of assets are estimated to be included and up to date asset parameter data is limited. Replacement costs are only based on an escalation of original acquisition costs and estimated useful life is assumed equal to the accounting amortization period.

There are no major data quality differences between the 2018 and 2016 SOTI Report results. This is because both reports results are based on the City's Financial Tangible Capital Asset (TCA) Registry, without any review of historical records, only the additions and disposals of known assets.

Figure 41 - Corporate, Finance and Administrative Confidence Band



4. Conclusions

4.1. Summary of Results

The 2018 State of Infrastructure (SOTI) Report provides City staff, Council, and residents with a better understanding of the current state of infrastructure repair essential to the delivery of public services, as well a high-level understanding of the financial requirements to sustainably replace assets at the end of their useful lives. The 2018 version is the second iteration of the SOTI Report, building on the foundation established in the 2016 version. The following general conclusions are drawn from the results presented above:

1. The current replacement value of all City assets is $2.73 billion, while the infrastructure deficit (assets at or beyond its useful life) is $435 million (approximately 16% of the total asset valuation).

2. The City's assets are generally in a Good to Fair condition. However, roughly 19% (replacement-value weighted) of the City's assets are in a Poor or worse condition.

3. Overall, the City's assets are recognized as having a Medium degree of risk. However, there are over $97.3 million of assets (by replacement value) in the Extreme risk category. This total is primarily composed of water transmission mains.

4. The City is currently underfunding its infrastructure renewal requirements. Projected capital funding for 2020 – 2023 indicates an average annual funding of $26.0 million per year, while the sustainable funding requirement (funding needed to replace assets as they reach the end of their useful life and eliminate the current infrastructure deficit over a 100-year period) is $59.9 million per year. This represents a funding gap of $33.9 million per year and the City would need to increase its annual funding contribution by 130% to achieve the sustainable funding level.

5. The City has earned a "C+" grade for the current state of infrastructure (considering both condition and risk). This letter grade indicates the City's infrastructure is in a Good to Fair state of repair. In general, most assets are expected to show signs of deterioration, with some elements exhibiting deficiencies which need to be addressed in the short term. Some assets are beyond repair and need to be replaced immediately.

In summary, the City's assets are generally in a Good to Fair condition, while a significant number of the assets are in a Poor or Very Poor condition. The City is currently under-funding in its infrastructure renewal requirements and its ability to sustainably provide municipal services is expected to diminish as assets continue to further deteriorate.

In the interpretation of the SOTI Report results, it is important to note the presented information is based on current, readily available data of the City's assets. The 2018 Report shows significant improvements in the confidence of information presented from the 2016 Report. However, many data gaps still exist, and it is expected results will continue to change as additional improvements in the completeness and accuracy of asset data are made. Generally, the City's asset data and information is relatively complete but many improvements in the accuracy of asset data can be made. Although the accuracy of information can still be improved, the general conclusions are suitable to provide guidance for strategic decision making related to the management of the City's assets.

4.2. Comparing the 2016 and 2018 SOTI Reports

Results from the 2016 and 2018 SOTI Reports do vary significantly due to an improved asset inventory. A summary of differences from the 2016 and 2018 reports for Saint John Water and the General Fund are presented in Table 16.

Table 16 - 2016 to 2018 SOTI Report Changes

Indicator	2016 Result	2018 Result	Difference
Total Replacement Value			
General Fund	$1,110 million	$1,287 million	+$177 million
Saint John Water	$1,088 million	$1,444 million	+$355 million
Infrastructure Deficit			
General Fund	$219 million	$121 million	-$98 million
Saint John Water	$214 million	$314 million	+$99 million
Extreme Risk Assets			
General Fund	$51 million	$22 million	-$29 million
Saint John Water	$106 million	$76 million	-$30 million
Letter Grade			
General Fund	C	B	Improved
Saint John Water	C-	C+	Improved
Sustainable Funding Requirement			
General Fund	$42 million/yr	$35 million/yr	-$8 million/yr
Saint John Water	$27 million/yr	$25 million/yr	-$1 million/yr
Projected Funding			
General Fund	$19.1 million/yr	$18.5 million/yr	-$0.6 million/yr
Saint John Water	$12.5 million/yr	$7.5 million/yr	-$5.0 million/yr
Investment Gap			
General Fund	$23.0 million/yr	$16.1 million/yr	-$6.9 million/yr
Saint John Water	$14.1 million/yr	$17.8 million/yr	+$3.6 million/yr
Data Completeness			
General Fund	Moderate	Very High	Improved
Saint John Water	Low	Very High	Improved
Data Accuracy			
General Fund	Low	Moderate	Improved
Saint John Water	Low	Moderate	Improved

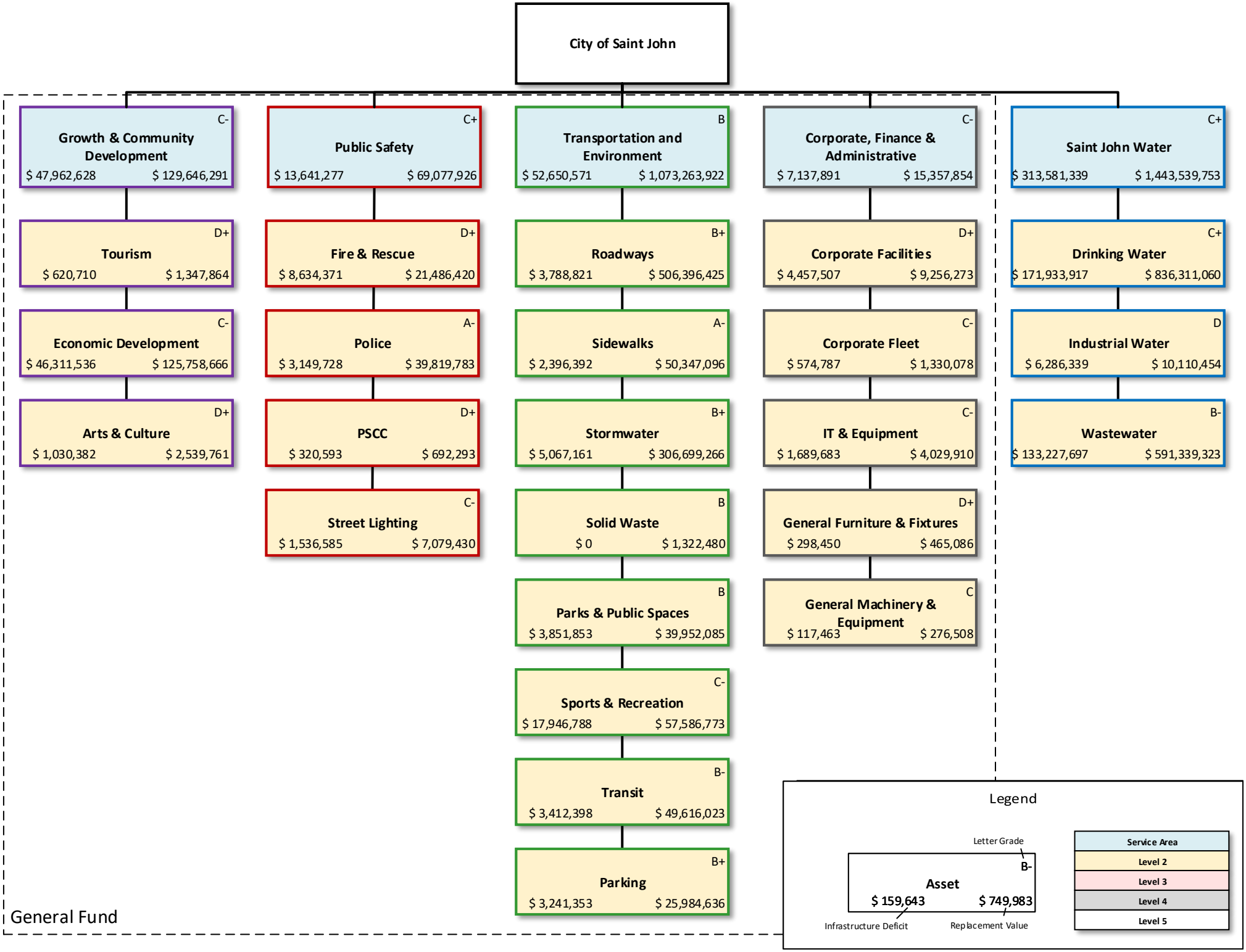
As previously mentioned, the 2018 SOTI Report has made significant improvements in the quality and reliability of results presented. A summary of significant changes is presented below:

