FIT CONSULTING

How to write a Long-Term Financial Plan for Asset Management

2023 Edition

ASSET MANAGEMENT BC

Contents

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ASSET MANAGEMENT BC

UBCM Union of BC Municipalities

BRITISH COLUMBIA Ministry of Municipal Affairs and Housing

Module One: Introduction

In this Module you will learn:

- Public Assets – Duty of Stewardship
- Asset Management BC Framework
- Other Important Frameworks
- Atelophobia – The Imperfection Principal
- Sustainable Funding – What Is It and Why Is It Important?

Purpose of this Guide

This Guide has been prepared with a broad audience in mind. While the course material contains some technical analysis, the overriding objective is to empower non-financial professionals to work with their finance colleagues to develop long-term, sustainable funding for the public assets entrusted to them. The concepts found within this Guide are scalable to all sizes of local governments.

The primary objectives of this Guide are:

- Foster an understanding about the importance and significance of long-term financial planning in asset management;
- Empower professionals of all disciplines to use a common language and understanding to discuss long-term financial planning for asset management;
- Help readers know what core data should be collected for the development of a long-term financial plan;
- Demonstrate the core calculations required to produce long-term financial plan findings;
- Demonstrate how to model assumptions, prepare findings, and prepare a relevant sensitivity analysis to validate modelling;
- Demonstrate how to develop funding options for governance consideration; and
- Recommend how to communicate long-term financial plan findings and recommendations.

Public Assets – Duty of Stewardship

Local governments are entrusted with the stewardship of public assets. According to the Federation of Canadian Municipalities, local governments own approximately 60 per cent of the public infrastructure supporting our economy and quality of life[1]. The fiduciary duty for the stewardship of public assets is firmly rooted in local government legislation. For instance, in British Columbia, Section 7 of the Community Charter states:

> "The purposes of a municipality include…(c) providing for the stewardship of the public assets of its community"

Similarly, Section 185 of the Local Government Act establishes the identical purpose in respect to the stewardship of public assets by regional districts.

Carrying out the duty of stewardship of public assets should include conducting the financial planning to support adequate capital maintenance and replacement. Inadequate or reactive financial planning often results in higher life-cycle costs or significantly reduced service levels. Reducing service levels to adjust to financial limitations usually means long-term financial planning was not adequately prepared and has resulted in inequitable intergenerational access to capital services.

So what does an effective long-term financial plan look like for asset management? The International Infrastructure Financial Management Manual states:

> "The long-term financial plan should accommodate the organization's cash flow needs to enable it to carry out the asset operations and maintenance activities and renewal of assets…"[2]

Preparing a long-term financial plan in a manner consistent with this Guide will accomplish the following:

- Highlight unsustainable funding levels that may result in intergenerational inequitable access to capital services or intergenerational inequitable funding levels,
- Demonstrate the life-cycle costing benefits to long-term financial planning, and
- Construct "course-correction" options to achieving sustainable funding levels.

1. FCM.ca. 2022. Infrastructure |Federation of Canadian Municipalities. [online 5 October 2022]
2. Howard, J., & Comrie, J. (2020). International Infrastructure Financial Management Manual (2020th ed., p. 1.1) [Review of International Infrastructure Financial Management Manual].

Asset Management BC Framework

The Asset Management BC Framework is based on international best practices and described as a:

> "high-level systemic approach designed to support local governments in moving toward service, asset, and **financial sustainabilit**y through asset management processes"[3].

This Framework is widely adopted by BC municipalities and views asset management as an iterative and continuous process, therefore providing value to local governments of all asset management maturity levels.

An essential component of the Asset Management BC Framework is the integration of asset management practices into the long-term financial plan. This Framework (and other frameworks) point out that a local government's long-term financial plan is separate from its asset management plan, and often in conflict. The financial reality of asset management decisions, however, is inseparable. Therefore, the disharmony between these two plans often results in service level reductions or abrupt adjustments to the financial plan (i.e., steep tax and utility rate increases).

FIGURE 1: ASSET MANAGEMENT BC FRAMEWORK

The Framework does not focus on what best practices for preparing a long-term financial plan are. Consistent with international best practices, it recommends a long-term financial plan be at least 10 years in length. However, this Guide recommends a much longer view be implemented when analyzing the financial impacts of asset management, as municipal assets are long lived and can often exceed 70 years or more. In fact, some local governments assign useful lives exceeding 100 years to some linear assets. Therefore, a 10-year planning window can be wholly inadequate, as capital maintenance and renewal costs typically compound near the end of infrastructure lives. For this reason, this Guide raises the standard for best practices in long-term financial planning for asset management.

3. Urban Systems. (2019). Asset Management for Sustainable Service Delivery A BC Framework (Union of BC Municipalities & Ministry of Municipal Affairs and Housing, Eds.) [Review of Asset Management for Sustainable Service Delivery A BC Framework]. Asset Management BC.

Other Important Frameworks

The Institute of Public Works Engineering Australasia (IPWEA) has developed an International Infrastructure Financial Management Manual. This Manual outlines crucial considerations for asset management professionals when developing a long-term financial plan. The Manual states:

> "the long-term financial plan should accommodate the organization's cash flow needs to enable it to carry out the asset management activities set out in the asset management plan(s) and be financially sustainable."[4]

Furthermore, the Manual recommends the financial plan be 10 years in length:

> "organizations should develop long-term financial plans covering a period of 10 years, supported by asset management plans for services provided from infrastructure."

Long-term financial sustainability in the IPWEA's view, therefore, has a 10-year view. However, many local governments are young and therefore have young assets. Consequently, a 10-year view on financial sustainability is not indicative of the long-term financial implications. Thus, this course analyzes funding sustainability on a full life cycle costing basis.

4. Howard, J., & Comrie, J. (2020). International Infrastructure Financial Management Manual (2020th ed., p. 1.1) [Review of International Infrastructure Financial Management Manual].

Atelophobia – The Imperfection Principal

…the opportunity costs of equitable funding that leverages investment returns exceeds the costs of implicit imperfection in forecasts

Atelophobia is an obsessive fear of imperfection. Someone with this condition is terrified of making mistakes. The accounting and engineering professional often requires a high degree accuracy but preparing long-term financial plans and estimating life-cycle costs requires utilizing assumed variables. Slight changes to these variables can make a significant difference to forecasts.

This Guide argues there is more to be lost by failing to prepare a long-term financial plan than there is by preparing an imperfect one. Decision makers should not be asked to make long-term decisions without having at least some understanding of the long-term financial implications. This Guide contends the pros of equitable funding leveraging investment returns exceeds the cons of implicit imperfection in forecasting.

Sustainable Funding – What Is It and Why Is It Important?

Sustainable annual funding is the choice to fund infrastructure replacement over the lifetime of assets. In practice, this approach imposes infrastructure costs to ratepayers as infrastructure is used, spreading out the cost of infrastructure across its full age, rather than compressing costs at the end of an asset's useful life.

Notice the example in Figure 2 and Table 1 (page 11). Infrastructure spending is typically compressed near the end of the useful life of an asset. An organization may choose to fund the infrastructure costs evenly over the life of the asset ($1,004K per year), or variably in each decade. With the latter option, ratepayers in the later decades would have to pay significantly more, making this unsustainable model inequitable.

FIGURE 2: RISING CAPITAL MAINTENANCE IN LIFECYCLE

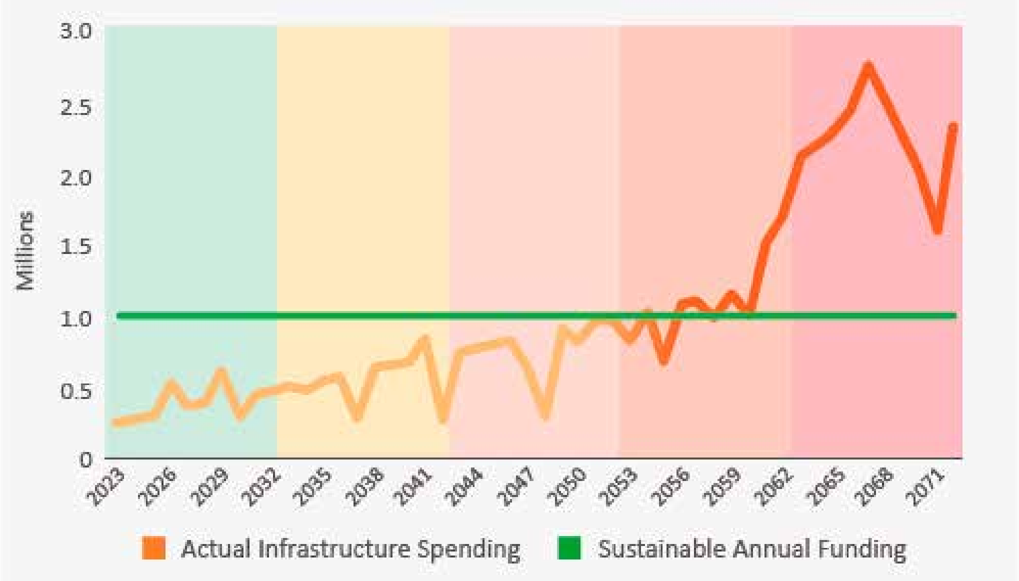


TABLE 1: RISING CAPITAL MAINTENANCE IN LIFECYCLE

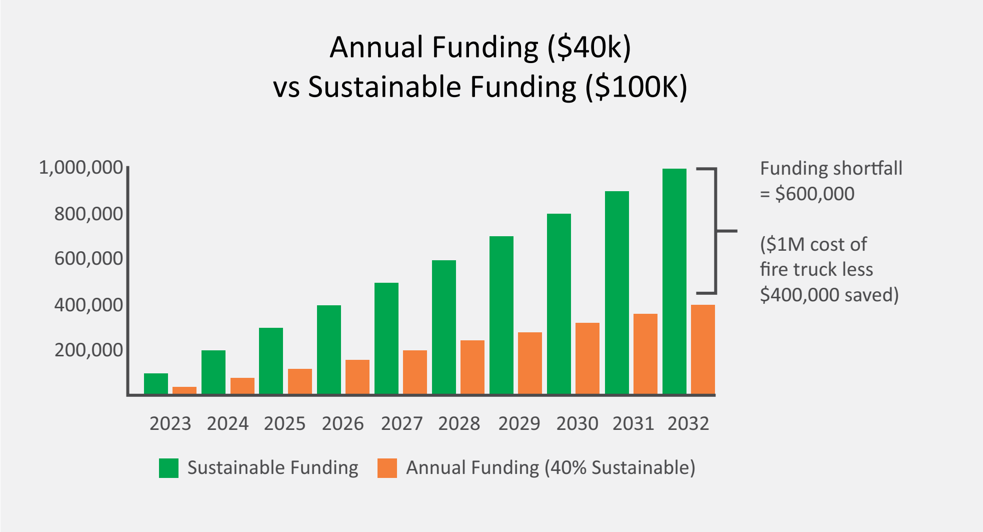
Years 1-10 Average: $390k	Years 11-20 Average: $540k	Years 21-30 Average: $765k	Years 31-40 Average: $1,092k	Years 41-50 Average: $2,230k	50-Year Sustainable: $1,004k

Consider another example: assume a local government wishes to replace its ladder truck in 10 years and the cost of the ladder truck is expected to be $1M. The government can choose several ways to fund the purchase:

1. Set aside an equal annual amount while earning interest revenue,
2. Set aside nothing and finance with debt in year 20, or
3. A combination thereof.

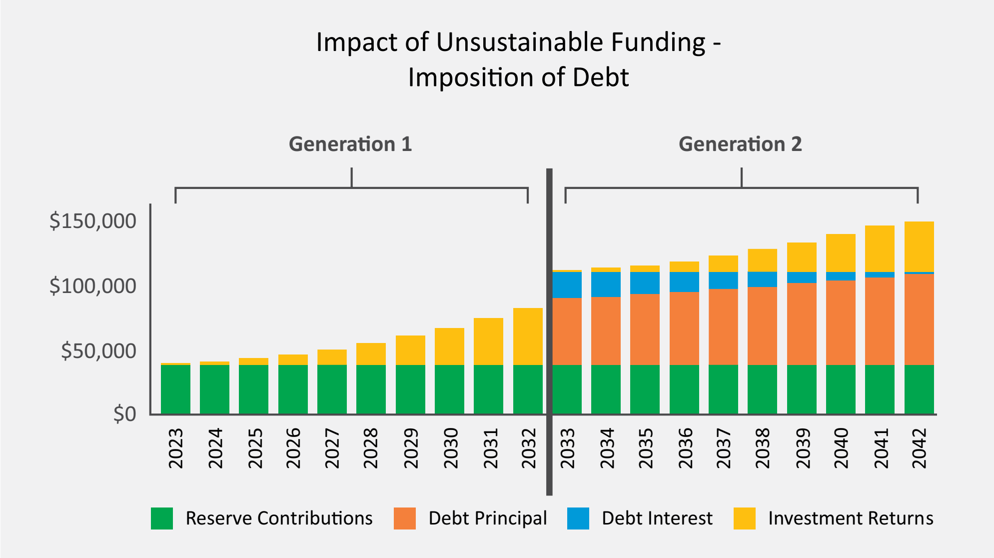
In most cases, a municipality chooses to combine annual reserve contributions with debt financing. However, sustainable annual funding will reduce the cost to the taxpayer, and fairly distribute the infrastructure costs over the life of the ladder truck. The example government's annual funding is currently estimated to be slightly above 40% of the sustainable target. Assuming this funding level, this government would produce a $600,000 accumulated funding shortfall by the time the truck is due for replacement in 10 years.

FIGURE 3: CUMULATIVE INFRASTRUCTURE FUNDING GROWTH



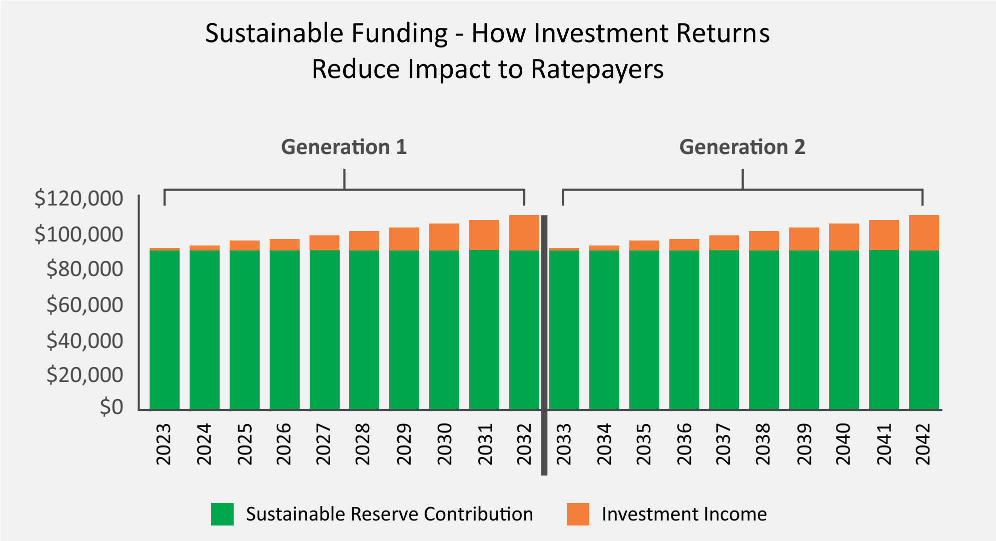
Thus, this municipality would have to debt finance for the funding shortfall, imposing debt interest costs on the next generation of taxpayers and increasing the total life-cycle costs.

