HALTON HILLS

Corporate Asset Management Program

State of Infrastructure | 2018

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Town of Halton Hills

2018 State of Infrastructure

At a glance

Administration

Value
$11,741,744
Deficit
51%

C-

Transportation and Transit

Value
$549,804,014
Deficit
5%

B-

Fire Services

Value
$22,754,377
Deficit
11%

B-

Recreation and Culture

Value
$74,418,436
Deficit
22%

B-

Parks and Open Spaces

Value
$38,237,507
Deficit
24%

B-

Environmental Services

Value
$153,289,977
Deficit
0%

B

Library Services

Value
$20,572,059
Deficit
25%

C+

LEGEND
A = Very Good
B = Good
C = Fair
D = Poor
F = Very Poor

Deficit = Assets which are at or beyond their useful lives.

Executive Summary

Introduction

The purpose of the State of Infrastructure (SOI) report is to communicate the state of repair for infrastructure assets essential to the delivery of public services and to outline the financial requirements to maintain the current stock of assets. In general, the SOI report is intended to provide information to answer the six key asset management questions, listed below.

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?

The SOI report contains several indicators that will allow the comparison of the state of infrastructure repair across different service areas and over time (when the SOI report is regenerated 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), and a distribution of the asset conditions and risks. Indicators included for each category are:

- Replacement value.
- Infrastructure deficit (value of infrastructure at or beyond the end of its service life).
- Letter grade to indicate state of repair.
- Condition distribution charts.
- Risk distribution charts.
- Confidence in the asset data from which the indicators are generated.

Note, this report was prepared using the best asset and financial information available at the time of preparation. Although reasonable efforts were made to ensure the suitability of this information for the purposes of this report, the best available information cannot be assumed to be absolutely complete and accurate, and the information presented in this report should be interpreted accordingly.

Inventory and Valuation

The State of Infrastructure report includes all documented assets owned and operated by the Town of Halton Hills. To assist in the interpretation of the results, all assets have been categorized according to a budget-based asset hierarchy. Inventory, valuation and deficit (percentage of assets at or beyond their useful lives) results for the major assets are shown in Table 1.

Table 1 - Town of Halton Hills Inventory and Valuation

Asset	Quantity	Value	Deficit %
Administration			
Town Hall	1	$10,684,790	52%
Information Technology (IT)	821	$1,056,954	44%
Transportation and Transit			
Roadways	447 lane-km	$326,670,480	2%
Bridges	75	$90,623,231	0%
Culverts	66	$30,845,459	3%
Sidewalks	238 km	$31,412,932	18%
Other		$70,251,912	17%
Fire Services			
Fire Facilities	3	$15,024,397	10%
Fire Apparatus	17	$6,130,000	0%
Light Vehicles	15	$663,129	50%
Fire Equipment		$936,850	58%
Recreation and Culture			
Community Centers	7	$72,358,538	20%
Aquatic Facilities	2	$358,117	47%
Miscellaneous Facilities	4	$1,701,781	85%
Parks and Open Spaces			
Cemeteries	4	$609,901	7%
Trails	25.7 km	$1,386,495	12%
Parks	63	$36,241,111	25%
Environmental Services			
Stormwater Management Ponds	39	$24,947,188	0%
Stormwater Mains	190	$62,469,655	0%
Manholes	3,236	$28,625,794	0%
Catchbasins	5,524	$20,964,238	0%
Drainage Culverts	23.3 km	$8,233,103	1%
Other		$8,050,000	1%
Library Services			
Library Facilities	2	$16,736,592	30%
Library IT and Equipment	107	$66,950	63%
Library Content	138,224	$3,768,517	0%
TOWN OF HALTON HILLS		**$870,818,113**	**7%**

Condition

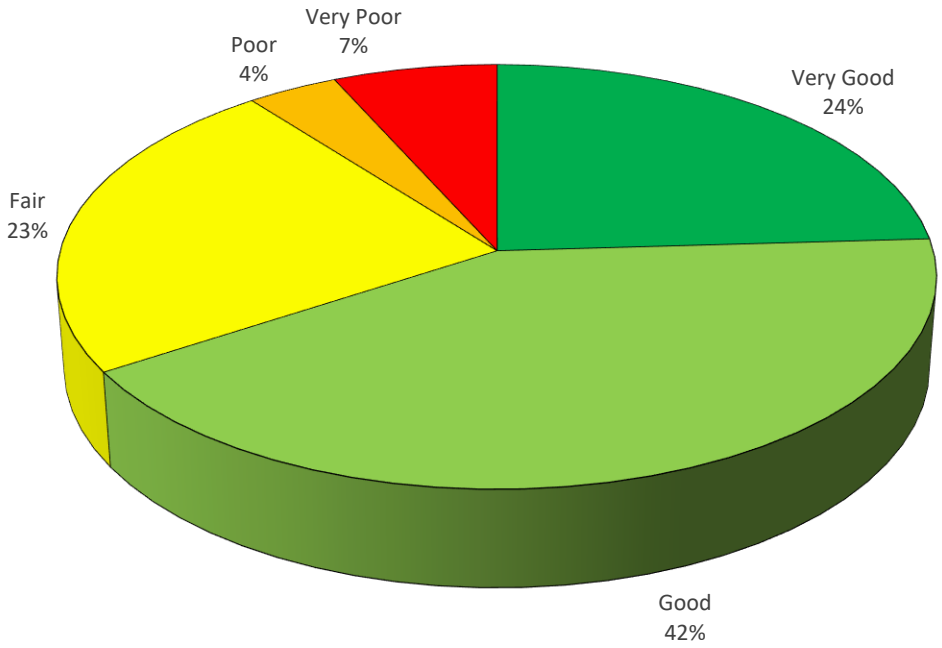
The condition of each asset represents either the current state of repair or the relative duration of time until the asset is no longer serviceable. Condition is rated using a five-point scale to align the SOI report of Town of Halton Hills with the 2016 Canadian National Infrastructure Report Card. This cross-asset 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 2 below.

Table 2 - Condition Rating Framework

Rating	Condition	Definition (check if any apply)
1	Very Good	• Fit for the future. Well maintained, good condition. • New or recently rehabilitated.
2	Good	• Good working condition. • Generally approaching mid-stage of expected service life.
3	Fair	• Signs of deterioration, some elements exhibit deficiencies. • Mid-stage of expected service life.
4	Poor	• Condition below standard, large portion of system exhibits significant deterioration. • Approaching end of service life.
5	Very Poor	• Widespread signs of advanced deterioration, asset may be unusable. • Near or beyond expected service life.

Overall, the Town of Halton Hills assets are recognized to be in a **"Good" to "Fair" condition**. To calculate the overall condition rating, a replacement value-weighted condition rating is used. Rather than simply averaging the condition rating of all assets, the weighted value considers higher replacement cost assets more than lower cost ones. For the Town of Halton Hills, the overall condition rating is 2.27 out of 5.0 and only **11%** of Town assets (by replacement cost) are in a Poor or worse condition, as shown in Figure 1.

Figure 1 - Condition Distribution



Risk

Risk ratings are 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 SOI report. This method uses both the probability and consequence of failure of an asset, and calculates the risk rating with the following equation:

$$Risk\ Rating = Probability\ of\ Failure * Consequence\ of\ Failure$$

Like condition, probability and consequence of failure is scored on a 1-5 rating scale. Multiplying these two values (probability and consequence of failure) together yields a risk rating framework, shown in Figure 2.

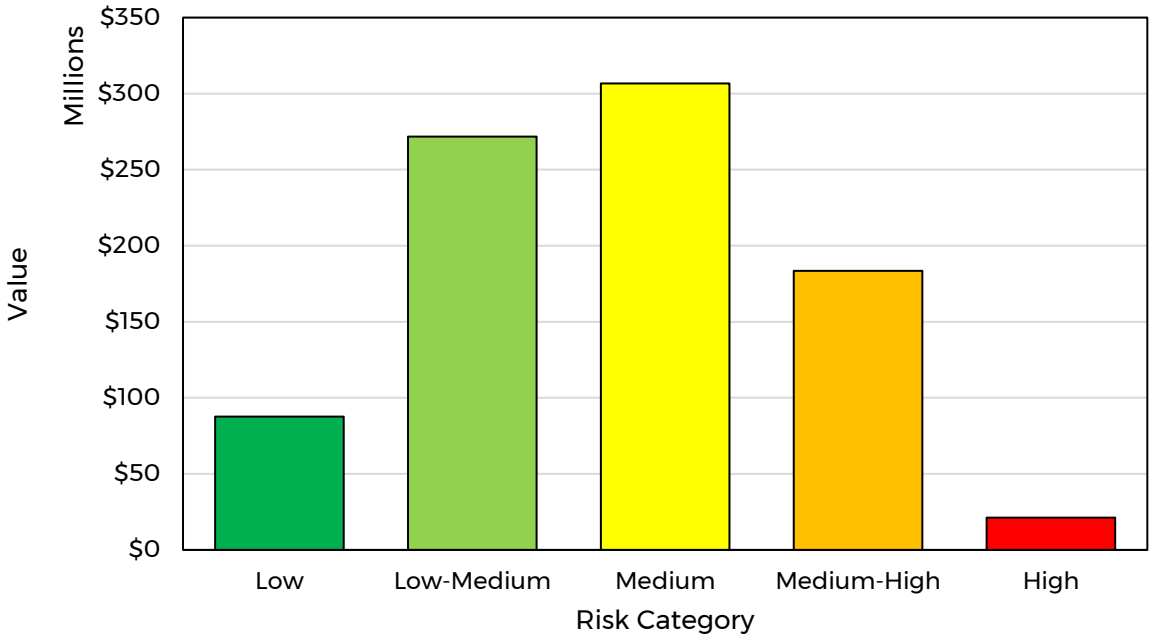
Figure 2 – Risk Rating Framework

Probability of Failure		Consequence of Failure: Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
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	Low
2	Low-Medium
3	Medium
4	Medium-High
5	High

Overall, the Town of Halton Hills assets have a **"Medium" degree of risk**. There is a small percentage of assets (2%) which are 'High" risk and considerable amount of assets (21%) which are "Medium-High" risk. The total value of assets in each of the five risk categories are shown in Figure 3.

Figure 3 - Risk Distribution



Long-Term Financial Forecast

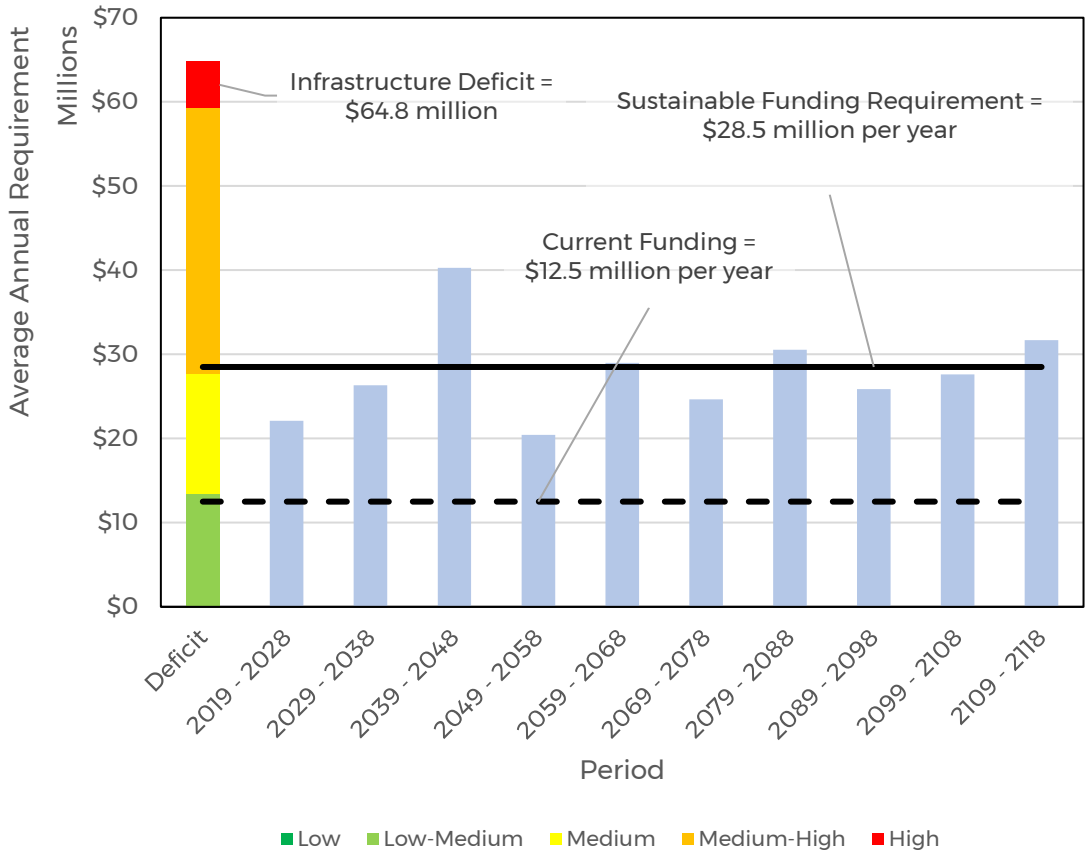
The long-term financial forecast presents the future capital expenditures (replacement and rehabilitation) for all assets. The forecast highlights the current infrastructure deficit (value of assets which are at or beyond the end of their useful lives), the average annual investment requirement for the next 10 decades, and the sustainable funding requirement. The sustainable funding requirement is the average annual funding required to maintain all assets over a 100-year period (including the infrastructure deficit). A summary of replacement and rehabilitation costs, and estimated useful lives used for all assets can be found in Appendix 1.

In the interpretation of these results the reader should note that the analyses in this report were limited to existing assets only and no allowances were made to accommodate growth (i.e. the construction of new assets and the associated future investment requirements) and that the financial contributions from capital and operating budgets were not evaluated separately.

The Town of Halton Hills has a current infrastructure deficit of **$64.8 million** and a sustainable funding requirement (SFR) of **$28.5 million per year**. Over the next 10 years, the Town of Halton Hills has planned to allocate roughly **$12.5 million per year** to the replacement and renewal of existing infrastructure. This represents an estimated infrastructure investment gap of $16.0 million per year.

For the infrastructure deficit, it is important to recognize the relative degree of risk which is present. To assist with this interpretation, the total value of assets within the infrastructure deficit have been broken down into one of the five risk categories listed above. There is currently a total of **$5.57 million** of asset value which is both in a deficit position and is a High risk asset. This group is mainly composed of playground equipment and safety surfaces, as well as facility components such as electrical and structural. These results and the average annual funding requirement for each of the next 10 decades are shown in Figure 4 below.

Figure 4 - Long-Term Financial Forecast



Closing the Investment Gap

As noted above, the Town of Halton Hills currently has an investment gap of $16.0 million per year. This gap can be closed using one of, or a combination of, three methods:

1. Reduce services (and subsequently reduce investment requirements)
2. Increase funding levels for asset renewal and replacement
3. Deliver services more cost-effectively

The Town of Halton Hills is currently in a period of extensive growth and it is unlikely that investment requirements and services can (or should) be reduced. As the community grows, additional services (and assets) are required. Additionally, there are limits to the cost-effectiveness of delivering services, and the Town is continually improving its internal processes to accommodate this.

With this mind, the Town of Halton Hills has explored three funding scenarios to close the investment gap and achieve the desired annual funding level. These funding scenarios increase the funding amount allocated for the renewal or replacement of existing assets by a fixed percentage each year. Results of these funding scenarios are summarized in Figure 5 and Table 3.

Figure 5 – Achieving the Sustainable Funding Requirement at Various Rates of Funding Increases

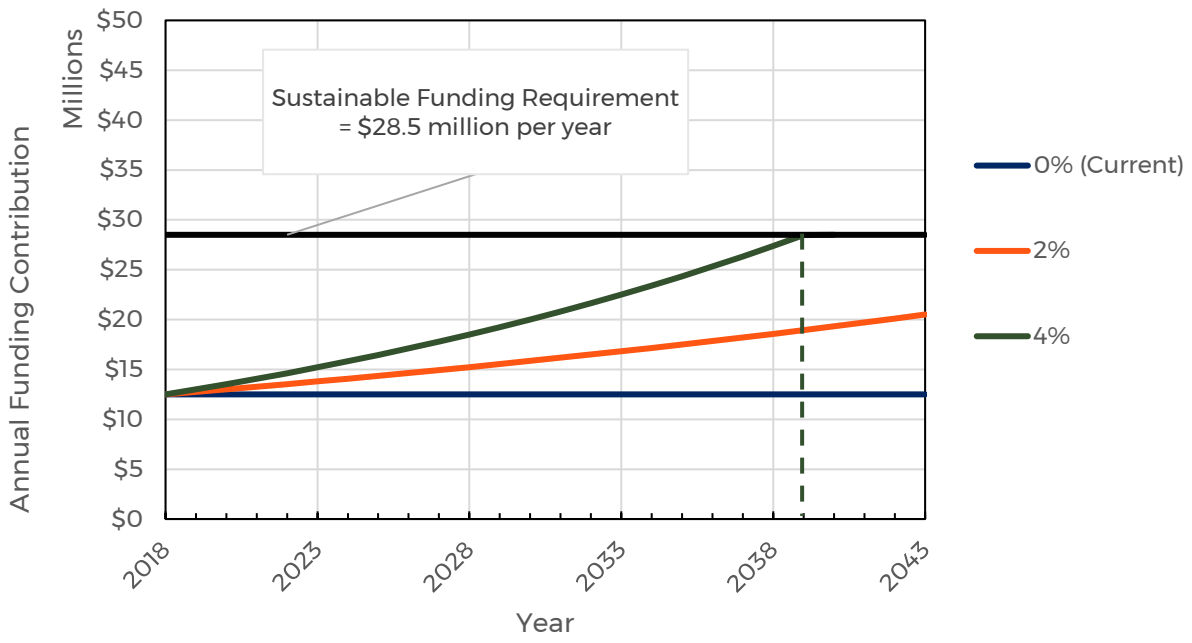


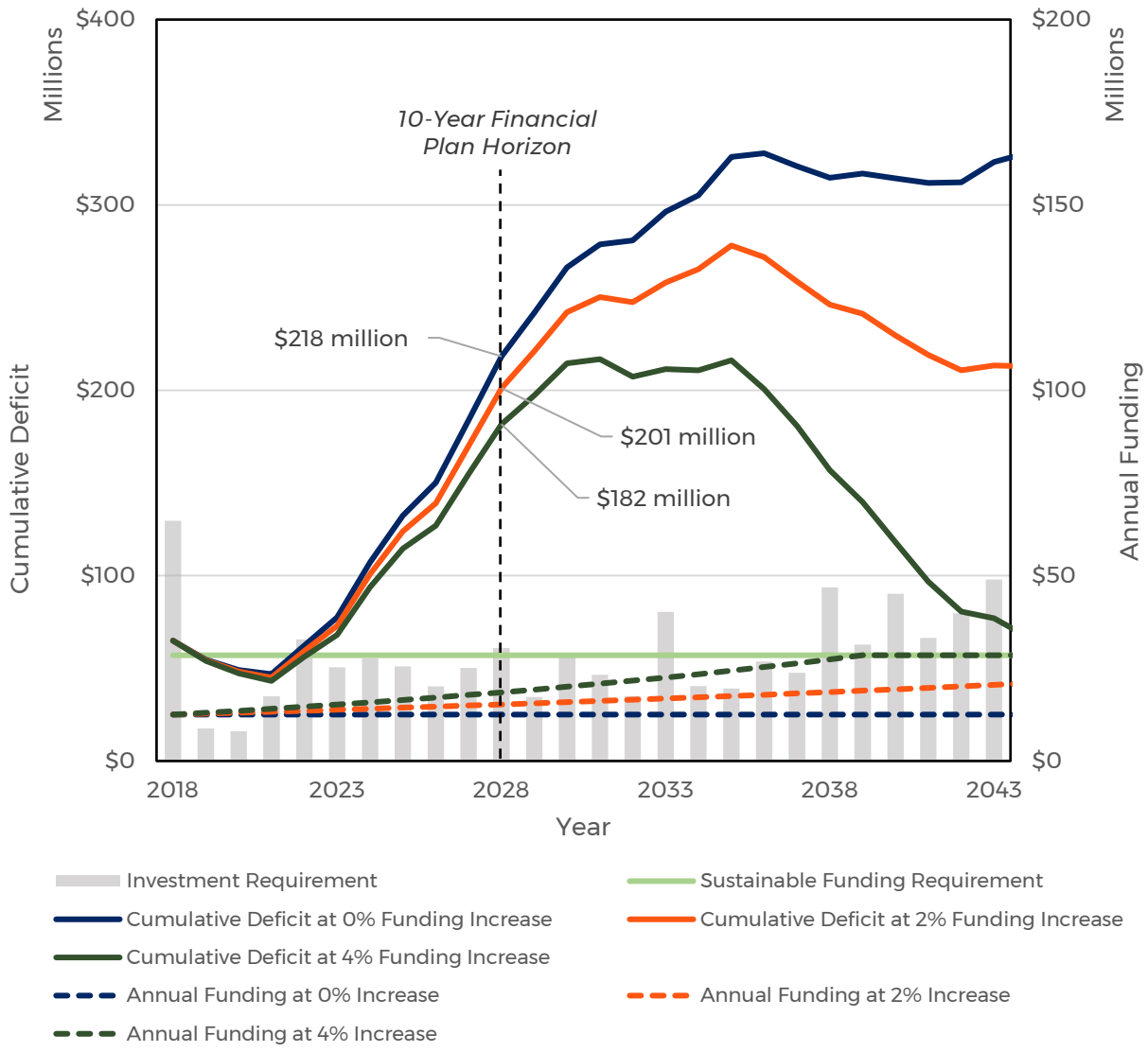
Table 3 – Sustainable Funding Achievement Projections

Rate of Funding Increases	Year Sustainable Funding Requirement Achieved
0%	Never
2%	2060
4%	2039

Failure to address the investment gap will have a significant impact on the cumulative infrastructure deficit and reduce the Town's ability to effectively deliver municipal services. If the Town maintains a planned funding level of $12.5 million per year, the cumulative infrastructure deficit will increase from $64.8 million to over $323 million over a 25-year period.