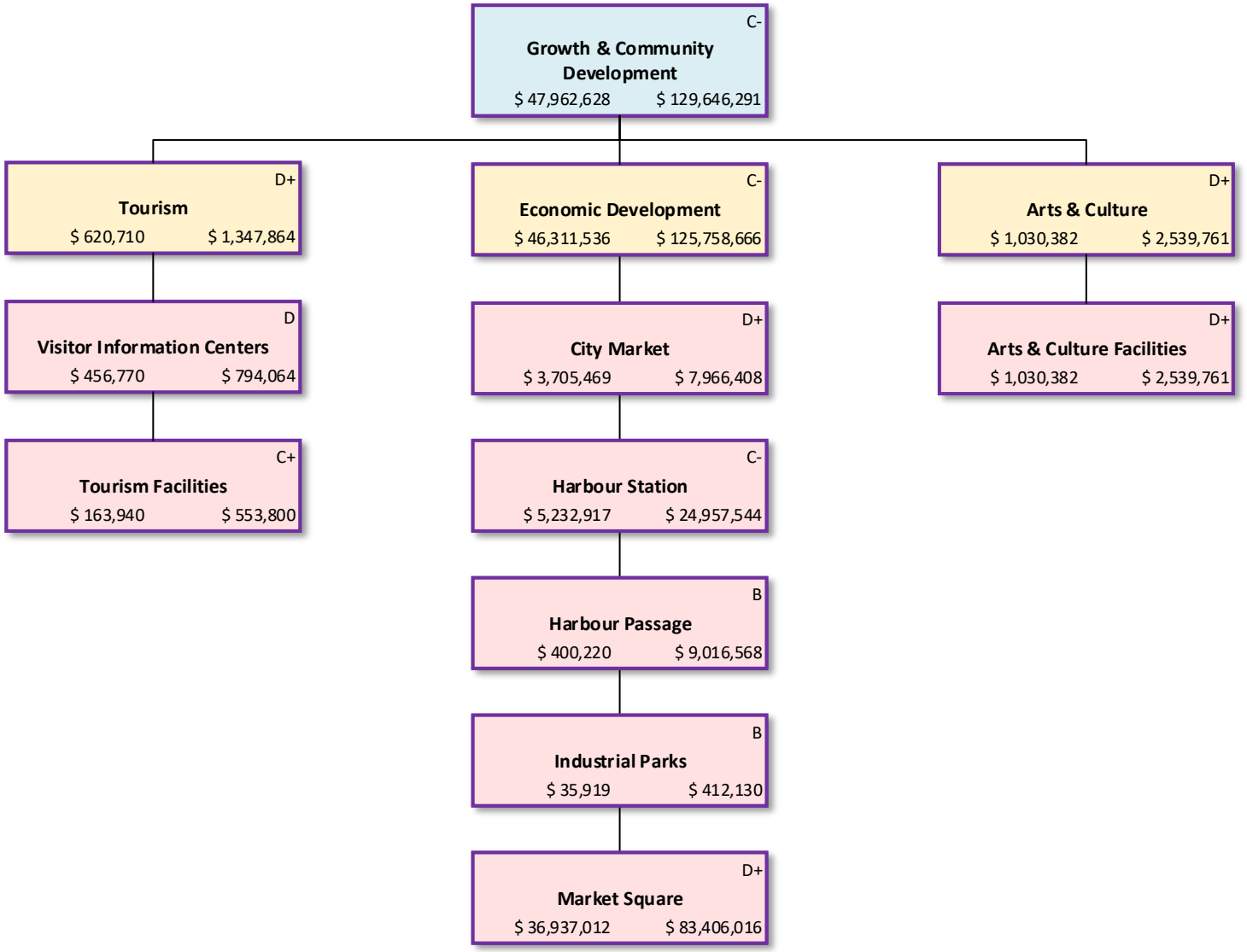
- The 2016 SOTI Report relied solely on the data and information contained in the City's financial Tangible Capital Asset (TCA) Registry. The 2018 Report relies on a variety of information management systems found throughout the City (e.g. GIS, MicroPaver, ...). The data and information from these sources more accurately reflects the asset inventory.

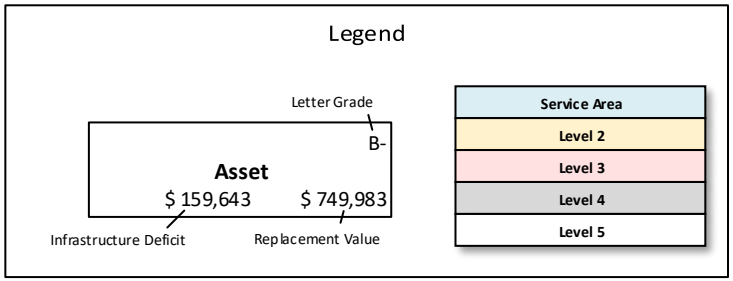
- Replacement costs for the 2016 SOTI Report were estimated for each asset solely by escalating the original acquisition cost of an asset using the Canadian Consumer Price Index (CPI) to account for inflation. Assets in the 2018 SOTI Report rely on a combination of engineering experience, historical tenders and contracts, as well as escalating original acquisition costs. This combination of methods to estimate cost is much more accurate.
- Estimated useful lives for the 2016 SOTI Report were assumed equal to an asset's amortization period. These often conservation (shortened) amortization-based estimated useful live estimates are to ensure an asset is fully amortized upon disposal. The estimated useful lives used for the 2018 Report rely on a combination of engineering and operator experience, industry references, as well as amortization periods. This combination of methods to estimate useful life is more accurate and better reflects the true service life of each asset.