FIGURE 4: INTERGENERATIONAL IMPACT OF UNSUSTAINABLE FUNDING



In contrast, the sustainable funding model distributes the infrastructure replacement costs evenly over the life of the asset, sparing subsequent generations undue burden:

FIGURE 5: HOW INVESTMENT RETURNS REDUCE IMPACT TO RATEPAYERS



The unsustainable funding model results in the local government having to finance infrastructure replacement with debt. This imposes debt interest and eliminates the opportunity for investment returns, thereby increasing the cost to the ratepayer. In this example, the sustainable model is $187,500 (or 21%) less expensive to the ratepayer than the unsustainable model. This difference is compounded even more dramatically over the life cycle of assets with longer useful lives. For instance, for an asset with a useful life of 80 years, investment returns could account for 60% of funding.

TABLE 2: RATEPAYER SAVINGS FROM SUSTAINABLE FUNDING MODEL

Building ID	Sustainable Model	Unsustainable Model
Reserve Contributions	$890,000	$400,000
Debt Principal Payments	-	$600,000
Debt Interest Payments	-	$77,500[1]
Total Cost to the Ratepayer	$890,000	$1,077,500
Investment Returns	$110,000	-
Total Funding	**$1,000,000**	**$1,077,500**

1: Net of $44,000 investment returns earned.

Module Two:

Data Collection

In this Module you will learn:

- Infrastructure Material
- Infrastructure Size, Location, and Acquisition Year
- Costing Information
- Estimated Useful Lives
- Funding Levels
- Condition Assessments

Introduction

This module explores the general classes of data that should be collected prior to conducting Core Calculations (Module 3) and Modelling (Module 4). Appendix A provides more detailed recommended data parameters by asset class. Further, a sample database is provided as part of the course material.

TABLE 3: DATA CRITICALITY/ACCURACY

Data	Criticality	Degree of Accuracy Required
Material	Medium	Low accuracy required
Size & Location	Medium	Moderate accuracy required
Costing	High	Moderate accuracy required
Estimated Useful Lives	Critical	Moderate accuracy required
Current Funding Levels	Critical	High accuracy required
Condition Assessments	Low	Low accuracy required

Infrastructure Material

Useful lives are often estimated using material type. For instance, polyvinyl chloride (PVC) pipe is generally expected to last longer than cast iron pipe. Therefore, material type is crucial for determining forecasted infrastructure replacement years. Material type for the following asset classes is particularly important:

- Stormwater, Sanitary Sewer, and/or Water Pipe,
- Building Components, and
- Roads and Bridges.

Often governments will have incomplete or inaccurate information related to infrastructure material but may still establish estimated useful lives with incomplete information that can be refined in future versions of long-term financial plans. For example, only organizations with mature asset management programs will have detailed information for Building Components (see example below), however building maintenance forecasts can still be established without this detailed information.

TABLE 4: EXAMPLE BUILDING COMPONENT INVENTORY

Building ID	Building Component Group	Building Component	Material
B0001	Roof	Roof	Metal
B0001	Mechanical	Ducting	
B0001	External Fabric	Windows	Aluminum
B0001	Interior Finishes	Insulation	Thermofleece
B0002	Roof	Tile Roofing	Concrete
B0002	External Fabric	Windows	Metal Framed
B0002	Interior Finishes	Hardwall	Plaster
B0002	Electrical	Lighting	Florescent

Infrastructure Size, Location, & Acquisition Year

Infrastructure replacement costs are most often estimated using infrastructure size. For instance, watermain replacement costs may be estimated using pipe length and diameter.

Replacement costs are also estimated using infrastructure location. The placement (depth) of storm sewer main may materially impact the estimated replacement cost. For this reason, infrastructure placement can be valuable information when refining estimated replacement costs, yet some local governments do not maintain detailed asset placement information.

Acquisition year is also vital information and can often be found in engineering databases or in the Tangible Capital Asset database.

Costing Information

Infrastructure replacement costing information will be required to prepare reasonable spending forecasts and annual funding targets. Some common sources of costing information are:

Recent capital projects – Your organization may have carried out similar capital projects and your accounting department will be able to provide their total costs. An engineering department will be able to provide capital asset dimensions. From this you can determine unit rates. For instance, suppose a recent watermain project was determined to cost $1.2M for 1,000 meters of PVC watermain. The unit rate would be $1.2M/1,000 = $1,200 per meter. This unit rate could then be multiplied by other pipe lengths to reasonably estimate replacement costs elsewhere.

Engineering Firm – Engineering firms are often required to prepare detailed cost estimates when designing infrastructure projects.

Quantity Surveyor – Quantity surveyors specialize in the costing of construction projects and can be hired to assist in preparing replacement cost estimates.

Software – Software is available that can provide high-level market-based construction costing based on region. This Guide does not endorse any particular software, but two commonly used software packages are RS Means and Marshall & Swift.

Appraisal Reports – Appraisal reports are often required to acquire property insurance. Appraisal reports normally include replacement cost information for local government buildings and sometimes for playground structures, pump stations, and other municipal equipment.

Internal Equipment Replacement Plans – Police, public works, and fire departments often prepare replacement plans for vehicles and major equipment. Work with your colleagues to prepare accurate replacement cost estimates.

Quotes – Some bulk assets are identical and a single quote can be extrapolated. For instance, bulk water meters or water hydrants are often identical and one single quote can be used to value an entire inventory.

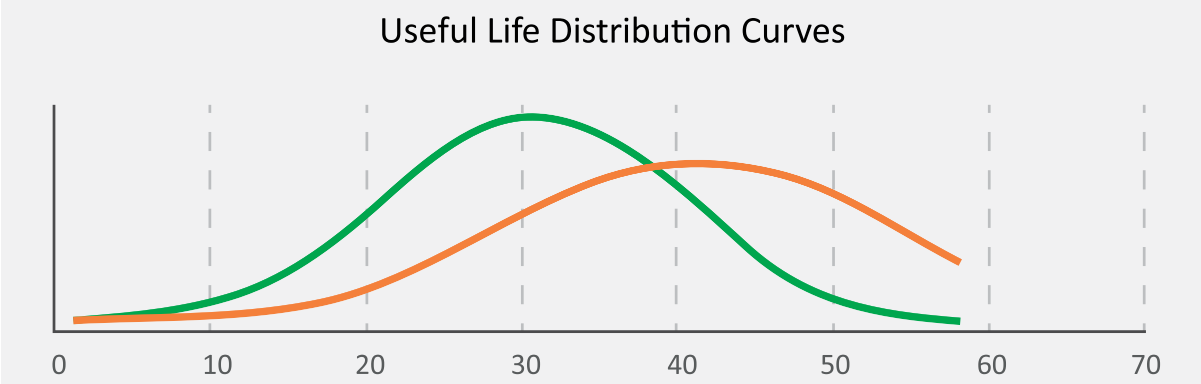
BC Assessment – BC Assessment data is available free of charge to local governments. This data can be used to prepare land value or building cost estimates.

Masterplans and Condition Assessments – Often masterplans integrate cost estimates into recommended capital plans. This information can be extrapolated to support replacement cost estimates.

Estimated Useful Lives

Estimated useful lives will require local professional judgement, as conditions vary significantly from one community to the next. It is always necessary to distinguish between physical life and estimated useful life. Physical life is the length of time an asset is expected to remain in service before it fails. Estimated useful life, however, is a service level and risk decision made by the organization. For instance, an organization may wish to replace its watermains before they fail. Suppose the watermain pipes have an estimated physical life of 100 years, however, to play it safe and mitigate the risk of a major watermain break, the organization has decided on an estimated useful life of 90 years.

FIGURE 6: EXAMPLE USEFUL LIFE DISTRIBUTION CURVES



National Asset Management Standards (NAMS) – NAMS Canada has produced a publication entitled "Practice Note 12: Useful Life of Infrastructure," which provides useful life estimates. This publication was developed using surveys of infrastructure management professionals.

Condition assessments – Condition assessments combined with asset current life information may provide clues regarding how long an asset will last. For example, if a road top was last paved 25 years ago and is now showing significant signs of deterioration based on a recent condition assessment, this may indicate a 25-year useful life.

Tangible Capital Asset Policy (TCA) – Local governments are required to adhere to Public Sector Accounting Standards, which includes Public Sector Accounting Handbook Section 3150, Tangible Capital Assets. This accounting standard indirectly requires local governments to establish an expected useful life for each asset class. You may consider harmonizing long-term financial plan useful lives with TCA Policy useful lives.

Community of practice – There are many established asset management community of practices across Canada with a rich network of asset management professionals. Discuss estimated useful lives with your colleagues and determine what is appropriate based on your community's needs.

Established levels of service – Some communities have developed levels of service with their governance body after discussing risk, affordability, and community expectations. These levels of service guide useful lives.

Given that estimated useful lives can vary significantly based on professional judgement, an organization should be prepared to develop a flexible sensitivity analysis to validate findings. Please see Module 6 for further details (page 49).

TABLE 5: SAMPLE WATER UTILITY INVENTORY

Asset ID	Material	Diameter	Length	Year Installed	Useful Life	Physical Life	Age
WM001	ST	150	51.8	1953	80	125	69
WM002	CI	200	4.6	1953	80	125	69
WM003	VC	200	29.4	1953	70	100	69
WM004	CI	150	80.8	1953	80	125	69
WM005	VC	200	26.4	1953	70	100	69
WM006	AC	200	71	1953	70	100	69
WM007	AC	200	42	1953	70	100	69
WM008	ST	200	96.2	1953	80	125	69
WM009	AC	200	78.6	1953	70	100	69

Funding Levels

Determining existing infrastructure funding levels will require cooperation with your organization's finance department. Section 165 of the Community Charter and Section 374 of the Local Government Act require local governments to report certain reserve transfers, capital expenditures, and debt serving costs in a five-year financial plan. However, sometimes it can be difficult to determine exactly what revenue is dedicated to fund the cost of infrastructure replacement since money is fungible. Furthermore, funding is sometimes used to build new infrastructure, rather than existing infrastructure.

While preparing your long-term financial plan, be sure to distinguish between ongoing, dedicated, and one-time funding.

Sustainable/ongoing/annual funding sources:

- Annual Transfers into or to reserves
- Annual government transfers such as gas tax/community works funds transfers
- Annual direct taxation funding of capital expenditures
- Annual direct utility or user fee funding of capital expenditures
- Investment returns earned within capital reserve
- Annual funding dedicated to debt servicing (principal and interest)
- Annual other revenue dedicated to infrastructure replacement funding such as casino revenue

Unsustainable

- Transfers from or out of reserves or surplus
- One-time government transfers
- Developer contributions/donations of capital

FIGURE 7: SUSTAINABLE FUNDING PROGRESS CHART

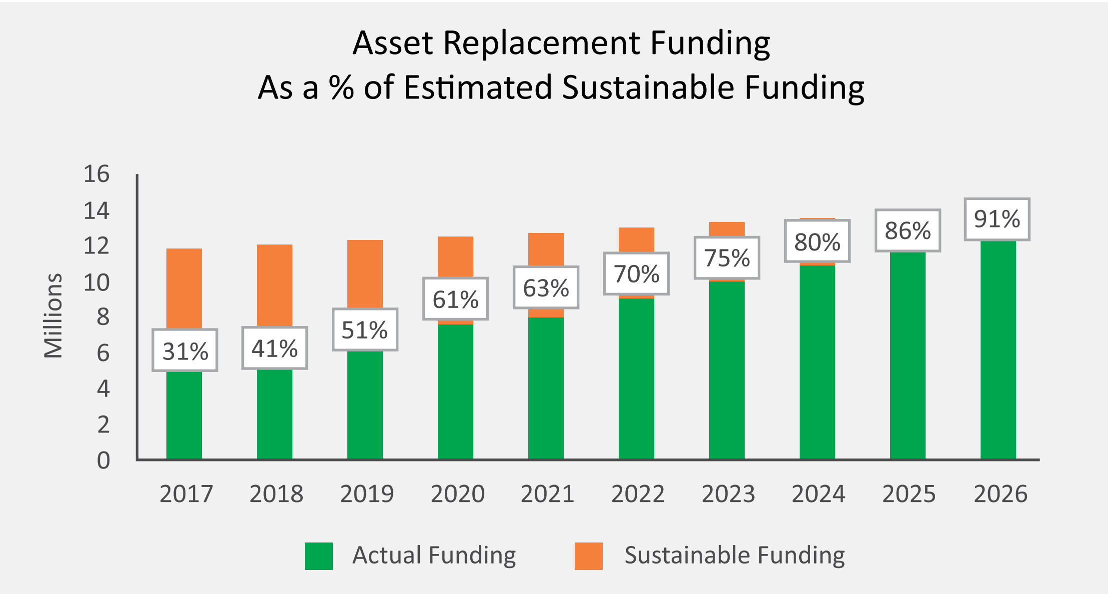


TABLE 6: BUDGET ANALYSIS: ANNUAL FUNDING SOURCES

Revenues	2022 Budget	Comment
Property Taxation	$10,450,000	• There may be some direct property tax funding of capital, but it will not be apparent – discuss with Finance Department
Parcel Taxes	1,000,000	• There may be some direct parcel tax funding of capital, but it will not be apparent – discuss with Finance Department
1% Utility Revenue	500,000	x This is likely dedicated to fund ongoing operating expenses, not capital
Grant in lieu of taxes	200,000	x This is likely dedicated to fund ongoing operating expenses, not capital
Fees & Charges/User Fees	2,000,000	• There may be some direct fees and charges funding of capital, but it will not be apparent – discuss with Finance Department
Government Transfers	500,000	• This may include funding for operating expenses, or one-time grant funding. It also may include community works fund payments, which is sustainable capital funding. You will need to get a breakdown from the finance department.
Developer Contributions	100,000	x Developer contributions can be in the form of cash or assets – both are unsustainable revenue sources as they are one-time and do not provide ongoing dedicated revenue
Investment Income	$250,000	• The portion of investment income earned in infrastructure replacement reserves is a sustainable funding source
Total Revenue	**$15,000,000**	

Expenses		
General Government	$5,000,000	Local Governments aren't required to include amortization expenses in their financial plan. However, they are required to include amortization in their Public Sector Accounting Standard annual financial statements. Consequently, many local governments include amortization. Below you will have to ensure amortization is removed while calculating infrastructure replacement funding.
Protective Services	2,500,000	
Transportation	1,500,000	
Recreation	1,000,000	
Environmental Services	500,000	
Water Utility	1,500,000	
Sewer Utility	1,000,000	
Debt Interest	150,000	• Debt is supported by taxation and/or fees and charges and can be converted to reserve contributions after retirement and is therefore a sustainable funding source.
Total Expenses	**$13,150,000**	

TABLE 6: BUDGET ANALYSIS: ANNUAL FUNDING SOURCES

Accounting Surplus	$1,850,000	($15,000,000 revenues less $13,500,000 expenses)
Add: Debt Proceeds	1,000,000	x Receiving debt proceeds is not a sustainable funding source – however the taxation or fees used to pay back debt is a sustainable funding source
Add: Transfers from Reserves **Add:** Amortization **Less:** Capital Expenditures	2,000,000 800,000 (3,250,000)	x Using reserves is not a sustainable funding source as reserves are a finite balance
Less: Debt Principal	(200,000)	• Debt is supported by taxation and/or fees and charges and can be converted to reserve contributions after retirement and is therefore a sustainable funding source
Less: Transfers to Reserves	(2,200,000)	• Using taxes or fees and charges to fill reserves is a sustainable funding source; review carefully as some transfers may be for new capital or for operating expenses
Budgetary Surplus	**($-)**	

Using the figures in Table 6, the annual infrastructure funding totals would be calculated as follows:

General Taxation & Fees and Charges: It is difficult to determine if capital expenditures are funded directly by taxation or utility fees. One way to determine this is to apportion all funding sources to all operating expenses, debt payments, and transfers to reserves. However, a municipality's finance department will likely know exactly how taxation is allocated and/or how capital expenditures are funded and can provide this information. In this example, $750,000 of infrastructure renewal is funded from direct taxation.