However, if the Town were to increase the annual funding for asset renewals and replacements by 4% a year (reaching the Sustainable Funding Requirement of $28.5 million per year by 2039), the cumulative infrastructure deficit can be reduced significantly. This is shown in Figure 6, where the cumulative infrastructure deficit is limited to $77 million over a 25-year period.

Figure 6 – Cumulative Deficit and Annual Funding



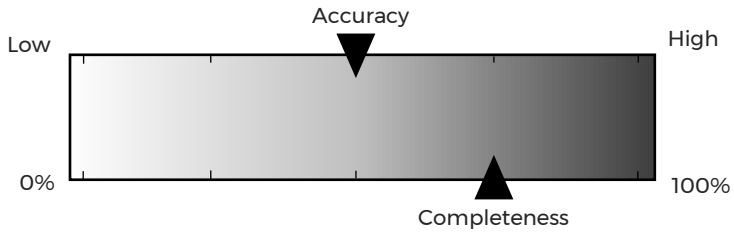
Confidence Band

The information in the SOI report is based on the best readily available data for each individual asset. As the information presented in the SOI report is sensitive to the accuracy and completeness of the asset data, confidence bands have been produced. The confidence bands illustrate two things. First, 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 Town can use

confidence bands to identify which asset groups require improvements in data quality to produce more certain results.

The Town of Halton Hills asset inventory is believed to be mostly complete. However, there are still some asset categories (e.g. parks, facilities, walkways, retaining walls, guiderails) which are likely incomplete and require additional investigation and assessment. While the inventory is mostly complete, much of the asset information included is likely inaccurate and does not reflect the current reality or condition of the assets. This inaccuracy is attributed to two major items: condition and cost estimates. The condition rating of most assets is based on a theoretical value and only a limited number of assets (e.g. roads, bridges, facilities) undergo regular condition assessments. Secondly, many of the cost estimates used in this report are based on escalating the original acquisition cost or by engineering estimates which depend on the accuracy of information available.

Figure 7 - Confidence Band



Conclusions

The following general conclusions are drawn from the results presented above. In the interpretation of these recommendations the reader should note that the analyses in this report were limited to existing assets only and no allowances were made to accommodate growth (i.e. the construction of new assets and the associated future investment requirements) and that the financial contributions from capital and operating budgets were not evaluated separately.

1. The current replacement value of all Town assets is $870.8 million, while the infrastructure deficit (infrastructure at or beyond its theoretical service life) is roughly $64.8 million (approximately 7% of the inventory value).

2. Town assets are generally in a "Good to Fair" condition. On a replacement value-weighted basis, only a small percentage (11%) of these assets are in a condition of Poor or Very Poor.

3. Overall, Town assets are recognized as having a "Medium" degree of risk. There are a limited number of assets (2%) which are categorized as having a "High" risk.

4. To maintain the current inventory over a 100-year period, it is estimated the Town will require an average investment of $28.5 million per year. This estimate includes the rehabilitation and replacement of all assets at pre-determined intervals.

5. The 2018-2027 preliminary long-term capital budget indicates the Town proposes to allocate an average investment of $12.5 million per year to infrastructure renewals and replacements. As a result, the Town has a current investment gap of $16.0 million per year.

6. Failure to address the investment gap will have a significant impact on the cumulative infrastructure deficit. By the year 2043 (25-year horizon), the cumulative deficit will increase to over $323 million (37% of the inventory value) if the Town maintains the current proposed investment level of $12.5 million per year for asset renewals and replacements.

7. Increasing the annual investment by 4% per year (or an equivalent efficiency gain from a reduction in services or cost-efficiencies) will result in the Town achieving the Sustainable Funding Requirement by the year 2039. As a result, the cumulative deficit in year 2043 (25-year horizon) will be limited to only $77 million (9% of the inventory value) and will rapidly decrease afterwards.

In summary, the Town of Halton Hills' assets are generally a Good to Fair condition. This is primarily attributed to recent growth in the Halton Hills area, with most assets being relatively new and still in good condition. However, the Town is currently under-investing in its infrastructure and if additional resources are not allocated to renew or replace its inventory, the Town's ability to sustainably provide municipal services is expected to diminish as assets deteriorate. Additionally, as the Town continues to experience significant growth and continually adds new assets to its inventory, further resources will be required.

Introduction

What is Asset Management?

Asset management for Halton Hills involves continuous monitoring of infrastructure assets' condition, costs, risks, age, performance, and estimated useful lives to systematically identify and prioritize the Town's investment needs. This ensures that, with limited financial resources, the Town can effectively sustain the delivery of services to residents and businesses, while adapting to external threats such as climate change. Engineers Canada defines asset management as follows:

Asset Management can be defined as an integrated approach involving planning, engineering and finance to effectively manage existing and new municipal infrastructure in a sustainable manner to ***maximize benefits, reduce risk and provide satisfactory levels*** *of service to the community user in an environmentally and ecologically responsible manner.*

Most importantly, asset management processes ensure the Town of Halton Hills is getting the most out of taxpayer dollars by carefully selecting high-value projects for renewal or replacement. Asset management supports Council-approved *Strategic Plan 2031*, which includes "*providing sustainable infrastructure and services*" to "*maintain and enhance community infrastructure and services that support our quality of life*".

Purpose

The purpose of a State of Infrastructure (SOI) report is to communicate the state of repair for infrastructure assets essential to the delivery of public services. In general, the SOI report is intended to provide information to answer the six key asset management questions, listed below.

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?

The SOI report contains several indicators that will allow the comparison of the state of infrastructure repair across different service areas and over time (when the SOI report is regenerated in the future). Indicators included for each category include:

- Replacement value.
- Infrastructure deficit (value of infrastructure at or beyond the end of its service life).
- Letter grade to indicate state of repair.

- Condition distribution charts.
- Risk distribution charts.
- Confidence in the asset data which the indicators are generated from.

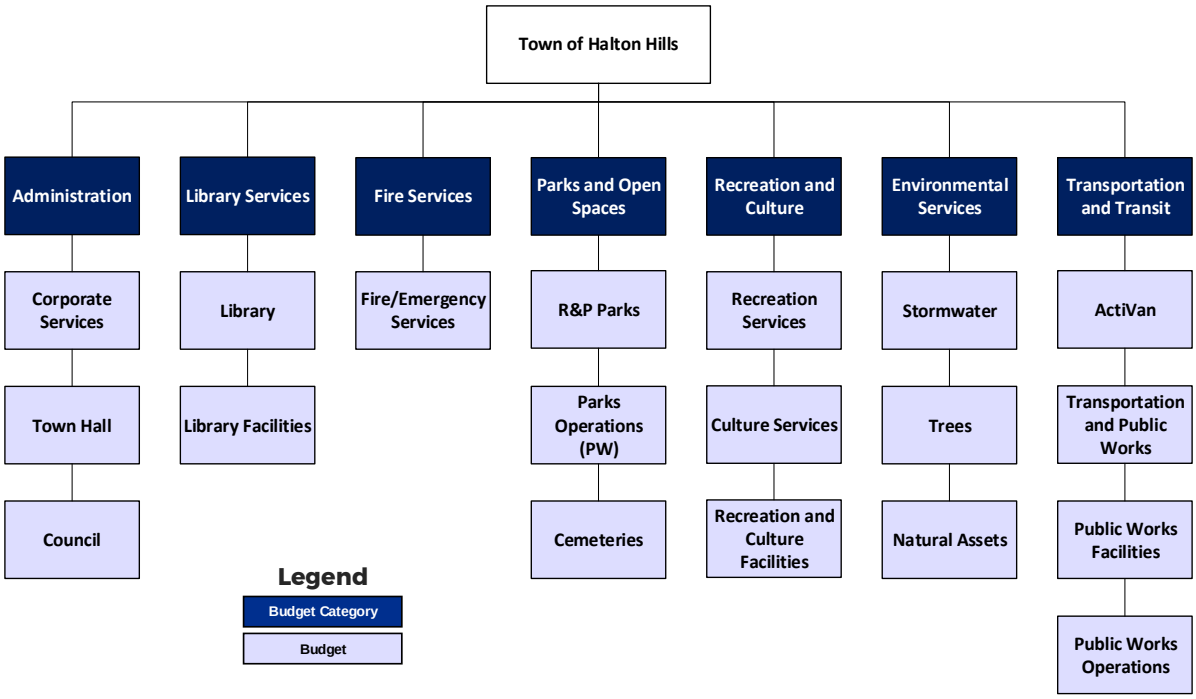
As the inaugural issue of the SOI report, this document will provide a benchmark and framework for future iterations. It is expected the Town will produce SOI reports on an on-going basis at pre-defined intervals. As future iterations are produced, Town residents will be able to understand and see the impacts of infrastructure renewal programs, funding commitments, and advanced asset management practices.

In the interpretation of this report, it should be noted the presented information is based on current, readily available asset data. As this asset data is currently incomplete and not fully accurate, the results presented in this inaugural SOI report are expected to be subject to change when the data quality is refined and improved.

Scope and Hierarchy

The State of Infrastructure report includes all assets owned and operated by the Town of Halton Hills. To assist in the interpretation of the results, all assets have been categorized according to a budget-based asset hierarchy. The asset hierarchy arranges assets into specific categories or "levels" (e.g. Stormwater Main > Storm Water System > Stormwater > Environmental Services). A budget-based asset hierarchy is used to ensure the long-term financial planning results can easily be used to assist in the annual budgeting practices of the Town. The asset hierarchy is first broken down into the various Budget Categories and individual budgets, shown in Figure 8.

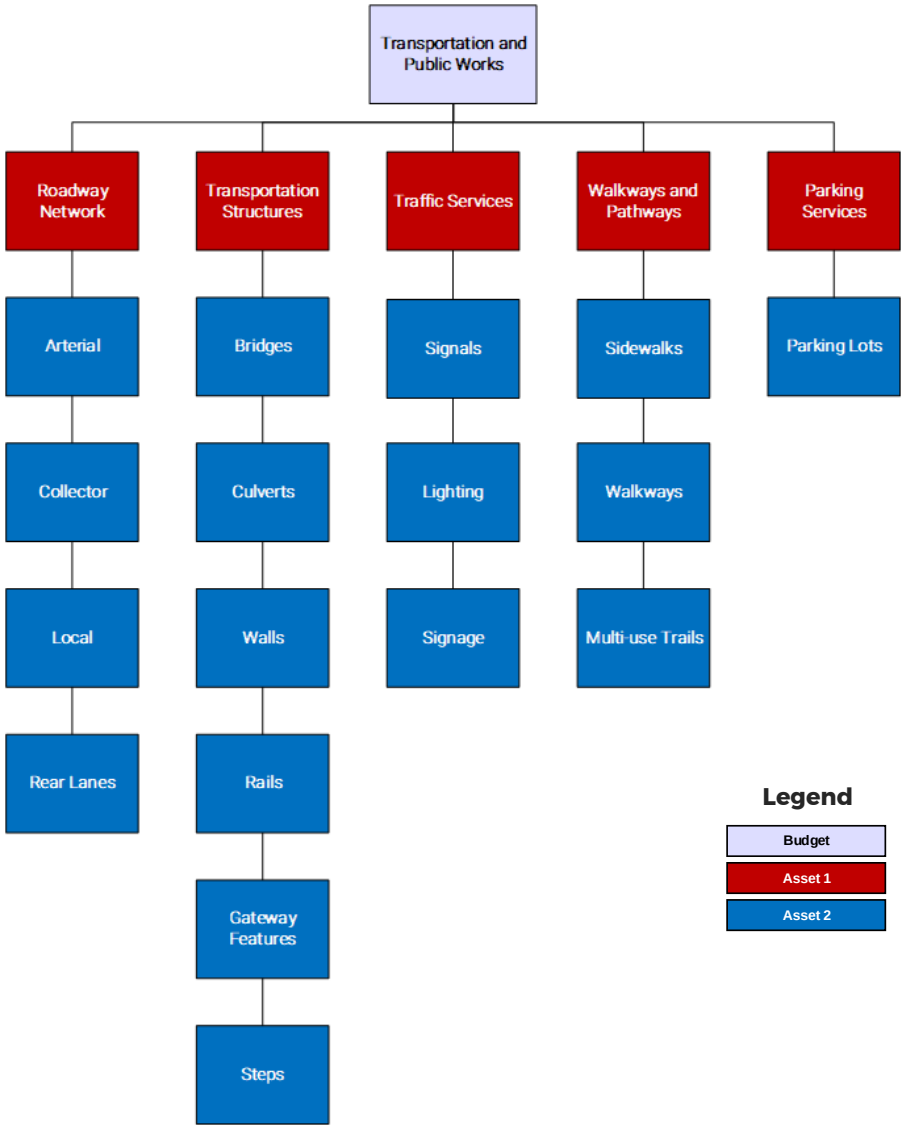
Figure 8 – Halton Hills Budget-Based Asset Hierarchy (Budget Categories and Budgets)



Note: The hierarchy presented above are budgets *only*. Individual asset types in each of the budgets can be found in the complete asset hierarchy shown in Appendix 2.

For each budget shown above, additional asset "levels" are prepared to categorize the type of assets included. These asset levels can be broken down into an infinite amount of levels and can be updated or modified as the Town makes changes to the nature of assets it manages. An example of a further break down of this hierarchy is shown in Figure 9 for the "Transportation and Public Works" budget. A complete copy of the Town's asset hierarchy is shown in Appendix 2.

Figure 9 – Asset Hierarchy Asset-Level Breakdown



Approach and Methodology

This section details the methodologies used to quantify the Town's current state of repair for municipal infrastructure assets. The state of infrastructure is described using a service-based asset hierarchy, condition & risk rating systems, letter grades, financial forecasts, and confidence bands. Although each of these indicators only quantifies a specific aspect of the asset's state of repair, the combined information provides the reader with a comprehensive overview. Detailed information regarding each of these indicators is presented in the following section.

Condition

The condition of each asset represents either the current state of repair or the relative duration of time until the asset is no longer serviceable. Condition is rated using a five-point scale to align the SOI report of Town of Halton Hills with the 2016 Canadian National Infrastructure Report Card. This cross-asset 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 4 below.

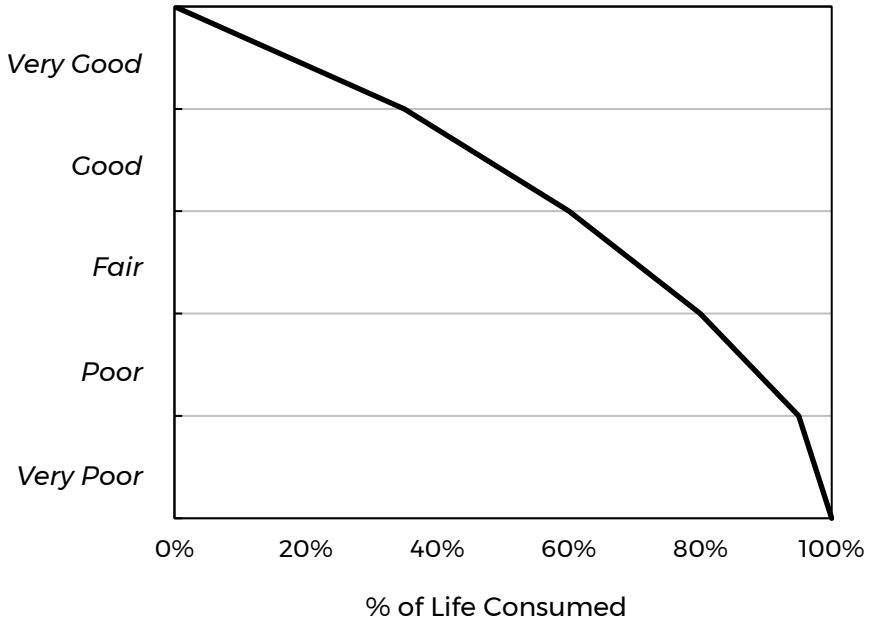
Table 4 - Condition Rating Framework

Rating	Condition	Definition (check if any apply)
1	Very Good	• Fit for the future. Well maintained, good condition. • New or recently rehabilitated.
2	Good	• Good working condition. • Generally approaching mid-stage of expected service life.
3	Fair	• Signs of deterioration, some elements exhibit deficiencies. • Mid-stage of expected service life.
4	Poor	• Condition below standard, large portion of system exhibits significant deterioration. • Approaching end of service life.
5	Very Poor	• Widespread signs of advanced deterioration, asset may be unusable. • Near or beyond expected service life.

Condition ratings can be determined in a variety of ways but are generalized in two categories; by field assessment and predictive modelling. The preferred and more reliable method to determine condition is through field assessments and inspections. Only a limited number of assets have undergone field inspections to determine asset condition. For these assets, specific condition assessment methodologies were used to evaluate the current state of physical repair. The results of these assessments were then translated to the 1 – 5 scale shown above. These assets included roads, bridges, culverts, guiderails, and retaining walls. For all other assets, individual asset condition ratings were estimated using a simplified predictive model, using age as a proxy, rather than field assessments or inspections. A generalized asset deterioration curve, shown in Figure 10, was used to convert the remaining useful life of an

asset to condition. This general deterioration curve reflects the accelerated rate of deterioration towards the end of an asset's service life.

Figure 10 - Generalized Asset Deterioration Curve



Risk

Risk ratings are 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 SOI report. This method uses both the probability and consequence of failure of an asset, and calculates the risk rating with the following equation:

$$Risk\ Rating = Probability\ of\ Failure * Consequence\ of\ Failure$$

Like condition, probability and consequence of failure is scored on a 1-5 rating scale. These ratings, and their associated descriptions, are shown in Table 5 below. Multiplying these two values (probability and consequence of failure) together yields a risk rating framework, shown in Table 6.

Table 5 - Probability and Consequence of Failure Descriptions

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

Table 6 - 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	Low
2	Low-Medium
3	Medium
4	Medium-High
5	High

For the initial SOI report, it is assumed the condition of an asset directly relates to its probability of failure. Additionally, the consequence of failure of all assets have been pre-determined by subjective input by RV Anderson Associates Limited and feedback provided from Town staff (see Appendix 1.5 for details). The exception to this rule is for some facilities which underwent a Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol assessment to identify the climate change risks and vulnerabilities. The results of these assessments were then translated to relate to the risk-rating framework described above.

