Long Term Infrastructure Funding Requirements

Based on Asset Replacement Schedules for

Gillies Bay Improvement District

Prepared for: **Gillies Bay Improvement District**
Box 102
Gillies Bay, BC V0N 1W2

Prepared by: **AquaVic Water Solutions Inc.**
PO Box 3075 STN CSC
R-Hut McKenzie Avenue
University of Victoria
Victoria, BC Canada V8W 3W2

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**PO Box 3075 STN CSC, R-Hut McKenzie Avenue,
Victoria, BC Canada V8W 3W2
Tel: 250 590 8143; Fax: 250 721 6497
www.AquaVic.com
email: jp@AquaVic.com**

Bridget Andrews, Financial Administrator
Gillies Bay Improvement District
Box 102
Gillies Bay, BC V0N 1W2
admin@gillies-bay.ca
Phone: 604 414 7459

26 June 2012

Dear Ms. Andrews,

Gillies Bay Improvement District (GBID): Long Term Infrastructure Funding Requirement

We are pleased to present this report on long term infrastructure funding requirements for the Gillies Bay Improvement District. This report summarizes the results of the analysis undertaken over the past months.

We are very grateful to the staff of GBID for the assistance provided during the course of this work.

If you have any questions about the work covered in this document please contact the undersigned. Thank you very much for the opportunity to work on this important project.

Yours truly,

Jean-Pierre Joly B.A.Sc.
Project Manager

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Contents

Please Note

The information presented in this document was compiled for the purposes stated in this document, and with the understanding that each user accepts full responsibility for the use and application of the document and the information it contains. This document and the information it contains are intended only as a general guide. It is not intended to replace the services of experienced specialists where these services are warranted by specific circumstances.

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1 Introduction

Organizations that own and operate large scale infrastructure, such as water and wastewater transmission, distribution and treatment systems, must ensure that their pricing structure will provide for the ongoing renewal of infrastructure. This infrastructure tends to be expensive, will have a long life, and is out-of-sight and out-of-mind. This combination of factors can lead to major financial deficits and political challenges as systems age.

This report is completed as part of a project undertaken during the period December 2011 through June of 2012 with the Gillies Bay Improvement District (GBID or the "District"). The goal of this project was to assist the District in determining long term infrastructure funding requirements for its water service area.

This was accomplished by first developing an asset replacement schedule (ARS) and then identifying a scenario for annual contributions for asset replacement (ACFAR) that supports long term sustainability.

1.1 Purpose

The purpose of this report is to summarize the work undertaken to develop asset replacement schedules and annual funding requirements for the Gillies Bay Improvement District.

1.2 Terminology

The following terms and acronyms will be used in this report:

GBID – Gillies Bay Improvement District ("the District")
AAFR – Average Annual Funding Requirement
ARS – Asset Replacement Schedule
ACFAR – Annual Contribution for Asset Replacement

1.3 Methodology - ACFAR Technique

The work undertaken in this project involves a financial planning technique which uses an Asset Replacement Schedule (ARS) to first determine the Average Annual Funding Requirement (AAFR) for keeping up with infrastructure replacement. Then, through a process of exploring scenarios, a plan for Annual Contributions for Asset Replacement (ACFAR) can be developed. This technique is described in more detail in Appendix D and Appendix F.

1.4 Benefits of using this Technique

Completing an Asset Replacement Schedule provides several potential benefits listed here. These are discussed in more detail in Appendix E.

- Responsible Stewardship
- Adopt Full-Cost Pricing
- Support Political Decisions
- Justify Rate Increases

- Leverage PSAB-3150 work
- Facilitate Capital Project Planning
- Improve Organizational Continuity
- Stabilize Rates for Long Term
- Prioritize Engineering Spending
- Improve inter-departmental collaboration

1.5 Project Scope

This project involved reviewing District documentation including Tangible Capital Asset Inventory and Valuation work previously completed; several phone discussions with staff members to review information and ensure that the information provided was correctly interpreted; in other discussions, asset replacement models were reviewed and scenarios explored; finally this concise covering report was developed to summarize the work undertaken.

1.6 Using this Information

The ARS tool is intended to be used to determine an organization's ACFAR and to inform the broader long term financial planning process. The ARS is not intended to be a long term financial plan in and of itself, nor a capital plan or an accurate prediction of when specific assets will fail or be replaced. Asset conditions are not assessed during this project. Assessment by a qualified engineer is required when determining whether an asset should remain in service or be replaced. Scenarios are intended to be a snap-shot in time. Assumptions should be reviewed from time to time and adjusted as needed.

1.7 Reference Documentation

Several documents were reviewed and incorporated into the asset replacement schedule including some past invoices and system plans.

1.8 Project Deliverables

The deliverables for this project include this concise covering report and the following Microsoft Excel spreadsheets which comprise the Asset Replacement Schedules for the District:

- GBID_ARS_2.11 Water.xls
- GBID_Linear_Assets_2.11 Water.xls

2 Gillies Bay Improvement District

2.1 Infrastructure Overview

The Gillies Bay Improvement District was established in 1965. The Improvement District serves a population of approximately 500 residents living in the Gillies Bay community located on Texada Island in the Georgia Straight.