TABLE 7: CAPITAL EXPENDITURE FUNDING

Capital Expenditures	Taxation Funding	Reserves	Grants	Total Funding
New Capital	$400,000	$1,000,000	$100,000	$1,500,000
Infrastructure Renewal	750,000	1,000,000		1,750,000
Total	**$1,150,000**	**$2,000,000**	**$100,000**	**$3,250,000**

Government transfers: In this example, assume that the Chief Financial Officer provides the following summary of government transfers:

TABLE 8: GOVERNMENT TRANSFERS DETAIL

Government Transfer	Amount	Comment
Community Works Fund – Gas Tax	$300,000	Must be for infrastructure
Investing in Canada Capital Grant (One-Time)	100,000	Not annual or ongoing
Traffic Fine Revenue Sharing	75,000	Funds operating
Asset Management Planning Grant	25,000	Funds a one-time study
Total	**$500,000**	

Notice only the Gas Tax grant can be considered ongoing annual funding for infrastructure. The only other infrastructure grant is a one-time grant and thus cannot be relied on as an annual funding source. The other two grants fund operating expenses and a study, and cannot be relied upon as annual infrastructure funding.

Investment returns: Often governments establish reserves that must be used for capital purposes. If the purpose of such a reserve is for infrastructure renewal, then the investment income earned on the reserve balance may be considered ongoing annual infrastructure funding.

TABLE 9: INVESTMENT RETURN DETAIL

Investment Returns	Amount	Comment
Earned on Capital Replacement Reserves	$135,000	
Earned on Development Cost Charge Reserve	25,000	DCCs are for new infrastructure only
Earned on Accumulated Surplus	75,000	This is undedicated
Earned on Climate Action Reserve	15,000	Not for infrastructure replacement
TOTAL	**$250,000**	

Transfers to reserves: The annual amount of funding set aside in reserves for infrastructure replacement will be the main funding measure. Funding should not be confused with spending in this sense. Saving up for the replacement of infrastructure requires funding. Spending occurs when infrastructure is replaced, and the accumulated funding may be used at that time.

TABLE 10: TRANSFER TO RESERVE DETAIL

Transfers to Reserve	Amount	Comment
Transfer to Infrastructure Replacement Reserve	$500,000	
Transfer to Community Works Gas Tax Reserve	300,000	
Transfer to Council Priorities Fund	775,000	Operating expenses
Transfer to Park acquisition fund	100,000	This would be new capital so is excluded.
Transfer to Machinery & Equipment Replacement Fund	160,000	
Transfer to Police Contingency Reserve	50,000	This is for operating expenses so is excluded
Transfer to Climate Action Reserve	90,000	This is for operating expenses so it is excluded
Transfer to Reserve – Water	150,000	
Transfer to Reserve – Sewer	75,000	
Total	**$2,200,000**	

Using the information in Tables 6-10, annual infrastructure replacement funding is calculated as follows:

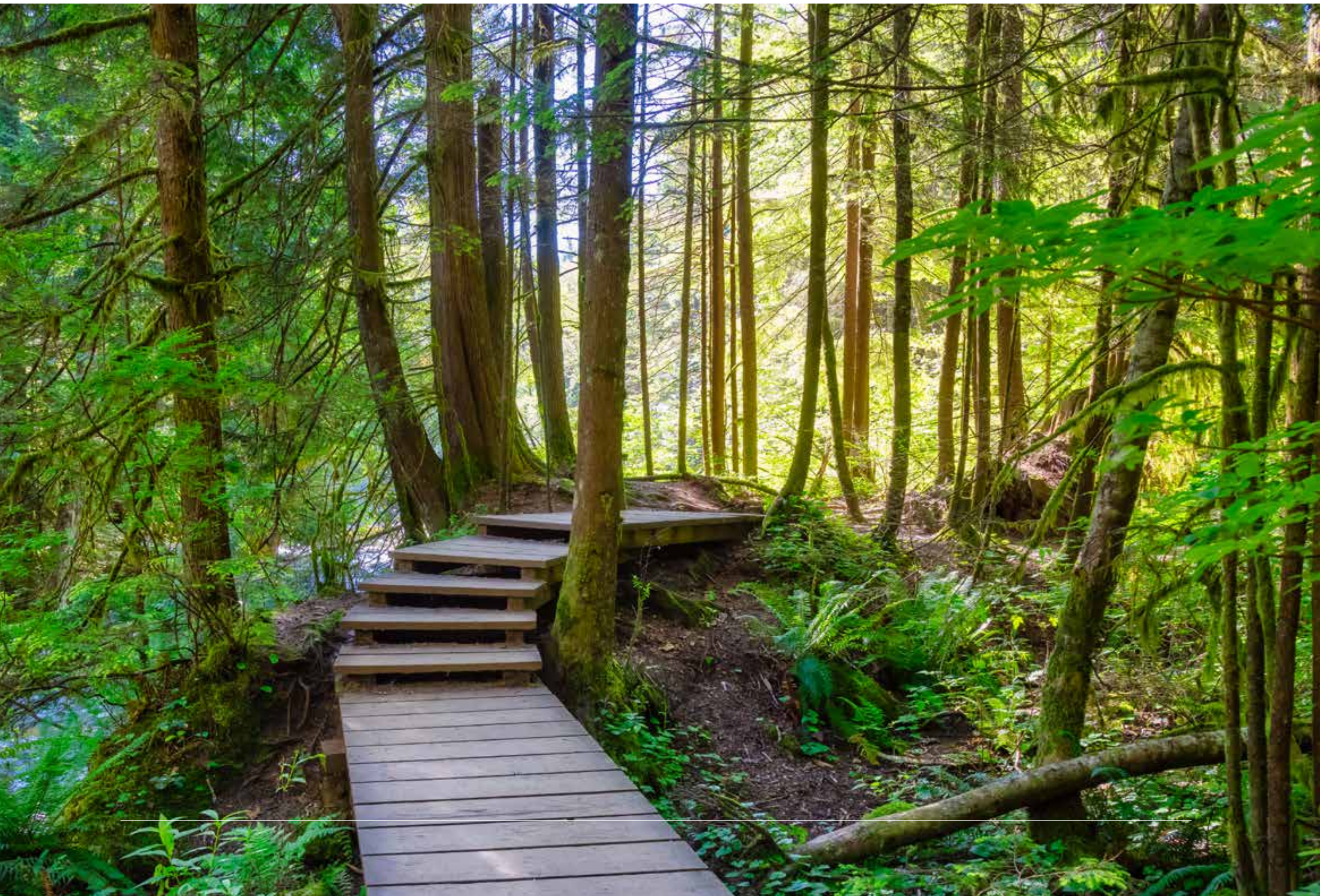
Transfers to Reserve	Amount
Direct Taxation Funding	$750,000
Community Works – Gas Tax Grant	300,000
Investment Returns	135,000
Debt Interest	150,000
Debt Principal	200,000
Transfer to Infrastructure Replacement Reserve	500,000
Transfer to Machinery & Equipment Replacement Fund	160,000
Transfer to Reserve – Water	150,000
Transfer to Reserve – Sewer	75,000
Total	**$2,420,000**

Condition Assessments

Condition assessments are not required in order to prepare a long-term financial plan for asset management. However, condition assessments can be valuable for determining and validating useful life assumptions. For instance, suppose an organization has selected 25 years as the useful life for its collector-category road top. A condition assessment may assess the condition of road top close to 25 years in age. If the 25-year-old collector road top is in poor condition, this would validate the useful life assumption.

Condition assessments municipalities may choose to conduct include:

- Closed-circuit television inspections of storm and sanitary sewer pipes,
- A Pavement Condition Assessment, and
- A Building Condition Assessment.



Module Three:
Core Calculations

In this Module you will learn:

- Replacement Costs
- Sustainable Annual Funding
- Sustainable Annual Funding – Componentized Assets
- Annual Funding Gap
- Asset Consumption
- Accumulated Infrastructure Funding Gap

Replacement Costs

Capital project costing often follows a five-step system:

TABLE 11: CAPITAL PROJECT COSTING CLASSIFICATION SYSTEM

Class	Description	Level of Effort	Expected Accuracy Range
1/A	Pre-Tender	~90%	-5% to +10%
2/B	90% Design	~60%	-10% to +20%
3/C	60% Design/Budget Approval	~30%	-20% to +30%
4/D	Preliminary/Feasibility	~10%	-30% to +60%
5/	Conceptional	~1%	-50% to +100%

Local government infrastructure is often long-lived, with some useful lives exceeding 80 years. Typically, only a small proportion of a municipality's asset inventory will be replaced within the next five-year financial planning period. For this reason, Class 5/Conceptional estimates are often appropriate for the purpose of preparing a long-term financial plan. Given that the expected accuracy range is between -50% and +100%, it is necessary to prepare a sensitivity analysis to validate a plan's broad findings (see Module 6 on page 49). In most cases, a local government's infrastructure funding levels are below sustainable funding levels. Generally this means that its plan recommends funding increases. This broad recommendation is likely unchanged even when optimistic assumptions are incorporated into a sensitivity analysis.

For an example, refer to the Asset Inventory Excel file included in the course material. In this asset register example, watermain replacement costs have been estimated using a unit rate per meter based on diameter.

TABLE 12: SAMPLE WATER INVENTORY REPLACEMENT COST CALCULATION

Asset	Material	Diameter (mm)	Length (m)	Unit Rate (per meter)	Replacement Cost
WM001	ST	150	51.8	1,400.00	$72,520.00
WM002	CI	200	4.6	1,450.00	$6,670.00
WM003	VC	200	29.4	1,450.00	$42,630.00
WM004	CI	150	80.8	1,400.00	$113,120.00
WM005	VC	200	26.4	1,450.00	$39,280.00
WM006	AC	200	71	1,450.00	$102,950.00
WM007	AC	200	42	1,450.00	$60,900.00
WM008	ST	200	96.2	1,450.00	$139,490.00
WM009	AC	200	78.6	1,450.00	$113,970.00
WM010	AC	150	82.5	1,400.00	$115,500.00

Sustainable Annual Funding

The simplified model for determining sustainable annual funding is to divide an asset's replacement cost by its useful life. Each asset class, subclass, and segment may have different estimated useful lives. Consequently, it is necessary to first calculate sustainable annual funding by each asset segment. Next, sustainable annual funding by asset segment can be subtotaled to determine funding by asset subclass.

TABLE 13: SUSTAINABLE ANNUAL FUNDING BY SUB-ASSET SEGMENT

GIS ID	Material	Useful Life	Length (m)	Unit Rate	Replacement Cost	Sustainable Funding
WM1	Cast Iron	80	46.61	$1,200.00	$52,931.97	$699.15
WM2	Asbestos Concrete	60	90.80	$1,200.00	$108,956.31	$1,815.94
WM3	Polyvinyl Chloride	75	177.13	$1,200.00	$212,559.07	$2,834.12
WM4	Polyvinyl Chloride	75	147.64	$1,200.00	$177,163.87	$2,362.18
				Total	**$554,611.21**	**$7,711.39**

In the scenario in Table 13 above, the weighted average useful life is 71.92 years ($554,611.21 / $7,711.39). This means the full replacement value of all assets will be set aside in reserves after 71.92 years. This ensures there is enough money in the reserve to replace all pipe at years 60, 75, and 80, as necessary.

After the first replacement of asbestos concrete in Year 60, reserve contributions continue to ensure there are funds available for the next replacement in Year 120.

TABLE 14: RESERVE BALANCES AFTER FIRST REPLACEMENT CYCLE

Asset	Useful Life	Length (m)	Year 60	Year 75	Year 80
Asset 1	80	Cast Iron Reserve Balance	$41,948.97	$52,436.22	$55,931.97
Asset 2	60	Asbestos Concrete Reserve Balance	$108,956.31	$27,239.08	$36,318.80
Asset 3	75	Polyvinyl Chloride Reserve Balance	$170,047.25	$212,559.07	$14.170.16
Asset 4	75	Polyvinyl Chloride Reserve Balance	$141,731.09	$177,163.87	$11,810.90
		Use of Reserves	$(108,956.31)	$(389,722.94)	$(55,931.97)
		Total	**$353,727.32**	**$79,675.30**	**$62,299.86**

Notice that at the end of Year 80 there is approximately a $62,299.86 reserve balance. This represents reserve contributions for Replacement Cycle 2 of Assets 2-4:

TABLE 15: LIFE CYCLE FUNDING RESERVE BALANCE CALCULATION

Asset 2	20 years (year 61 thru 80) x 1,815.94	$36,318.80
Asset 3	5 years (years 76 thru 80) x 2,834.12	$14,170.16
Asset 4	5 years (years 76 thru 80) x 2,362.18	$11,810.90
	Total	**$62,299.86**

The simplified sustainable infrastructure funding model above demonstrates an intuitive approach to fair and equitable intergenerational funding. Taxation and user fees are smoothed as much as possible since funding is spread across the life of the asset. The simplified model, however, does not take investment returns into consideration. The impact of compounding investment returns can significantly reduce the tax/user fee funding required for infrastructure replacement.

Consider the example demonstrated in Figures 8 and 9. In this example, a water pipe needs to be replaced in 80 years for $100,000. Using the simplified model, the annual sustainable infrastructure funding amount would be $1,250 ($100,000/80). However, assuming investment returns of 2%, only an annual contribution of $506 is needed.

In this example, cumulative investment returns exceed cumulative reserve contributions by year 63. This is due to the nature of compounding investment returns. At the end of the 80-year cycle, cumulative reserve contributions of approximately $40,000 will have earned approximately $60,000 in investment returns. The sustainable funding model would have effectively reduced property tax/utility fee reserve contributions needed to fund the pipe replacement by almost 60% ($1,250 in the simplified model vs $506 with investment returns).