For future iterations of the SOI report, more advanced methodologies of quantifying probability and consequence of failure can be used. These methods can incorporate several key decision-making criteria such as (but not limited to) climate change, social, economic, environmental, future growth, life cycle cost, and operation impacts.

Letter Grade

Each budget category 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 7. Consideration is given for assets which score close to the threshold of another grade (see Table 8). That is, assets are given a + or – symbol to indicate if an asset is close to a better or worse grade.

Table 7 - Letter Grade State of Repair and Definitions

Letter Grade	State of Repair	Definition
A	Very Good	Fit for the future. Well maintained, good 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 category were calculated using replacement value-weighted condition ratings and risk categories values for each asset in the categories. Each asset was 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 6. The condition ratings and risk category values were used to calculate letter scores ranging from 1 to 5 for the combined assets in the level 1 and level 2 service areas 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 Table 8 below.

Table 8 - Letter Grade Thresholds

Letter Grade	Letter Score
F	4.75 – 5.00
D-	4.50 - 4.75
D	4.00 - 4.50
D+	3.80 – 4.00
C-	3.50 - 3.80
C	3.00 - 3.50
C+	2.60 – 3.00
B-	2.40 - 2.60
B	2.00 - 2.40
B+	1.60 – 2.00
A-	1.40 - 1.60
A	1.30 - 1.40
A+	1.00 - 1.30

Asset Valuation

All Town assets have been valued according to their current replacement cost. Current replacement costs are estimated using one of three methodologies:

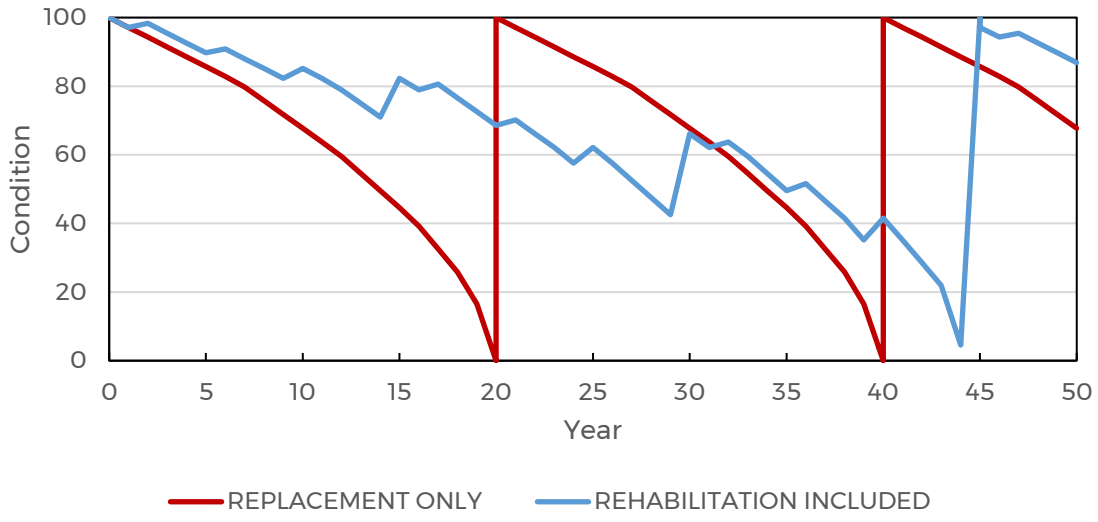
1. Escalation of original acquisition cost to current year.
2. Industry standards.
3. Review of recent historical contracts and tender documents.

The most accurate method of estimating current replacement cost is through a review of recent historical contracts and tender documents as it includes the impact of local conditions and changes in market valuations. A detailed summary of asset unit costs or methodologies used to estimate current replacement costs are presented in Appendix 1.2.

Asset Useful Lives

In this report, two types of estimated useful lives are used. The most common is the "run to failure" useful life. This useful life of an asset receives no significant intervention or rehabilitation and the asset deteriorates according the universal deterioration curve presented Figure 10. For some assets (e.g. roads and bridges), major rehabilitation activities have been included. These interventions can extend the useful life of an asset beyond its original "run to failure" period. This concept is demonstrated in Figure 11, where the asset's useful life is extended due to timely interventions. A detailed summary of run to failure and extended useful lives for each asset are presented in Appendix 1.1.

Figure 11 - Comparison of Run to Failure and Extended Asset Useful Lives

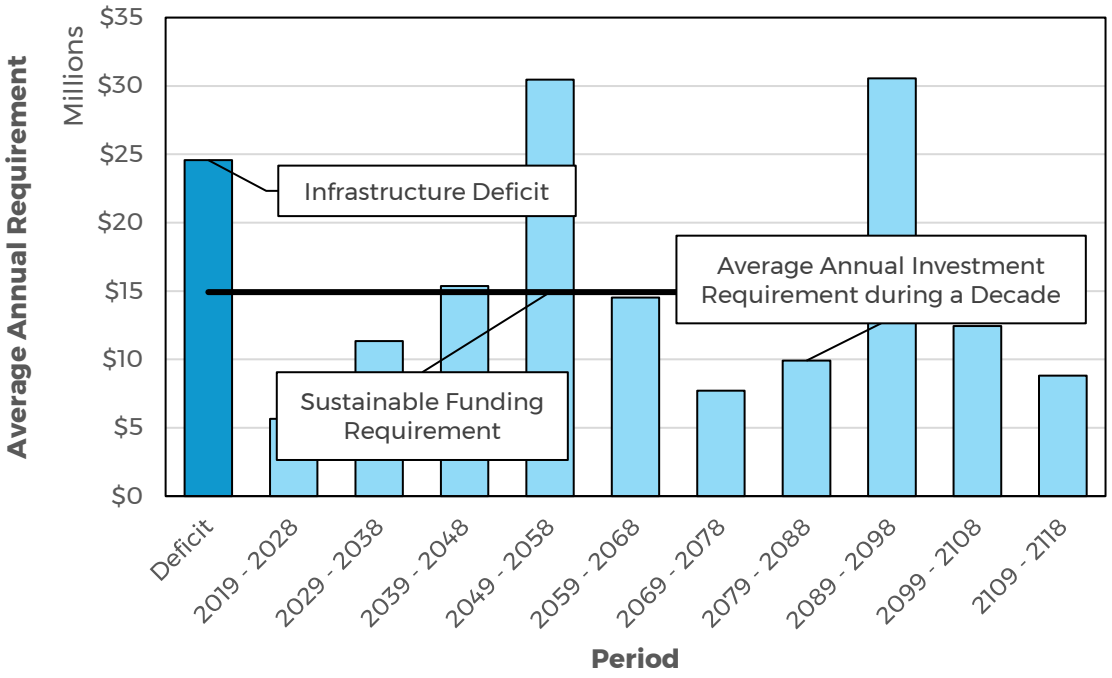


Long-Term Financial Forecast

The long-term financial forecast presents the future capital expenditures (replacement and rehabilitation) for all assets. The forecast highlights the current infrastructure deficit (value of assets which are at or beyond the end of their useful lives), the average annual investment requirement for the next 10 decades, and the sustainable funding requirement. The sustainable funding requirement is the average annual funding requirement to maintain all assets over a 100-year period (including the infrastructure deficit).

The financial forecasts developed for this report assume each asset in the inventory will be replaced once it reaches the end of its estimated useful life or the asset undergoes a rehabilitation activity at a predetermined interval. Replacement and rehabilitation costs for assets have been estimated from a variety of sources, from engineering evaluation, review of historical contracts, escalating original acquisition costs to current dollars, or by subjective input. Separate financial forecasts have been developed for each budget category to provide insight into the various budget requirements. An example financial forecast and its components are shown in Figure 12 below. Rehabilitation schedules, replacement costs and estimated useful lives for all assets can be found in Appendix 1.

Figure 12 - Long-Term Financial Forecast Example

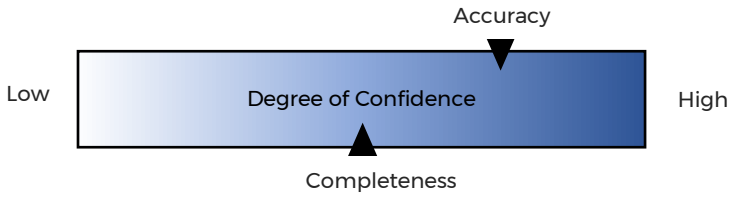


Confidence Band

The information in the SOI report is based on the best data available for individual assets. As the summary information presented in the SOI report is likely sensitive to the accuracy and completeness of the asset data, confidence bands have been produced for all budget categories included in the SOI report.

The confidence bands illustrate two things. First, 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 Town 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 13 below.

Figure 13 - Example Confidence Band



Results

The results of the Town of Halton Hills State of Infrastructure (SOI) report are presented in the following section. This section is split into the seven parts, one for each of the budget categories at the Town of Halton Hills:

1. Administration
2. Transportation and Transit
3. Fire Services
4. Recreation and Culture
5. Parks and Open Spaces
6. Environmental Services
7. Library Services

General results for the Town can be found in the Executive Summary of this report. For each budget category, the following information is included:

- Letter grade for the category as a whole
- Inventory quantities and valuation for each of the major asset groups
- Summary of asset condition and risk using distribution pie and bar charts
- Long-term financial forecasts
- Confidence bands

As previously mentioned, this report relies solely on the data found in the asset inventory. It is expected all results are sensitive to more complete and more accurate asset data, and readers are advised to consult the confidence bands for each budget category to understand the uncertainty of the results.

Administration

Administration

LETTER GRADE	VALUE	DEFICIT %
C-	$11,741,744	51%

Overview

The Town's administration is responsible for the general management and control of the organization, including adopting bylaws, adopting administrative policy, levying taxes, and providing administrative, technology and financial services. This budget category also ensures that quality services are provided to the community and that the services provided are aligned with Council approved actions. The Administration budget category is divided into three component budgets: Corporate Services, Town Hall, and Council. Significant asset categories include: information technology (IT) and the Town Hall Facility.

Inventory and Valuation

The Administration budget category assets are mainly composed of facilities and equipment to support the employees who perform daily tasks. As a result, the total value of assets is quite small relative to the other budget categories. A summarized breakdown of the inventory and valuation of Administration assets is shown in Table 9 below. A complete list of assets included in this category can be found in the asset hierarchy, shown in Appendix 2.

Table 9 - Administration Asset Inventory and Valuation

Asset	Quantity	Value	Deficit %
Town Hall Facility	1	$10,684,790	52%
Information Technology (IT)	821	$1,056,954	44%
Network Equipment	*28*		
PCs	*439*		
Printers	*18*		
Server Equipment	*13*		
Storage	*6*		
Telephones	*310*		
Total		**$11,741,744**	**51%**

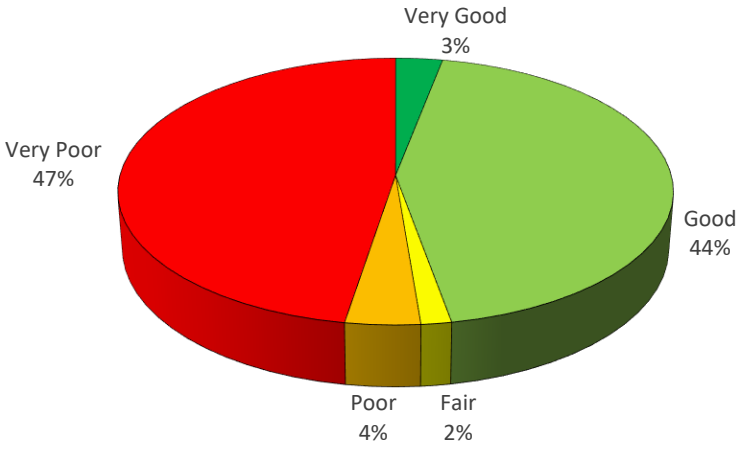
Condition

The condition rating of all assets in the Administration category was estimated by using age as a proxy. For assets where the acquisition year was unable to be determined, it is assumed the

asset is in a deficit position. As the results of these condition assessment relies on accurate asset data such as age and estimated service life, it is likely the condition of these assets will change as better asset data is obtained.

The replacement value-weighted average condition for the Administration assets is 3.48 out of 5.00 and assets are generally recognized as being in a "Fair to Poor" condition. As shown in Figure 14, 51% of the Administration assets are in a condition of Poor or worse. The majority of of the "Poor" or "Very Poor" assets are due to an aging Town Hall, with many of the facility components at or near the end of their estimated useful lives.

Figure 14 - Condition Distribution

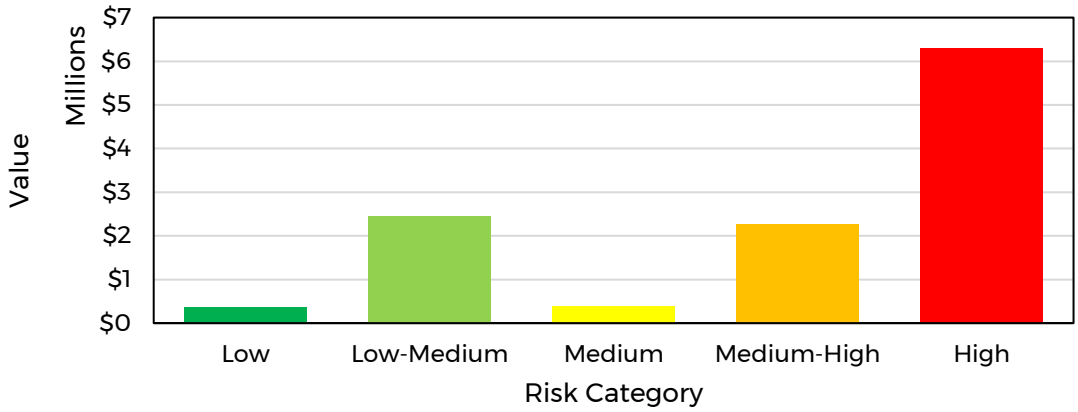


Risk

Risk ratings are 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 Administration category. Assumptions regarding the consequence of failure for assets in this category are shown in Appendix 1.

Results of the initial risk assessment suggest the Administration category exhibits a "High" risk profile. There are a large percentage (54%) of "High" risk which should be investigated in the short-term. These high-risk assets are primarily composed of Town Hall components, which are threatened by high winds causing building and property destruction. A distribution of the total value of assets in each of the five risk categories is shown in Figure 15.

Figure 15 - Risk Distribution

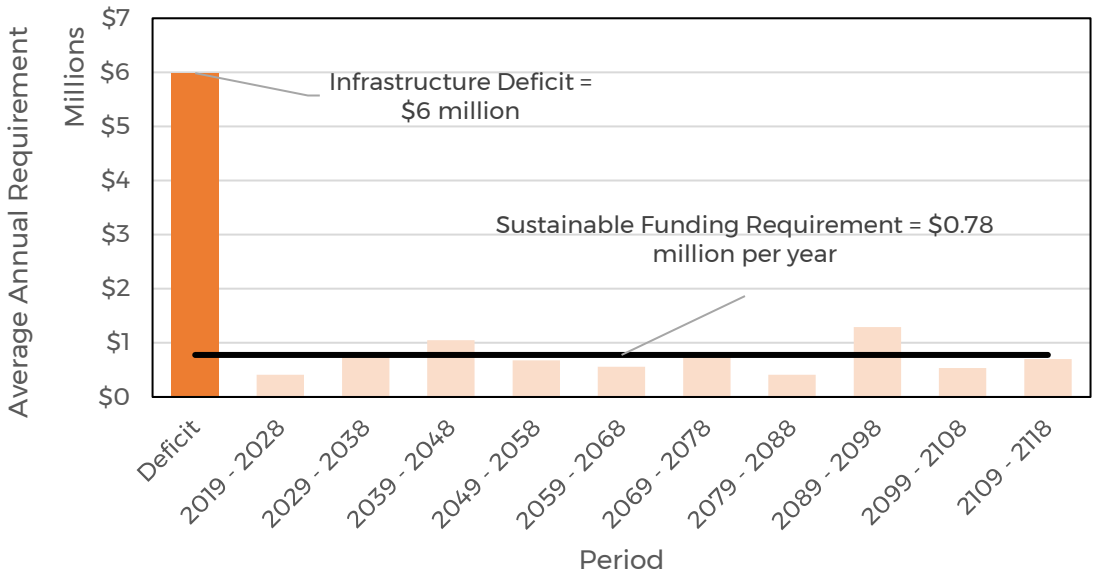


Long-Term Financial Forecast

The long-term financial forecast presents the future capital expenditures (replacement and rehabilitation) for all assets in the Administration category. The forecast highlights the current infrastructure deficit (value of assets which are at or beyond the end of their useful lives), the average annual investment requirement for a given decade, and the sustainable funding requirement. The sustainable funding requirement is the average annual funding requirement to maintain all assets over a 100-year period (including the infrastructure deficit). A summary of replacement and rehabilitation costs, and estimated useful lives used for all assets can be found in Appendix 1.

The Administration category has a current infrastructure deficit of $5,985,500 and a sustainable funding requirement of $777,140 per year. These results and the average annual funding requirement for the next 10 decades are shown in Figure 16 below.

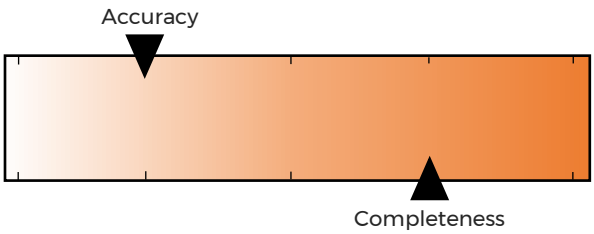
Figure 16 - Long-Term Financial Forecast



Confidence Band

The Administration category is believed to be mostly complete. The Town Hall facility contains a complete list of components and a detailed list of IT and Equipment is included. While the inventory is believed to be complete, it is not likely to be accurate. The list of facility components is likely out of date and the IT equipment inventory is missing a large quantity of information to reasonably estimate condition and cost. As a result, the Administration category has a Low Accuracy and Good Completeness rating, shown in Figure 17.

Figure 17 - Administration Confidence Band



Transportation and Transit

Transportation and Transit

LETTER GRADE	VALUE	DEFICIT %
B-	$549,804,014	5%

Overview

The Transportation and Transit service provides for a safe, reliable and accessible transportation network for vehicles and pedestrians to use. The Transportation and Transit budget category is composed of four different budgets: Transit, Public Works Facilities, Public Works Operations, and Transportation. This budget category contains the highest value of assets for the Town with several key pieces of infrastructure such as roads, sidewalks, bridges, culverts, signalized intersections, and other transportation structures.

Inventory and Valuation

The Transportation and Transit category contains a significant variety of assets such as facilities, equipment, roads, fleet, sidewalks, signalized intersection, bridges, culverts, and other transportation structures. Table 10 below, lists the major asset classes found in this group while the remainder are aggregated under "other". A complete list of assets included in this category can be found in the asset hierarchy, shown in Appendix 2.

Table 10 – Transportation and Transit Asset Inventory and Valuation

Asset	Quantity	Value	Deficit %
Roadway Network	447 lane-km	$326,670,480	2%
Bridges	75	$90,623,231	0%
Culverts	66	$30,845,459	3%
Sidewalks	238 km	$31,412,932	18%
Street Lights	2,576	$19,320,000	1%
Public Works Fleet	131	$13,601,500	29%
Public Works Facilities	4	$10,587,066	16%
Signals	35	$8,184,200	25%
Signage	9,082	$5,519,100	85%
Other		$13,040,046	10%
TOTAL		**$549,804,014**	**5%**

Condition

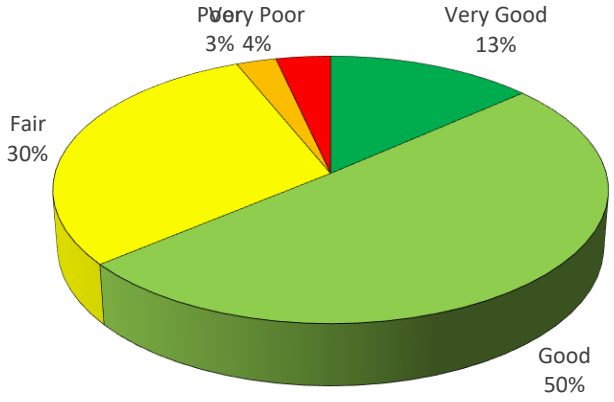
The condition ratings for assets in the Transportation and Transit category were gathered from several different sources. Most assets were evaluated by using age as a proxy, while some key pieces of infrastructure were evaluated using engineering analysis, industry standards or subjective input. The different methodologies used to evaluate these assets are shown in Table 11. If necessary, the results of these methodologies were then translated to the 1 – 5 rating scale using an agreed upon conversion scale.