The system serves 210 single family residential homes, 13 multifamily buildings, and 15 commercial buildings. The distribution system also has 32 fire hydrants. There are a further 55 parcels of land that are not currently connected to the water distribution and have service availability at the curb stop.

The water is treated using sodium hypochlorite. The distribution system consists of water mains ranging in diameter from ¾ inch to 12 inches. The water mains were not constructed at the same time and consist of a variety of materials including asbestos cement and thin wall PVC.

Raw water source	The District's water supply comes from Cranby Lake. A dam and spillway are used to regulate the water level on this shallow lake. From the intake works, water is conveyed by gravity to the chlorinator building.
Water production & treatment	The current wood construction building will soon be replaced with a 6,400 square meter galvanized steel building which will house the chlorine gas system, monitoring board, and backup generator.
Storage	Treated water is stored in a 36,000 gallon steel tank reservoir as well as distributed directly to the users.
Distribution	Treated water is distributed through a 9 km network of mains currently of sizes ranging from 100mm to 300mm. Over the next few decades, the distribution network will be upgraded to PVC and HDPE with pipework ranging in size from 150mm to 400mm. See appendix A for more details on the inventory of planned pipework replacement. One portion of the distribution system is pressurized by a pumping station containing 2 duty pumps and a reserve pump. There are about 60 valves throughout the distribution network.
Fire protection	The district maintains 33 fire hydrants.
Services	There are about 220 services in the system. Eleven commercial services are metered.