This example demonstrates how effective the sustainable funding model is at reducing the property tax or utility fee impact to ratepayers in a community. Further, unsustainable funding often leads to the need for debt which increases required property tax/utility fee funding due to debt interest.

FIGURE 8: SUSTAINABLE FUNDING: RESERVE CONTRIBUTIONS & INVESTMENT RETURNS

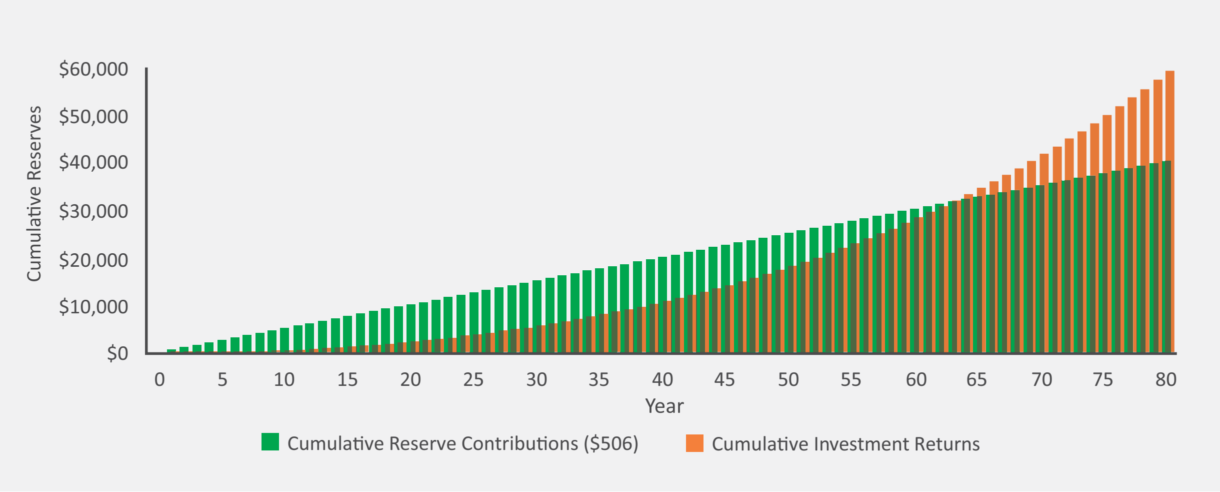
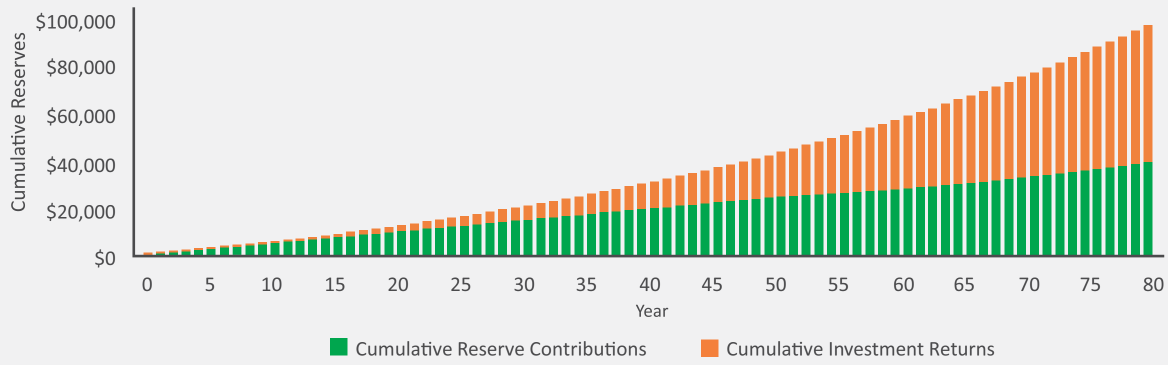


FIGURE 9: SUSTAINABLE FUNDING: RESERVE CONTRIBUTIONS & INVESTMENT RETURNS (STACKED)



An annuity formula can be used to determine the required sustainable annual funding amount as demonstrated in Figure 10 below:

FIGURE 10: SUSTAINABLE ANNUAL FUNDING FORMULA

RC = Replacement Cost

UL = Useful Life

I = Investment Return

SF = Sustainable Annual Funding

$$SF = \frac{RC}{1 + I} \; x \; \frac{I}{((1 + I)^{UL} - 1)}$$

To demonstrate the formula above:

RC = $100,000

UL = 80 Years

I = 2.00%

SF = $506

$$\frac{100{,}000}{1 + 2.00\%} \; x \; \frac{2.00\%}{((1 + 2.00\%)^{80} - 1)}$$

$$98{,}039.22 \; x \; \frac{2.00\%}{4.8754 - 1}$$

Sustainable Annual Funding – Componentized Assets

Some assets are composed of multiple major components, each of which has a different useful life. The strongest examples of this are roads and buildings. Roads are often composed of a base, subbase, and top layer. These components likely have different useful lives. A top layer will need replacing much more frequently than the base layer. Therefore, using the base layer's useful life to determine sustainable funding would not be accurate.

Similarly, a building is composed of many major components: roof, envelope, foundation, mechanical and electrical, interior finishes, etc. Since each of these components will be replaced multiple times in a building's life cycle, sustainable funding will have to reflect this.

For example, consider the lifecycle costs of the building below. The replacement cost of the entire building is $10M. However, an organization will spend $20.8M over the life cycle of the building as it replaces components according to their individual useful lives.

TABLE 16: COMPONENTIZED CAPITAL LIFECYCLE COSTS

A	B	C	D	E	F
Asset ID	Component	Replacement Value	Useful Life	Replacements per Life	Life Cycle Capital Costs
B0001	Building	$10,000,000	75 Years	1	$10,000,000
B0001.A	Roof	$700,000	20 Years	3	$2,100,00
B0001.B	Mechanical	$1,600,000	20 Years	3	$4,800,000
B0001.C	Windows	$200,000	40 Years	1	$200,000
B0001.D	Doors	$200,000	35 Years	2	$400,000
B0001.E	Electrical	$800,000	20 Years	3	$2,400,000
B0001.F	Floor Coverings	$300,000	20 Years	3	$900,000
				Total	**$20,800,000**

To calculate the life cycle capital costs of a componentized asset, carry out the following four-step process:

1. Assign values to component replacement costs (Column C) – An organization may not have an itemized list of asset components or their respective values. There are industry norms they can use to apportion approximate costs if needed.
2. Assign useful lives to each component (Column D).
3. Determine how many times each component will be replaced in the life cycle of the componentized asset (Column E) – In this example, a building's useful life is 75 years while the roof's useful life is 20. The roof will be replaced in years 20, 40, and 60. Since the full building will be replaced in year 75, do not count beyond that. This means the roof will be replaced three times during the life cycle of the building.
4. Multiply component replacement values by number of component replacements per life cycle (Column F = Column C x Column E).

Using this methodology, it is possible to determine that the organization can expect to incur $20.8M over 75 years, much higher than the $10M replacement cost of the building. Therefore, the annualized sustainable funding (simplified method) would be: $20,800,000 / 75 = $277,333.

Annual Funding Gap

The annual funding gap is the difference between sustainable annual funding when compared to actual annual funding. Local governments often establish self-supporting utilities, meaning utility expenditures are funded by utility fees. Thus, it may be important to calculate the annual funding gap in each utility and by general taxation.

This will require examination of the local government's financial plan. Municipalities often establish utility funds to fund utility operations and/or utility capital expenditures but often utility capital expenditures are funded by taxation, or taxation plus utility fees. Further, you will need to examine what is the funding source for any transfer to reserve budgets. Are such transfers funded by taxation, utility fees or other annual funding sources? Or are they funded by one-time or infrequent revenue sources. One-time or infrequent revenue sources should not be included in annual funding sources.

FIGURE 11: ANNUAL FUNDING GAP CALCULATION DEMONSTRATION

General Taxation	
Transfer to Machinery Reserve	$1.0M
Transfer to General Infrastructure Reserve	$1.0M
Gas Tax	$0.8M
Transfer Casino Funds to General Infrastructure Reserve	$0.5M
Investment Income: General	$0.5M
Transfer to Fire Reserve	$0.3M
Total Annual Funding, General	**$4.1M**

Total Sustainable Annual Funding, General $7.8M

Total Annual Funding Gap, General Taxation ($7.8M – $4.1M) $3.7M

Water Utility	
Transfer to Water Equipment Reserve	$0.3M
Transfer to Water Infrastructure Reserve	$0.5M
Investment Income: Water	$0.3M
Total Annual Funding, Water	**$1.1M**

Total Sustainable Annual Funding, Water $2.1M

Total Annual Funding Gap, Water Utility ($2.1M – $1.1M) $1.0M

Sewer Utility	
Transfer to Sewer Equipment Reserve	$0.2M
Transfer to Sewer Infrastructure Reserve	$0.3M
Investment Income: Sewer	$0.2M
Total Annual Funding, Sewer	**$0.7M**

Total Sustainable Annual Funding, Sewer $2.0M

Total Annual Funding Gap, Sewer Utility ($2.0M – $0.7M) $1.3M

Asset Consumption

Many assets have physical lives that exceed several decades. This often leads to local governments not adequately preparing funding for long term replacement costs. Asset consumption demonstrates how close an asset is to its replacement date and is calculated by dividing an asset's age by its useful life. Further, an asset class' weighted average asset consumption can be calculated. You may choose to weigh the asset consumption by asset quantity or replacement cost. Table 17 below demonstrates how to calculate the asset consumption by individual asset segment. Table 18 (on page 35) demonstrates how to calculate the weighted average consumption by asset class. From this, one could conclude that watermains are 53% through their life cycle and have 47% remaining on average.

TABLE 17: ASSET CONSUMPTION BY ASSET

Asset _ID Watermain	Length (m)	Replacement Costs	Year Installed	Service Life	Age	Replacement Year	% Consumed
WMAIN-0002	87.6	$109,500	1993	80	29	2073	36.25%
WMAIN-0003	85.0	$106,250	1993	80	29	2073	36.25%
WMAIN-0004	131.3	$164,125	1993	80	29	2073	36.25%
WMAIN-0007	123.3	$154,125	1991	80	31	2071	38.75%
WMAIN-0008	112.8	$141,000	1993	80	29	2073	36.25%
WMAIN-0009	132.5	$165,625	1991	80	31	2071	38.75%
WMAIN-0010	58.7	$73,375	1994	80	28	2074	35.00%
WMAIN-0011	76.6	$95,750	1994	80	28	2074	35.00%
WMAIN-0013	181.8	$227,250	1965	60	57	2025	95.00%
WMAIN-0014	137.8	$172,250	1965	60	57	2025	95.00%
TOTAL	**1,464.0**	**$1,830,000**					

TABLE 18: WEIGHT AVERAGE ASSET CONSUMPTION BY ASSET SUBCLASS

A	B	C	D	E	F	F
Asset _ID Watermain	**Material**	**Length (m)**	**Replacement Costs**	**% Consumed**	**Weighted by Length (CxE)**	**Weighted by Cost(DxE)**
WMAIN-0002	PVC	87.6	$109,500	36.25	31.76	$39,693.75
WMAIN-0003	PVC	85.0	$106,250	36.25	30.81	$38,515.63
WMAIN-0004	PVC	131.3	$164,125	36.25	47.60	$59,495.31
WMAIN-0007	PVC	123.3	$154,125	38.75	47.78	$59,723.44
WMAIN-0008	PVC	112.8	$141,000	36.25	40.89	$51,112.50
WMAIN-0009	PVC	132.5	$165,625	38.75	51.34	$64,179.69
WMAIN-0010	PVC	58.7	$73,375	35.00	20.55	$25,681.25
WMAIN-0011	PVC	76.6	$95,750	35.00	26.81	$33,512.50
WMAIN-0013	AC	181.8	$227,250	95.00	172.71	$215,887.50
WMAIN-0014	AC	137.8	$172,250	95.00	130.91	$163,637.50
TOTAL		**1,127.4**	**$1,409,250**		**601.15**	**$751,439.07**

Weighted average consumption by length =

601.15 / 1,127.4 = 53%

Weighted average consumption by replacement cost =

$751,439.06 / $1,409,250.00 = 53%

Your organization may wish to report the total value of assets beyond their useful lives. Recall that an asset's 'useful' life often differs from its expected 'physical' life. An asset's 'useful' life is determined by an organization's risk analysis of when an asset should be replaced before failure. Just because an asset has reached the end of its useful life does not mean it has reached the end of its physical life. Be careful to ensure assets beyond their useful lives are expressed as 100% consumed. Otherwise, if they are expressed as greater than 100% consumed, they will skew the average.

Accumulated Infrastructure Funding Gap

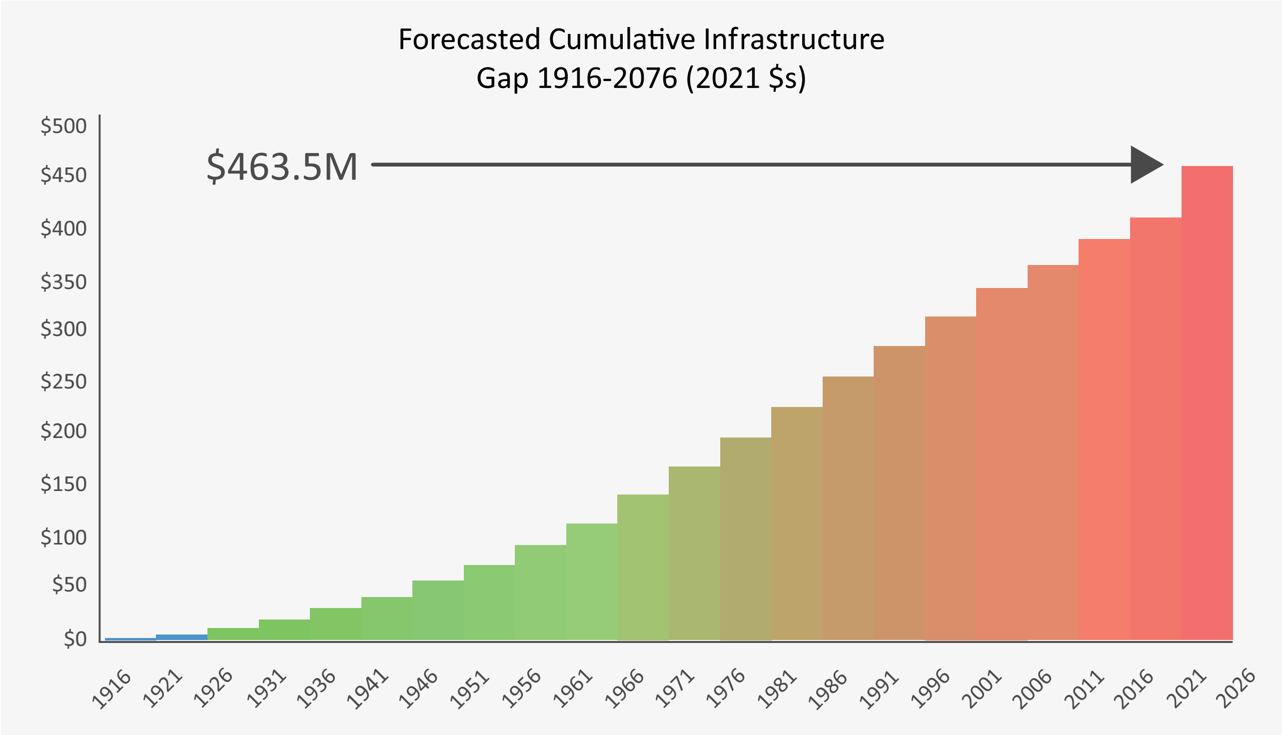
An accumulated infrastructure funding gap is a measure of the underfunded consumption throughout the history of owned assets. For instance, suppose an asset with a replacement cost of $1M is 50% through its lifecycle. Sustainable funding would have set aside 50% x $1,000,000 = $500,000. Suppose that $300,000 has been set aside instead of the sustainable $500,000. This would yield a $200,000 ($500,000 minus $300,000) accumulated infrastructure funding gap.