Table 11 - Condition Assessment Methodologies

Asset	Methodology	% Evaluated
Roadways	Pavement Quality Index (PQI)	100
Bridges and Culverts	Bridge Condition Index (BCI)	100
Guiderails	Subjective Rating	35
Retaining Walls	Subjective Rating	29

The replacement value-weighted average condition for the Transportation and Transit category is 2.32 out of 5.00 and is generally recognized as "Good to Fair". As shown in Figure 18, 6% of the Transportation and Transit assets are in a condition of Poor or worse.

Figure 18 - Condition Distribution

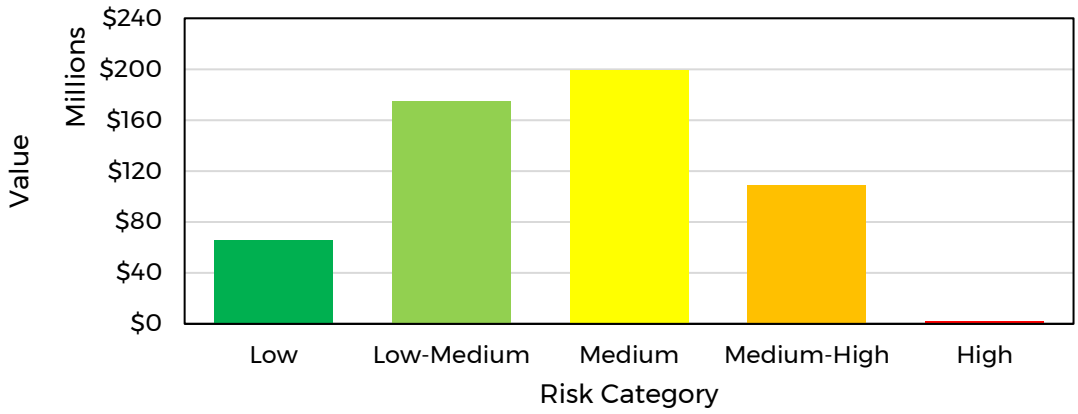


Risk

Risk ratings are 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 Transportation and Transit category. Assumptions regarding the consequence of failure for assets in this category are shown in Appendix 1.

Results of the initial risk assessment suggest the Transportation and Transit category exhibits a Medium risk profile. Additionally, there is a small number of Arterial roads which are currently "High" risk and should be investigated in the short-term. A distribution of the total value of assets in each of the five risk categories is shown in Figure 19.

Figure 19 - Risk Distribution

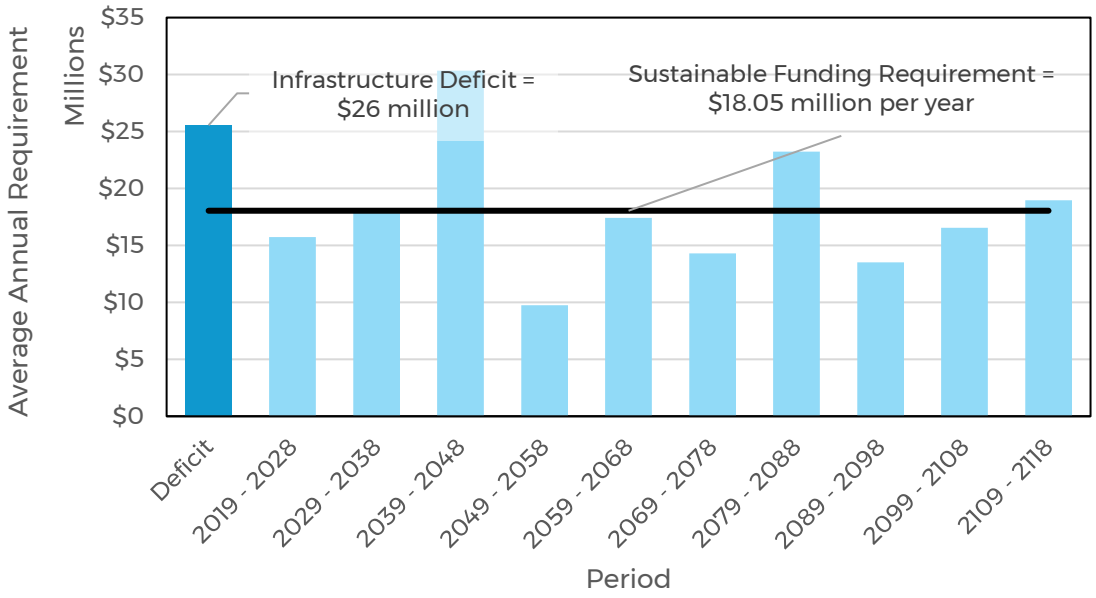


Long-Term Financial Forecast

The long-term financial forecast presents the future capital expenditures (replacement and rehabilitation) for all assets in the Transportation and Transit category. The forecast highlights the current infrastructure deficit (value of assets which are at or beyond the end of their useful lives), the average annual investment requirement for a given decade, and the sustainable funding requirement. The sustainable funding requirement is the average annual funding requirement to maintain all assets over a 100-year period (including the infrastructure deficit). A summary of replacement and rehabilitation costs, and estimated useful lives used for all assets can be found in Appendix 1.

The Transportation and Transit category has a current infrastructure deficit of $25,549,852 and a sustainable funding requirement of $18,045,427 per year. These results and the average annual funding requirement for the next 10 decades are shown in Figure 20.

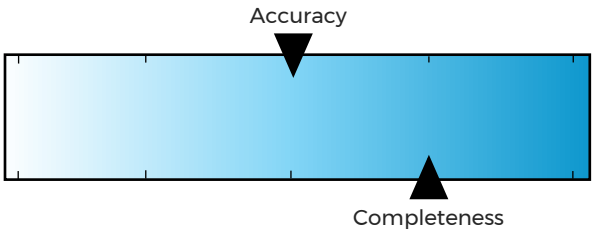
Figure 20 - Long-Term Financial Forecast



Confidence Band

The Transportation and Transit category is believed to be mostly complete and accurate. Major asset groups such as roads and sidewalks are well documented and tracked. However, some assets have very poor information available (e.g. guiderails, retaining walls, walkways, traffic signals). Overall, the accuracy of asset data and information in this category is recognized as "Good". Major assets such as roads and bridges undergo regular condition assessments and information is generally up to date. However, this contrasts with many other assets in the category (e.g. retaining walls, guiderails, walkways, traffic signals), where little to no data is available or information is out of date.

Figure 21 - Confidence Band



Fire Services

Fire Services

LETTER GRADE	VALUE	DEFICIT %
B-	$22,754,377	11%

Overview

Fire Services provides the Town with a wide range of fire prevention, fire suppression, and emergency rescue services. This category contains the assets and resources necessary to reliably respond to emergency situations and conduct related fire prevention activities. This category is composed of only one budget: Fire/Emergency Services.

Inventory and Valuation

There are three major asset types included in the Fire Services category: Fire Facilities, Fire Fleet, and Fire Equipment. Fire Fleet is sub-categorized into two major divisions: Fire Apparatus and Light Vehicles. When compared to the total value of Town assets, Fire assets represent less than 3% of the total value of Town assets. A summary of Fire related assets is shown in Table 12 below.

Table 12 – Fire Services Asset Inventory and Valuation

Asset	Quantity	Value	Deficit %
Fire Facilities	3	$15,024,397	10%
Fire Apparatus		$6,130,000	0%
Heavy Rescue	*3*		
Pumper	*5*		
Support Apparatus	*2*		
Tanker	*3*		
Trailer	*4*		
Light Vehicles	15	$663,129	50%
Fire Equipment[1]		$936,850	58%
TOTAL		**$22,754,377**	**11%**

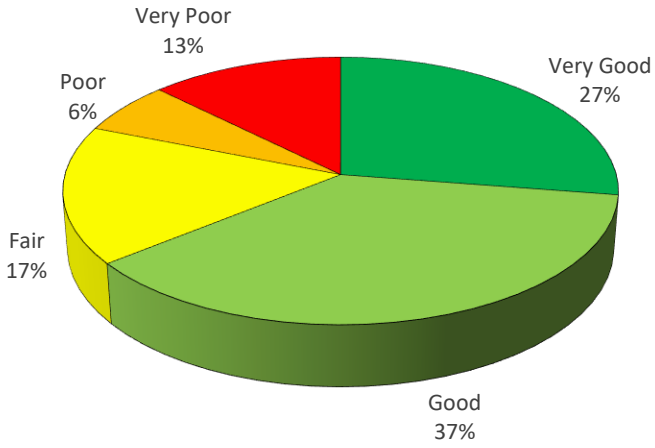
1 – The accuracy of Fire Equipment data is recognized as Poor and results should be interpreted with caution. The condition ratings and deficit amounts refer to useful life consumed for the assets. For Fire Services, the condition ratings should not be interpreted to mean the assets are not in good work condition, but rather they are expected to be replaced soon. Additionally, many of the Fire Equipment assets have incomplete acquisition years, and as a result, have been assumed to be at or near a deficit. Additional confidence in the accuracy of this information will considerably change the results presented above.

Condition

The condition rating of all assets in the Fire Services category was estimated by using age as a proxy. As the results of these condition assessment relies on accurate asset data such as age and estimated service life, it is likely the condition of these assets will change as better asset data is obtained. Fire related assets are unique in that they provide life-saving capabilities and are under much stricter requirements. Firefighting equipment is never used if seemed to be in Poor working condition. It is expected that upon further analysis and investigation, the condition of all fire fighting related assets will improve.

The replacement value-weighted average condition for the Fire Service area is 2.40 out of 5.00 and is generally recognized as being in "Good to Fair" condition. As shown in Figure 22, 19% of the Fire Service assets are in a condition of Poor or worse.

Figure 22 - Condition Distribution

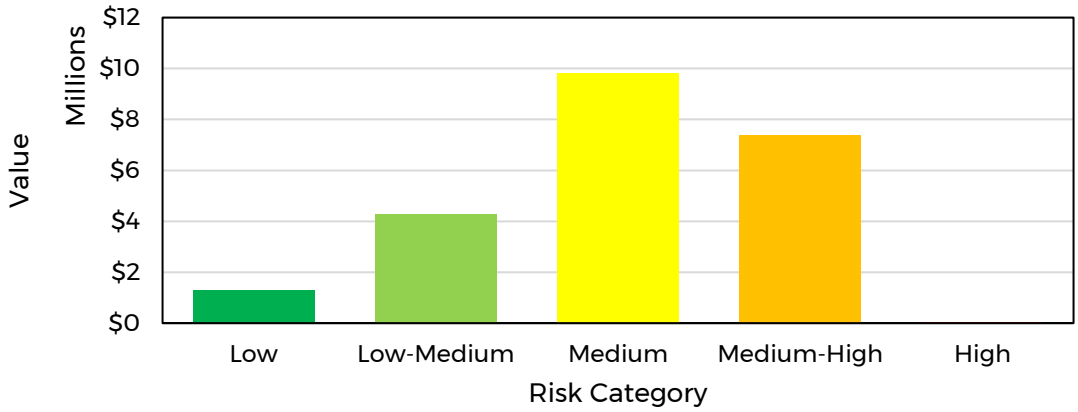


Risk

Risk ratings are 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 Fire Services category. Assumptions regarding the consequence of failure for assets in this category are shown in Appendix 1.

Results of the initial risk assessment suggest the Fire Services category exhibits a "Medium" risk profile. There is only one single "High" risk asset (Acton Fire Hall Communications/Security system) which should be investigated in the short-term. A distribution of the total value of assets in each of the five risk categories is shown in Figure 23.

Figure 23 - Risk Distribution

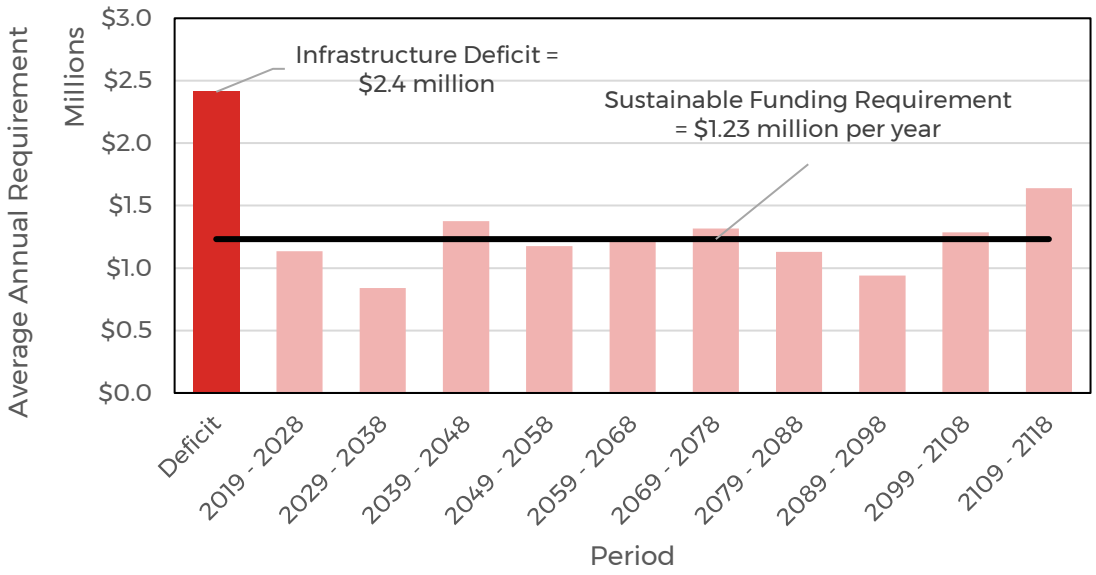


Long-Term Financial Forecast

The long-term financial forecast presents the future capital expenditures (replacement and rehabilitation) for all assets in the Fire Services category. The forecast highlights the current infrastructure deficit (value of assets which are at or beyond the end of their useful lives), the average annual investment requirement for a given decade, and the sustainable funding requirement. The sustainable funding requirement is the average annual funding requirement to maintain all assets over a 100-year period (including the infrastructure deficit). A summary of replacement and rehabilitation costs, and estimated useful lives used for all assets can be found in Appendix 1.

The Fire Services category has a current infrastructure deficit of $2,411,097 and a sustainable funding requirement of $1,231,822 per year. These results and the average annual funding requirement for the next 10 decades are shown in Figure 24 below.

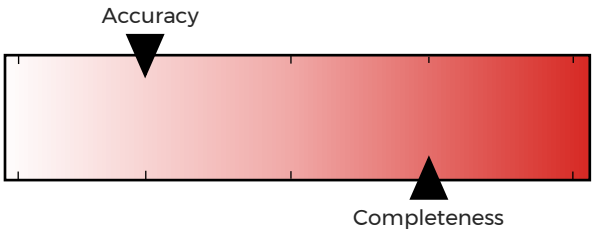
Figure 24 - Long-Term Financial Forecast



Confidence Band

The Fire Services category is believed to be mostly complete but is missing some key pieces of information. The category contains a complete list of fleet, equipment, and facility assets however many attributes are missing. Facility components are believed to be out of date and are likely inaccurate. Fleet assets are generally accurate but likely require an additional review of replacement costs and estimated useful lives. Equipment assets are missing a significant amount of acquisition dates and useful lives to accurately estimate current condition. Furthermore, no assets in this category have documented condition data and condition is therefore estimated using theoretical values.

Figure 25 - Confidence Band



Recreation and Culture

Recreation and Culture

LETTER GRADE	VALUE	DEFICIT %
B-	$74,418,436	22%

Overview

The Recreation and Culture service mainly provides the Town with the Recreational and Cultural facilities and equipment for residents and visitors to enjoy. This category is composed of three major budgets: Recreation Services, Culture Services, and Recreation and Culture Facilities. All assets included in this category are Recreation and Culture Facilities.

Inventory and Valuation

There are three categories of Recreation and Culture Facilities recognized by the Town of Halton Hills: Community Centers, Aquatic Facilities, and Miscellaneous. The Community Centers category is composed of a variety of recreation and cultural facilities such as sports complexes, community halls, and seniors' centers. Additional asset types included in this category include Recreation Equipment and the Town Art Collection; however, no asset data has been collected for these items and they are therefore not included in Table 13.

Table 13 - Recreation and Cultural Asset Inventory and Valuation

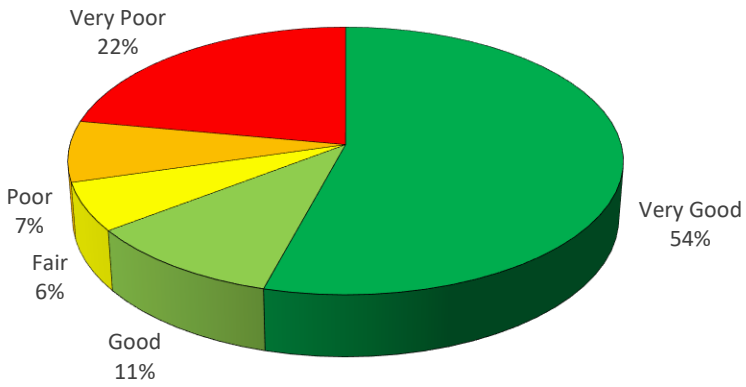
Asset	Quantity	Value	Deficit %
Community Centers	7	$72,358,538	20%
Aquatic Facilities	2	$358,117	47%
Miscellaneous Facilities	4	$1,701,781	85%
TOTAL		**$74,418,436**	**22%**

Condition

The condition rating of all assets in the Recreation and Culture category was estimated by using age as a proxy. As the results of these condition assessments rely on accurate asset data such as age and estimated service life, it is likely the condition of these assets will change once asset data is improved. While there have been several facility condition assessment studies done in the past, these assessments only identify a limited number of facility component deficiencies and only assign an aggregated condition rating for the facility as a whole. The approach used for the SOI report looks at each component of a facility individually and assigns a unique condition rating for each component, rather than the facility.

The replacement value-weighted average condition for the Recreation and Culture service area is 2.33 out of 5.00 and is recognized as being in "Good to Fair" condition . As shown in Figure 26, 29% of the Recreation and Culture assets are in a condition of Poor or worse.

Figure 26 - Condition Distribution

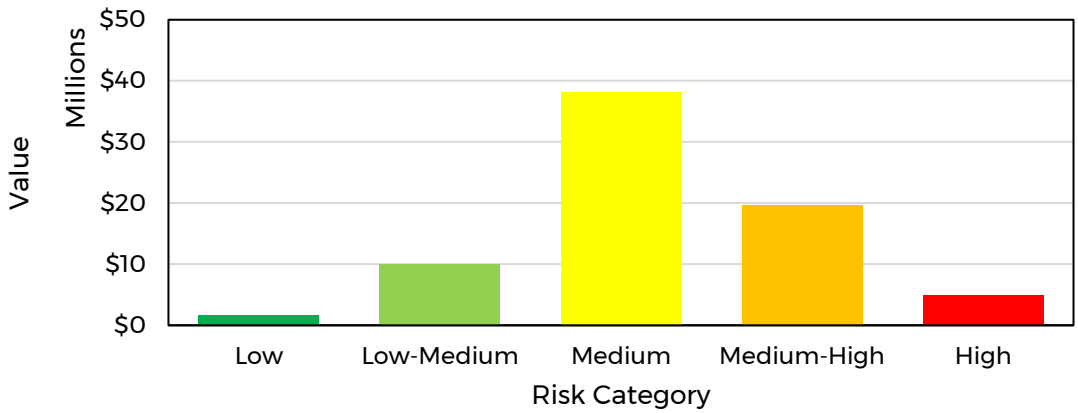


Risk

Risk ratings are 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 Recreation and Culture category. Assumptions regarding the consequence of failure for assets in this category are shown in Appendix 1.