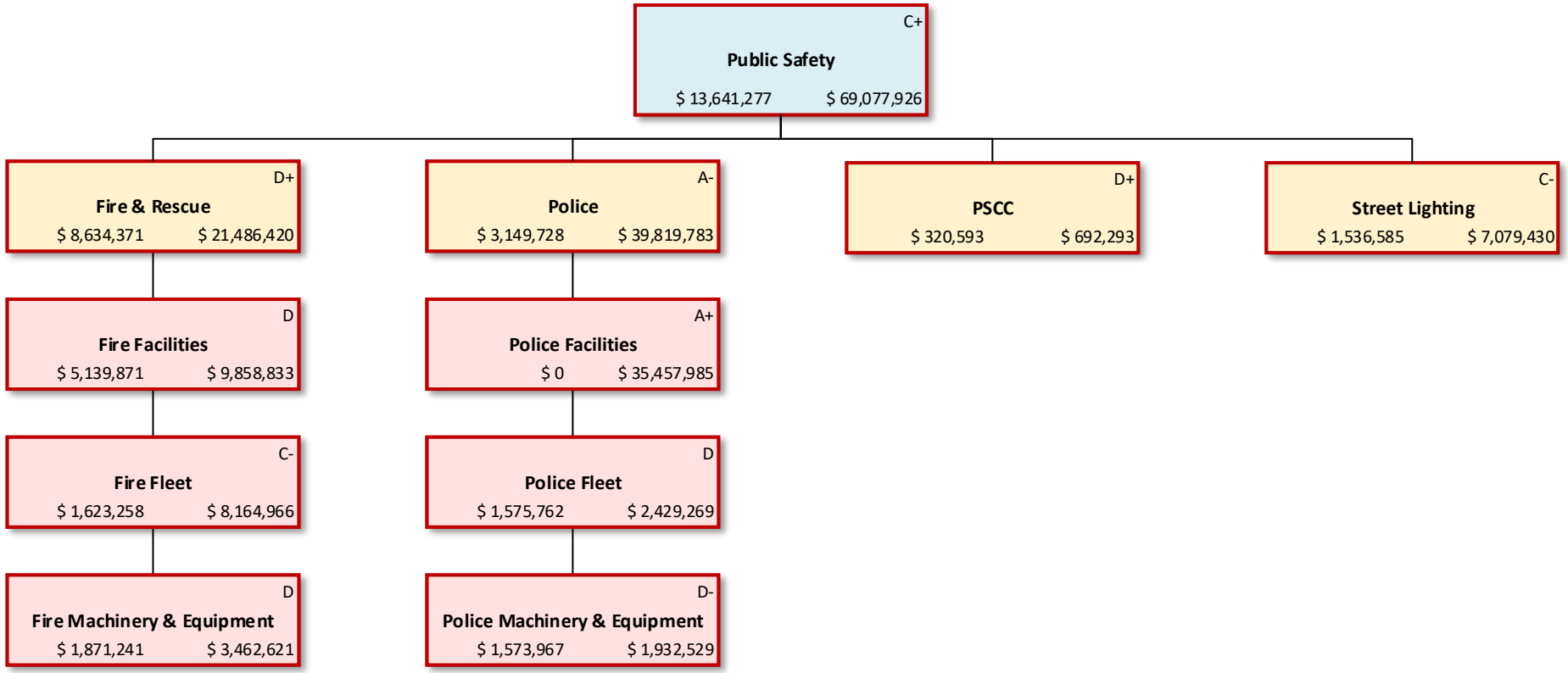
APPENDIX A

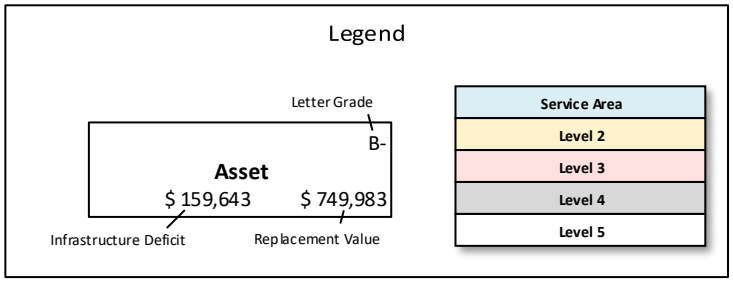
Asset Hierarchy

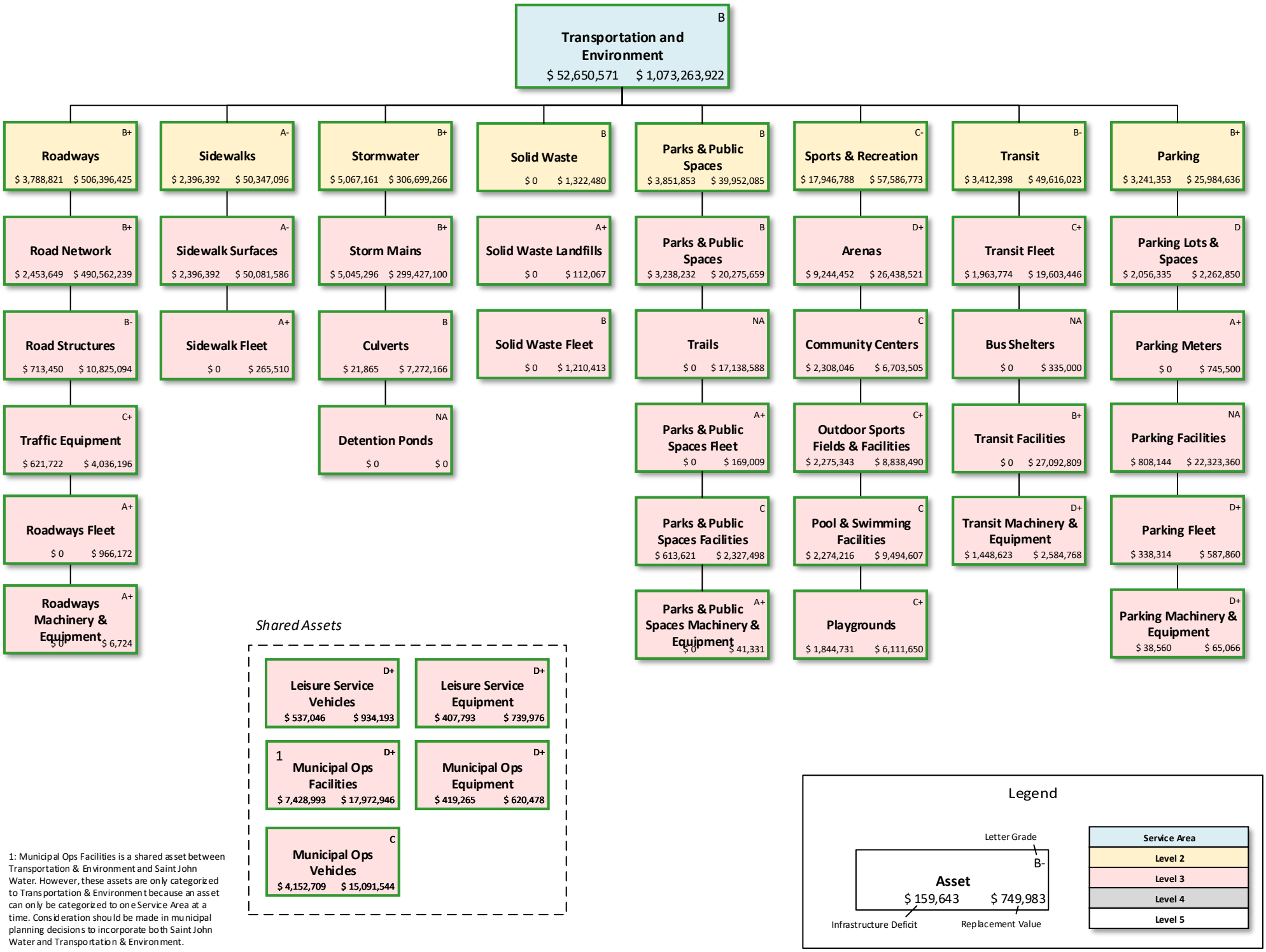

City of Saint John
C-
Growth & Community Development
$ 47,962,628
$ 129,646,291
D+
Tourism
$ 620,710
$ 1,347,864
C-
Economic Development
$ 46,311,536
$ 125,758,666
D+
Arts & Culture
$ 1,030,382
$ 2,539,761
C+
Public Safety
$ 13,641,277
$ 69,077,926
D+
Fire & Rescue
$ 8,634,371
$ 21,486,420
A-
Police
$ 3,149,728
$ 39,819,783
D+
PSCC
$ 320,593
$ 692,293
C-
Street Lighting
$ 1,536,585
$ 7,079,430
B
Transportation and Environment
$ 52,650,571
$ 1,073,263,922
B+
Roadways
$ 3,788,821
$ 506,396,425
A-
Sidewalks
$ 2,396,392
$ 50,347,096
B+
Stormwater
$ 5,067,161
$ 306,699,266
B
Solid Waste
$ 0
$ 1,322,480
B
Parks & Public Spaces
$ 3,851,853
$ 39,952,085
C-
Sports & Recreation
$ 17,946,788
$ 57,586,773
B-
Transit
$ 3,412,398
$ 49,616,023
B+
Parking
$ 3,241,353
$ 25,984,636
C-
Corporate, Finance & Administrative
$ 7,137,891
$ 15,357,854
D+
Corporate Facilities
$ 4,457,507
$ 9,256,273
C-
Corporate Fleet
$ 574,787
$ 1,330,078
C-
IT & Equipment
$ 1,689,683
$ 4,029,910
D+
General Furniture & Fixtures
$ 298,450
$ 465,086
C
General Machinery & Equipment
$ 117,463
$ 276,508
C+
Saint John Water
$ 313,581,339
$ 1,443,539,753
C+
Drinking Water
$ 171,933,917
$ 836,311,060
D
Industrial Water
$ 6,286,339
$ 10,110,454
B-
Wastewater
$ 133,227,697
$ 591,339,323
General Fund
Legend
Letter Grade
B-
Asset
$ 159,643
$ 749,983
Infrastructure Deficit
Replacement Value
Service Area
Level 2
Level 3
Level 4
Level 5