The accumulated infrastructure funding gap can grow gradually over the life cycle of an asset. Since these assets are long lived, this funding gap is not realized and incurred until after long periods of time. Thus, an accumulated funding gap can grow into a significant amount.

TABLE 19: SAMPLE CUMULATIVE INFRASTRUCTURE FUNDING GAP CALCULATION

Asset	Value of Consumption	Reserve Balance	Accumulated Infrastructure Funding Gap
Road Infrastructure	$85.0M	$12.0M	$73.0M
Buildings	$56.0M	$1.8M	$54.2M
Water Infrastructure	$122.0M	$10.0M	$112.0M
Sewer Infrastructure	$93.0M	$8.0M	$85.0M
Drainage	$150.0M	$15.0M	$135.0M
Park Infrastructure	$2.3M	$0.0M	$2.3M
Vehicles and Equipment	$8.0M	$6.0M	$2.0M
Total	**$516.3M**	**$52.8M**	**$463.5M**

FIGURE 12: CUMULATIVE INFRASTRUCTURE FUNDING GAP



Module Four:
Modelling

In this Module you will learn:

- Spending Forecasts Modelling
- Componentized Assets (Building & Roads)
- Reserve Forecasts
- Allocating Undedicated Reserve Balances
- Investment Returns & Debt Servicing
- 100-Year Funding Gap

Spending Forecasts Modelling

The purpose of the forecasting exercise is not to perfect predictions but rather demonstrate the scale and significance of infrastructure spending and relative appropriateness of existing funding levels

A local government is required to prepare a five-year financial plan (Community Charter S. 165 or Local Government Act S. 374). It is difficult for a reader to gauge the:

1. adequacy of infrastructure funding, and
2. scale of the financial burden a municipality will incur to maintain and replace its infrastructure

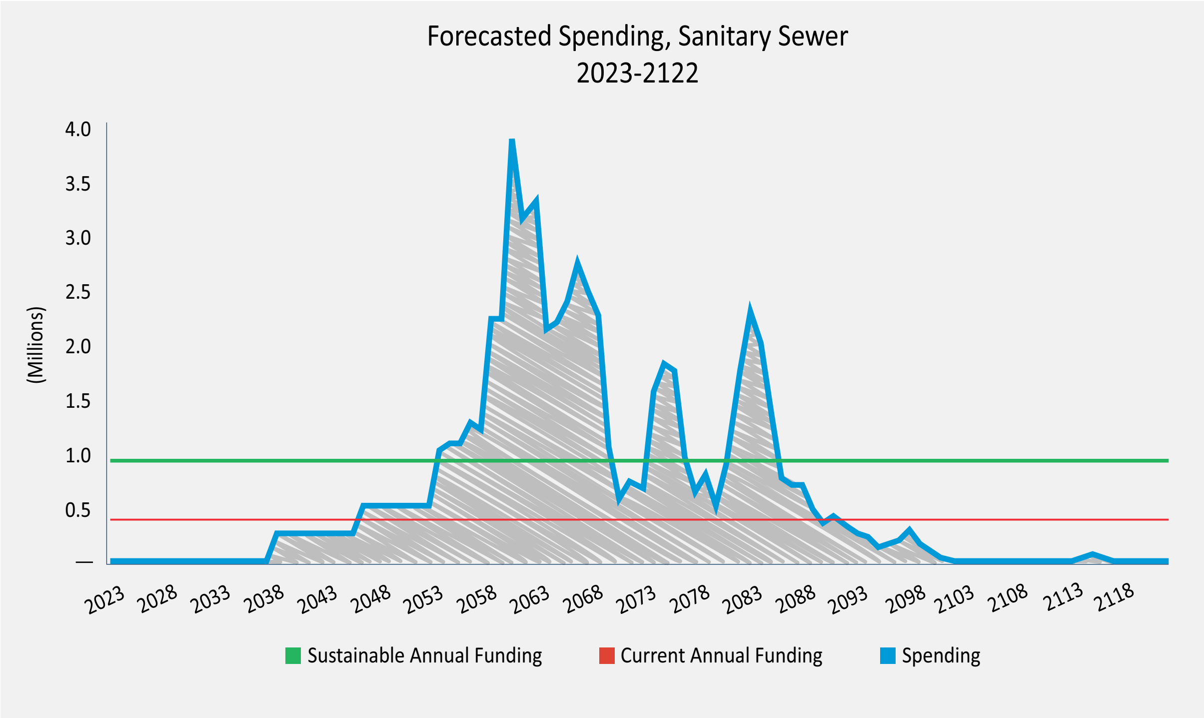
The weighted average physical life of assets will normally exceed 70 years, with many assets having physical lives exceeding 100 years. Often capital maintenance costs are concentrated near the end of an asset's physical life. Thus, a five-year financial plan is wholly inadequate at demonstrating the long term financial implications of a local government's infrastructure.

Many local governments develop master plans with a capital spending horizon of 10-20 years. Some have developed consolidated 20-year capital plans. These are welcomed and necessary improvements on statutory five-year financial planning minimums. However, a 20-year spending forecast may omit an era of significant capital renewal that exists just outside the planning horizon. For instance, a significant proportion of infrastructure may need replacing in years 25-35. This financial burden would not be evident to stakeholders in the absence of a 100-year financial model.

It is recommended that the forecasting horizon selected for a long-term financial plan be 100 years. Such a long forecasting window will make many professionals uncomfortable, particularly engineers and accountants. Multiple variables will materially change actual spending: inflation, investment returns, political direction, climate change, technology, asset physical life, and growth and development. The purpose of the forecasting exercise is not to perfect predictions but rather demonstrate the scale and significance of infrastructure spending and relative appropriateness of existing funding levels.

One hundred year modelling will ensure the full life-cycle costs of most assets are captured. This is particularly helpful when demonstrating the impact funding decisions will have on affordability and financial sustainability in the long term.

FIGURE 13: INFRASTRUCTURE SPENDING FORECAST



Componentized Assets (Building & Roads)

Spending forecasts should include detailed forecasts for componentized assets. In other words, replacement of major asset components as well as replacement of an entire asset should be represented and modelled. For example, spending forecasts should include replacement of a road's curb and gutter, base, and top layers, all according to their different component replacement schedules.

Reserve Forecasts

Infrastructure replacement spending does not often occur in a smooth and even way. Many assets are long lived and do not have uniform physical lives. Infrastructure spending can vary significantly from year to year.

Annual reserve contributions are an appropriate way to spread the cost of infrastructure replacement over the life cycle of an asset. This funding method has several advantages:

1. Expected replacement costs are spread across the life cycle of an asset, thereby ensuring all generations of ratepayers who use capital services pay a fair and proportionate share,
2. Proactive reserve contributions can benefit from significant investment returns and help avoid debt interest costs, and
3. Tax and utility rates remain stable and predictable.

Sustainable annual funding in the form of reserve contributions will ensure reserve balances are available for infrastructure replacement spending when needed. Unsustainable funding will result in reserve balances becoming insufficient, and debt becomes necessary. Forecasting reserve balances will provide insight about when and to what extent debt may be necessary.

To forecast reserves you will need to compile opening reserve balances, add annual reserve contributions, deduct forecasted infrastructure spending, and add forecasted investment returns.

TABLE 20: RESERVE FORECAST COMPONENTS

	2023	2024	2025	2026	2027	2028
Opening Balance	$1,000,000	$1,102,800	$1,468,100	$1,516,200	$1,434,700	$1,269,700
Reserve Contribution	$450,000	$450,000	$450,000	$450,000	$450,000	$450,000
Infrastructure Spending	$(367,200)	$(106,700)	$(430,900)	$(561,000)	$(643,000)	$(671,000)
Investment Returns	$20,000	$22,000	$29,000	$29,500	$28,000	$25,000
Ending Balance	**$1,102,800**	**$1,468,100**	**$1,516,200**	**$1,434,700**	**$1,269,700**	**$1,073,700**

Allocating Undedicated Reserve Balances

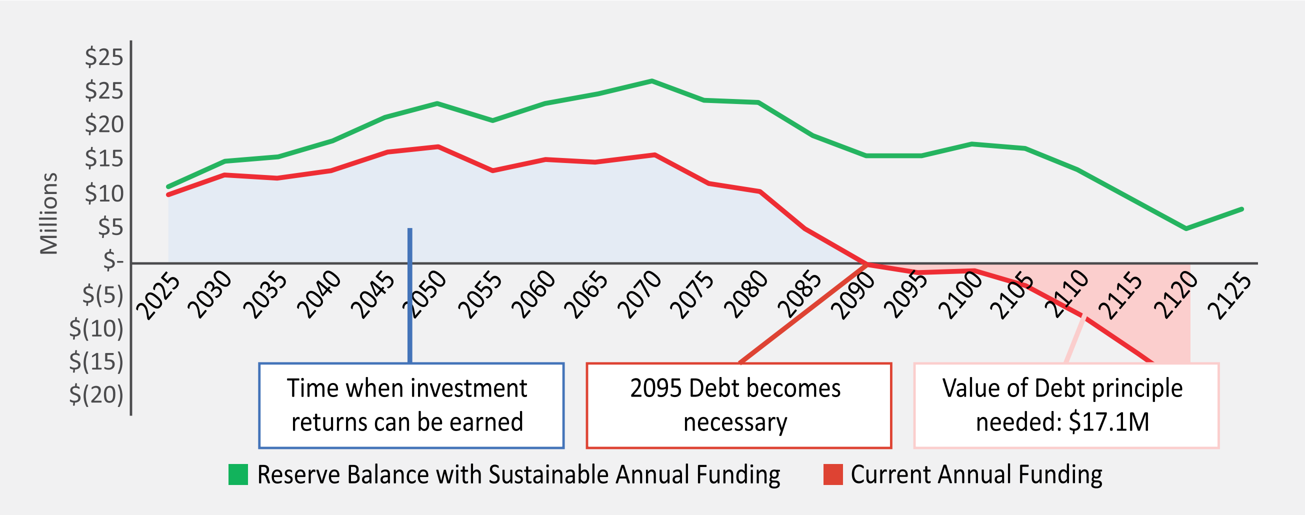
Only reserves dedicated toward infrastructure replacement should be used in reserve forecasts. Often local governments will maintain reserve balances that can be used to construct or purchase new capital. For instance, British Columbia municipalities are provided with annual Community Works funds through the Union of BC Municipalities from the federal government. These funds may be used to purchase or construct new assets or to replace existing assets.

It may be advisable to establish reserves or financial policies that dedicate reserve balances for renewing or replacing capital only. In the absence of formal dedications, your organization's Chief Financial Officer may be able to provide an average historical percentage of reserve balances spent on infrastructure replacement.

Investment Returns & Debt Servicing

Potential investment returns and debt servicing costs are an important consideration when evaluating funding options. Reserve forecasting allows governments to predict when debt may be required. While forecasted reserve balances remain positive, investment returns can be earned. When reserves become insufficient, debt interest should be modelled.

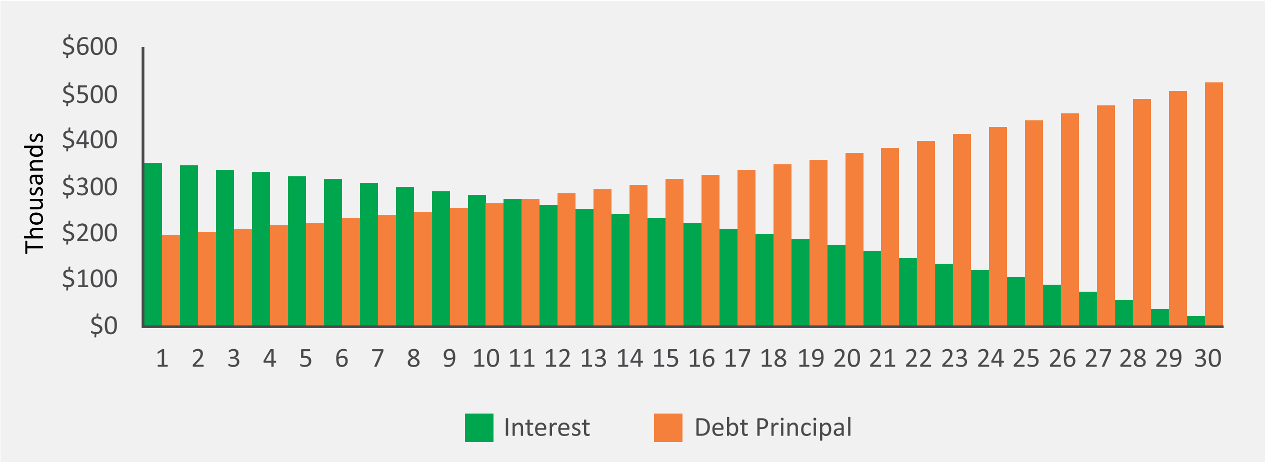
FIGURE 14: RESERVE FORECASTING – USING RESERVE FORECASTING TO MODEL INVESTMENT RETURNS AND DEBT INTEREST



The Community Charter requires that investment returns earned on reserve balances stay within the reserve fund (with a few exceptions). Investment returns are a highly relevant component of a sustainable infrastructure replacement funding stream.

Modelling investment returns will depend on many factors. A local government can tailor its investment approach to its cash flow expectations in order to maximize yields. The Municipal Finance Authority (MFA) established a Diversified Multi Asset Class (DMAC) Fund, for instance. This fund has exposure to stock market equities and has a performance objective of exceeding inflation by 3.5%. Direct investing in equities by local governments is prohibited by the Community Charter and Local Government Act. However, they may invest in a pooled fund of the MFA. In this way, a government can achieve significant yield using long-term reserve fund balances.