Results of the initial risk assessment suggest the Recreation and Culture category exhibits a "Medium" risk profile. Most assets are in the "Medium" risk category, however there is a small percentage (7%) of "High" risk assets. The High risks are primarily attributed to weather related risk events which are strengthened due to climate change impacts. A distribution of the total value of assets in each of the five risk categories is shown in Figure 27.

Figure 27 - Risk Distribution

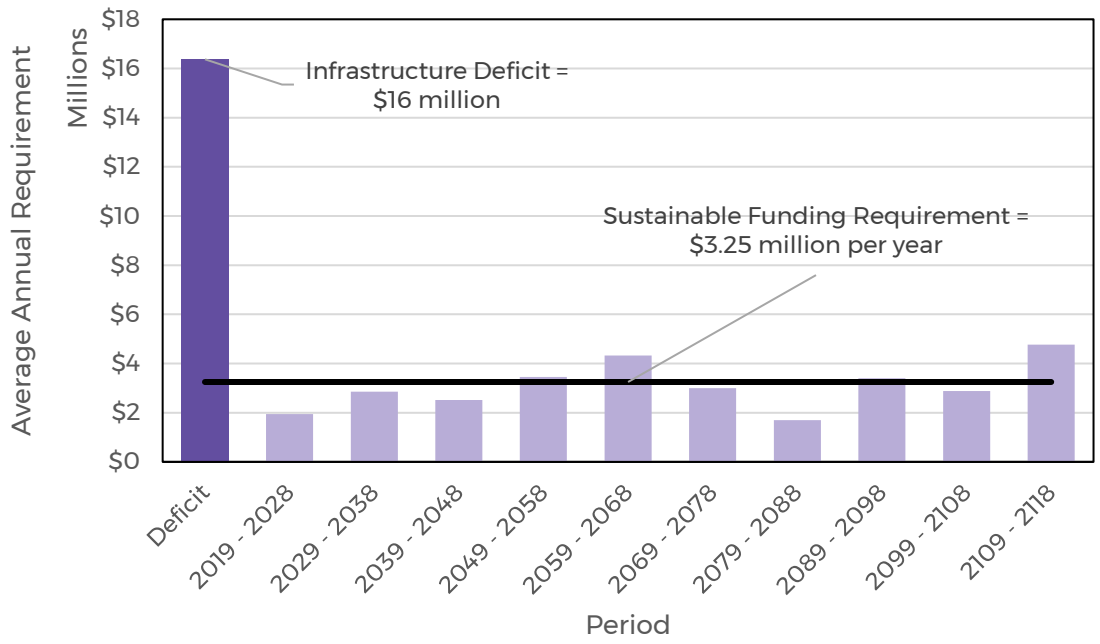


Long-Term Financial Forecast

The long-term financial forecast presents the future capital expenditures (replacement and rehabilitation) for all assets in the Recreation and Culture category. The forecast highlights the current infrastructure deficit (value of assets which are at or beyond the end of their useful lives), the average annual investment requirement for a given decade, and the sustainable funding requirement. The sustainable funding requirement is the average annual funding requirement to maintain all assets over a 100-year period (including the infrastructure deficit). A summary of replacement and rehabilitation costs, and estimated useful lives used for all assets can be found in Appendix 1.

The Recreation and Culture category has a current infrastructure deficit of $16,372,988 and a sustainable funding requirement of $3,248,663 per year. These results and the average annual funding requirement for the next 10 decades are shown in Figure 28 below.

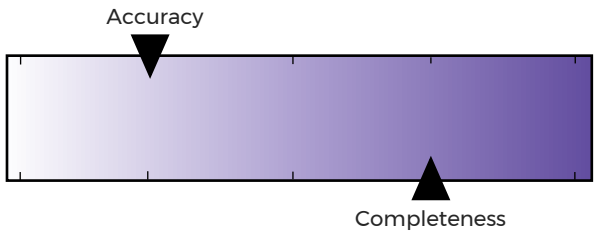
Figure 28 - Long-Term Financial Forecast



Confidence Band

The Recreation and Culture category is mainly composed of facilities with a detailed list of components sourced from the Town Ledger. While a detailed list of components is available, this data is likely out of date and is inaccurate. Several facility condition assessments were conducted in the past; however, these results were not consistent with the inventory of facility components used in this inventory and could not be easily translated. As a result, the condition rating of facilities is based on theoretical values only.

Figure 29 - Confidence Band



Parks and Open Spaces

Parks and Open Spaces

LETTER GRADE	VALUE	DEFICIT %
B-	$38,237,507	24%

Overview

The Parks and Open Spaces category provides the Town with sport and recreation parks, preservation of natural environments, and provision of green space. The category also includes the vast network of rural trails which provide active transportation and recreational activities for Town residents. This category is composed of two separate budgets: Recreation and Parks and Cemeteries.

Inventory and Valuation

The Parks and Open Spaces category includes a range of assets including Community and Local Parks, Cemeteries, and Trails. Of significant interest is the Park asset category, which contains many different types of assets. Examples of assets included in a Park are facilities, sports fields and courts, lighting, parking lots, pathways, shelters, gazebos, irrigation, fencing, and utilities.

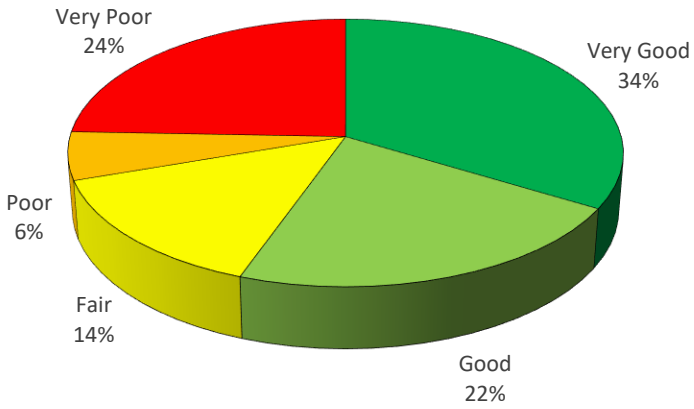
Asset	Quantity	Value	Deficit %
Cemeteries	4	$609,901	7%
Trails	25.7 km	$1,386,495	12%
Parks		$36,241,111	25%
Community Sports Parks	3		
Regular Community Parks	15		
Neighborhood Parks	30		
Parkettes	15		
TOTAL		**$38,237,507**	**24%**

Condition

The condition rating of all assets in the Parks and Open Spaces category are estimated by using age as a proxy. As the results of these condition assessment rely on accurate asset data such as age and estimated service life, it is likely the condition of these assets will change as better data is obtained.

The replacement value-weighted average condition for the Parks and Open Spaces category is 2.66 out of 5.00 and is recognized as “Good to Fair”. As shown in Figure 9, 30% of the Parks and Open Spaces assets are in a condition of Poor or worse.

Figure 30 - Condition Distribution

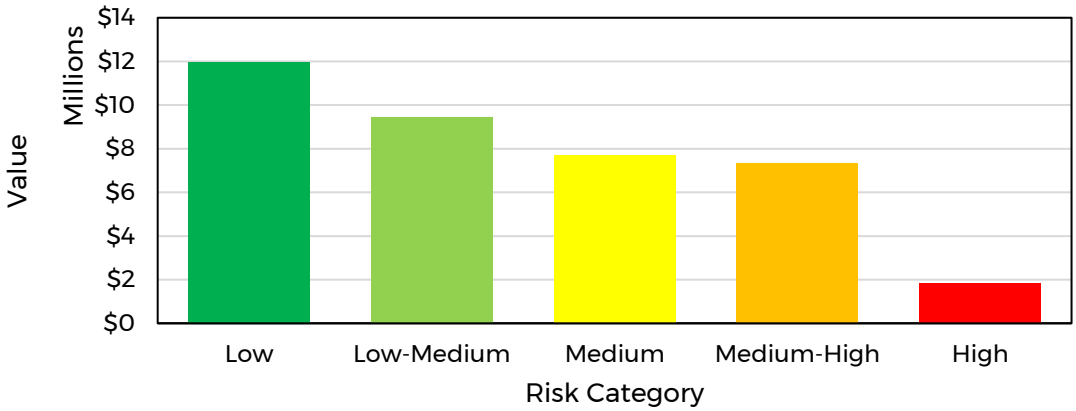


Risk

Risk ratings are 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 Parks and Open Spaces category. Assumptions regarding the consequence of failure for assets in this category are shown in Appendix 1.

Results of the initial risk assessment suggest the Parks and Open Spaces category exhibits a “Medium” degree of risk. Most assets are in the “Low” or “Low-Medium” risk categories, however there is a small percentage (5%) of assets in the “High” risk category. These high-risk assets are primarily attributed due to aging playground equipment and safety surfaces. A distribution of the total value of assets in each of the five risk categories is shown in Figure 31.

Figure 31 - Risk Distribution

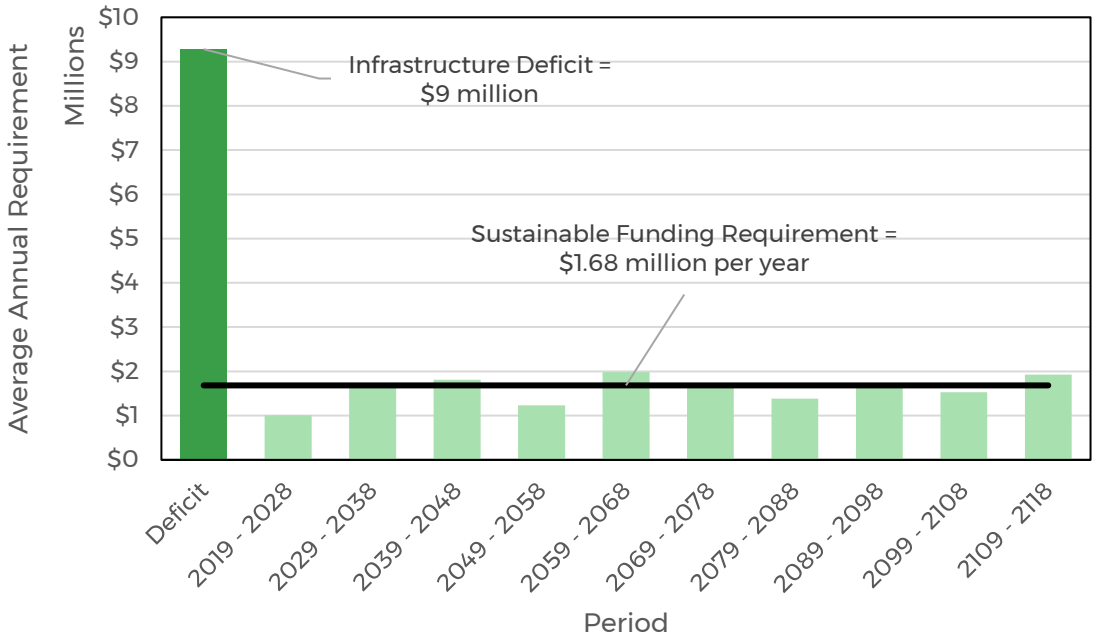


Long-Term Financial Forecast

The long-term financial forecast presents the future capital expenditures (replacement and rehabilitation) for all assets in the Parks and Open Spaces category. The forecast highlights the current infrastructure deficit (value of assets which are at or beyond the end of their useful lives), the average annual investment requirement for a given decade, and the sustainable funding requirement. The sustainable funding requirement is the average annual funding requirement to maintain all assets over a 100-year period (including the infrastructure deficit). A summary of replacement and rehabilitation costs, and estimated useful lives used for all assets can be found in Appendix 1.

The Parks and Open Spaces category has a current infrastructure deficit of $9,280,061 and a sustainable funding requirement of $1,682,597 per year. These results and the average annual funding requirement for the next 10 decades are shown in Figure 32 below.

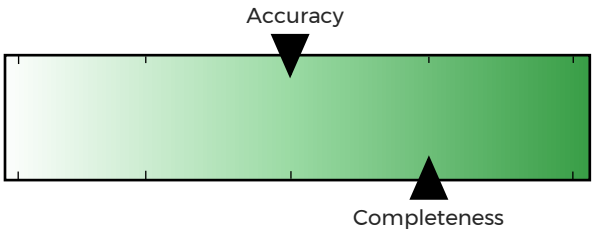
Figure 32 - Long-Term Financial Forecast



Confidence Band

The Parks and Open Spaces category contains three major categories of assets: Parks, Trails and Cemeteries. Trail data is very accurate and is recognized as being complete. Additionally, Town staff has a good understanding of the physical condition of the trails and results are based on actual assessments. However, Parks and Cemeteries data is recognized as being incomplete and inaccurate. The inventory data used was sourced from a variety of sources, each of which with it's on unique problems. These inventory sources were reconciled to the best of the Town's ability but it is recognized there is still additional effort required to fill in the gaps.

Figure 33 - Confidence Band



Environmental Services

Environmental Services

LETTER GRADE	VALUE	DEFICIT %
B	$153,289,977	0%

Overview

The Environmental Services category provides the Town with reliable collection, diversion, and treatment of stormwater. Furthermore, the category contains the Towns' natural assets – trees, rivers, and creeks. These natural assets will play a significant role in the Town's future asset management plans and it has been a priority that they be included in future iterations of the Asset Management Plan and State of Infrastructure Report.

NOTE: At the time this document was prepared, the Town was in the final stages of completing the Stormwater Management Strategy through AMEC Foster Wheeler. The final draft of their report, dated April (Revised June) 2018, is under final review and anticipated to be presented to Council Q1 2019. One of the areas identified in this report that needs attention are the older parts of Halton Hills that were developed before stormwater management was considered. It is recommended in the Stormwater Management Strategy that the Town create an area wide Stormwater Master Plan to identify areas where water quality, erosion and flooding may be a concern. This section (Environmental Services) may need to be revaluated after the Stormwater Master Plan has been completed as the recommendation from that plan will affect these results.

Inventory and Valuation

Most assets included in this category are found in the Stormwater budget. These assets range from stormwater management ponds, low impact development assets, and storm sewer system components such as stormwater mains, manholes, and drainage culverts. The stormwater management system in Halton Hills is relatively new and, as a result, is still in good condition.

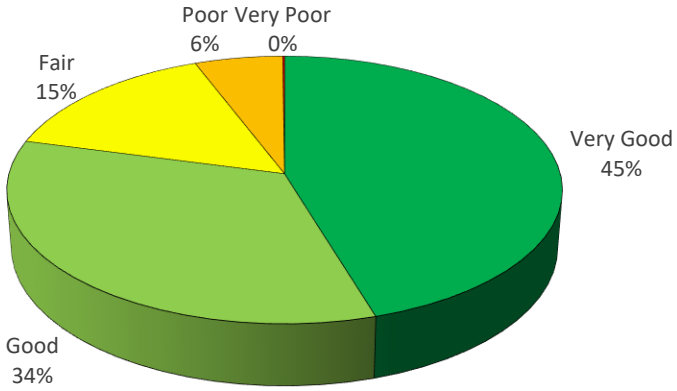
Asset	Quantity	Value	Deficit %
Stormwater Management Ponds	39	$24,947,188	0%
Stormwater Mains	189.9 km	$62,469,655	0%
Manholes	3,236	$28,625,794	0%
Drainage Culverts	23.3 km	$8,233,103	1%
Catch Basins	5,524	$20,964,238	0%
Outfalls	282	$5,680,000	2%
Infiltration Galleries	158	$2,370,000	0%
TOTAL		**$153,289,977**	**0%**

Condition

The condition ratings of all assets in the Environmental Services category were estimated by using age as a proxy. As the results of these condition assessment rely on accurate asset data such as age and estimated service life, it is likely the condition of these assets will change as better data is obtained.

The replacement value-weighted average condition for the Environmental Services assets is 1.82 out of 5.00 and is generally recognized as being in "Good" condition. As shown in Figure 34, 6% of the Environmental Services assets are in a condition of Poor or worse.

Figure 34 - Condition Distribution

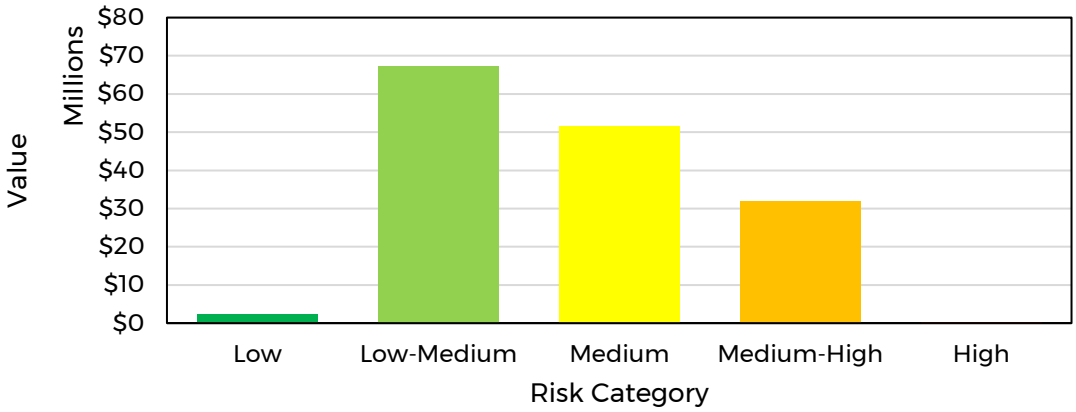


Risk

Risk ratings are 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 Environmental Services category. Assumptions regarding the consequence of failure for assets in this category are shown in Appendix 1.

Results of the initial risk assessment suggest the Environmental Services category exhibits a "Low to Medium" risk profile. Most assets are in the "Low-Medium" risk category, and there are only 4 outfalls which are categorized as "High" risk. A distribution of the total value of assets in each of the five risk categories is shown in Figure 35.

Figure 35 - Risk Distribution

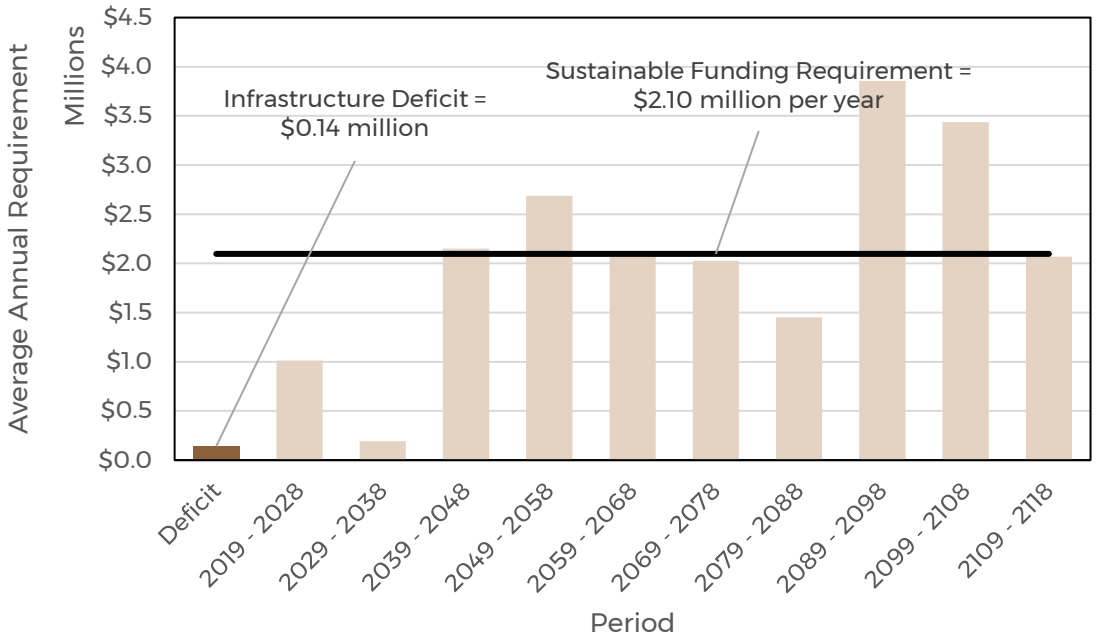


Long-Term Financial Forecast

The long-term financial forecast presents the future capital expenditures (replacement and rehabilitation) for all assets in the Environmental Services category. The forecast highlights the current infrastructure deficit (value of assets which are at or beyond the end of their useful lives), the average annual investment requirement for a given decade, and the sustainable funding requirement. The sustainable funding requirement is the average annual funding requirement to maintain all assets over a 100-year period (including the infrastructure deficit). A summary of replacement and rehabilitation costs, and estimated useful lives used for all assets can be found in Appendix 1.