2.2 Asset Depreciation

GBID annual amortization amount for water assets for 2011 = $13,313

2.3 Average Annual Asset Funding Requirement (AAFR)

GBID Annual Asset Funding Requirement (AAFR) in 2012 dollars = $100,000

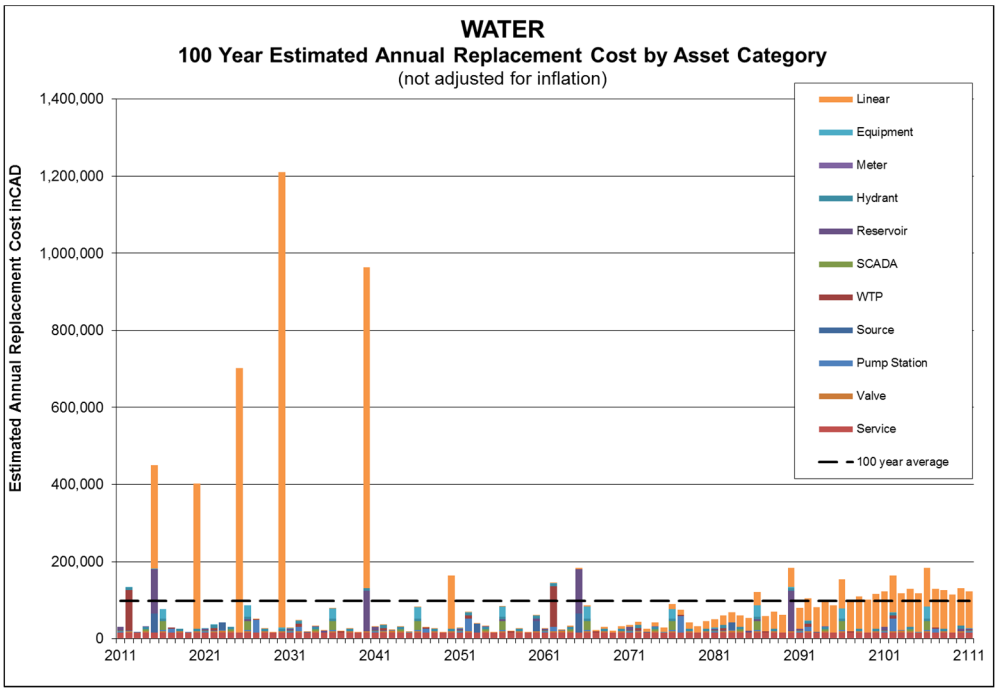


Figure 1 – GBID Asset Replacement Schedule with AAFR $100,000

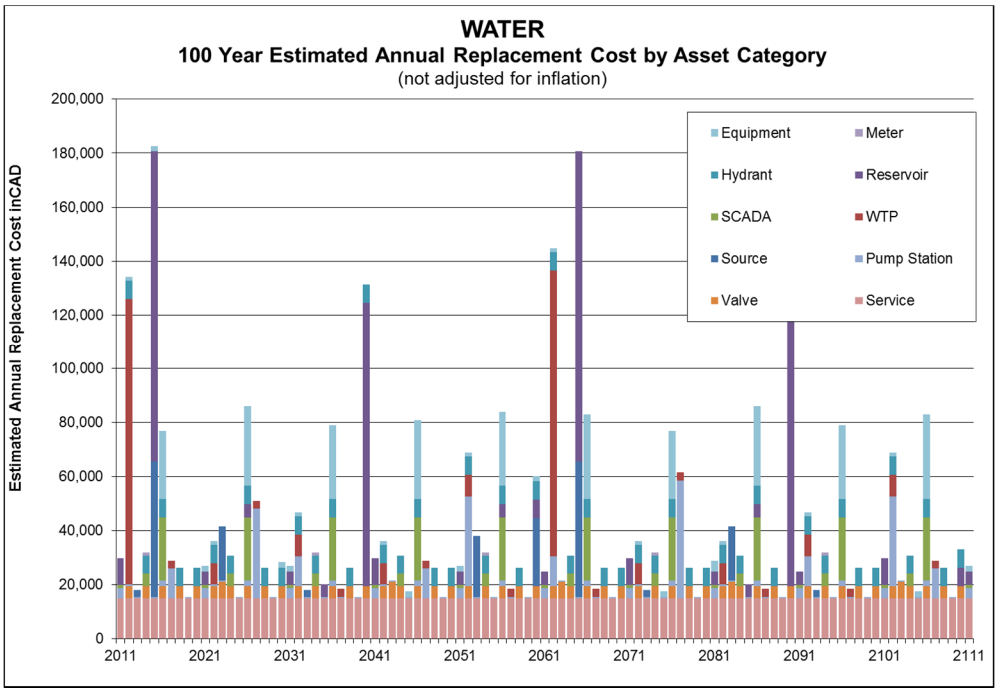


Figure 2 – GBID Asset Replacement Schedule without pipe work

2.4 Annual Contributions for Asset Renewal (ACFAR)

One or more ACFAR scenarios are presented on the following pages. Scenarios are based on the assumptions that inflation is on average 2%, cost of borrowing is on average 3% and return on investment is on average 1.5%.

2.4.1 GBID Scenario 1

ACFAR starts at $100,000 and increases by 2% annually over the 100 year horizon.

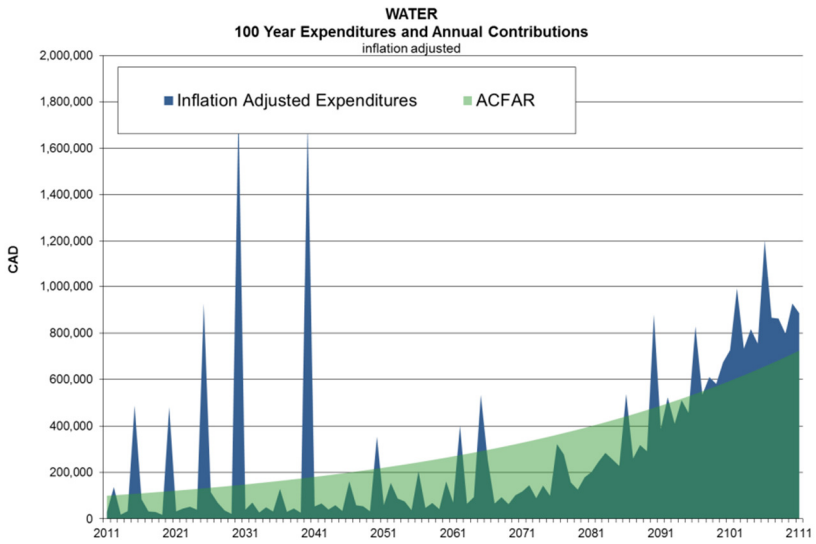


Figure 3 – GBID ACFAR Scenario 1

The blue curve represents inflation adjusted expenditures over the long term.

ACFAR budget is the green curve superimposed on the blue.