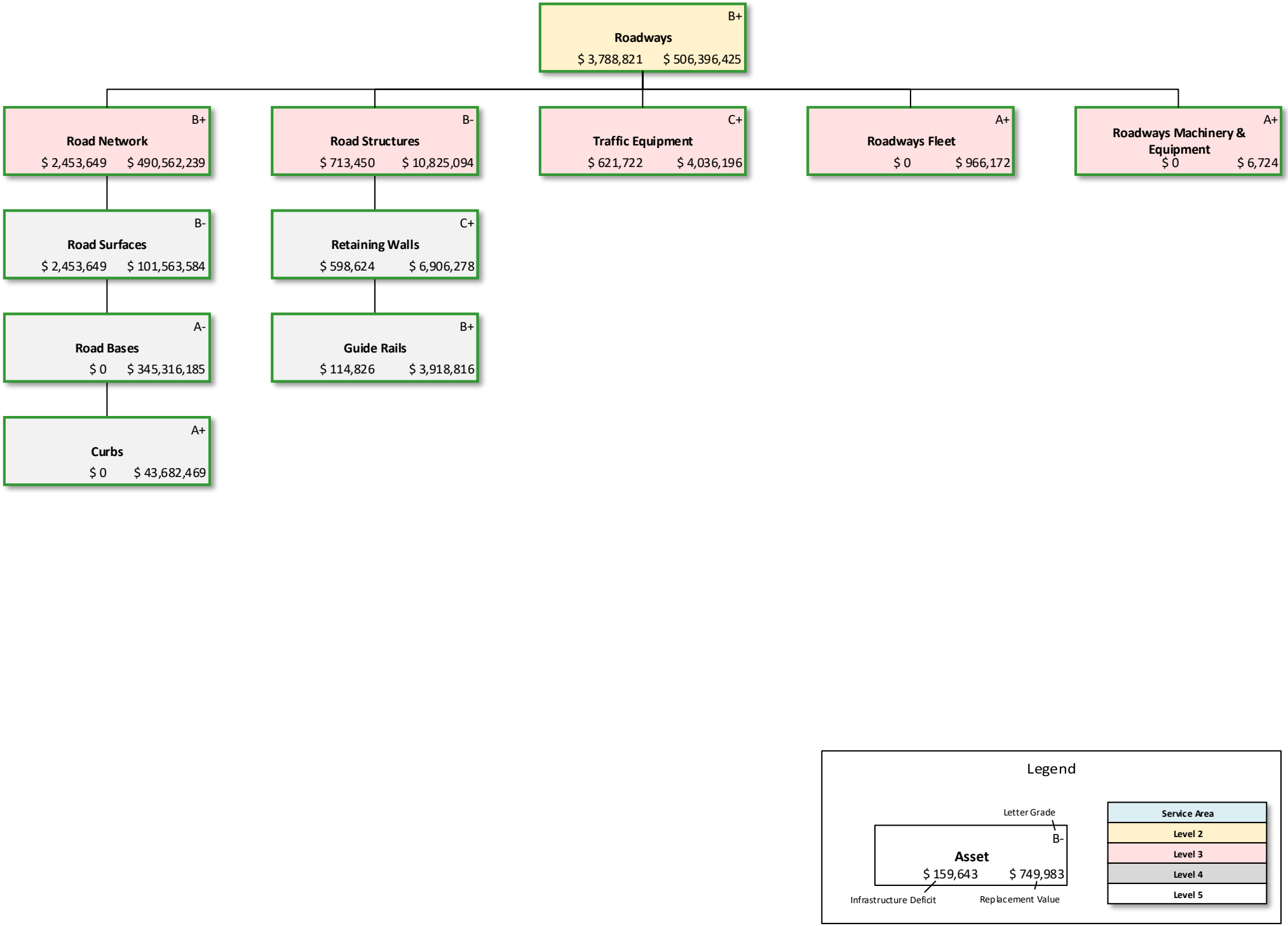

C-
Growth & Community Development
$ 47,962,628
$ 129,646,291
D+
Tourism
$ 620,710
$ 1,347,864
C-
Economic Development
$ 46,311,536
$ 125,758,666
D+
Arts & Culture
$ 1,030,382
$ 2,539,761
D
Visitor Information Centers
$ 456,770
$ 794,064
D+
City Market
$ 3,705,469
$ 7,966,408
D+
Arts & Culture Facilities
$ 1,030,382
$ 2,539,761
C+
Tourism Facilities
$ 163,940
$ 553,800
C-
Harbour Station
$ 5,232,917
$ 24,957,544
B
Harbour Passage
$ 400,220
$ 9,016,568
B
Industrial Parks
$ 35,919
$ 412,130
D+
Market Square
$ 36,937,012
$ 83,406,016


Legend
Letter Grade
B-
Asset
$ 159,643
$ 749,983
Infrastructure Deficit
Replacement Value
Service Area
Level 2
Level 3
Level 4
Level 5


C+
Public Safety
$ 13,641,277
$ 69,077,926
D+
Fire & Rescue
$ 8,634,371
$ 21,486,420
A-
Police
$ 3,149,728
$ 39,819,783
D+
PSCC
$ 320,593
$ 692,293
C-
Street Lighting
$ 1,536,585
$ 7,079,430
D
Fire Facilities
$ 5,139,871
$ 9,858,833
A+
Police Facilities
$ 0
$ 35,457,985
C-
Fire Fleet
$ 1,623,258
$ 8,164,966
D
Police Fleet
$ 1,575,762
$ 2,429,269
D
Fire Machinery & Equipment
$ 1,871,241
$ 3,462,621
D-
Police Machinery & Equipment
$ 1,573,967
$ 1,932,529


Legend
Letter Grade
B-
Asset
$ 159,643
$ 749,983
Infrastructure Deficit
Replacement Value
Service Area
Level 2
Level 3
Level 4
Level 5


B
Transportation and Environment
$ 52,650,571 $ 1,073,263,922
B+
Roadways
$ 3,788,821 $ 506,396,425
A-
Sidewalks
$ 2,396,392 $ 50,347,096
B+
Stormwater
$ 5,067,161 $ 306,699,266
B
Solid Waste
$ 0 $ 1,322,480
B
Parks & Public Spaces
$ 3,851,853 $ 39,952,085
C-
Sports & Recreation
$ 17,946,788 $ 57,586,773
B-
Transit
$ 3,412,398 $ 49,616,023
B+
Parking
$ 3,241,353 $ 25,984,636
B+
Road Network
$ 2,453,649 $ 490,562,239
A-
Sidewalk Surfaces
$ 2,396,392 $ 50,081,586
B+
Storm Mains
$ 5,045,296 $ 299,427,100
A+
Solid Waste Landfills
$ 0 $ 112,067
B
Parks & Public Spaces
$ 3,238,232 $ 20,275,659
D+
Arenas
$ 9,244,452 $ 26,438,521
C+
Transit Fleet
$ 1,963,774 $ 19,603,446
D
Parking Lots & Spaces
$ 2,056,335 $ 2,262,850
B-
Road Structures
$ 713,450 $ 10,825,094
A+
Sidewalk Fleet
$ 0 $ 265,510
B
Culverts
$ 21,865 $ 7,272,166
B
Solid Waste Fleet
$ 0 $ 1,210,413
NA
Trails
$ 0 $ 17,138,588
C
Community Centers
$ 2,308,046 $ 6,703,505
NA
Bus Shelters
$ 0 $ 335,000
A+
Parking Meters
$ 0 $ 745,500
C+
Traffic Equipment
$ 621,722 $ 4,036,196
NA
Detention Ponds
$ 0 $ 0
A+
Parks & Public Spaces Fleet
$ 0 $ 169,009
C+
Outdoor Sports Fields & Facilities
$ 2,275,343 $ 8,838,490
B+
Transit Facilities
$ 0 $ 27,092,809
NA
Parking Facilities
$ 808,144 $ 22,323,360
A+
Roadways Fleet
$ 0 $ 966,172
C
Parks & Public Spaces Facilities
$ 613,621 $ 2,327,498
C
Pool & Swimming Facilities
$ 2,274,216 $ 9,494,607
D+
Transit Machinery & Equipment
$ 1,448,623 $ 2,584,768
D+
Parking Fleet
$ 338,314 $ 587,860
A+
Roadways Machinery & Equipment
$ 0 $ 6,724
A+
Parks & Public Spaces Machinery & Equipment
$ 0 $ 41,331
C+
Playgrounds
$ 1,844,731 $ 6,111,650
D+
Parking Machinery & Equipment
$ 38,560 $ 65,066
Shared Assets
D+
Leisure Service Vehicles
$ 537,046 $ 934,193
D+
Leisure Service Equipment
$ 407,793 $ 739,976
1
D+
Municipal Ops Facilities
$ 7,428,993 $ 17,972,946
D+
Municipal Ops Equipment
$ 419,265 $ 620,478
C
Municipal Ops Vehicles
$ 4,152,709 $ 15,091,544
1: Municipal Ops Facilities is a shared asset between Transportation & Environment and Saint John Water. However, these assets are only categorized to Transportation & Environment because an asset can only be categorized to one Service Area at a time. Consideration should be made in municipal planning decisions to incorporate both Saint John Water and Transportation & Environment.
Legend
Letter Grade
B-
Asset
$ 159,643 $ 749,983
Infrastructure Deficit
Replacement Value
Service Area
Level 2
Level 3
Level 4
Level 5