FIGURE 15: INVERSE RELATIONSHIP BETWEEN DEBT PRINCIPAL AND INTEREST

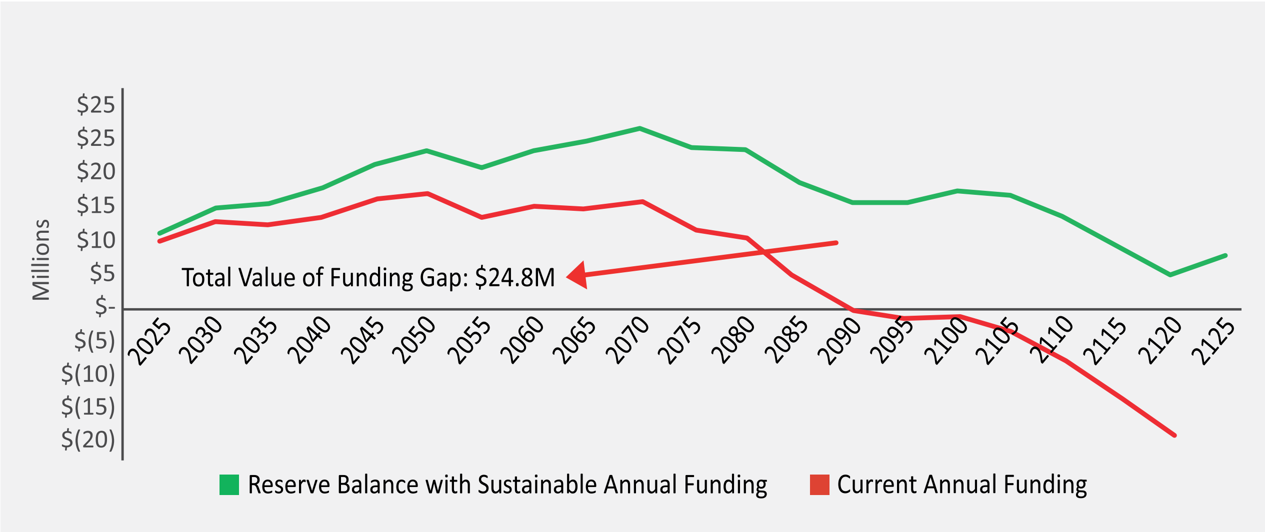


100-Year Funding Gap

Assuming a community's current funding levels are less than sustainable annual funding levels, its reserve forecasts will trend downward. This is because total 100-year spending will exceed total 100-year reserve contributions.

Modelling reserve balances using sustainable funding will result in a clear difference. This difference is the 100-year funding gap that demonstrates the unsustainability of the community's current funding levels.

FIGURE 16: 100-YEAR FUNDING GAP DEMONSTRATION



Time to Reflect

So far in this Guide we have looked at the steps necessary to analyze your organization's financial situation regarding asset management and to get to the point where you're able to develop funding options and recommendations to address shortfalls.

At this point, we offer you an opportunity to collect your thoughts and reflect on what you have learned so far. You might want to ask yourself:

- ☐ How does the information presented so far relate to my specific organization?
- ☐ How far along is my organization regarding assessing asset costs and conditions?
- ☐ What steps are still needed?
- ☐ How would we go about carrying out those steps?
- ☐ Are there any areas still causing confusion that I can read through again?
- ☐ Who else in my organization would benefit from this Guide?

Once you've taken the time to reflect and reenergize, we invite you to continue with the rest of Guide, where you will learn how to take the information gathered and develop specific funding options and recommendations. We will then look at how to present your findings to your associates, board or council, and community.

Module Five:

Developing Funding Options

In this Module you will learn:

- Property Taxation and Utility Fees
- Non-Market Change Revenue
- Grants from Senior Level of Government
- Casino Revenue, Lease Revenue, and Other

Property Taxation and Utility Fees

In British Columbia, municipalities are granted broad taxation powers pursuant to Section 197 of the Community Charter. Similarly, regional districts are granted broad powers to requisition member municipalities, who in turn recover requisitions through taxation. Regional districts must apportion costs to each service, while municipalities may impose taxes on all taxable properties.

When determining tax increase options, the following steps are recommended:

1. Determine what infrastructure is funded by fees (such as a water utility) and what infrastructure is funded by taxation.
2. Determine the difference between actual funding (as determined in Module 2) and sustainable funding (as determined in Module 3) for taxation-funded infrastructure. The difference between these two measures is the funding gap that should be closed with property tax increases.

TABLE 21: ANNUAL FUNDING GAP CALCULATION

General Taxation	Replacement Cost	Sustainable Funding (Simplified)	Sustainable Funding (Annuity)	Actual Funding	Actual Funding Gap
Stormdrain	$21,697,715.00	$268,248.54	$107,764.68	$219,023.36	$49,225.18
Roadway	$89,018,787.03	$1,943,063.50	$712,042.55	$1,248,582.80	$694,480.70
Buildings	$52,100,000.00	$1,599,473.81	$622,062.38	$525,913.30	$1,073,560.51
Vehicles & Equipment	$5,650,717.00	$324,054.49	$268,842.68	$160,000.00	$164,054.49
Park Infrastructure	$642,000.00	$33,686.67	$27,461.10	$6,480.54	$27,206.12
Total General	**$169,109,219.03**	**$4,168,527.00**	**$1,738,173.40**	**$2,160,000.00**	**$2,008,527.12**

3. Determine the equivalent property tax/utility rate increase required to close the annual funding gap.

Suppose a local government levies approximately $10,450,000 in annual property taxes. This means that $104,500 is a 1% property tax increase approximately ($10.45M x 1%). Similarly, 1% of water utility revenue is $11,500 ($1.15M x 1%) and 1% of sewer utility revenue is $8,500 ($0.85M x 1%). Therefore, the tax and utility increase necessary to close the annual funding gap is as follows:

TABLE 22: FUNDING GAP TAX/UTILITY INCREASE CALCULATION

	Funding Gap	1% Increase	Increase Required
General Infrastructure	$2,008,527	$104,500	19.2%
Water Infrastructure	$78,268	$11,500	6.8%
Sewer Infrastructure	$117,363	$8,500	13.8%

4. Model tax increases over various time frames for consideration by a council or board.

This step requires professional judgement by senior leadership and conversation with council. Based on the results from Step 3, council/board may be comfortable with phasing in increases over a 10-year period or even less. It is recommended that several options be prepared for consideration. Each option should demonstrate incremental debt servicing and incremental investment returns that may result.

Note that you should consider modelling tax and utility rate increases separately. This means you will need to understand the funding gap for utility-funded and general-taxation funded assets.

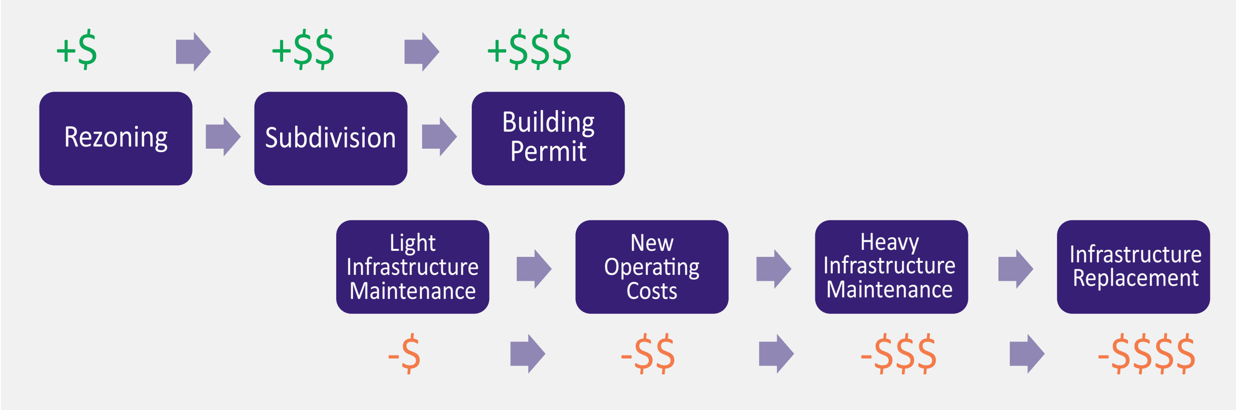
TABLE 23: SAMPLE SEWER UTILITY INCREASE OPTION ANALYSIS

Sewer Utility Inc. Options	Incremental Utility Fees Paid 2022-2121	Total Debt Interest Paid 2022-2121	Total Investment Returns Earned 2022-2121	Net Cost to Ratepayer 2022-2121	
1: 1 x 10%	$18,410,000	$47,700,000	$(2,466,000)	$63,644,000	
2: 1 x 20%	$40,310,000	$21,500,000	$(10,198,000)	$51,612,000	
3: 2 x 10%	$39,800,000	$22,100,000	$(10,034,000)	$51,866,000	
4: 4 x 5%	$39,400,000	$22,100,000	$(9,573,000)	$51,927,000	
5: 8 x 2.5%	**$38,986,000**	**$22,700,000**	**$(9,214,000)**	**$52,472,000**	Recommended
6: 5 x 5%	$49,000,000	$20,300,000	$(14,172,000)	$55,128,000	

Non-Market Change Revenue

Often municipalities will benefit from increased tax revenues when a property is initially subdivided. Even more revenue is earned when a property is developed and new buildings are built. However, the capital maintenance, operating maintenance, and replacement costs all lag. Therefore, when a municipality uses non-market change (NMC) revenue to reduce the tax burden for current taxpayers, the true cost of development is not integrated into the tax rate.

Figure 17: NON-MARKET CHANGE VS LIFE-CYCLE COSTS OF INFRASTRUCTURE



A municipality will benefit from establishing a policy for using NMC revenue to help close the annual funding gap.

Grants from Senior Levels of Government

Some local governments benefit from stable, dedicated grants from senior governments for capital expenditures. In British Columbia, all municipalities are recipients of the Community Works Fund, which provides stable, predictable, and dedicated funding for local infrastructure.

This funding stream may be used to construct or acquire new infrastructure. Therefore, local governments will need to dedicate this funding (or a portion) to infrastructure replacement in order for it to be used to reduce the annual funding gap.

Casino Revenue, Lease Revenue, and Other

Other revenues can be dedicated for infrastructure replacement. For instance, often governments own buildings that are leased out. The annual lease revenue can exceed annual operating expenditures, generating a small operating surplus. Rather than using this surplus to reduce taxes, consider transferring it to a reserve to fund capital maintenance and replacement costs.

Module Six:

Sensitivity Analysis

In this Module you will learn:

- Sensitivity Analysis

Sensitivity Analysis

Long-term financial plans are prepared using key assumptions. These assumptions, when changed, can make a significant difference to the plan's conclusions and findings. Modelling, forecasts, and key assumptions will inevitably be imperfect. Recognizing that exact financial predictions will be imperfect, it is important to ensure broad findings and conclusions are accurate.

For example, suppose a plan has the following findings:

Inventory Valuation: The replacement costs of the City's depreciable assets (including trees) are estimated to be between $900M and $1.1B.

Infrastructure Consumption: Overall, the City is estimated to have consumed between 35.0% and 41.4% ($414.8M – $443.1M) through the value of its infrastructure.

Spending Forecasts: Modelling indicates the City may spend between $1.1B and $1.4B (2022 dollars) approximately over the next 100 years (2023-2122) to replace existing infrastructure.

Funding Sustainability: Annual funding levels are estimated to between 36% and 41% sustainable. Funding levels will need to be increased gradually, or the City will likely be forced to incur increased debt-servicing costs as assets age.

Funding Gap: The value of infrastructure consumption is estimated to be $443.1M while the City's infrastructure replacement reserves are approximately $18.0M. This results in an accumulated infrastructure funding gap of $425.1M.

Life cycle Funding: Proactive, sustainably-funded reserve contributions can reduce property tax and utility funding required over the life cycle of the City's infrastructure. For instance, it is estimated tax and utility funding required can be reduced by between 42-51%, or over $680M, over the life of its infrastructure by leveraging investment returns and avoiding debt interest.

These findings can be validated by modelling optimistic and conservative assumptions for key variables, including:

- Useful/physical lives,
- Unit rates,
- Investment return, and
- Debt interest.

Report writings are encouraged to vary assumptions widely in order to validate key findings. Sensitivity Analysis findings can be summarized as follows:

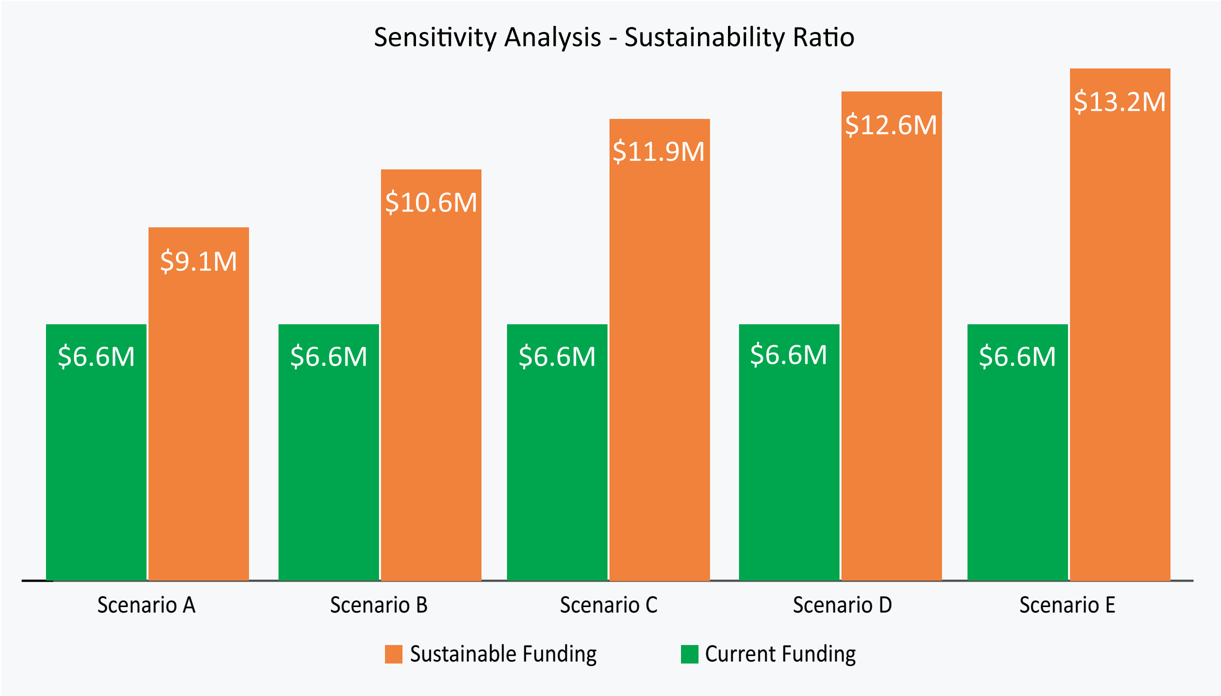
TABLE 24: EXAMPLE OF SENSITIVITY ANALYSIS PARAMETERS

General Taxation	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F
Sanitary Sewer Pipe Useful Life	+50% NAMS	+25% NAMS	NAMS	NAMS	-10% NAMS	-25% NAMS
Watermain Pipe Useful Life	+50% NAMS	+25% NAMS	NAMS	NAMS	-10% NAMS	-25% NAMS
Investment Return % (average)	4.0%	3.5%	3.5%	3.5%	3.0%	2.5%
Debt Interest % (average)	3.0%	2.5%	2.5%	3.0%	3.5%	3.5%
Unit Rates	-20%	-10%	-10%	N/A	+10%	+20%

TABLE 25: EXAMPLE OF SENSITIVITY ANALYSIS RESULTS

General Taxation	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F
Annual Sustainable Funding	$8.3M	$9.1M	$10.6M	$11.9M	$12.6M	$13.2M
Annual Funding Gap $	$1.7M	$2.5M	$4.0M	$5.3M	$6.0M	$6.6M
Annual Funding Gap %	20.5%	27.4%	37.8%	44.5%	47.6%	50.0%
% Sustainable Funding	79.5%	72.5%	62.3%	55.5%	52.4%	50.0%
Accumulated Infrastructure Funding Gap	$163.2M	$186.7M	$205.2M	$234.7M	$258.1M	$299.1M
$ Infrastructure overdue for replacement	-	$0.5M	$20.6M	$45.3M	$50.3M	$55.3M
% Infrastructure overdue for replacement	0.0%	0.0%	4.1%	9.1%	10.1%	11.1%
Recommended Tax Increase	5.8%	6.1%	8.5%	9.9%	10.8%	12.3%
Recommended Water Utility Rate Increase	6.1%	6.6%	7.6%	7.9%	8.1%	8.9%
Recommended Sewer Utility Rate Increase	4.9%	5.3%	6.7%	7.0%	7.3%	7.9%

FIGURE 18: SENSITIVITY ANALYSIS – SUSTAINABILITY RATIO



Module Seven:

Communicating Findings

In this Module you will learn about:

- Communication Plans
- News Release
- Executive Summary
- Key Recommendations
- Other Communication Materials

This module was written in partnership with Morello Communications Inc

Communicating long-term financial plan findings is as important, if not more important, than conducting the analysis. Findings and recommendations should be understandable and relatable to all stakeholders. Given that the findings can have a significant impact on a community and its residents, a communications plan should be part of the overall project plan.