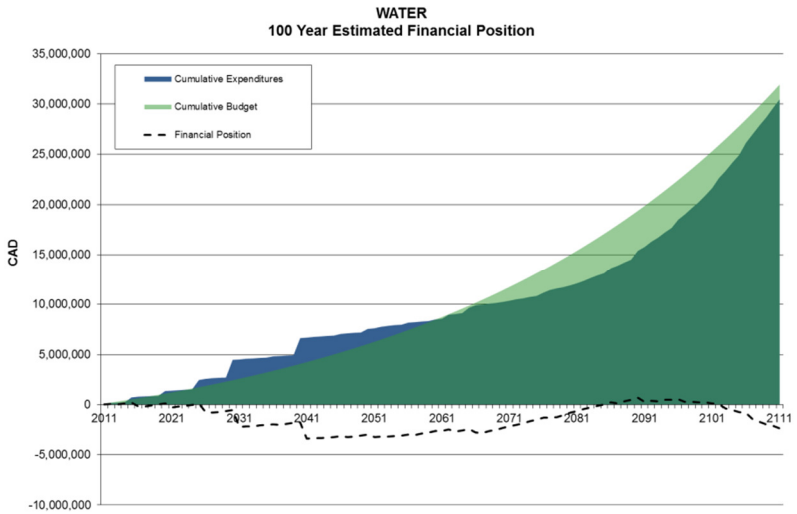


Figure 4 - GBID Long Term Financial Position Scenario 1

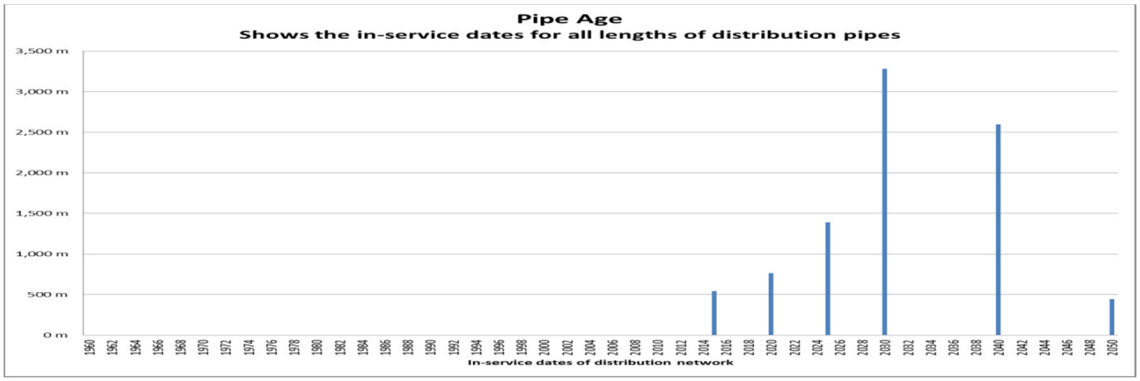
The blue curve here represents the same expenditures cumulatively over the time frame.

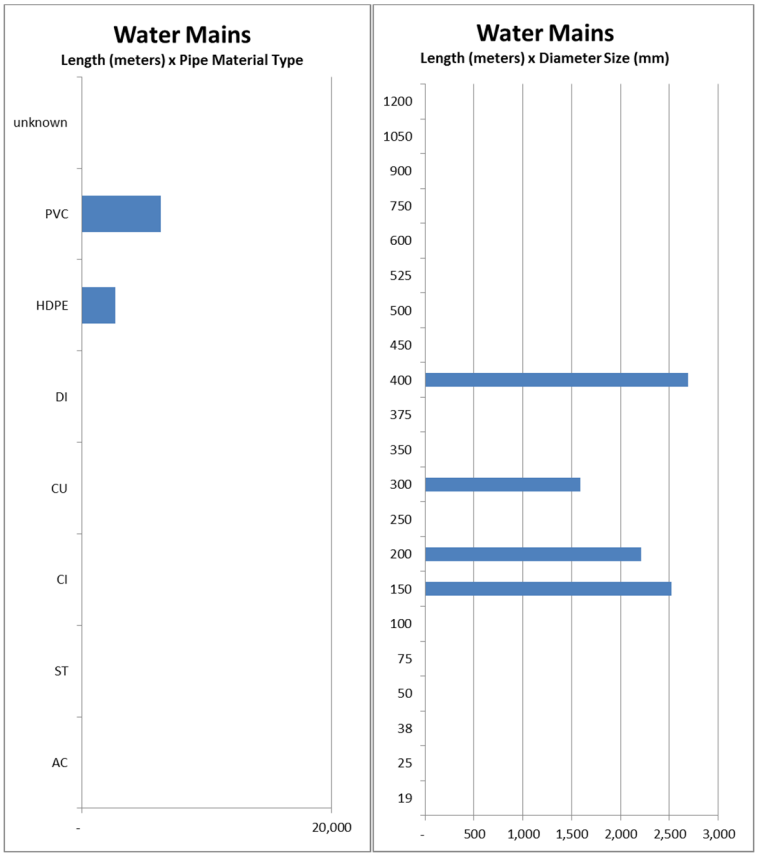
The green cumulative ACFAR budget also superimposed.

The dashed line is the financial position. When below zero, it implies the need for additional funding from through, and increases to taxes and utility charges.

Appendix A – **Distribution Network Details**

Gillies Bay Improvement District is planning updates to the distribution network over the next few decades. The anticipated replacement dates and planned composition of this network are shown below:

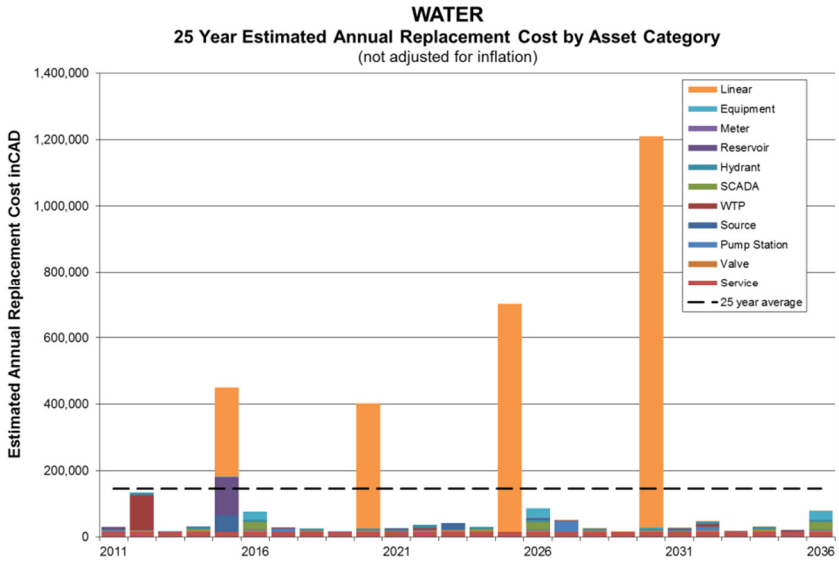


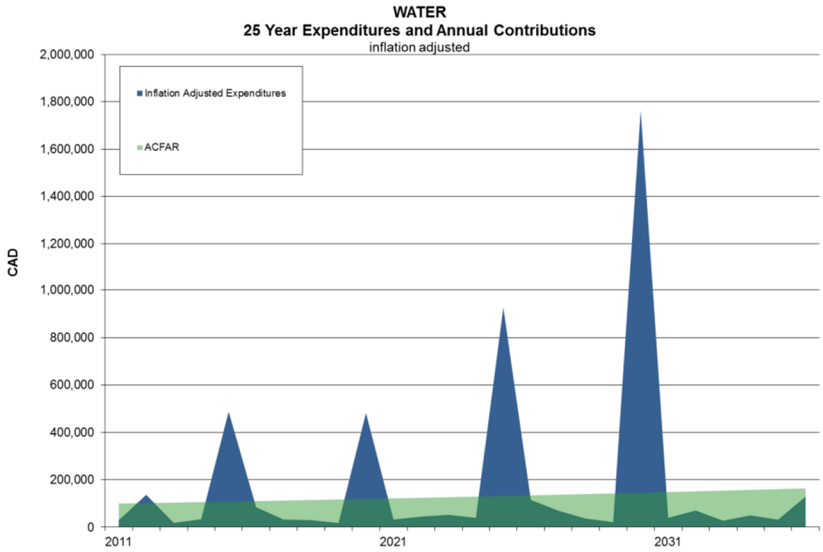


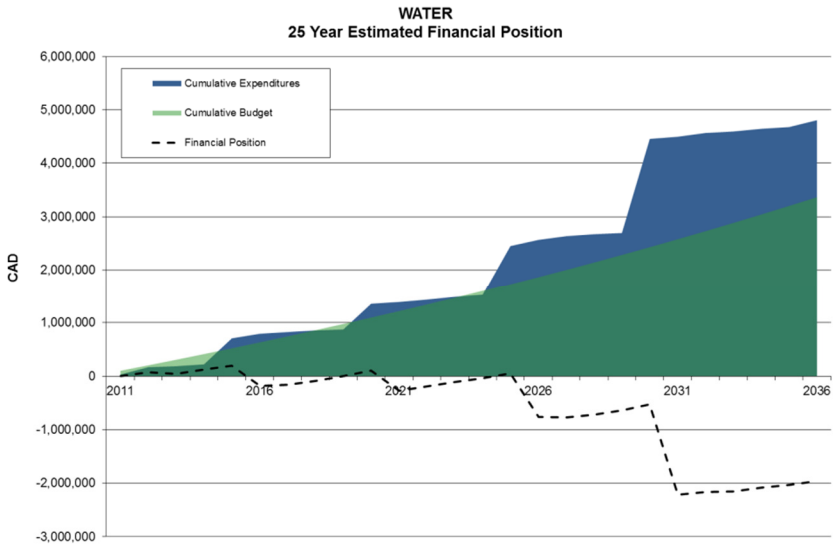
Appendix B – **GBID Twenty Five Year Time Frame**

This section contains the 25 year horizons of the figures in the main body of the report.

Royston Scenario 1






WATER
25 Year Estimated Financial Position
Cumulative Expenditures
Cumulative Budget
Financial Position
CAD
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
-1,000,000
-2,000,000
-3,000,000
2011
2016
2021
2026
2031
2036

Appendix D – ACFAR Technique

The ACFAR financial planning technique uses an Asset Replacement Schedule (ARS) to first determine the Average Annual Funding Requirement (AAFR) for keeping up with infrastructure replacement. Then, through a more elaborate process, a variety of scenarios and sensitivity analyses can be explored. Through this process, a long term plan for Annual Contributions for Asset Replacement (ACFAR) can be developed.

Depreciation

Historic costs of assets are recorded for accounting purposes. Each year, the net value of the assets depreciates by an amount called the annual amortization. This amount is a reflection of *wear and tear.* However, since it is calculated using historic costs, it may not accurately reflect future replacement cost. This is because inflation and other factors (such as technology advancements and changing standards) may increase or decrease the future replacement cost of assets relative to their initial cost.