The Environmental Services category has a current infrastructure deficit of $141,408 and a sustainable funding requirement of $2,097,358 per year. However, a significant amount of these required investments are not due until the end of the century. These results and the average annual funding requirement for the next 10 decades are shown in Figure 36 below.

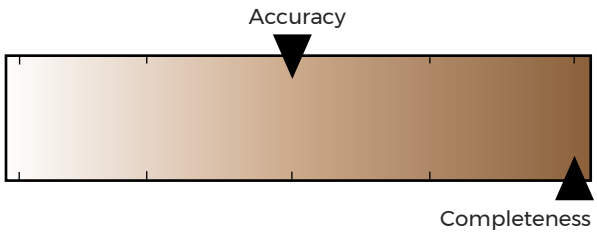
Figure 36 - Long-Term Financial Forecast



Confidence Band

Most assets in the Environment Services category were sourced directly from the Town's Geographic Information System (GIS). As a result, it is believed the inventory is complete. However, while the inventory is likely complete, there were often critical pieces of asset data missing such as construction year or identifying features necessary to classify the assets correctly. Where possible, discrepancies in the asset data were estimated based on available information but is likely inaccurate.

Figure 37 - Confidence Band



Library Services

Library Services

LETTER GRADE	VALUE	DEFICIT %
C+	$20,572,059	25%

Overview

Library Services provides for the Town's Library facilities and equipment, with a stated mission to engage the residents of Halton Hills in exploring ideas, expressing creativity, and making connections. This category is mainly composed of facilities and Library equipment and as a result, has a relatively limited asset value when compared to the rest of the Town's assets.

Inventory and Valuation

In addition to the Library facilities and equipment, the library manages an art collection and vast array of Library materials. As the value of these assets is relatively limited and is not typically included in an asset management plan, they have been omitted from this report.

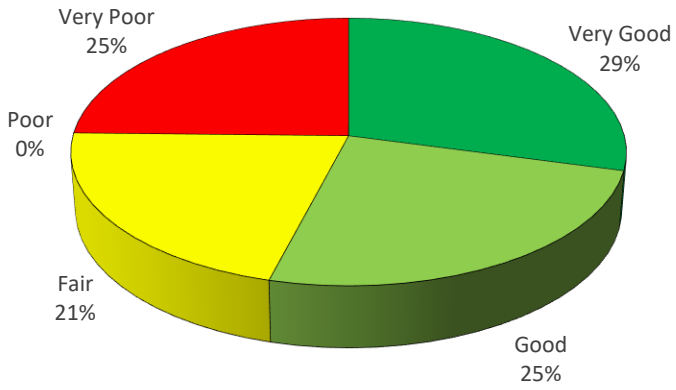
Asset	Quantity	Value	Deficit %
Library Facilities	2	$16,736,592	30%
Library IT and Equipment	107	$66,950	63%
Library Content	138,224	$3,768,517	0%
TOTAL		**$20,572,059**	**25%**

Condition

The condition rating of all assets in the Library Services category was estimated by using age as a proxy. As the results of these condition assessment rely on accurate asset data such as age and estimated service life, it is likely the condition of these assets will change as better data is obtained.

The replacement value-weighted average condition for the Library Services category is 2.66 out of 5.00 and is generally recognized as being in a "Good to Fair" condition. As shown in Figure 38, 25% of the Library assets are in a condition of Poor or worse.

Figure 38 - Condition Distribution

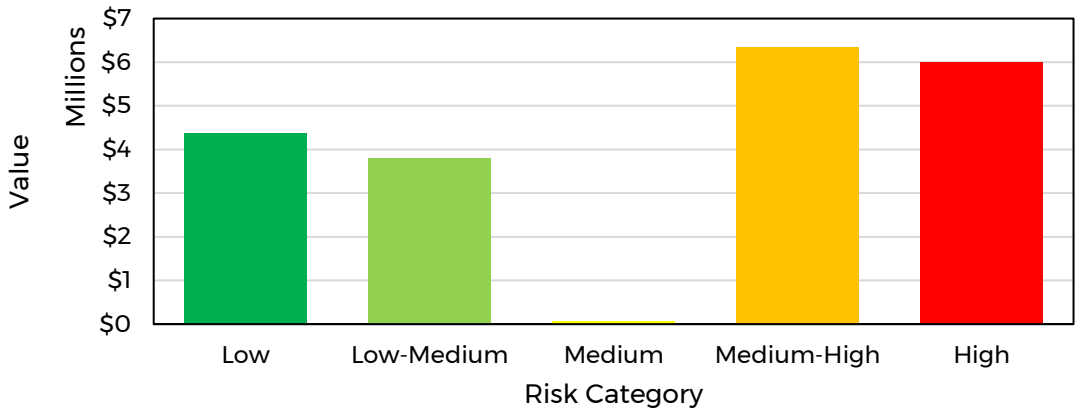


Risk

Risk ratings are 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 Library Services category. Assumptions regarding the consequence of failure for assets in this category are shown in Appendix 1.

Results of the initial risk assessment suggest the Library Services category exhibits a "Medium to High" risk profile. Most assets are in the "Medium-High or High" risk category, with 29% of assets being in the High risk category. The majority of "Medium-High" and "High" risk assets are attributed due Library Facility structures and electrical systems threatened by climate change weather related risk events. A distribution of the total value of assets in each of the five risk categories is shown in Figure 39.

Figure 39 - Risk Distribution

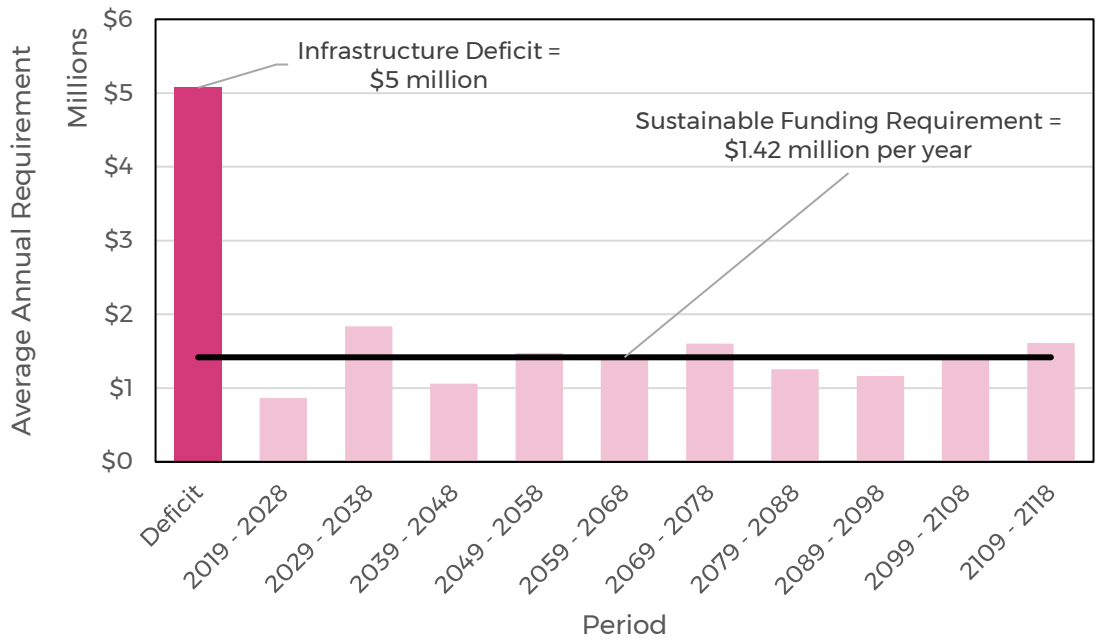


Long-Term Financial Forecast

The long-term financial forecast presents the future capital expenditures (replacement and rehabilitation) for all assets in the Library Services category. The forecast highlights the current infrastructure deficit (value of assets which are at or beyond the end of their useful lives), the average annual investment requirement for a given decade, and the sustainable funding requirement. The sustainable funding requirement is the average annual funding requirement to maintain all assets over a 100-year period (including the infrastructure deficit). A summary of replacement and rehabilitation costs, and estimated useful lives used for all assets can be found in Appendix 1.

The Library Services category has a current infrastructure deficit of $5,073,530 and a sustainable funding requirement of $1,417,584 per year. These results and the average annual funding requirement for the next 10 decades are shown in Figure 40 below.

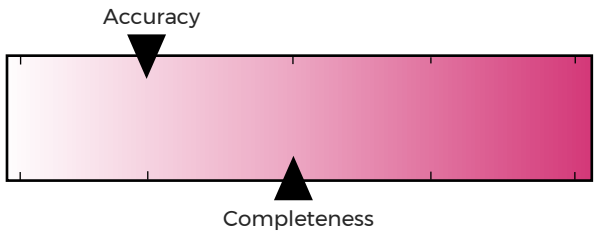
Figure 40 - Long-Term Financial Forecast



Confidence Band

The Library Services category is composed of two major asset categories: Facilities and Equipment. The facility data found in the Town's inventory is well-documented and contains a complete list of components. However, this data is likely not up to date and there is limited condition data available. Secondly, the equipment inventory is likely incomplete and is missing key pieces of information such as acquisition year or cost. As a result, the Library Services category is recognized as having a Low Accuracy and Medium Completeness rating.

Figure 41 - Confidence Band



Conclusion

This initial State of Infrastructure (SOI) report provides Town staff, Council, and residents with a better understanding of the current state of repair of the Town's infrastructure (municipal assets) essential to the delivery of public services. The SOI report provides indicators and a framework to compare the state of infrastructure repair across different service areas and asset categories. It is expected the Town will produce SOI reports on an on-going basis at pre-defined intervals to track changes in the infrastructure state of repair over time, and to quantify and communicate the impacts of infrastructure renewal programs, funding commitments, and advanced asset management practices.

The development of the SOI report significantly improved the Town's asset inventory. A detailed and thorough review of existing asset data and information was completed for all assets, initial data gaps were identified, and asset data was refined and collected. Examples of this include conducting field investigations and condition assessments of drainage culverts, retaining walls and guiderails. Additionally, significant effort was made to identify "low-hanging fruit" – areas of improvement easily corrected through consultations with Town staff. Despite the significant efforts to aggregate, analyze and correct the asset inventory, it is important to recognize substantial efforts are still required to have a fully complete and accurate asset inventory. It is recommended the data gap analysis performed during the preparation of this SOI report be revisited to identify remaining data gaps and determine the most appropriate course of action to correct these.

In the interpretation of the results of the inaugural SOI report it should be noted the level of detail of the asset data inventories is limited (providing approximately 40 – 60% of the detailed asset data necessary for a complete analysis), and the confidence in the report results is fair. Improvements in the asset data completeness and accuracy expected to occur during the next few years will significantly improve the confidence in future SOI report results, as well as change the state of infrastructure repair indicators. However, while the confidence in specific results is fair, the general conclusions are suitable to provide guidance for strategic decisions related to the sustainable management of the Town's infrastructure assets.

Additionally, the reader should note that the analyses in this report were limited to existing assets only and no allowances were made to accommodate growth (i.e. the construction of new assets and the associated future investment requirements) and that the financial contributions from capital and operating budgets were not evaluated separately.

The following general conclusions are drawn from the results presented above:

1. The current replacement value of all Town assets is $870.8 million, while the infrastructure deficit (infrastructure at or beyond its theoretical service life) is roughly $64.8 million (approximately 7% of the inventory value).

2. Town assets are generally in a "Good to Fair" condition. On a replacement value-weighted basis, only a small percentage (11%) of these assets are in a condition of Poor or Very Poor.

3. Overall, Town assets are recognized as having a “Medium” degree of risk. There are a limited number of assets (2%) which are categorized as having a “High” risk.

4. To maintain the current inventory over a 100-year period, it is estimated the Town will require an average investment of $28.5 million per year. This estimate includes the rehabilitation and replacement of all assets at pre-determined intervals.

5. The 2018-2027 preliminary long-term capital budget indicates the Town proposes to allocate an average investment of $12.5 million per year to infrastructure renewals and replacements. As a result, the Town has a current investment gap of $16.0 million per year.

6. Failure to address the investment gap will have a significant impact on the condition of Town assets. By the year 2043 (25-year horizon), the total value of assets in a Very Poor condition will increase to over $350 million if the Town maintains the current investment level of $12.5 million per year for asset renewals and replacements.

7. Increasing the annual investment by 4% per year will result in the Town achieving the Sustainable Funding Requirement by the year 2039. As a result, the total value of assets in a Very Poor condition in year 2043 (25-year horizon) will be limited to $117 million.

In summary, the Town of Halton Hills’ assets are generally a Good to Fair condition. This is primarily attributed to recent growth in the Halton Hills area, with most assets being relatively new and still in good condition. However, the Town is currently under-investing in its infrastructure and if additional resources are not allocated to renew or replace its inventory, the Town’s ability to sustainably provide municipal services is expected to diminish as assets deteriorate. Additionally, as the Town continues to experience significant growth and continually adds new assets to its inventory, further resources will be required.

APPENDIX 1

ASSUMPTIONS

1.1 – Estimated Useful Lives

Budget Category	Asset	Criteria	Run to Failure	Extended
Administration	IT	PC	4	
		Servers	5	
		Network	5	
		Other	5	
Transportation and Transit	Roadways	Flexible-Arterial	20	45
		Flexible-Collector	20	45
		Flexible-Local	20	45
		Surface Treated	20	
		Gravel	20	
	Bridges and Culverts	Corrugated Steel Pipe	40	
		Other	45	70
	Sidewalks	All	30	50
	Retaining Walls	Concrete	75	
		Gabion	40	
		Piza	75	
		Other	60	
	Guiderails	All	30	
	Lighting	Poles	50	
		Fixtures	25	
	Signs	All	15	
	Parking Lots	All	25	
	Traffic Signals	Communication and Controls	15	
		Beacons	30	
		Poles	40	
Fire Services	Fire Equipment	SCBA	10	
		Voice Amps	10	
		HazMat Gear	10	
		Bunker Gear	10	
		Helmet	10	
		Pagers	10	
	Fire Fleet	Pumper	15 - 20	
		Heavy Rescue	20	

Budget Category	Asset	Criteria	Run to Failure	Extended
		Support Apparatus	20	
		Tanker	20	
Parks and Open Spaces	Trails	Concrete	50	
		Asphalt	25	
		Other	15	
	Parks			
	Fencing	Chain Link	40	
		Stone	30	
		Wood	15	
		Iron	50	
		Steel	50	
		Other	40	
	Fields and Courts	All	30	
	Skateparks	All	50	
	Sports Equipment	All	10-20	
	Lighting	All	25	
	Pathways and Trails	Asphalt	25	
		Pavers	30	
		Concrete	50	
		Gravel	15	
		Wood	15	
		Other	30	
	Playgrounds	Safety Surface	10	
		Play Equipment	10	
		Play Curb	15	
	Furniture	Bleacher	12	
		Players Bench	15	
		Various	15	
	Structures	Precast Concrete / Block	50	
		Metal / Masonry	40	
		Wood / Masonry	30	
		Wood	25	
	Splash Pads	Surface	30	
		Mechanical	20	
		Play Equipment	15	

Budget Category	Asset	Criteria	Run to Failure	Extended
	Parking Lot	All	25	
	Irrigation	All	25	
Environmental Services	Stormwater Management Ponds	All	50	
	Stormwater Mains	All	75	120
	Manholes/Catch Basins/Vaults	All	75	120
	Drainage Culverts	All	25	
	Infiltration Galleries	All	75	
	Outfalls	All	75	
Library Services	Library Equipment	Varies		
	Library Collections	All	7	
General	Facilities	All	From Town Ledger	
	Fleet	Heavy	7 - 20	
		Light	7 - 10	
		Trailers	10 - 20	
	Machinery and Equipment	All	7 - 20	

1.2 – Replacement Costs

Budget Category	Asset	Criteria	Cost	Unit
Administration	IT	All	Escalated acquisition cost	
Transportation and Transit	Roadways	Flexible-Arterial	$110	/ m2
		Flexible-Collector	$100	/ m2
		Flexible-Local	$90	/ m2
		Gravel	$50	/ m2
		Surface Treated	$75	/ m2
	Bridges and Culverts			
	(Type)	*(Material)*	*Average unit costs are listed.*	
	Arch Culvert	Corrugated Steel Pipe	$7,579	/ deck area (m2)
		Reinforced Precast Concrete	$3,788	/ deck area (m2)
		Structural Steel	$7,815	/ deck area (m2)
	Box Beams or Girders	Reinforced Precast Concrete	$6,222	/ deck area (m2)
		Structural Steel	$7,947	/ deck area (m2)
	Earth Filled Arch	Reinforced Cast-in-Place Concrete	$4,694	/ deck area (m2)
		Reinforced Precast Concrete	$4,671	/ deck area (m2)
	Ellipse Culvert	Corrugated Steel Pipe	$7,321	/ deck area (m2)
		Structural Steel	$3,942	/ deck area (m2)
	Half-Through Truss	Weathering Steel	$10,992	/ deck area (m2)
	I-Beam or Girders	Reinforced Cast-in-Place Concrete	$5,638	/ deck area (m2)
		Reinforced Precast Concrete	$5,696	/ deck area (m2)
		Structural Steel	$9,930	/ deck area (m2)
		Weathering Steel	$13,794	/ deck area (m2)
		Wood	$4,927	/ deck area (m2)

Budget Category	Asset	Criteria	Cost	Unit
	Open Footing	Reinforced Cast-in-Place Concrete	$5,976	/ deck area (m2)
	Prefabricated Truss	Weathering Steel	$5,134	/ deck area (m2)
	Rectangular Culvert	Masonry	$7,822	/ deck area (m2)
		Reinforced Cast-in-Place Concrete	$7,720	/ deck area (m2)
		Reinforced Precast Concrete	$5,645	/ deck area (m2)
	Rigid Frame, Vertical legs	Prestressed Precast Concrete	$4,808	/ deck area (m2)
		Reinforced Cast-in-Place Concrete	$7,667	/ deck area (m2)
		Reinforced Precast Concrete	$5,622	/ deck area (m2)
	Round Culvert	Corrugated Steel Pipe	$7,774	/ deck area (m2)
	Solid Slab	Reinforced Cast-in-Place Concrete	$10,594	/ deck area (m2)
	Spandrel Arch	Masonry	$9,184	/ deck area (m2)
	Sidewalks	Concrete	$110	/m2
		Other	$60	/m2
	Retaining Walls	Concrete	y=50x^2 + 440	y = $/m; x = height (m)
		Gabion	y=270x^2 + 88x + 200	y = $/m; x = height (m)
		Piza	y=215x	y = $/m; x = height (m)
		Stone	y=1235x	y = $/m; x = height (m)
		Wood	y=180x	y = $/m; x = height (m)
	Guiderails	Rail = Steel; Post = Metal	$105	/m
		Rail = Steel; Post = Wood	$105	/m

Budget Category	Asset	Criteria	Cost	Unit
		Rail = Cable; Post = Wood	$57	/m
	Lighting	Poles	$4,500	each
		Fixtures	$3,000	each
	Signs	Large (> 0.4m2)	$900	each
		Medium (0.25 – 0.4 m2)	$600	each
		Small (<= 0.25m2)	$300	each
		Unknown	$600	each
	Parking Lots	All	See roadways	
	Traffic Signals	Controller and Cabinet	$30,000	each
		Buttons	$500	each
		Beacons	$3,800	each
		Poles	$25,000	each
Fire Services	Fire Equipment	SCBA	$7,500	each
		Voice Amps	$250	each
		HazMat Gear	Varies	
		Bunker Gear		
		Coat	$2,000	each
		Pant	$1,500	each
		Helmet	$1,000	each
	Fire Fleet	All	Assumed	
Parks and Open Spaces	Trails	Concrete	$50	/m2
		Asphalt	$25	/m2
		Other	$15	/m2
	Parks			
	Fencing	All	$200	/m
	Courts	All	$40,000	each
	Fields	All	$47.50	/m2
	Ball Diamonds	All	$3,000	/ average outfield length (m)
	Skateparks	All	$350,000	each