Communications Plan

A communications plan may include the following items:

1 Developing a Communications Strategy

a. Clear timelines and resources required for communications activities

2 Developing a Public Relations Strategy

a. Social media strategy
b. Short explainer video
c. Briefing notes for council/board
d. Conducting a briefing with the governance body beforehand
e. Press release
f. Partnering with an asset management or local government finance association

3 Professionally Prepared Report

a. Should have a succinct, easy to read executive summary
b. Should include intuitive visuals
c. Should be easy to navigate and organized in a logical way
d. Should be professionally proofread by a communications specialist
e. Senior leadership should decide on key phrases and terminology
f. Senior leadership should decide on a name or branding of the report

News Release

An effective news release should contain the following:

Headline:

Be sure to title the release with a headline, about 10 words or less, that delivers the most pertinent information of the release in a way that will entice a member of the media to read the rest. Use active language and, when applicable, eye-catching words such as “new” and “latest.”

Example: “City Develops New Plan to Ensure 100-Year Sustainability”

Lead Paragraph:

Much like the headline, your lead paragraph should contain the most vital information of the release, presented in a way that will make someone want to keep reading. It should stress the importance of the new information and the overall message of the release. Keep it short, one to two sentences are enough.

Body:

The rest of the news release should present all the relevant information in a way that tells a story and delivers your message succinctly and clearly, using active language throughout. Generally, the most important information (the findings and recommendations of the report, for instance) should appear towards the beginning of the release, with more contextual information (such as the process of developing the report) towards the bottom.

It’s good practice to always include at least one quote from a government spokesperson in the release, such as your mayor or relevant department head, whomever will be speaking to the media if they follow up for more information. Quotes should focus more on emotion than information, and work to humanize the release. Avoid jargon and try to make the quote sound how the average person speaks. Opening statements such as “We’re excited to be presenting…” or “I’m delighted by the findings of…” are examples of ways to give the quote a personal, emotion-driven touch.

About Section

After the body of the news release, it’s worthwhile to include your organization’s boilerplate “About Us” statement as further background information for the reader. Likely, you have something along these lines already prepared, but if not, keep it to one paragraph and include information such as when your community was incorporated, where it is located, and any other basic information.

Contact Information

Also be sure to include contact information for either a communications staff member or a spokesperson, whomever you decide to be your first point of contact for members of the media.

Executive Summary

An effective executive summary may contain the following:

Introduction

Use the introduction to outline unique qualities about your community such as size, history, and First Nations significance. The introduction provides you with the opportunity to educate your community on statutory requirements and the importance of asset management.

Purpose of the Plan

This section should include information about any governance decisions that have led to the development of the plan.

Key Findings

The key findings section should list the following:

- **Inventory valuation:** What is the total value of your organization's depreciable and non-depreciable assets.
- **Infrastructure Condition (optional):** Infrastructure condition is an optional component as financial findings can be prepared without condition assessments. However, condition assessments help reinforce findings related to asset consumption.
- **Annual funding levels compared to sustainable funding levels:** As an example, this may state current funding is $1M while sustainable funding is $2M and thus the organization is currently 50% sustainable.
- **Sensitivity Analysis:** The results of the sensitivity analysis should be in the executive summary so that findings are validated immediately in the reader's mind.
- **Accumulated Infrastructure Funding Gap:** Be cautious when incorporating the accumulated infrastructure funding gap messaging into your report. This measure can confuse readers or give the impression that funding challenges are insurmountable. However, some organizations may decide it is a key communications component.

Key Recommendations

A plan should provide a roadmap for your organization to achieve financial sustainability in asset management. Recommendations may include:

- **Funding increases:** This could include tax and/or utility rate increases required over a recommended time frame to achieve financial sustainability in asset management.
- **Policy recommendations:** This guidebook doesn't discuss asset management policy in significant detail, however many asset management policies support long-term financial sustainability such as:
  - procurement,
  - land-use,
  - debt management,
  - investment,
  - budget,
  - non-market change revenue,
  - and others.

Other Communications Materials

Key Messages

Developing a document of key messages for your spokesperson is vital to help them prepare to speak to media. You should craft no more than three key messages containing the most important information you want to get out to the public. Your spokesperson will be able to lean on these messages to ensure the relevant information is presented to media. Below the key messages, the document should also contain secondary messages and/or background information your spokesperson can use if needed to answer questions.

To further help your spokesperson prepare, you may also want to consider putting together a document of Q&As. In this document you should attempt to anticipate what questions the media will have and prepare answers ahead of time, to help avoid being caught off guard. Make sure to think like a reporter when putting this together and consider any tough, probing questions your spokesperson may face. Lean on your key messages when crafting answers, to help control the narrative.

Social Media

It's a good idea to have some prepared social media content for the public launch of your report. Take the most vital information, such as announcing the release of the report itself, and craft specific messaging for your various social media channels. It's important to also include a photo in these posts, so find something eye-catching, preferable featuring people, that represents your community. It's recommended to use a photo from the report itself, if possible, for consistency. Be sure to link to more information, either via a landing page on your website or to a digital copy of the report itself.

Video

Videos are one of the most effective ways to earn attention online, especially via social media. You may want to consider crafting a short, concise video presenting the most relevant information from your report and your key messages. The video can be as simple as narration or captions over a series of photographs and visual information from the report. A simple animated video can also be effective and can be made using various online tools. For something more complex, or if you don't have the internal capacity to make a simple video, it's recommended to hire a videographer or communications contractor for support.

Appendices

In the Appendices you will find:

- Appendix A – Detailed Data Requirements By Asset Class
- Appendix B – Recommended Resources
- About the Author
- Glossary

Appendix A:
Detailed Data Requirements By Asset Class

Water Infrastructure

Water infrastructure can include mains, laterals, hydrants, valves, meters, and pump stations (which can also be included in the buildings asset class). The methodology to estimate replacement costs for these water infrastructure components often varies, therefore different data is often required:

Mains & Laterals: Mains are often estimated using a per-linear-unit rate. Often laterals are included in the unit rates for mains.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Diameter	Millimetres	Engineering Database	Replacement Cost
Length	Linear Metres	Engineering Database	Replacement Cost
Unit Rates by Material	$ per Metre	Quantity Surveyor/Engineering Consulting/Quantity Surveyor Software/Local Accounting Records	Replacement Cost
Year Install	YYYY	Engineering database/Tangible Capital Asset Database	Replacement Year & Consumption
Material	Type	Engineering Database	Replacement Year
Estimated Useful Life by Material	Numeric	TCA Policy/ Engineering Consulting/ National Asset Management Standards	Replacement Year, Annual Sustainable Funding

Hydrants, Valves, Meters: This infrastructure is often estimated on a cost-per-unit basis. Your engineering department should be able to provide a total count, which can be multiplied by a unit cost.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Unit Rates by Asset Subclass	$ per	Quantity Surveyor/Engineering Consulting/Quantity Surveyor Software/Local Accounting Records	Replacement Cost
Year Install	YYYY	Engineering database/Tangible Capital Asset Database	Replacement Year & Consumption
Estimated Useful Life by Unit	Numeric	TCA Policy/ Engineering Consulting/ National Asset Management Standards	Replacement Year, Annual Sustainable Funding

Pump Stations: Pump stations vary in size and capacity. It may be necessary to commission a replacement cost estimate for each pump station.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Appraisal – Replacement Cost	$ Total	Property Insurance Appraisal/Quantity Surveyor/Engineering Consulting	Replacement Cost
Year Install	YYYY	Engineering database/Tangible Capital Asset Database	Replacement Year & Consumption
Estimated Useful Life by Unit	Numeric	TCA Policy/ Engineering Consulting/ National Asset Management Standards	Replacement Year, Annual Sustainable Funding

Sanitary Sewer Infrastructure

Sanitary sewer infrastructure can include mains, laterals, lift stations, manholes, and clean outs.

Mains & Laterals: Mains are often estimated using a per-linear unit rate. Often laterals are included in the unit rates for mains.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Diameter	Millimetres	Engineering Database	Replacement Cost
Length	Linear Metres	Engineering Database	Replacement Cost
Depth (if available)	Linear Metres	Engineering Database	Replacement Cost
Unit Rates by Material	$ per Metre	Quantity Surveyor/Engineering Consulting/Quantity Surveyor Software/Local Accounting Records	Replacement Cost
Year Install	YYYY	Engineering Database/Tangible Capital Asset Database	Replacement Year & Consumption
Material	Type	Engineering Database	Replacement Year
Estimated Useful Life by Material	Numeric	TCA Policy/Engineering Consulting/ National Asset Management Standards	Replacement Year, Annual Sustainable Funding

Lift Stations: Lift stations vary in size and capacity. It may be necessary to commission a replacement cost estimate for each pump station. Lift station replacement cost may be listed on an appraisal report.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Appraisal – Replacement Cost	$ Total	Property Insurance Appraisal/Quantity Surveyor/Engineering Consulting/	Replacement Cost
Year Install	YYYY	Engineering Database/Tangible Capital Asset Database	Replacement Year & Consumption
Estimated Useful Life by Unit	Numeric	TCA Policy/Engineering Consulting/ National Asset Management Standards	Replacement Year, Annual Sustainable Funding

Manholes & Clean outs: Manholes and Clean outs are normally included in the unit cost for mains and laterals.

Storm Sewer/Drainage Infrastructure

Storm drain infrastructure can include mains, laterals, manholes, pump stations, culverts, ditches, bioswales, raingardens, rock pits, and stormwater management ponds.

Mains & Laterals: Mains are often estimated using a per-linear unit rate. Often laterals are included in the unit rates for mains.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Diameter	Millimetres	Engineering Database	Replacement Cost
Length	Linear Metres	Engineering Database	Replacement Cost
Depth (if available)	Linear Metres	Engineering Database	Replacement Cost
Unit Rates by Material	$ per Metre	Quantity Surveyor/Engineering Consulting/Quantity Surveyor Software/Local Accounting Records	Replacement Cost
Year Install	YYYY	Engineering Database/Tangible Capital Asset Database	Replacement Year & Consumption
Material	Type	Engineering Database	Replacement Year
Estimated Useful Life by Material	Numeric	TCA Policy/Engineering Consulting/ National Asset Management Standards	Replacement Year

Manholes: Manholes and clean outs are normally included in the unit cost for mains and laterals. It may be worthwhile to gather number of units for information purposes when presenting scale.

Pump Stations: Pump stations vary in size and capacity. It may be necessary to commission a replacement cost estimate for each pump station.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Appraisal – Replacement Cost	$ Total	Property Insurance Appraisal/Quantity Surveyor/Engineering Consulting/	Replacement Cost, Annual Sustainable Funding
Year Install	YYYY	Engineering Database/Tangible Capital Asset Database	Replacement Year & Consumption
Estimated Useful Life by Unit	Numeric	TCA Policy/Engineering Consulting/ National Asset Management Standards	Replacement Year, Annual Sustainable Funding
Material	Type	Engineering Database	Replacement Year
Estimated Useful Life by Material	Numeric	TCA Policy/Engineering Consulting/ National Asset Management Standards	Replacement Year

Culverts: Culverts are often valued using a per-meter-unit rate. However, unit rates can vary significantly for size, material, depth, and diameter. If depth and diameter information is unavailable, for instance, a conservative approach may be required to estimate values.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Adjacent To Road Name (if available)		Engineering Database	May be helpful in estimating depth and diameter
Segment From Road (if available)		Engineering Database	May be helpful in estimating depth and diameter
Segment To Road (if available)		Engineering Database	May be helpful in estimating depth and diameter
Material		Engineering Database	Replacement Year
Length	Linear Metres	Engineering Database	Replacement Cost
Depth	Metres	Engineering Database	Replacement Cost
Diameter	Millimetre	Engineering Database	Replacement Cost
Year Install	YYYY	Engineering Database	Replacement Year & Consumption

Ditches & Bioswales/Rain Gardens: Ditches are often valued using a per-meter unit rate. However, unit rates can vary significantly for depth and diameter. If depth and diameter information is unavailable, a conservative approach may be required to estimate values. Open drainage systems can be tricky to value as there may also be opportunity costs of additional capital services that a closed drainage system can support. For instance, a closed drainage system may provide the opportunity for above ground capital services such as green space, tree canopy, parking, active transportation corridors, etc.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Adjacent To Road Name (if available)		Engineering Database	May be helpful in estimating depth and diameter
Segment From Road (if available)		Engineering Database	May be helpful in estimating depth and diameter
Segment To Road (if available)		Engineering Database	May be helpful in estimating depth and diameter
Length	Linear Metres	Engineering Database	Replacement Cost
Depth	Metres	Engineering Database	Replacement Cost
Diameter	Millimetre	Engineering Database	Replacement Cost
Year Constructed	YYYY	Engineering Database	Replacement Year & Consumption

Rock pits:

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Location (if available)		Engineering Database	
Length	Linear Meters	Engineering Database	Replacement Cost
Year Construction	YYYY	Engineering Database	Replacement Year & Consumption
Other Dimensions (if available)	Meters	Engineering Database	Replacement Cost
Estimated Useful Life by Unit	Numeric	TCA Policy/Engineering Consulting/National Asset Management Standards	Replacement Year, Annual Sustainable Funding

Stormwater Management Ponds: By their nature, stormwater management ponds vary significantly. Therefore, useful life and replacement cost will be unique to each individual asset. Since replacement costs are difficult to generalize, a municipality may engage an engineering consultant and/or quantity surveyor to estimate costs. A municipality may also use an inflated TCA historical cost using cost escalation indices.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Year Construction	YYYY	Engineering Database, TCA Database	Replacement Year
Expected Useful Life	Numeric	Engineering Peers, Engineering Consultant, TCA Policy	Replacement Year
Area	Square Metres	Engineering Database	Replacement Cost
Volume (if available)	Cubic Metres	Engineering Database	Replacement Cost
Historical Cost	$	TCA Inventory	Replacement Cost
Replacement Cost	$	Engineering Consultant, TCA Inventory	Replacement Cost

Road Infrastructure

Road infrastructure can include arterial, collector, and local roads, incorporating both top and base layers, curb and gutter, sidewalks, bridges, active transportation infrastructure, traffic signals, and streetlights.