B+
Roadways
$ 3,788,821 $ 506,396,425
B+
Road Network
$ 2,453,649 $ 490,562,239
B-
Road Structures
$ 713,450 $ 10,825,094
C+
Traffic Equipment
$ 621,722 $ 4,036,196
A+
Roadways Fleet
$ 0 $ 966,172
A+
Roadways Machinery & Equipment
$ 0 $ 6,724
B-
Road Surfaces
$ 2,453,649 $ 101,563,584
C+
Retaining Walls
$ 598,624 $ 6,906,278
A-
Road Bases
$ 0 $ 345,316,185
B+
Guide Rails
$ 114,826 $ 3,918,816
A+
Curbs
$ 0 $ 43,682,469
Legend
Letter Grade
B-
Asset
$ 159,643 $ 749,983
Infrastructure Deficit
Replacement Value
Service Area
Level 2
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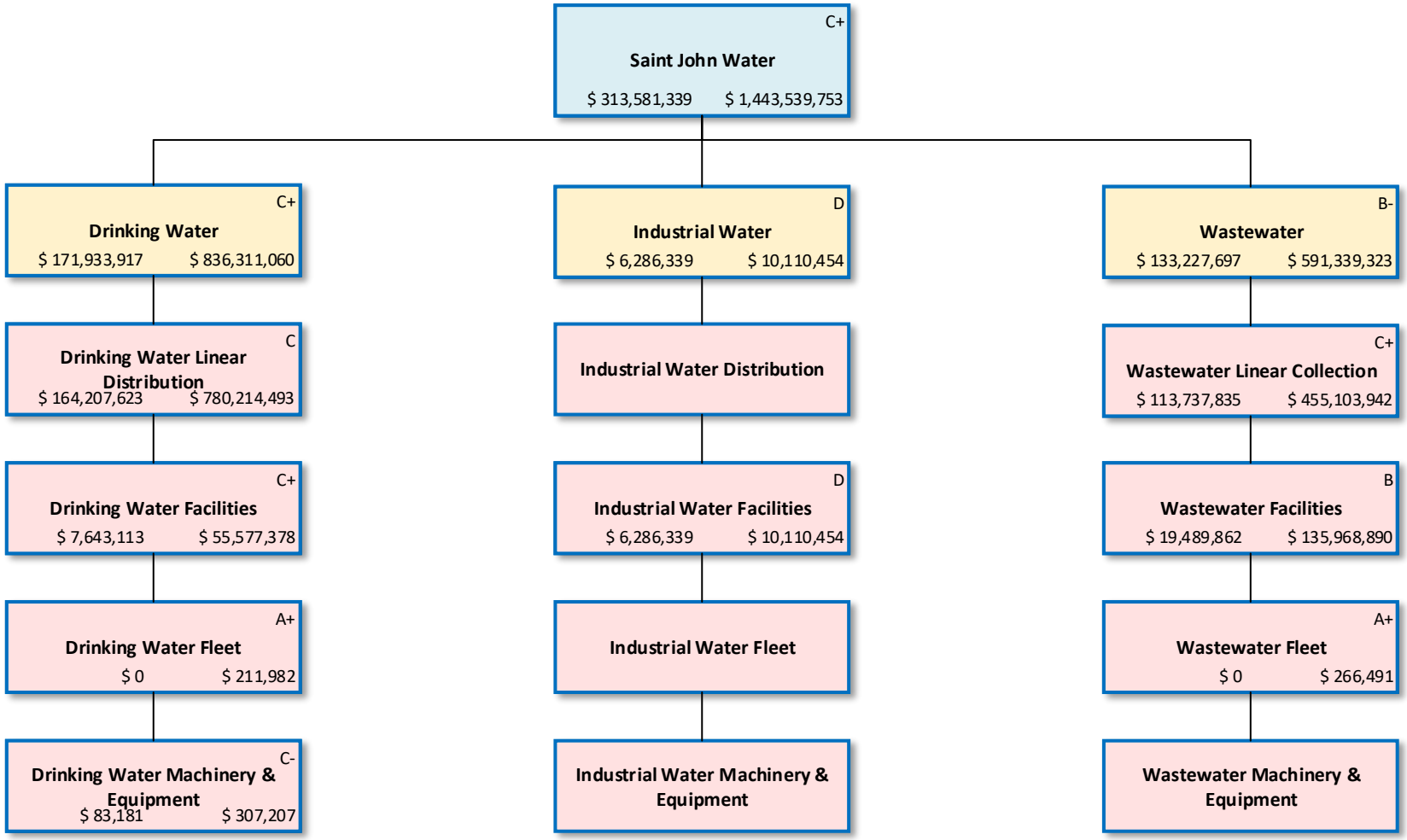
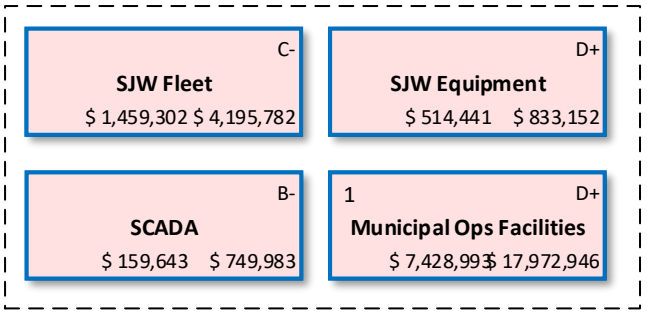
Level 4
Level 5