Budget Category	Asset	Criteria	Cost	Unit
	Lighting	Poles	$6,000	each
			$2,500	each
	Playgrounds	All	From Town Ledger	
	Furniture	Bleacher	$3,300	each
		Players Bench	$600	each
		Other	$600	each
	Splash Pads	Surface	$50,000	each
		Mechanical	$125,000	each
		Play Equipment	$75,000	each
	Parking Lot	All	$1,500	/ space
	Irrigation	All	$17,500	/ field
	Pathways and Trails	Concrete	$110	/ m2
		Asphalt	$60	/ m2
		Gravel	$25	/ m2
		Pavers	$225	/ m2
		Wood	$90	/ m2
		Other	$110	/ m2
Environmental Services	Stormwater Management Ponds	Quantity	$100	/m2
		Quality	$120	/m2
		Other	$110	/m2
	Stormwater Mains	Concrete	y = 0.0007x^2 + 0.2471x	y = $/m; x = diameter (mm)
		PVC	y = 0.2297x + 201.23	y = $/m; x = diameter (mm)
	Manholes	1200	$7,040	each
		1500	$12,400	each
		1800	$14,750	each
		2400	$26,950	each
		3000	$41,300	each
		3600	$55,700	each

Budget Category	Asset	Criteria	Cost	Unit
	Catchbasins	Single	$3,600	each
		Double	$4,900	each
		Lawn	$3,600	each
		Ditch Inlet	$4,800	each
		Ditch Inlet Twin	$5,700	each
	Drainage Culverts	All	y = 400 + x	y = $/m; x = diameter (mm)
	Infiltration Galleries	All	$15,000	each
	Outfalls	x < 900 mm	$15,000	$/m; x = diameter (mm)
		x = 900	$20,000	$/m; x = diameter (mm)
		x = 975	$25,000	$/m; x = diameter (mm)
		x = 1050	$30,000	$/m; x = diameter (mm)
		x = 1200	$35,000	$/m; x = diameter (mm)
		x = 1350	$40,000	$/m; x = diameter (mm)
		x = 1500	$45,000	$/m; x = diameter (mm)
		x = 1650	$50,000	$/m; x = diameter (mm)
		x = 1800	$55,000	$/m; x = diameter (mm)
		x = 1950	$60,000	$/m; x = diameter (mm)
		x = 2250	$65,000	$/m; x = diameter (mm)
		x = 2400	$70,000	$/m; x = diameter (mm)
	Oil/Grit Separators	x ≤ 600	$40,000	$ each; x = diameter (mm)
		x > 600	$80,000	$ each; x = diameter (mm)

Budget Category	Asset	Criteria	Cost	Unit
Library Services	Library Equipment	iPad	$900	each
		Chromebox	$500	each
		Monitor	$200	each
		Desktop	$1,200	each
		Laptop	$1,000	each
		Receipt Printer	$250	each
		AWE Station	$2,000	each
		RFID Reader	$300	each
		Barcode Scanner	$250	each
	Library Collections	All	Escalated acquisition cost	
General	Facilities	All	Escalated acquisition cost	
	Fleet	All	Escalated acquisition cost	
	Machinery and Equipment	All	Escalated acquisition cost	

1.3 – Condition Rating Translations

Condition	Bridge Condition Index (BCI)	Pavement Quality Index (PQI)
1 – Very Good	90 - 100	90 - 100
2 – Good	70 - 90	70 - 90
3 – Fair	60 - 70	40 - 70
4 - Poor	40 - 60	20 - 40
5 – Very Poor	0 - 40	0 - 20

1.4 – Rehabilitation Schedules

Asset	Activity	Cost (% of Replacement)	Year
Roads			
	RESURFACING (OVERLAY)	12.25%	15
	MAJOR REHAB (MILL & PAVE)	24.50%	30
	REPLACEMENT	100.00%	45
Bridges			
	JOINT REPLACEMENT 1	5.00%	15
	JOINT REPLACEMENT 2	5.00%	30
	DECK REHAB	10.00%	45
	SUPERSTRUCTURE REHAB	8.00%	45
	JOINT REPLACEMENT 3	5.00%	60
	REPLACEMENT	100.00%	70
Sidewalks			
	TRIP HAZARD MILLING	10.00%	25
	REPLACEMENT	100.00%	50
Stormwater Mains			
	LINING/JOINT REPAIR	10.00%	64
	REPLACEMENT	100.00%	120
Manholes/Catch Basins			
	COVER REPLACEMENT	15.00%	64
	REPLACEMENT	100.00%	120

1.5 – Consequence of Failure

NOTE: These are the "default" values assigned to all assets. Facilities which underwent a PIEVC protocol study have adjusted consequence and probability ratings to incorporate weather-related risk events impacted by climate change.

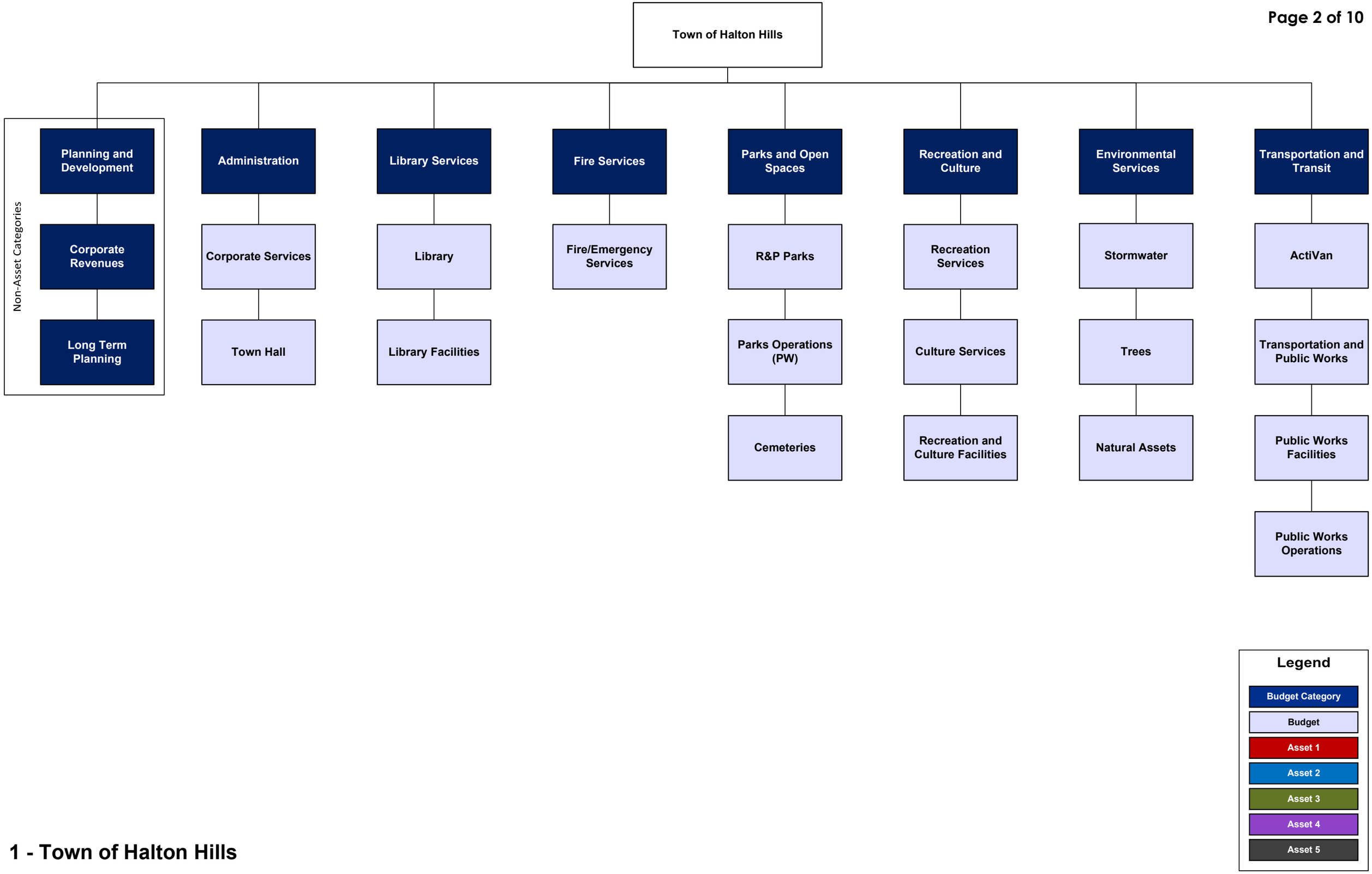
Budget Category	Asset	Criteria	Sub criteria	Consequence
Administration	IT	All		2
	Town Hall	All		3
Transportation and Transit	Roadways	Arterial		5
		Collector		4
		Local		3
	Bridges and Culverts	Bridges		5
		Culverts		4
	Guiderails	All		3
	Sidewalks	All		3
	Street Lights	Poles and Fixtures		2
	Signs	All		2
	Walkways	All		2
	Parking Lots	All		2
	Traffic Signal Components	All		3
	Public Works Facilities	All		2
Fire Services	Fire Equipment	All		3
	Fire Facilities	All		4
	Fire Fleet	All		3
Recreation and Culture	Aquatic Facilities	All		3
	Community Centers	All		3
	Miscellaneous Facilities	All		3
Parks and Open Spaces	Trails	All		2
	Park Components			
	Fencing	All		2
	Furniture	All		2
	Irrigation	All		3
	Park Lighting	All		3

Budget Category	Asset	Criteria	Sub criteria	Consequence
	Pathways and Trails	All		3
	Playground	Play Curb		2
		Play Equipment		4
		Safety Surface		4
	Site Civil and Services	Parking Lot		2
	Softscape	Gardens		1
	Sports and Recreation	Courts and Fields	All	3
		Skateparks	All	3
		Sports Equipment	All	2
		Splash Pads	Mechanical	4
			Surface	4
			Play Equipment	4
	Structures	Shelter		3
		Bridges		4
		Misc. Structures		4
		Trellis		3
		Walls		4
		Washrooms		3
	Facilities	All		2
Environmental Services	Stormwater Management Ponds	All		4
	Stormwater Mains	All		4
	Manholes	All		4
	Catch Basins	All		4
	Drainage Culverts	All		3
	Infiltration Galleries	All		3
	Outfalls	All		4
	Oil/Grit Separators	All		3
Library Services	Library Equipment	iPad		2

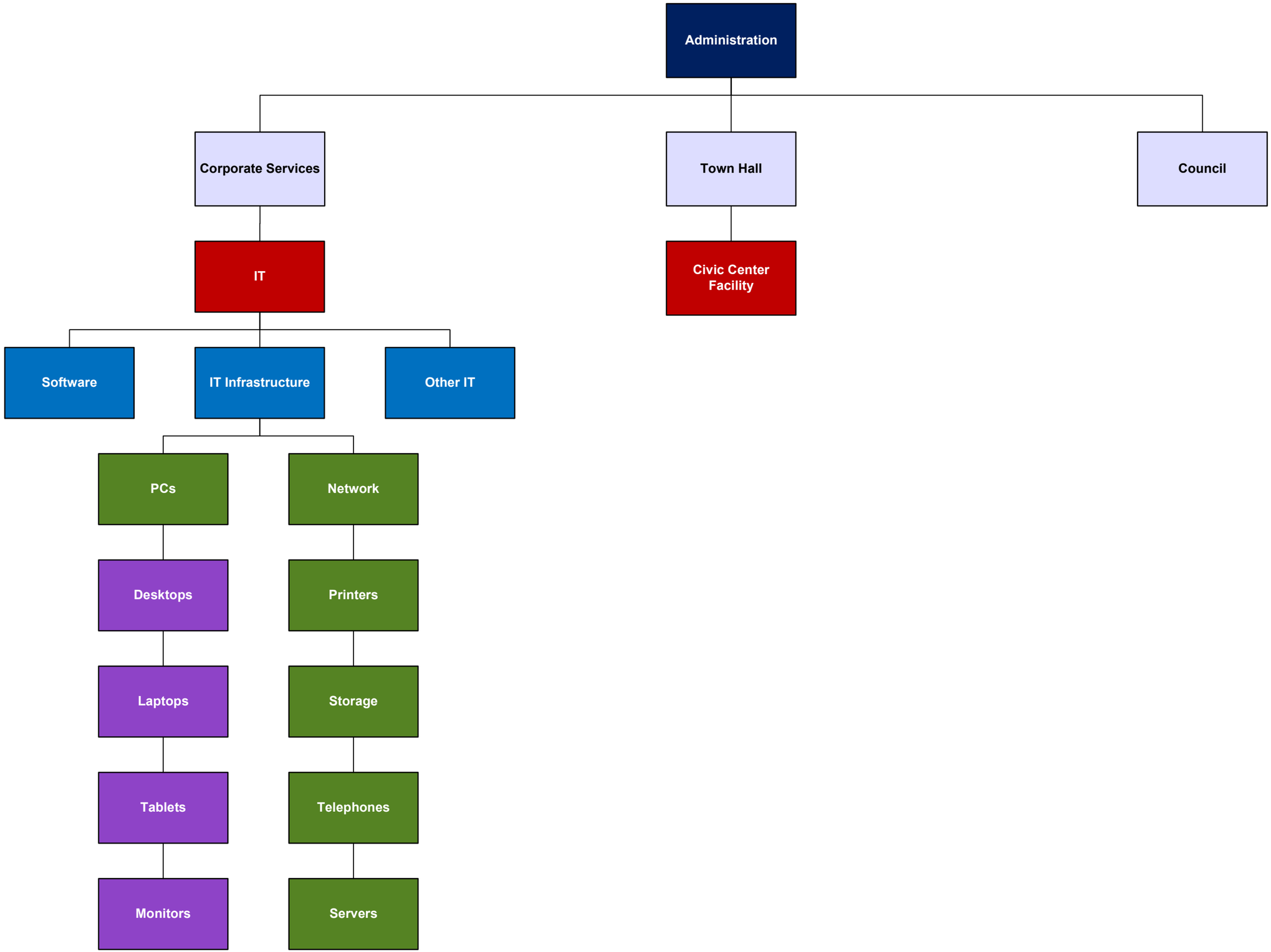
Budget Category	Asset	Criteria	Sub criteria	Consequence
	Library Collections	All		1
	Library Facilities	All		2
General	Fleet	All (Fire excl.)		1
	Machinery and Equipment	All		1