Roads: Roads are often valued using length but most often area. Useful lives are often determined using road classification. Roads are a componentized asset, meaning roads have components that are maintained and replaced at different times. For instance, a road top may be replaced several times before a road base is replaced.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Road Classification	Arterial, Collector, Local, or Other	Engineering Database, Pavement Condition Index	Replacement Year & Consumption
Road Sub-Classification (if applicable)	(e.g. Residential, Industrial etc).	Transportation Master Plan	Replacement Year & Consumption
Road Name	Alphanumeric	Engineering Database, Pavement Condition Index	
Road Segment From	Alphanumeric	Transportation Master Plan	
Road Segment To	Alphanumeric	Engineering Database	
Construction Material (if applicable)	Alphanumeric	Engineering Database	Replacement Year & Consumption
Area	Alphanumeric	Engineering Database	Replacement Cost
Length	Square Metres	Engineering Database, Pavement Condition Index	Replacement Cost
Construction Year	Linear Meters	Transportation Master Plan	Replacement Year & Consumption
Road Top Most Recent Pave Year	YYYY	Engineering Database	Replacement Year & Consumption
PCI Index (if available)	YYYY	Engineering Database,	Replacement Year & Consumption

Sidewalk: It's not uncommon for an local government to have an incomplete sidewalk inventory. It may be appropriate to use the Tangible Capital Asset listing to estimate sidewalk construction dates and areas.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Adjacent to Road Name	Alphanumeric	Engineering Database	Replacement Year
Road Segment From	Alphanumeric	Engineering Database	
Road Segment To	Alphanumeric	Engineering Database	
Construction Material (if applicable)	Alphanumeric	Engineering database, Transportation Master Plan, Sidewalk Master Plan	Replacement Year & Consumption
Area	Square Metres	Engineering Database	Replacement Cost
Length	Linear Meters	Engineering Database	Replacement Cost
Construction Year	YYYY		Replacement Year & Consumption

Curb & Gutter: Not all roads will have adjacent curb and gutter. It's also common for governments to not have a directory listing all curb and gutter. Curb and gutter likely represents a small proportion of assets. Therefore, it may be appropriate to estimate curb and gutter length and construction dates.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Road Classification	Arterial, Collector, Local, or Other	Engineering Database, Pavement Condition Index Transportation Master Plan	Replacement Year & Consumption
Road Sub-Classification (if applicable)	(e.g. Residential, Industrial etc). Alphanumeric	Engineering Database, Pavement Condition Index Transportation Master Plan	Replacement Year & Consumption
Road Name	Alphanumeric	Engineering Database	
Road Segment From	Alphanumeric	Engineering Database	
Road Segment To	Alphanumeric	Engineering Database	
Construction Material (if applicable)	Alphanumeric	Engineering Database, Pavement Condition Index Transportation Master Plan	Replacement Year & Consumption
Area	Square Metres	Engineering Database	Replacement Cost
Length	Linear Meters	Engineering Database	Replacement Cost
Construction Year	YYYY		Replacement Year & Consumption
Road Top Most Recent Pave Year	YYYY		Replacement Year & Consumption
PCI Index (if available)	XX.X%		Replacement Year & Consumption

Traffic Signals: Generally, traffic signal replacement costs are calculated by applying a unit rate per traffic signal classification and multiplying by the total number of units.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Signal Classification	Alphanumeric	Engineering Database	Replacement Cost
Install Year	YYYY	Engineering Database	Replacement Year & Consumption
Location	Alphanumeric	Engineering Database	

Streetlights:

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Streetlight Classification	Alphanumeric	Engineering Database	Replacement Cost
Install Year	YYYY	Engineering Database	Replacement Year & Consumption
Location			

Bridges: Bridges likely have components, just like building and roads. Thus, you will need to forecast replacement years and costs for each component. There is a likely a bridge inspection that you adhere to. Inspection reports will provide valuable insights. Since bridges are unique, you may need to pay for a quantity surveyor or engineering consultant to prepare forecasts or replacement costs estimates.

Field	Unit of Measurement	Data Source	Needed For
Segment or Asset ID		Engineering Database	
Location	Alphanumeric	Engineering Database	
Description	Alphanumeric	Engineering Database	
Construction Year	YYYY	Engineering Database	Replacement Year Consumption
Major Renovation Year (if applicable)	YYYY	Engineering Database	TCA Inventory
Area	Square Metres	Engineering Database	Bridge Inspection Report
Length	Metres	Engineering Database	Bridge Inspection Report
Replacement Cost	$	Appraisal Report Bridge Inspection Report	

Buildings

Buildings: Like roads, buildings are assets composed of components. This means that you may replace major components of a building throughout its life cycle and before the entire building is reconstructed. For this reason, the most accurate analysis will forecast individual component useful lives and replacement costs. This can be estimated using an industry standard. For instance:

Field	Unit of Measurement	Data Source	Needed For
Building ID		Appraisal Tangible Capital Asset Database	
Location	Alphanumeric	Appraisal Tangible Capital Asset Database	
Construction Year	YYYY	Appraisal Tangible Capital Asset Database	Replacement Year
Condition Rating (if available)	XX.X%	Facilities Condition Assessment	Replacement Year & Consumption
Floor Area	Square meters	Appraisal Building Department Records	Replacement Costs
Major Component 1, 2, 3….n			

Park Infrastructure

Park Infrastructure can vary significantly from community to community. Park infrastructure includes playgrounds, sports courts, park irrigation, benches, picnic tables, park utilities, fencing, park parking lots, ornamental lighting, and other. These infrastructure subclasses will each require a separate methodology for valuing and forecasting.

Benches, picnic tables, and ornamental lighting can typically be grouped into subclasses and value can be assigned using a per-unit rate.

Field	Unit of Measurement	Data Source	Needed For
Construction Year	YYYY		Replacement Year & Consumption
Useful Life		Professional Judgement	Replacement Year & Consumption
Number of Units	##	Parks Database	Aggregate Replacement Cost
Replacement Cost per unit	$$	Parks Database	

Fencing, parking lots, and sport courts can typically be valued based on a unit rate multiplied by measurement.

Field	Unit of Measurement	Data Source	Needed For
Construction Year	YYYY		Replacement Year & Consumption
Useful Life		Professional Judgement	Replacement Year & Consumption
Length or Area	Square or Linear Metre	Parks Database	Replacement Cost

Playgrounds and irrigation will vary significantly for each individual asset. A local government will have to collect replacement cost, construction year, and useful life information separately. The professional judgement of parks technical staff or consultants are valuable in collecting this information.

Vehicles and Equipment

Many departments will maintain detailed vehicle and equipment replacement plans for public works, parks, fire, police, and administrative vehicles. Often operations managers will have a good idea of what replacement costs will be. This information can also be gathered through normal procurement channels. Some local governments have conducted fleet reviews such as an E3 fleet review, which provides a replacement outlook and valuable data.

Field	Unit of Measurement	Data Source	Needed For
Acquisition Year	YYYY	Vehicles Database ICBC Insurance Documents	Replacement Year & Consumption
Useful Life		Professional Judgement	Replacement Year & Consumption
Replacement Cost		Procurement Quotes TCA Inventory + Cost Escalation	

Natural Assets

There is currently no universally accepted definition of a natural asset. However, Asset Management BC recommends the following definition:

> *"Municipal natural assets refer to the stock of natural resources or ecosystems that is relied upon, management or could be managed by a municipality, regional district, or other form of local government for the sustainable provision of one or more municipal services."*

A local government prepares its financial statements according to the accounting standards set out in the Public Sector Accounting (PSA) Handbook. These standards outline financial disclosures and accounting related to Tangible Capital Assets. Tangible Capital Assets must either be constructed or purchased to be recorded in financial statements. Unfortunately, this precludes the accounting for many natural assets. However, the importance of managing natural assets is quickly becoming a focal point in asset management.

One way of valuing natural assets is to consider the cost of the built infrastructure that would be required to provide the same or similar capital service the natural assets provide. Below find a few valuation methods used to try to demonstrate the value of natural assets:

Natural Assets	Potential Valuation Model
Trees (Urban Forest)	1. Value of reduced healthcare costs that result from cleaner air. 2. Value of carbon offsets that do not need to be purchased. 3. Cost to purchase, plant, maintain, and water a tree until maturity.
Creeks, Rivers	1. Cost of comparable recreational value provided by built infrastructure. 2. Life-cycle cost of grey infrastructure that doesn't have to be built due to drainage services provided by creeks and rivers.
Foreshore	1. Cost of comparable recreational value provided by built infrastructure.

Land

Land is not a depreciable asset and therefore the life cycle costs relate to annual maintenance costs. Maintenance costs will likely be established within a parks maintenance budget. It is worthwhile to establish parks service levels that are closely linked to a parks budget. In this way, parks service levels can be increased or decreased with the offsetting financial impact being integrated into the financial plan.

Appendix B:
Recommended Resources

TABLE 26: RECOMMENDED LONG TERM FINANCIAL PLAN RESOURCES

Resource	What Is It Needed For?	How Essential?
Asset Management Policy	Introduction	Medium
Asset Management Strategy	Introduction	Medium
Condition Assessments ☐ Facilities Condition Assessments ☐ Pavement Condition Assessments ☐ Closed Circuit Television for Storm and Sanitary Sewer ☐ Playground Inspection Reports ☐ Bridge Inspection Reports	Condition Assessments	Low
Costing information ☐ Unit Rates from an Engineering firm ☐ Unit Rates from Software ☐ Unit Rates from Recent Projects	Replacement Costs Modelling/Forecasting Annual Sustainable Funding	Crucial
Debt Amortization Schedule from MFA	Debt Modelling	Medium
Debt Servicing Historical Data	Debt Modelling	Medium
Five Year Financial Plan Bylaw	Annual Funding Levels Developing Funding Options	Crucial
Graphical information System export	Quantifying Inventory Totals Replacement Costs Modelling/Forecasting Annual Sustainable Funding	Crucial
Investment Policy	Investment Modelling	Low
Investment Return Information ☐ Historical Pooled Fund performance from Municipal Finance Authority	Investment Modelling	Low
Master Plans: ☐ Water ☐ Sanitary Sewer ☐ Stormwater/Drainage ☐ Parks ☐ Playground ☐ Transportation ☐ Sidewalk/Pedestrian	Modelling/Forecasting Condition Assessments	Medium

Resource	What Is It Needed For?	How Essential?
Official Community Plan		
Tangible Capital Asset Policy	Useful Lives	Low
TCA Register	Quantifying Inventory Totals Replacement Costs Modelling/Forecasting Annual Sustainable Funding	Crucial unless GIS information is available
Tax Rate Bylaw	Annual Funding Levels Developing Funding Options	Crucial
Useful Life Information: ☐ National Asset Management Standards Survey ☐ Technical Knowledge from Operations ☐ TCA Policy	Modelling/Forecasting Annual Sustainable Funding	Crucial
Utility Rate Bylaw	Annual Funding Levels Developing Funding Options	Crucial

About the Author
Christopher Paine, CPA, CGA

Christopher Paine is a Chartered Professional Accountant with 15 years of experience working in local government finance and two years experience as an Accounting Instructor.

Christopher is currently the Director of Finance and Asset Management for the District of Oak Bay and Principle with FIT Local Government Consulting. He has earned his Professional Certificate in Infrastructure Financial Management through the Institute of Public Works Engineering Australasia and is currently a member of the Asset Management BC Community of Practice.

Christopher has earned several awards for infrastructure replacement funding plans including:

- Union of BC Municipalities' Excellence in Asset Management Award,
- Government Finance Officers Association of US & Canada Award for Excellence in Government Finance, and
- GFOABC Outstanding Achievement Award

Christopher's work on the District of Oak Bay Sustainable Infrastructure Replacement Plan received Asset Management BC's first ever endorsement.

Glossary

Amortization

Amortization is the financial value of assets wearing out over time or by use. Generally, amortization is expressed in historical cost dollars.

Accounting Surplus

An accounting surplus is revenues less expenses. It does not include expenditures made for capital, on debt principal, or transfers to or from reserves. Local governments may budget for an accounting surplus or deficit but not a budget deficit or surplus.

Annual Funding Gap

In the context of this Guide, Annual Funding Gap refers to the difference between sustainable annual infrastructure funding vs actual annual infrastructure funding.

Asset Management

The combination of management, financial, economic, engineering, and other practices applied to physical assets with the objective of providing the required level of service in the most cost-effective manner.

Budgetary Surplus/Balanced Budget

A Balanced Budget is a financial plan where the sum of current revenue, transfers from reserves and debt proceeds, equals the sum of current operating expenditures, debt principal payments plus capital expenditures.

Accumulated Infrastructure Funding Gap

This is the difference between the sustainable reserve target and capital replacement reserves. For instance, suppose your roads are 30% through their life, and their replacement cost is $100M. The sustainable reserve target should be 30% x $100M = $30M. Sustainable reserve targets can be achieved by sustainable annual infrastructure funding. Thirty years of $1M contributions would result in $30M in reserves. However, suppose a local government doesn’t implement sustainable annual funding and has saved $0 by year 30. The sustainable reserve target ($30M) less actual reserves ($0) would yield a accumulated infrastructure funding gap of $30M.

Forced Growth

This refers to a necessary and often inflationary increase in the price to provide the same level of service. In the context of infrastructure replacement, it means an increase in the price to replace infrastructure. If the cost to replace a sidewalk in 2022 is 2% greater than the cost to replace the sidewalk in 2021, then forced growth is 2%. Sustainable annual infrastructure reserve contributions should be increased by an appropriate forced growth factor annually. Otherwise, the time value of money will result in the actual value of reserve contributions declining over time.

Levels of Services

In relation to capital services, these are the environmental, social, economic, and political outcomes that an organization derives from its capital assets.

Non-Market Change Revenue

Taxation revenue that results from taxable land or buildings not subject to taxes in the previous year. For example, newly built taxable buildings, previously exempt taxable property, newly subdivided land, or valuation increase due to zoning amendments.

Public Sector Accounting Standards

Public Sector Accounting Standards or PSAS represent the accounting framework established by the Public Sector Accounting Standards Board or PSAB. The PSAB was created to serve the public interest by establishing accounting standards for the public sector.

Physical Life vs Useful Life

Physical life is the length of time an asset can be in use before it is worn out, or beyond economic repair. This is not to be confused with useful life, which is the length of life selected by an organization to manage the risk of capital asset failures.

Tangible Capital Assets

An asset that has physical substance, is used to supply a service, lasts longer than a year, and is not for sale in the ordinary course of operations.

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