AAFR

The Average Annual Asset Funding Requirement (AAFR) represents the average funding required annually to cover the costs of replacing infrastructure over a long period of time. See appendix F for a detailed description of how an ARS is developed and AAFR calculated from the ARS.

AAFR is an improvement over the annual amortization (depreciation) because it considers replacement costs in today's dollars and takes into account a long term future view of asset replacement. The ARS on which AAFR is calculated also provides an opportunity to include new assets and to replace assets with something different than the original asset. The annual amortization does not allow for these projections.

AAFR however does consider factors that may affect future replacement costs such as inflation, technology advancements or changing standards. AAFR is calculated by projecting asset replacement expenses over a long term and taking the average. AAFR also does not consider existing debt or reserve funds, or the cost of borrowing or the return on investments obtained from reserve funds.

ACFAR

The term *Annual Contributions for Asset Renewal* (ACFAR) is used to mean a budgeted amount of funding made available annually to cover the AAFR. AAFR may be viewed as the goal, whereas ACFAR can be viewed as the planned path towards achieving that goal.

ACFAR is determined in a process of exploring scenarios and undertaking some sensitivity analyses on underlying assumptions. Several parameters are adjustable in exploring ACFAR. The key indicator that informs this process is the long term financial position.

In the simplest case, ACFAR may start out exactly equal to AAFR with planned annual increases or decreases to keep up with any inflation. So, if an organizations AAFR is $100, then ACFAR for year 1 is $100; if inflation is 10% then for year 2 ACFAR = $110. And so on…

The advantage of ACFAR over AAFR is that ACFAR allows for a more detailed financial analysis by taking into consideration more concepts including: inflation, borrowing, and saving.

Borrowing for asset renewal and using infrastructure reserve funds has implications to the AAFR. Borrowing creates an additional cost in the form of interest owed. Saving away in a reserve fund creates new contributions in the form of interest earned. These amounts affect the AAFR. An organization that relies heavily on borrowing will have a higher AAFR. An organization that saves and replaces assets on a pay-as-you-go basis will have lower AAFR.

Also, certain circumstances require that ACFAR be increased gradually towards AAFR if the funding gap between current ACFAR and AAFR is too large.

Financial Position

The term *financial position* is used to mean the relationship between the long-term expenditures and long-term funding available to support expenditures. The financial position is calculated by subtracting the cumulative capital costs from the cumulative funding budgets. If the difference between these two curves is above zero then there is a funding surplus which could be held in reserve. If the difference is below 0 there is a funding gap implying the need for more funds perhaps by borrowing and possibly by increasing taxes and utility rates.

Appendix E – **Benefits to Completing an ARS**

You rely on your infrastructure to deliver essential services to customers. What does it cost annually to own, operate and renew your infrastructure?

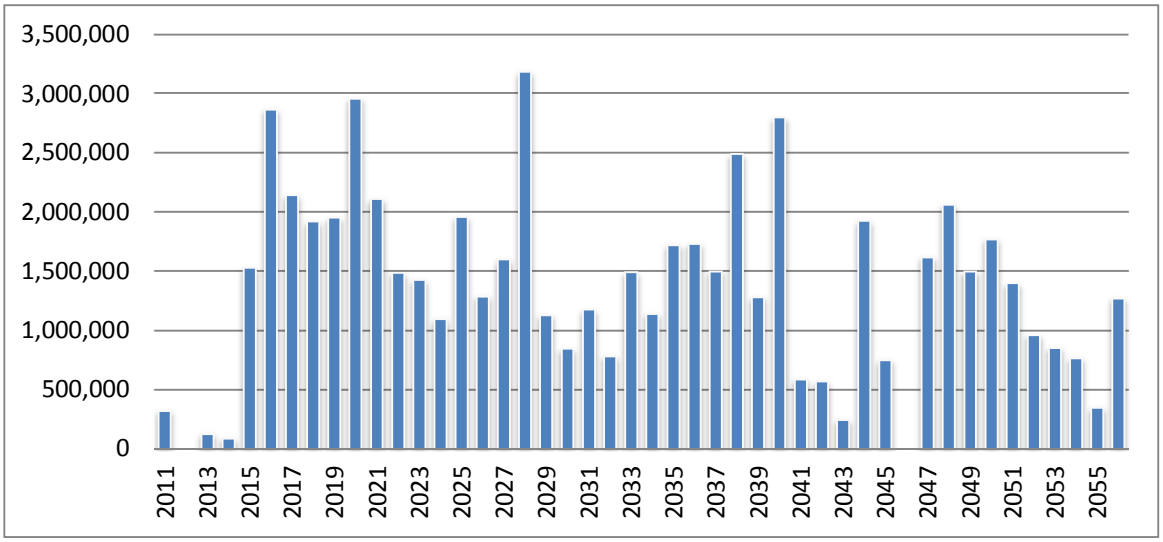
To find out, develop an Asset Replacement Schedule

What are the Benefits to Developing an Asset Replacement Schedule?