Shared Assets



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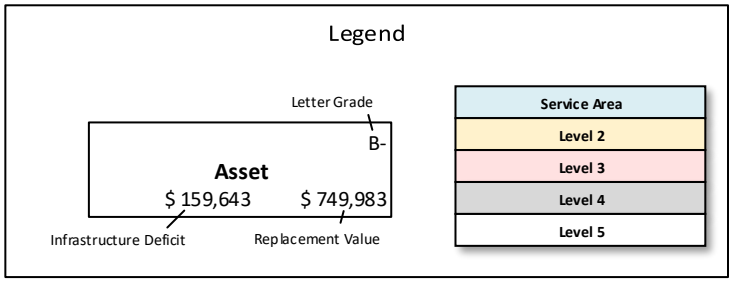
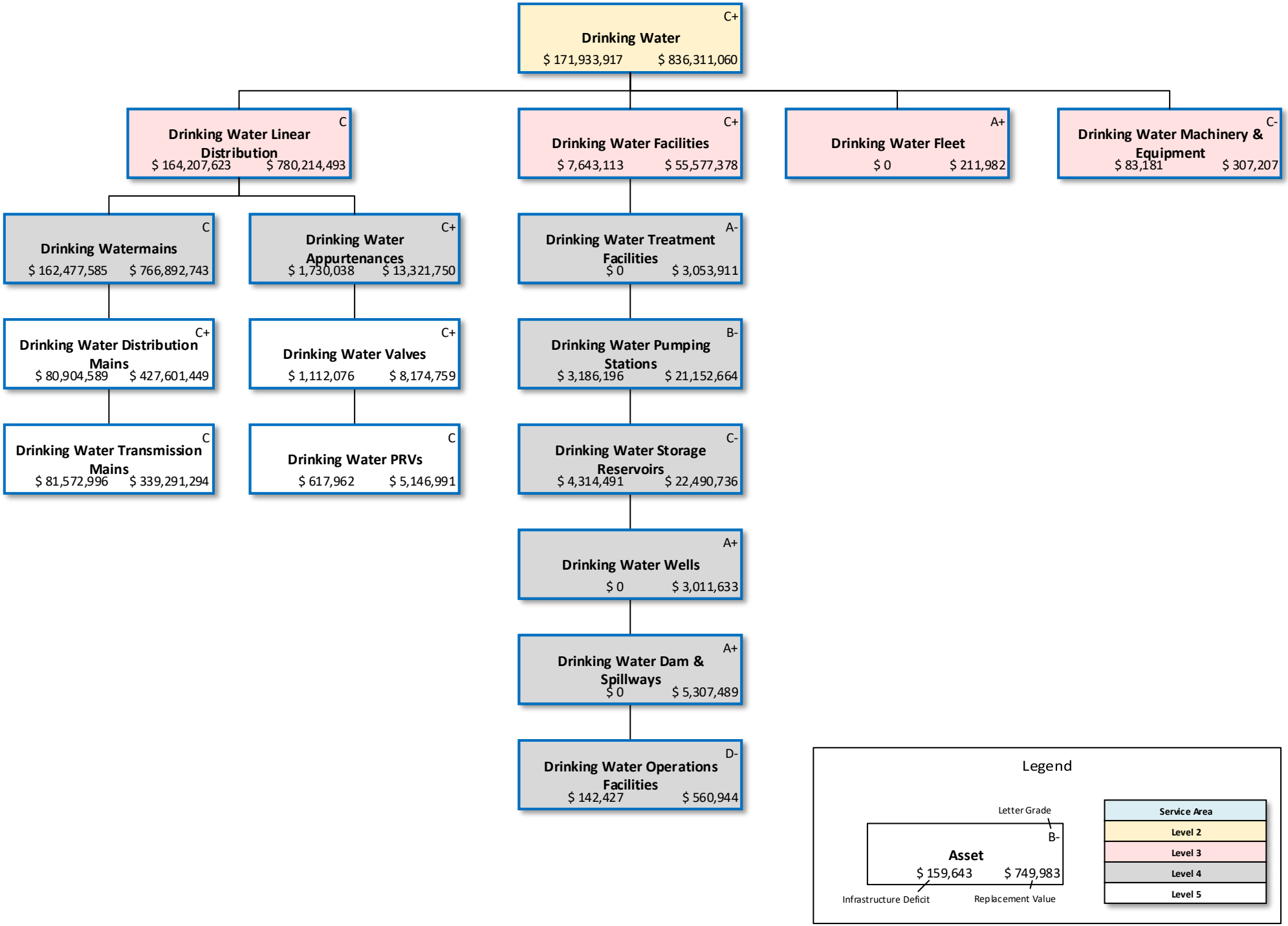
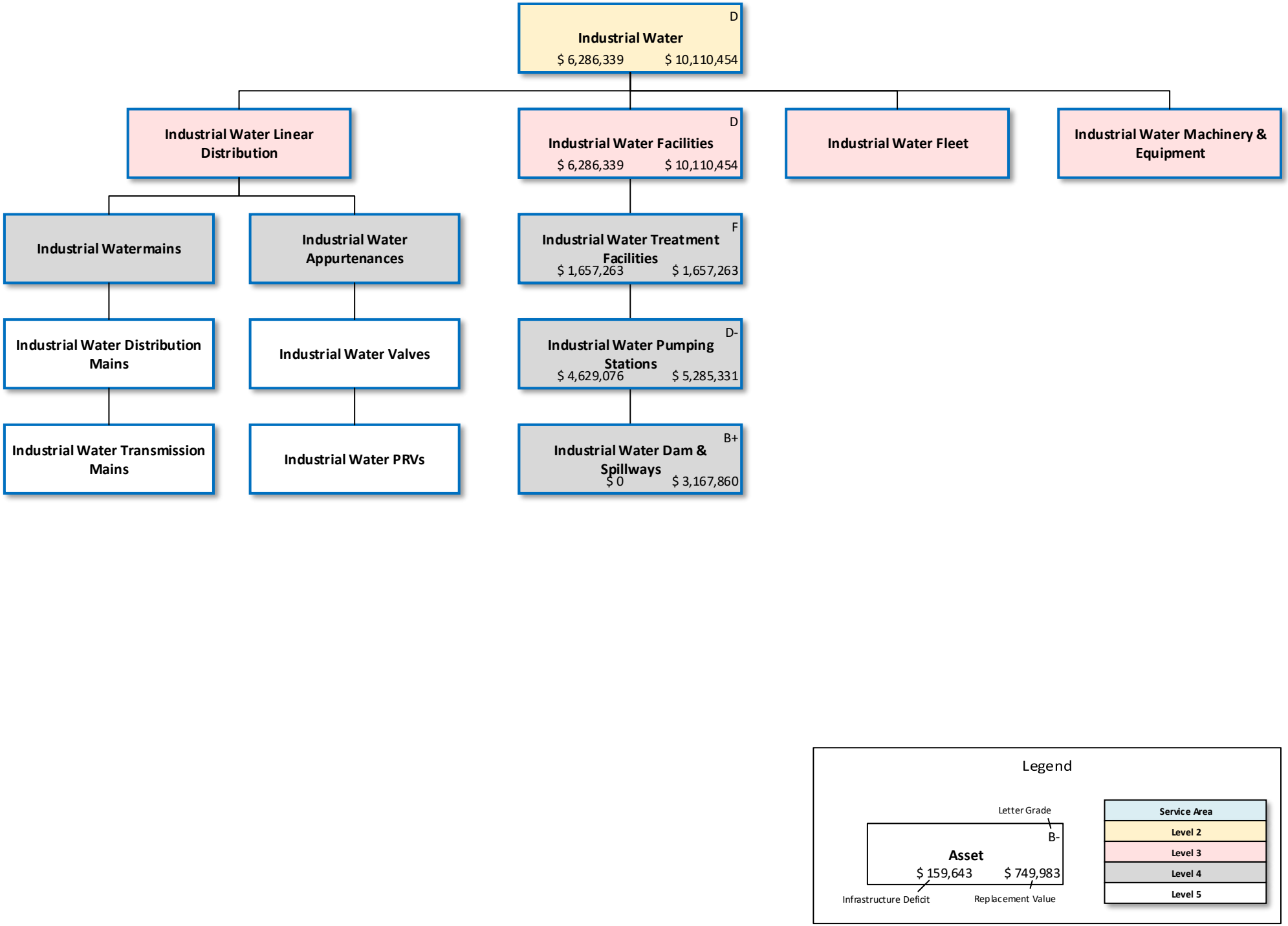
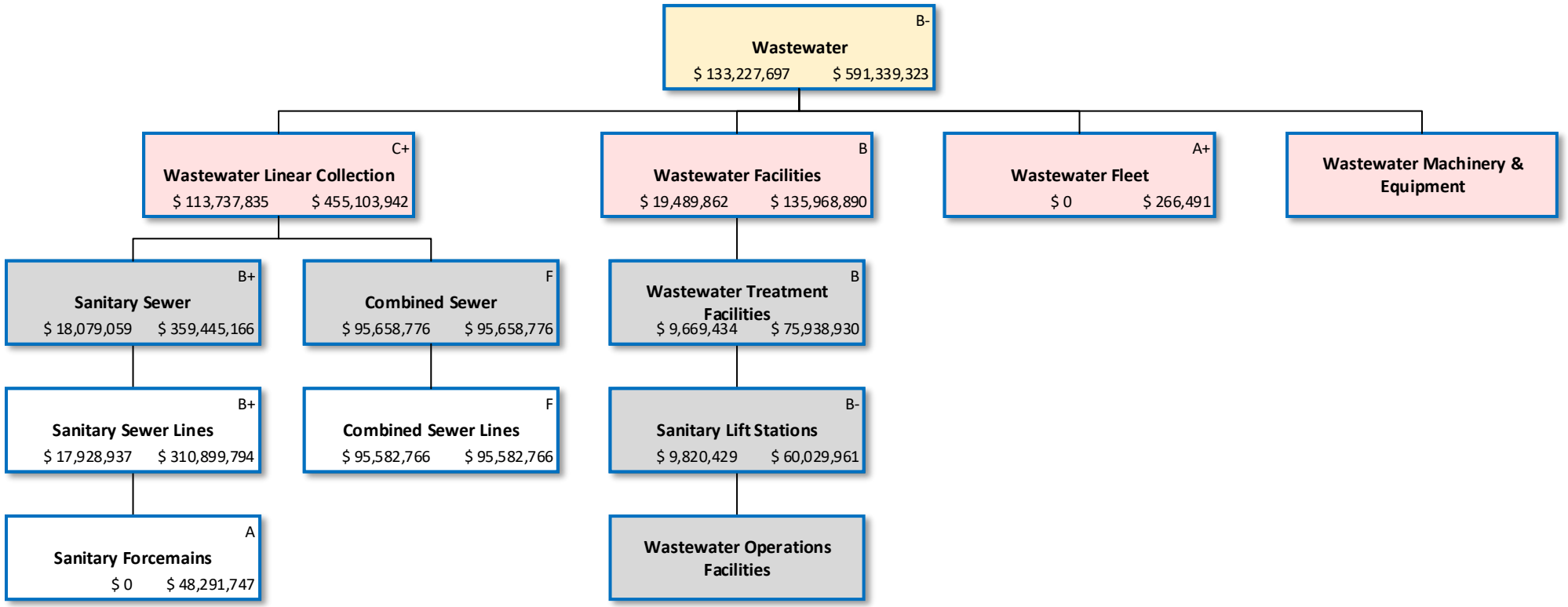
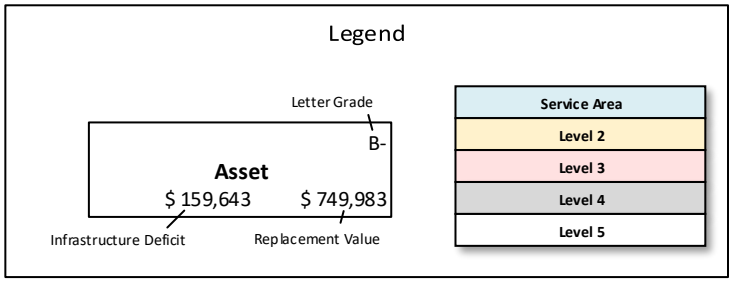