APPENDIX 2

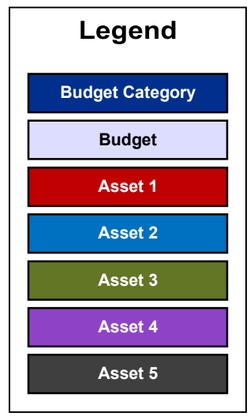
ASSET HIERARCHY

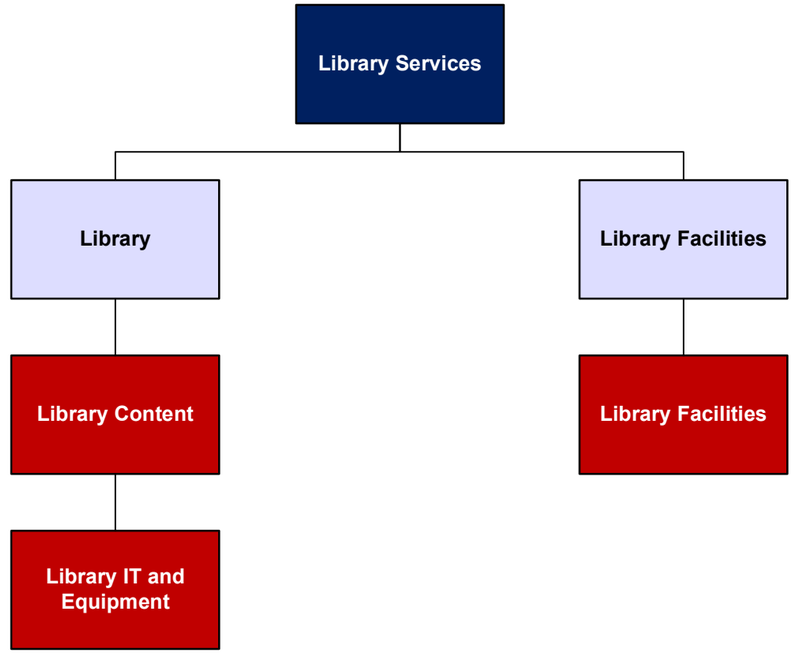


1 - Town of Halton Hills

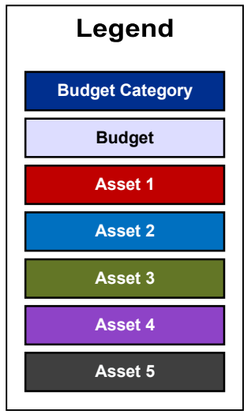


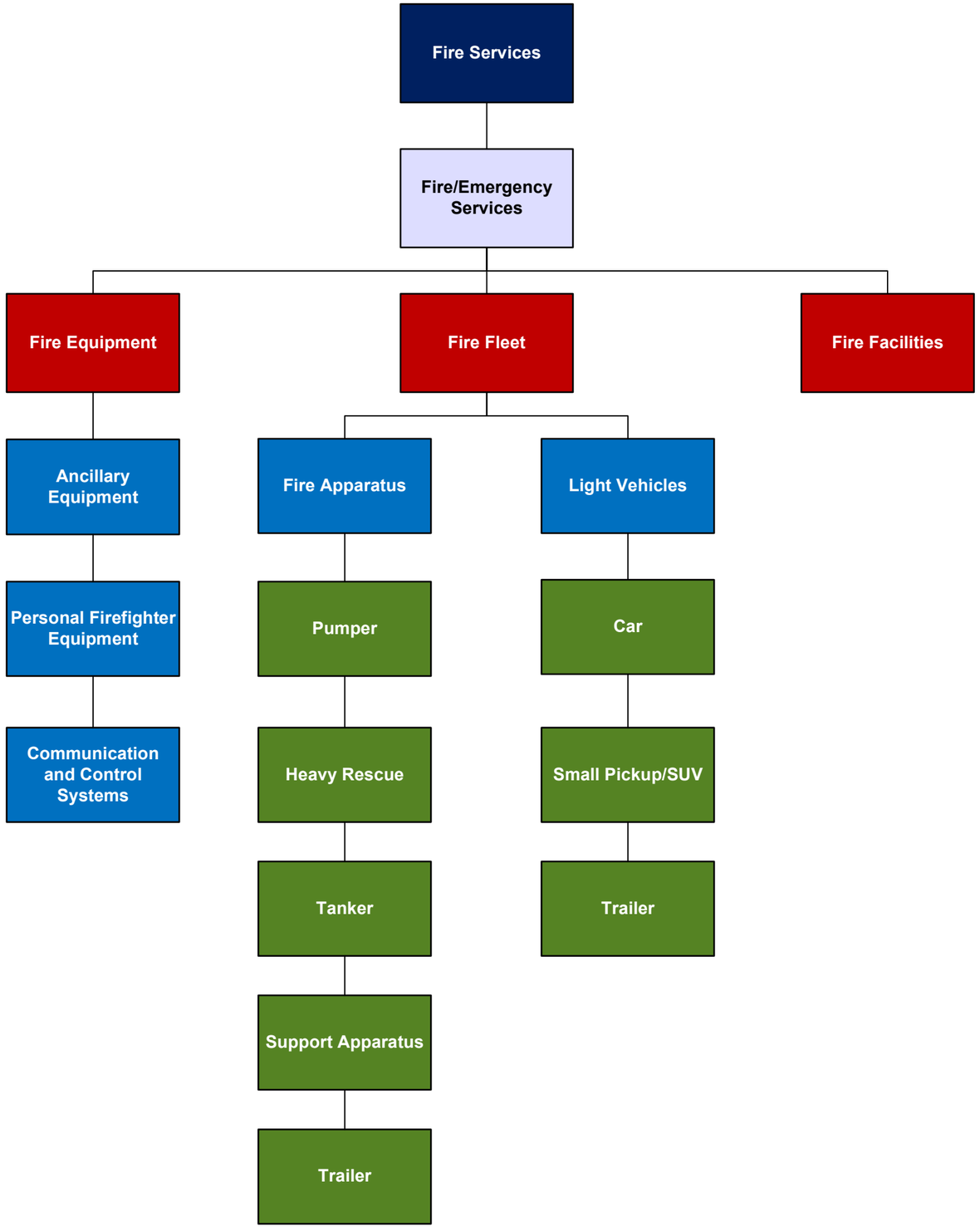
2 - Administration





3 - Library Services

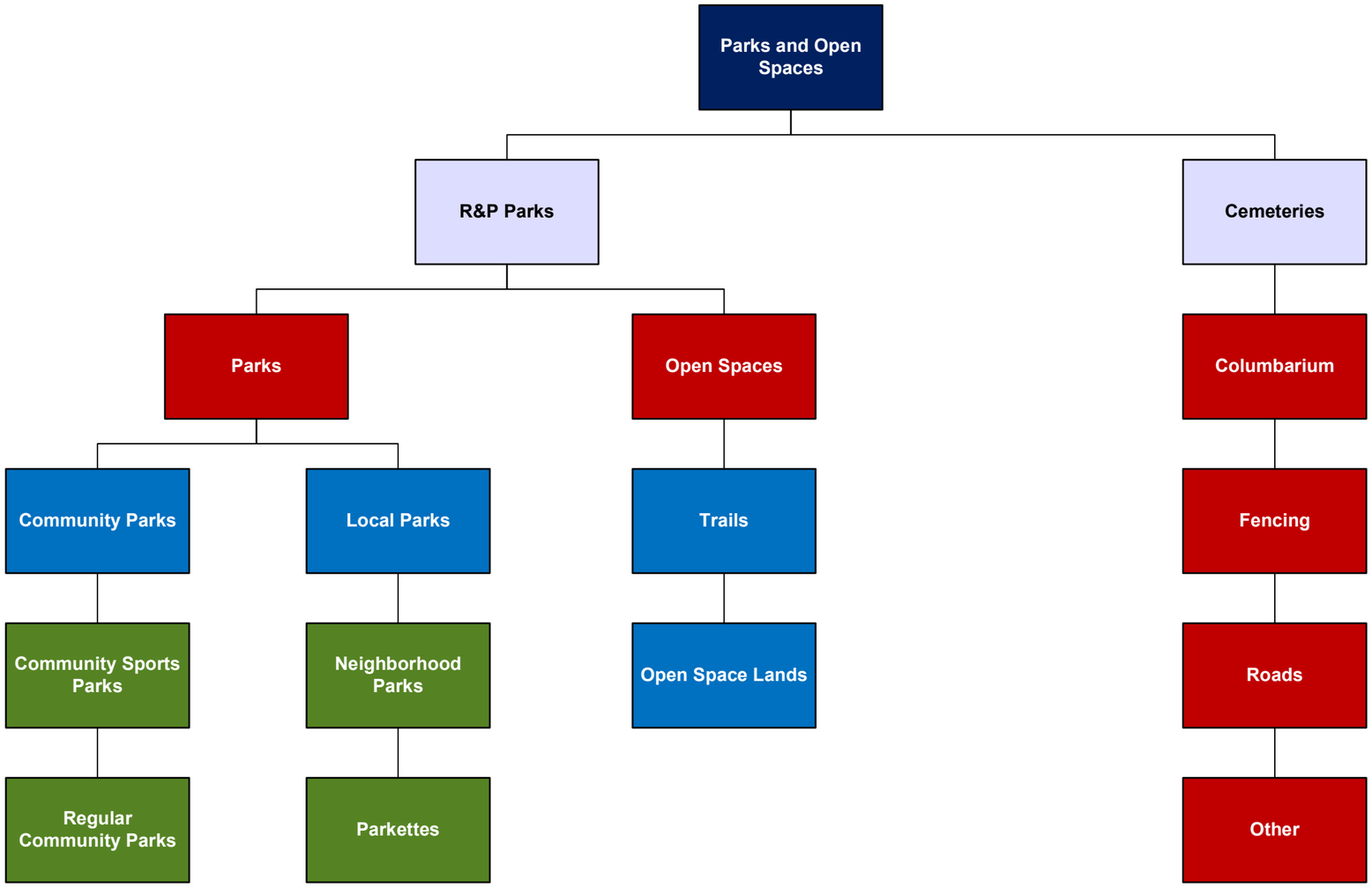


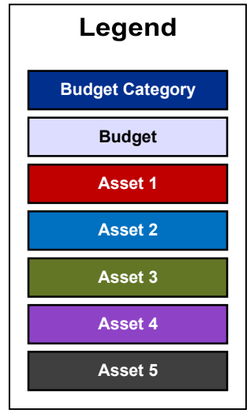


Legend

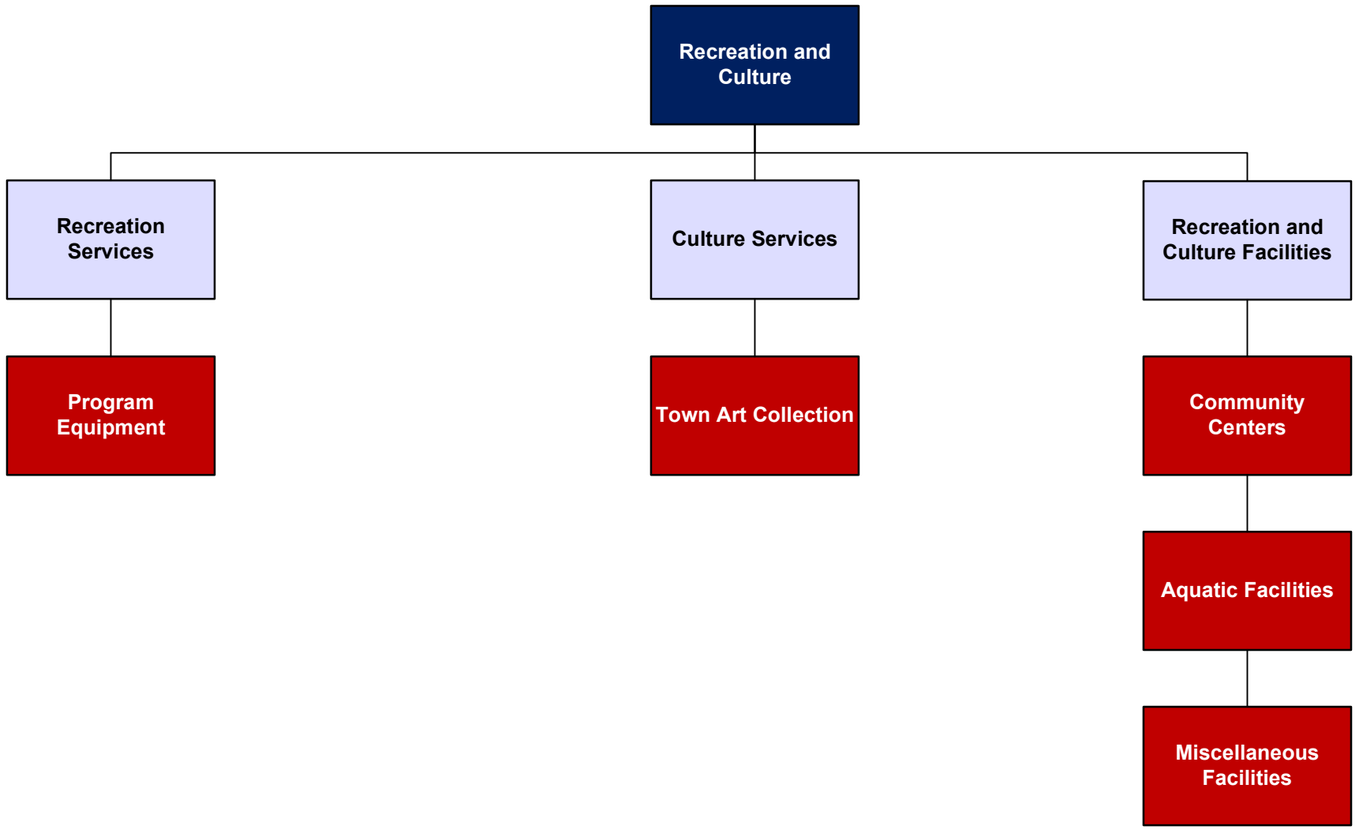
- Budget Category
- Budget
- Asset 1
- Asset 2
- Asset 3
- Asset 4
- Asset 5

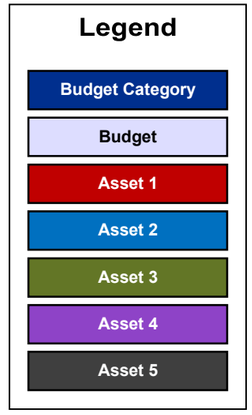
4 - Fire Services



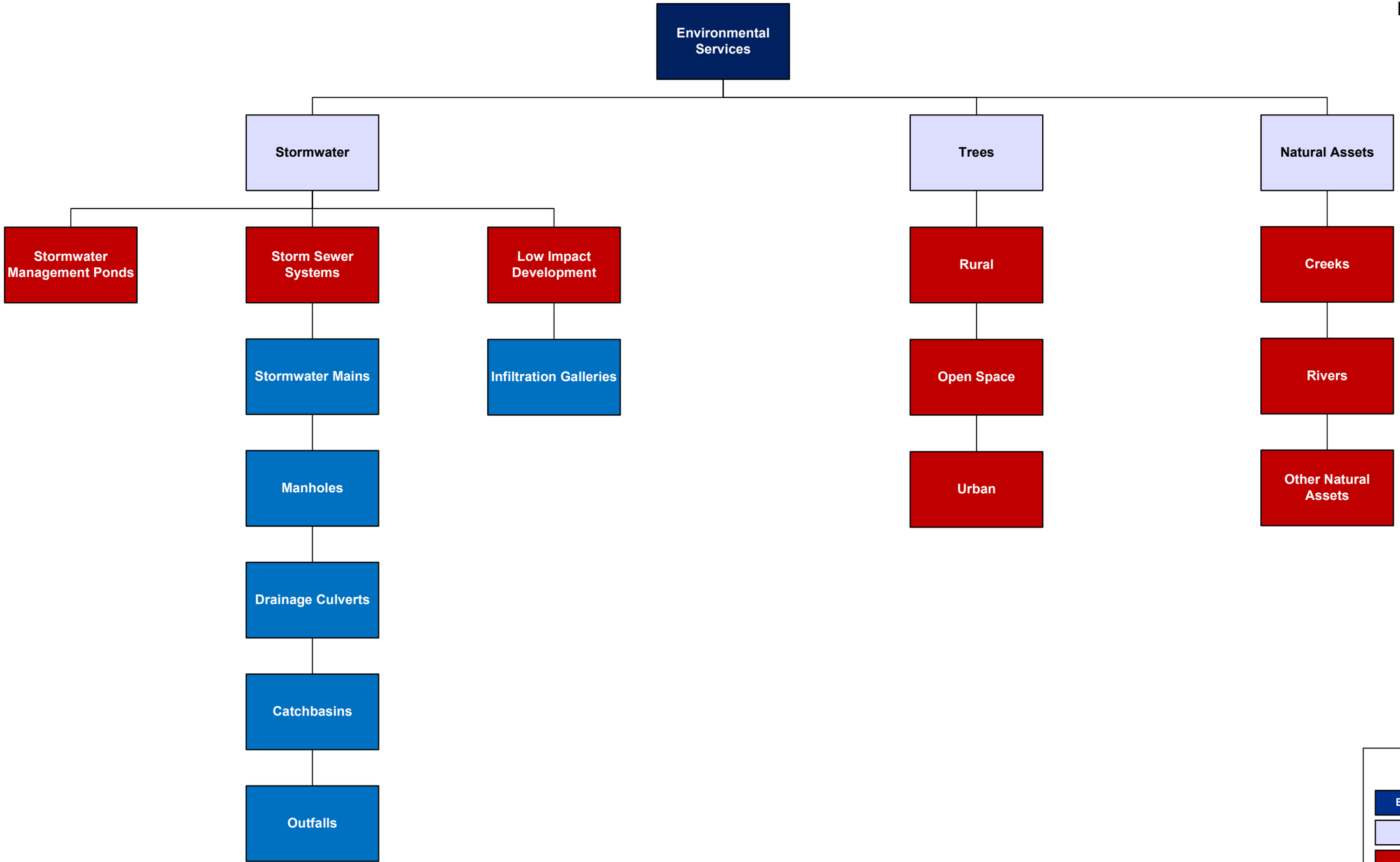


5 - Parks and Open Spaces

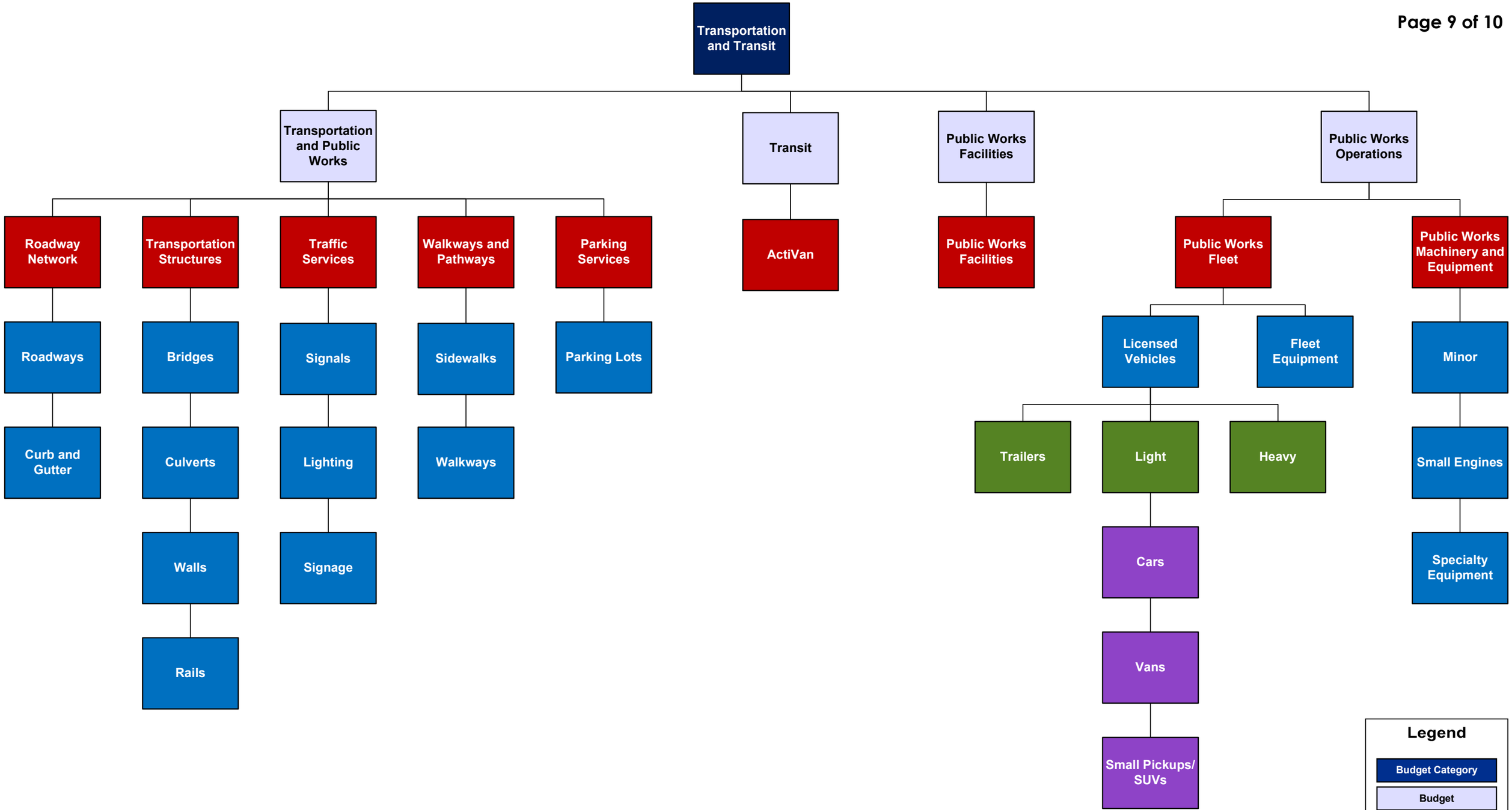




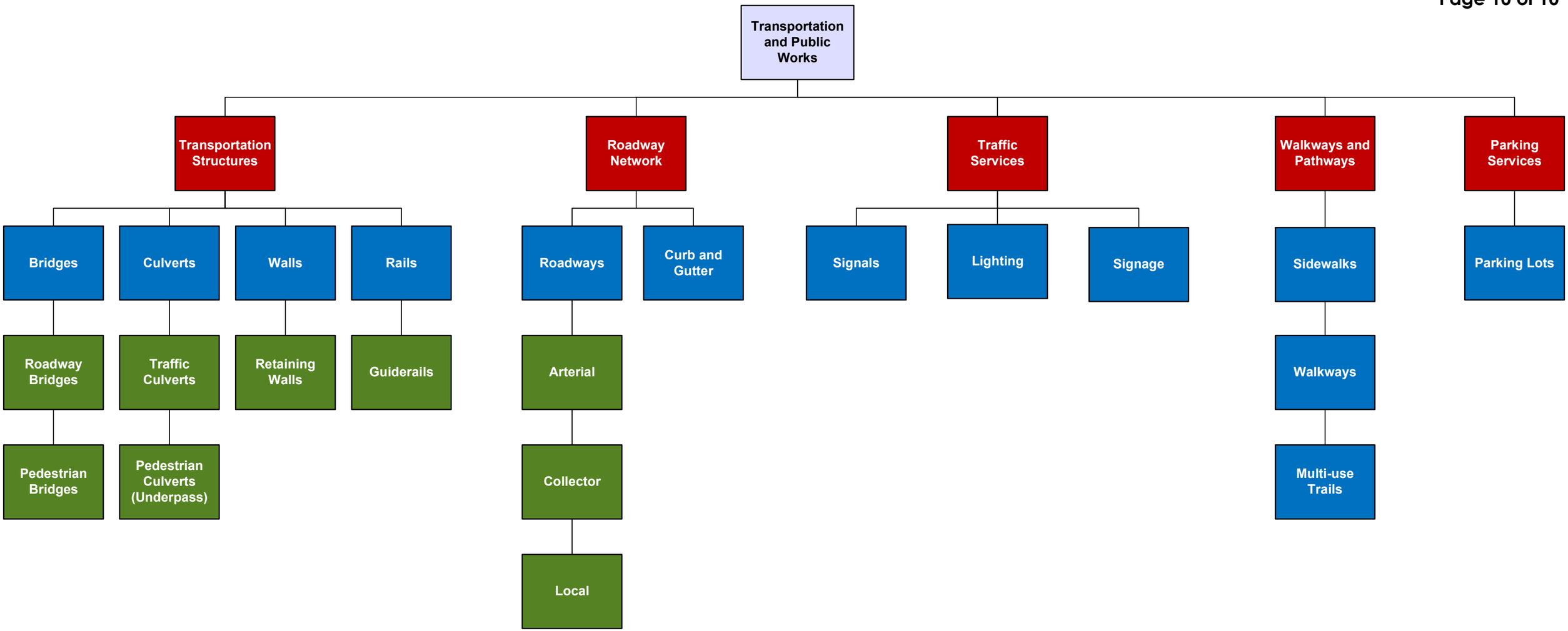
6 - Recreation and Culture



7 - Environmental Services



8 - Transportation and Transit



Legend

- Budget Category
- Budget
- Asset 1
- Asset 2
- Asset 3
- Asset 4
- Asset 5

8.1 - Transportation and Public Works