- **Responsible Stewardship**
- **Support Political Decisions**
- **Leverage PSAB-3150 work**
- **Facilitate Capital Project Planning**
- **Improve Organizational Continuity**
- **Adopt Full-Cost Pricing**
- **Justify Rate Increases**
- **Stabilize Rates for Long Term**
- **Prioritize Engineering Spending**
- **Improve inter-departmental collaboration**

Introduction

Many organizations own and operate large scale infrastructure, such as water and wastewater transmission and distribution and treatment systems. These organizations must ensure that their pricing structure will provide for the ongoing renewal of infrastructure. This infrastructure tends to be expensive, will have a long life, and is out-of-sight and out-of-mind. This combination of factors can lead to major financial deficits and political challenges as systems age. The long term costs to the organization for renewing infrastructure might look like the following:



Can Revenues Sustain Long Term Asset Renewal?

This question can be answered in part by ensuring that there is a sufficient budget annually from operating revenues to support long term asset renewal. This budget amount is termed *Annual Contribution for Asset Renewal (ACFAR).* The ACFAR is a planned and budgeted amount of funds allocated annually to support asset renewal according to an Asset Management Plan. Sustainability is achieved in part by determining the required ACFAR.

Two important goals are achieved by establishing a sufficient ACFAR:

1. Long term asset-renewal sustainability is ensured; and,
2. User rates and charges remain stable despite large fluctuations in annual expenditures.

The ACFAR for an organization is determined in part by completing an **Asset Replacement Schedule**. This practice allows organizations to more easily achieve full-cost pricing while insulating users from large fluctuations in user rates.

PS-3150 is a first step to completing an Asset Replacement Schedule

Recently local government organizations have completed the PSAB 3150 Tangible Capital Asset inventory and valuation of their infrastructure. This exercise took a close look at assets from an historic perspective. The results of this work gave information on net book value of assets and annual amortization (depreciation) of these assets.

Completing this work created an important first step towards sustainable operations. An Asset Replacement Schedule can be developed using the PSAB 3150 work as a basis. The ACFAR can then be more accurately determined.

Annual asset renewal-related expenses fall into three categories:

1. Capital projects paid for during the year
2. Principal and interest payments on outstanding asset renewal-related debt
3. Surpluses carried forward or transferred to asset renewal reserves

In order to determine if ACFAR is sufficient, other factors must be considered. In addition to paying for projects undertaken in the year, the annual capital asset renewal expenses also include debt servicing and reserve fund contributions.

Practical Benefits to Completing an Asset Replacement Schedule

Responsible Stewardship: Organizations that review rates and charges on a regular basis, with a consideration for long term asset renewal, are able to achieve full-cost pricing and maintain a sustainable operation for the foreseeable future;

Political Support: Elected officials and managers make challenging financial decisions about the procurement and upgrading of expensive infrastructure. The right decision is not always politically or publically appealing. An Asset Replacement Schedule (ARS) provides an integral part of the foundation which supports these decisions;

Add Value to the PSAB-3150 Work: An Asset Replacement Schedule is based on the PSAB-3150 work – an exercise that was recently and sometimes reluctantly completed by local governments in BC. Completion of an Asset replacement Schedule re-affirms the value of the PSAB-3150 work.

Improved Inter-departmental Collaboration: Like the PSAB-3150 work, the ARS combines accounting and engineering disciplines. Developing and maintaining an ARS galvanizes an ongoing collaboration between finance and engineering departments.

Improved Organizational Continuity: With changes in personnel, continuity of certain finance and engineering management activities can be disrupted. Continuity is greatly improved by adopting and institutionalizing certain asset management practices – for example, annually updating and reporting of the PS3150 work, and properly maintaining an asset replacement schedule.

Long-term Value: An Asset Replacement Schedule is a tool that is purchased once and can be used on an ongoing basis year after year;

Facilitate Annual Infrastructure Renewal Planning: An Asset Replacement Schedule assists with planning annual infrastructure renewal activities;

Establish Context for using Reserve Funds and Debt Financing: An Asset Replacement Schedule projects far into the future and provides a long-term financial outlook. This helps to manage the use of reserve funds and debt financing;

Justify Rate Enhancements: Completion of an Asset Replacement Schedule provides a basis on which to build the case for rate enhancements. It does this in part by emphasizing the need for a sufficient ACFAR component in the budget, and by justifying the need for a reserve fund.

Stability of Rates over long term: By establishing an ACFAR, rates and charges can be set to a stable level. They may rise over time with inflation, but should not spike and fluctuate significantly despite the large fluctuations in asset renewal expenditures.

Prioritize Spending on Engineering Reviews: Engineering reviews are typically undertaken to assess the condition of certain assets. An Asset Replacement Schedule provides a relatively inexpensive starting point to help prioritize and direct spending on engineering reviews.

Appendix F – **Asset Replacement Schedule Methodology**

This appendix briefly summarizes the methodology for developing the asset replacement schedule (ARS) from which the average annual asset funding requirement (AAFR) can be calculated.