C+
Drinking Water
$ 171,933,917
$ 836,311,060
C
Drinking Water Linear Distribution
$ 164,207,623
$ 780,214,493
C+
Drinking Water Facilities
$ 7,643,113
$ 55,577,378
A+
Drinking Water Fleet
$ 0
$ 211,982
C-
Drinking Water Machinery & Equipment
$ 83,181
$ 307,207
C
Drinking Watermains
$ 162,477,585
$ 766,892,743
C+
Drinking Water Appurtenances
$ 1,730,038
$ 13,321,750
A-
Drinking Water Treatment Facilities
$ 0
$ 3,053,911
C+
Drinking Water Distribution Mains
$ 80,904,589
$ 427,601,449
C+
Drinking Water Valves
$ 1,112,076
$ 8,174,759
B-
Drinking Water Pumping Stations
$ 3,186,196
$ 21,152,664
C
Drinking Water Transmission Mains
$ 81,572,996
$ 339,291,294
C
Drinking Water PRVs
$ 617,962
$ 5,146,991
C-
Drinking Water Storage Reservoirs
$ 4,314,491
$ 22,490,736
A+
Drinking Water Wells
$ 0
$ 3,011,633
A+
Drinking Water Dam & Spillways
$ 0
$ 5,307,489
D-
Drinking Water Operations Facilities
$ 142,427
$ 560,944
Legend
Letter Grade
B-
Asset
$ 159,643
$ 749,983
Infrastructure Deficit
Replacement Value
Service Area
Level 2
Level 3
Level 4
Level 5


D
Industrial Water
$ 6,286,339
$ 10,110,454
Industrial Water Linear Distribution
D
Industrial Water Facilities
$ 6,286,339
$ 10,110,454
Industrial Water Fleet
Industrial Water Machinery & Equipment
Industrial Watermains
Industrial Water Appurtenances
F
Industrial Water Treatment Facilities
$ 1,657,263
$ 1,657,263
Industrial Water Distribution Mains
Industrial Water Valves
D-
Industrial Water Pumping Stations
$ 4,629,076
$ 5,285,331
Industrial Water Transmission Mains
Industrial Water PRVs
B+
Industrial Water Dam & Spillways
$ 0
$ 3,167,860
Legend
Letter Grade
B-
Asset
$ 159,643
$ 749,983
Infrastructure Deficit
Replacement Value
Service Area
Level 2
Level 3
Level 4
Level 5


B-
Wastewater
$ 133,227,697
$ 591,339,323
C+
Wastewater Linear Collection
$ 113,737,835
$ 455,103,942
B
Wastewater Facilities
$ 19,489,862
$ 135,968,890
A+
Wastewater Fleet
$ 0
$ 266,491
Wastewater Machinery & Equipment
B+
Sanitary Sewer
$ 18,079,059
$ 359,445,166
F
Combined Sewer
$ 95,658,776
$ 95,658,776
B
Wastewater Treatment Facilities
$ 9,669,434
$ 75,938,930
B+
Sanitary Sewer Lines
$ 17,928,937
$ 310,899,794
F
Combined Sewer Lines
$ 95,582,766
$ 95,582,766
B-
Sanitary Lift Stations
$ 9,820,429
$ 60,029,961
A
Sanitary Forcemains
$ 0
$ 48,291,747
Wastewater Operations Facilities


Legend
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Asset
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$ 749,983
Infrastructure Deficit
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APPENDIX B

Asset Assumptions

Asset	Replacement Costs	Useful Lives		Consequence of Failure	
City Facilities	Escalate original acquisition costs using CPI	*Component Type*		*Component Type*	
		Conveying	30 - 40	Substructure, all components	5
		Electrical	5 - 50	Shell	
		Equipment	5 - 40	Superstructure	5
		Exterior Enclose	5 - 100	Exterior Structural Wall	5
		Fire Protection	10 - 40	Exterior Windows	3
		Foundations	30 - 100	Exterior Façade	3
		Furnishings	10 - 60	Exterior Doors	3
		HVAC	10 - 65	Roofing	4
		Interior Construction	10 - 60	Interiors	
		Interior Finishes	15 - 30	Interior Construction	1
		Plumbing	10 - 40	Stairs	3
		Process Instrumentation and Control	10 - 15	Interior Finishes	1
		Roofing	15 - 40	Services, all components	3
		Site Electrical Utilities	10 - 20	Equipment and Furnishings	
		Site Improvements	10 - 50	Equipment	3
		Site Mechanical Utilities	10 - 65	Furnishings	1
		Site Preparation	65	Special Construction	0
		Special Construction	25 - 40	Building Sitework, all components	2
		Superstructure	65 - 70	Dam, all components	5
		Unknown	10 - 70	Intakes, all components	5
SJW Facilities	Escalate original acquisition costs using CPI	*Component Type*		*Component Type*	
		Building and Process Structural	40 - 60	Substructure, all components	5
		Building Architectural	20	Shell	
		Building Electrical and Mechanical	25	Superstructure	5
		Controls	40	Exterior Structural Wall	5
		Cranes, hoists, monorail	20	Exterior Windows	3
		Electrical (including SCADA)	20 - 40	Exterior Façade	3
		Mechanical	20 - 40	Exterior Doors	3
		Process Electrical	30	Roofing	4
		Process Instrumentation	10	Interiors	
		Process Piping and Equipment	20 - 40	Interior Construction	1
		Production Well	50	Stairs	3
		Roof	20	Interior Finishes	1
		Site Works	25 - 40	Services, all components	3
		Structure	20 - 100	Equipment and Furnishings	
				Equipment	3
				Furnishings	1
				Special Construction	0
				Building Sitework, all components	2
				Process	4

Asset	Replacement Costs		Useful Lives		Consequence of Failure	
PRVs	Escalate original acquisition costs using CPI		*Component Type*		*Component Type*	
			Electrical	20	Electrical	3
			Mechanical	30	Mechanical	3
			Structure	40	Structure	4
Watermains	*Diameter (mm)*	*per m*	*Material*		*Function and Diameter (mm)*	
	< 100	*$0*	Asbestos Cement	60	Distribution	
	100	$931	Brass	60	<= 300 mm	2
	150	$931	Cast Iron	60 - 80	> 300 mm	3
	200	$931	Concrete	40	Transmission	
	250	$1,166	Concrete Pressure Pipe	60 - 80	<= 600 mm	3
	300	$1,348	Copper	30	> 600mm	4
	350	$1,519	Cross-Linked Polyethylene (PEXa)	80		
	375	$1,691	Ductile Iron	60 - 80		
	400	$1,734	High Density Polyethylene	80		
	450	$1,820	Polyvinyl Chloride	60 - 80		
	500	$1,906	Stainless Steel	40 - 80		
	600	$1,998	Steel	40		
	750	$2,350	Unknown	60		
	900	$3,102				
	975	$3,514				
	1050	$3,900				
	1200	$5,077				
	1350	$5,850				
	1500	$6,694				
	1800	$7,895				
	Unknown	$931				
Valves (>= 500mm only)	*Type and Diameter (mm)*	*each*	All	40	All	4
	Butterfly Valve					
	500	$13,253				
	600	$18,291				
	750	$32,840				
	900	$37,884				
	1050	$56,889				
	Check Valve					
	600	$56,213				
	750	$116,418				
	Gate Valve					
	500	$51,109				
	600	$77,820				
	750	$143,406				
	900	$179,997				

Asset	Replacement Costs		Useful Lives		Consequence of Failure	
	1050	$262,500				
	1500	$300,000				
Sanitary Lines	*Diameter (mm)*	*per m*	*Material*		*Function and Diameter (mm)*	
(Sanitary, Forcemain, Combined)	40	$807	Asbestos Cement	60	Gravity	
	50	$807	Brick	40	<= 600 mm	2
	65	$807	Cast Iron	60	> 600 mm	3
	75	$807	Concrete	80	Forcemain	
	100	$807	Corrugated Steel	40	<= 200 mm	2
	150	$807	Ductile Iron	60 - 80	> 200 mm & <= 500 mm	3
	200	$806	High Density Polyethylene	80	> 500 mm	4
	225	$922	Perforated Polyvinyl Chloride	80		
	250	$921	Polyethylene	80		
	300	$1,076	Polyvinyl Chloride	80		
	350	$1,178	Stainless Steel	80		
	375	$1,178	Steel	80		
	400	$1,217	Terracotta	60		
	450	$1,217	Unknown	60		
	500	$1,242	Wood	80		
	525	$1,242				
	600	$1,268				
	700	$1,344				
	750	$1,344				
	900	$2,049				
	1050	$2,587				
	1200	$3,194				
	1225	$3,194				
	1350	$3,400				
	1370	$3,400				
	1500	$3,606				
	1800	$3,812				
	2100	$4,020				
	2400	$4,020				
	Unknown	$807				
Storm Lines	*Diameter (mm)*	*per m*	*Material*		*Diameter (mm)*	
	30	$794	Acrylonitrile Butadiene Styrene	60	<= 300 mm	2
	50	$794	Aluminum	60	> 300 mm & <= 600 mm	3
	75	$794	Asbestos Cement	60	> 600 mm	4
	100	$794	Brick	40		
	150	$794	Cast Iron	60		
	200	$794	Concrete	80		
	225	$794	Corrugated Steel	40		