Project Tasks

The following activities are typically undertaken in preparing an Asset Replacement Schedule:

1. Assemble Information: Confirm scope and deliverables of project with organization staff. Assemble and review existing documentation including: scale plans & as-built drawings; financial reports; historical cost records; tangible capital asset inventory and valuation reports prepared under PSAB 3150 requirements; insurance statement of values; and, other relevant documents used by the organization.

2. Prepare Asset Schedule: Prepare an initial inventory of tangible capital assets using existing information and following from discussion with staff and others. Present information in spreadsheet form, including estimated age and remaining useful life of assets. Review with staff.

3. Develop Replacement Costs: Working with staff, apply a consistent method for estimating the future replacement costs of the assets. This may include research, consultation with specialists, discussions with knowledgeable staff members, and application of industry reference tables.

4. Review and Finalize Schedule: Review asset schedule with staff and modify replacement time frames and replacement costs as needed. Prepare the final worksheets including linear asset weibull analysis, the overall system replacement schedule, the average (not adjusted for inflation) annual replacement cost, the Annual Contribution for Asset Replacement (ACFAR).

5. Project management & reporting: Manage scope, schedule and budget of project. Coordinate meetings with staff and provide progress updates. Provide a concise written report on the project.

Tangible Capital Assets Inventory

Tangible Capital Assets (TCA) have characteristics that help distinguish them from other types of assets. The following characteristics are based on the definition a tangible capital asset as provided by the Public Sector Accounting Board (PSAB):

A tangible capital asset must have all of the following characteristics:

- Has use and / or value
- Is a physical asset used in the delivery of service
- Has a useful life of more than one year
- Is not bought or sold in the regular course of operation.

Aggregation

The level of detail required in the asset inventory is a balance between cost of data collection, tracking and analysis and the beneficial use of the information gathered.

The aggregation of assets involves the grouping of assets and is important for determining capitalization. In certain cases, capital assets are grouped in one of the following ways:

- Grouping same assets together. This is used primarily for linear assets. For example, it may be desirable to count pipework by km of pipe. In some cases, several segments of pipework are grouped together and in some of those cases, some pipes may be of different diameters. This is done for simplification and to reduce the cost of data collection. Typically, at least 90% of the pipes in a grouping are of similar diameter and the grouping is valuated for that diameter. The inaccuracy introduced by this method is immaterial as most of the costs are in the construction labour, and not in the materials used.

- Grouping related assets together. For example, it may be desirable to group all the assets for a treatment station (filters, disinfection facility, pipework, controls) under a single category called 'treatment facility'. Unit prices used for valuation of the water mains include for the supply and installation of items such as line valves, tees, bends and thrust blocks. These items are not identified separately.

Ages & Materials

The ages and materials of certain assets including the various lengths of water main in the distribution system are determined by reference to historical records, scale drawings, other documentation, and from the recollection of staff and operators.

Estimated Useful Life

Typically, the estimated useful life (ESL) of assets is selected from a table of useful life values for standard asset types. In certain cases, the manufacturer may recommend an ESL that is different from a standard value. In certain cases, the useful life of an asset is adjusted based on the condition of the asset as assessed by staff, operators and contractors. In some cases, an asset may be in excellent condition and may surpass its estimated useful life by many years. In other cases, assets that are in good condition may be replaced earlier because of the need to upgrade the capability of the asset or gain access to newer technology. The work undertaken during the project does not include on-site condition assessment of assets.

Linear Assets Weibull Analysis

Linear assets such as distribution networks can have long service lives, for example 80 years or even longer. However, rather than scheduling replacement of a length of pipe exactly 80 years after it was put in service, segments of that pipe are schedule

for replacement according to a probability (Weibull) curve, which is much like a normal distribution or a "bell curve". The Weibull curve predicts that the majority of that pipe will fail at its estimated service life, but significant portions will fail before and after that time. This provides a more realistic projection of replacement costs for linear assets.

Replacement Costs

The replacement value of an asset is the amount required to replace an asset at the end of its useful life. In the case of certain assets, the historic cost of installation of the asset is used to determine replacement costs in today's dollars. The historic cost is adjusted using a widely used index of construction costs (Engineering News Record), to determine the replacement value today.

Capitalized Asset Maintenance and Renewal

In some cases, assets are not fully replaced; instead, they undergo significant maintenance or upgrades which extend the service life of the asset. For example, a reservoir may have a liner replaced every 35 years. Although these costs are typically less than the cost of the original asset, they are still capitalized and considered as part of the asset inventory.

Non-capitalized Asset Maintenance and Renewal

Certain assets undergo regular maintenance and repair work which is not capitalized. These costs are typically covered in annual operations and maintenance budgets. This work is undertaken in some cases to ensure the full estimated duration of the life of an asset. In some cases, this work can ensure that an asset will provide useful service indefinitely: for example, a concrete dam may never be replaced as long as it is properly maintained.

Average Annual Funding Requirement (AAFR)

The average annual asset funding requirement in the ARS is calculated by taking the average of total expenditures over the 100 year horizon. A twenty-five year AAFR is also calculated by taking the average over a 25 year horizon.