Asset	Replacement Costs		Useful Lives		Consequence of Failure	
	250	$794	Ductile Iron	80		
	300	$794	High Density Polyethylene	80		
	350	$834	Perforated Polyvinyl Chloride	80		
	375	$831	Polyethylene	80		
	400	$953	Polyvinyl Chloride	80		
	450	$953	Stainless Steel	80		
	500	$973	Terracotta	60		
	525	$973	Unknown	60 - 80		
	600	$992				
	675	$1,013				
	750	$1,013				
	900	$1,509				
	1050	$1,932				
	1200	$2,343				
	1350	$2,623				
	1500	$2,902				
	1625	$3,182				
	1800	$3,462				
	2100	$3,742				
	2400	$4,020				
	Unknown	$794				
Fleet and Equipment	Escalate original acquisition costs using CPI		Varies	1 - 40	*Type*	
					General Sedans	2
					Heavy Trucks	2
					Light Trucks	2
					Fire	
					Heavy Ladder Truck	3
					Heavy Pumper/Rescue Truck	3
					Heavy Tanker Truck	3
					Light Truck	2
					Police	
					Patrol Light Duty Trucks	2
					Patrol Sedan	2
					Transit Fleet	3
					Light Equipment	1
					Heavy Equipment	3
					Fire Equipment	3
					Police Equipment	3
					PSCC Equipment	5
Roadways	*Component Type*	*per m2*	*Component Type*		*Road Class*	
	Road Base	$70	Road Base	80	Arterial	4

Asset	Replacement Costs		Useful Lives		Consequence of Failure	
	Road Surface	$21	Road Surface	20	Collector	3
					Local	2
Curbs	*Material*	*per m*	*Material*		All	1
	Concrete	$87	Concrete	80		
	Granite	$87	Granite	80		
	Asphalt	$54	Asphalt	25		
Retaining Walls	*Face Size*	*per m2*	Allan Block	80	*Wall Function*	
	All	$841	Amour Rock Embankment	80	Road	4
			Concrete Block	80	Landscape	2
			Concrete Crib	80		
			Concrete Curb	80		
			Concrete Formed	80		
			Concrete Lego	80		
			Gabion	30		
			Granite Block	80		
			Granite Curb	80		
			Serrascape	40		
			Stone	40		
			Timber	40		
Traffic Signals	*Component Type*	*each*	*Component Type*		*Component Type*	
	Controller		Controller	20	Controller	3
	2 Wire CCU	$4,000	Detector	10	Detector	2
	4 Wire APS Control Unit	$450	Electrical	40	Electrical	3
	Flasher Controller Cabinet	$385	Signal Head	5	Signal Head	3
	Flasher Unit	$300	Structure	40	Structure	3
	G Style Cabinet	$11,805				
	M Style Cabinet	$11,805				
	Midblock Controller	$3,125				
	RA-5 Controller	$698				
	Detector					
	2 Wire APS Button	$595				
	4 Wire APS Button	$595				
	Access Point	$1,000				
	Blue Cannon	$5,800				
	BullDog Button	$210				
	Iteris Camera	$5,800				
	Motion Detector	$865				
	Presence Detector	$620				
	Pucks	$1,000				
	Reno Loop	$337				
	Electrical					
	Electrical Disconnect	$1,188				

Asset	Replacement Costs		Useful Lives	Consequence of Failure
	Power Disconnect	$1,500		
	Power Hook Up	$2,500		
	Signal Head			
	1 Signal Light	$125		
	2 Section Head	$198		
	2 Signal Light	$200		
	3 Section Signal Head	$299		
	3 Signal Light	$299		
	3 Way Signal Light	$299		
	300mm Ped Head	$145		
	4 Section Signal Head	$469		
	4 Signal Light	$469		
	4 Way Signal Light	$469		
	APS RRFB System	$5,500		
	ITS DFB	$4,500		
	Novax	$250		
	Pedestrian Combo Timer	$362		
	RA-5 Crosswalk Sign	$2,087		
	RRFB System	$2,650		
	Solar Flasher Kit	$2,500		
	Traffic Logix DFB	$4,500		
	Structure			
	1 Way Span Wire Hanger	$100		
	10 Ft Pole	$473		
	12 Ft Pole	$515		
	15 Ft Pole	$1,024		
	15ft Traffic Arm	$544		
	15Ft Truss Arm	$613		
	17Ft Truss Arm	$698		
	19 Ft Pole	$1,163		
	19 Ft Pole Steel	$2,000		
	2 Way Span Wire Hanger	$150		
	20Ft Truss Arm	$770		
	22ft Traffic Arm	$636		
	22ft Truss Arm	$815		
	25ft Truss Arm	$862		
	3 Meter Decorative Arm	$503		
	3 Way Span Wire Hanger	$200		
	30ft Truss Arm	$1,036		
	33ft Truss Arm	$1,150		
	4 Way Span Wire Hanger	$250		

Asset	Replacement Costs		Useful Lives		Consequence of Failure	
	5 Ft Pole	$344				
	8 Ft Pole	$460				
	Adapter Plate	$113				
	Astro Bracket	$300				
	Concrete Base	$10,000				
	Decorative Pole	$2,688				
	Elbow Kit	$113				
	Large Concrete Base	$3,500				
	M Style Base	$10,000				
	Post Top	$95				
	Screw Base	$500				
	Signal Cushion Hanger	$123				
	Small Concrete Base	$2,500				
	Span Wire	$300				
	Steel Pole	$2,000				
	Steel Traffic Arm	$2,000				
	T Bracket	$105				
	TB-1	$336				
	TB-2	$295				
	Telspar Pole	$42				
Sidewalks	*Length*	*per m*	*Material*		All	2
	All	$134	Concrete	80		
			Asphalt	25		
Culverts	*Material and Diameter (mm)*	*per m*	All	80	*Function*	
	Concrete				Driveway	1
	0	$0			Other	3
	200	$681				
	250	$681				
	300	$681				
	350	$739				
	380	$739				
	400	$793				
	450	$793				
	500	$868				
	550	$868				
	600	$944				
	680	$1,168				
	700	$1,168				
	750	$1,242				
	850	$1,517				
	900	$1,517				

Asset	Replacement Costs		Useful Lives		Consequence of Failure	
	1000	$1,701				
	1050	$1,701				
	1250	$1,906				
	1450	$2,860				
	Metal					
	250	$495				
	300	$526				
	350	$575				
	400	$575				
	450	$610				
	1400	$1,679				
	1800	$2,130				
	Plastic					
	0	$0				
	250	$503				
	300	$519				
	350	$569				
	380	$569				
	400	$569				
	450	$608				
	500	$608				
	550	$695				
	600	$695				
	Unknown					
	0	$0				
	380	$739				
	450	$793				
Guiderail						
Street Lights	*Component Type*	*each*	*Component Type*		*Component Type*	
	Fixtures	$2,200	Fixtures	20	Fixtures	1
	Foundations		Foundations	40	Foundations	3
	CO	$2,500	Poles	40	Poles	3
	SI	$1,500				
	ST	$1,500 or $2,500				
	Poles					
	AL	$2,500				
	CO	$1,805				
	IR	$4,500				
	ST	$2,295				
	WRC	$1,805				

Asset	Replacement Costs		Useful Lives		Consequence of Failure	
Bus Shelters	*Type*	*each*	All	20	All	1
	Standard	$5,000				
	Heritage	$30,000				
Detention Ponds						
Parking Meters	*Type*	*each*	All	10	All	1
	Pay by Plate	$9,000				
	Pay and Display	$7,500				
	Parking Meter	$1,500				
	Handicapped	$1,500				
Parking Lots and Spaces	Escalate original acquisition costs using CPI		All	3 - 20	All	1
Parks and Public Spaces	Escalate original acquisition costs using CPI		All	10 - 100	All	0 - 5
Playgrounds	Escalate original acquisition costs using CPI		All	10 - 80	All	3
Outdoor Sports Fields & Facilities	Escalate original acquisition costs using CPI		All	10 - 50	All	3
Industrial Parks	Escalate original acquisition costs using CPI		All	5 - 25	All	0 - 2
Harbour Passage	Escalate original acquisition costs using CPI		All	5 - 50	All	2
Landfills	Escalate original acquisition costs using CPI		All	10	All	4
Trails	Material	$/m2	Material		All	2
	Asphalt	$58	Asphalt	20		
	Brick	$192	Brick	40		
	Concrete	$122	Concrete	40		
	Dirt	$0	Dirt	0		
	Gravel	$33	Gravel	10		
	Stone	$192	Stone	40		
	Wood	$192	Wood	20		
	Unknown	$58	Unknown	20		