# ASSET MANAGEMENT





The Asset Management Toolkit was developed by the Northwest Territories Association of Communities. Work was completed by Kerr Wood Leidal Associates Ltd. in 2018. It has been updated by Jacobs, in partnership with KWL, in May of 2023 to reflect the realities of how the climate is impacting the ability of NWT communities to deliver services.

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Funded by:



Prepared by:





# 1. About this Guide

The Asset Management Plan Guide ("The Guide") was developed by the Northwest Territories Association of Communities (NWTAC). The Guide is designed to help communities use the Asset Management Plan Template, and complementary Asset Inventory Templates to create documents that are tailored to their local context.

This Guide is part of a Toolkit of resources that have been developed to help communities build their capacity in asset management. The resources that make up this Toolkit include:

- ► Asset Management Policy Template & Supporting Guide
- > Asset Management Plan Template, Inventory Template & Supporting Guide (this document)
- ► Lifecycle Cost Workbooks (2) & Supporting Guides
- Levels of Service Template & Supporting Guide
- Playbook Worksheet, Climate Vulnerability Assessment Worksheet, Annual Schedule Template & Supporting Guide
- Smart Management Practices (6)

Each component is designed to be used together with the other components of the Toolkit, which can be found online at: www.nwtac.com

## Purpose

This Guide provides information and resources to support communities in the Northwest Territories as they develop a corporate Asset Management Plan (AMP). It is designed to help communities interpret and adapt the Asset Management Plan Template and supporting Asset Inventory Template.

## **Intended Audience**

This Guide has been developed for representatives of communities in the Northwest Territories, including staff, senior management, and decision-makers such as Mayor, Chief, and Council. This Guide may also be of interest to members of the public who would like to learn more about asset management practices in their community.

# **Guide Structure**

This Guide provides a starting place for communities to develop their own Asset Management Plan. It includes sections describing each component of the Asset Management Plan Template, with notes on how to bring information in from the Inventory. The Guide also provides support to communities interested in tailoring the templates to meet their needs.

The Guide is made up of five major sections:

| 1. | About this Guide         | Information on the purpose and structure of this Guide.   |
|----|--------------------------|---|
| 2. | Background               | Details on what a Asset Management Plan is and how it fits with existing strategies and practices in the Northwest Territories.       |
| 3. | Quick Start Guide        | Where to begin if you have limited resources. This section will help to focus your efforts  |
| 4. | Developing your Plan     | A description of each section in the AMP Worksheet, the Annual Schedule Template as well as some completed examples.                  |
| 5. | Putting it into Practice | An overview of next steps for finalizing your Asset Management Plan and using it to begin implementing your asset management program. |
| 6. | Glossary                 | A list of key terms used throughout the report, and their definitions.  |

# 2. Background

## **Asset Management Plans**

An asset management plan is a document that describes how one or more groups of assets are managed over a period of time to deliver an agreed upon standard of service. It compiles and analyzes information about assets to identify issues and strategies for moving forward in a proactive and sustainable manner.

AMPs provide important information to support decision-making. Understanding what assets you have and how to manage these assets can help your community maximize the value of existing infrastructure that delivers core community services.

## **Essential Elements of Asset Management**

There are many international, national, and regional best practices that provide guidance on developing an AMP. The seven essential elements touch on many of these best practices through a clear and concise list of questions, and associated actions, which should be addressed through the AMP development process. These elements were adapted from the federal InfraGuide on Managing Infrastructure Assets (Federation of Canadian Municipalities and National Research Council, 2005).

| <u>7 Essential Elements</u>                                  |                                  |
|--|----------------------------------|
| What do you own? ————————————————————————————————————        | Inventory                        |
| What is it worth? ————————————————————————————————————       | Valuation                        |
| What is its condition?                                       | Condition / Remaining Life       |
| What needs to be done?                                       | Levels of Service / Initial Plan |
| When do you need to do it?                                   | Risk Assessment & Prioritization |
| How much will it cost?                                       | Revenue Requirements             |
| How will you pay for it? ——————————————————————————————————— | Long Term Financial Plan         |

The AMP Template has been designed around this framework, with each section answering one or more of these questions.

The length and complexity of an AMP will vary from community to community depending on community size and experience with asset management. Communities should **start small and build** complexity over time as more information becomes available and the community grows its asset management capacity. For many communities in the Northwest Territories, a single "**Corporate**" **AMP** that includes all community-owned assets may be appropriate. Some larger communities may wish to have separate AMPs for each service area (e.g. water, sewer, roads, buildings).

An AMP is one of many tools that should make up an asset management program. It should be integrated with other tools, plans and policies.

# 3. Quick Start Guide

The first step for developing an asset management plan is to determine who will lead the process and which staff will be involved. Ideally, an asset management plan will involve input from staff from across departments. Recognizing that resources are limited in many communities, it may make sense to begin with a simplified asset management plan that can be built up over time as more resources and information become available.

There are many ways to develop an asset management plan. Three possible options are presented below, each representing a different level of effort and addressing a range of needs depending on community size and level of current asset management practice.

# Pathway 1: Getting Started (1 week)

Many communities have only a small contingent of staff who wear a variety of 'hats'. In these cases, there will likely be limited time and knowledge for working on asset management. This pathway is intended to enable you to begin a formal asset management program which can be expanded over time as resources allow.



The focus is on documenting key information about existing assets to develop a preliminary plan for renewal. A couple staff working together over a few days can complete this exercise. To be most effective, clear your schedules for those days (or for a series of half days) and sit together in a quiet space. The following steps will walk you through the process:

- Build your Asset Inventory draw on information on community-owned assets from available sources, beginning with your community public infrastructure funding asset list from MACA. This can be supplemented by lifecycle costing details, Municipal Funding Review capital information sheets, and NORCIX funding reports for individual assets. Both MACA and NWTAC have lists of your community's infrastructure and its condition which can be easily accessed. Refer to Section 2 of this Guide for details on key information to include.
- Summarize the Current State of Assets create one page "Current State of Assets" sheets for each major asset category. A sample format and further detail is included in Section 2 of this Guide and the Asset Management Plan Template.
- 3. **Develop a Renewal Plan** Estimate when existing assets will likely need to be renewed, and create a preliminary reinvestment plan using the "25-Year Renewal Plan" sheet in the Inventory Template.

At the end of this process you will have a clear summary of what assets your community owns (including an inventory), the current state of these assets, and valuable new insight into the longerterm needs for investment in renewing the assets your co mmunity needs for providing essential services. Other aspects of the asset management plan template can be added to in the future, including identifying key issues, defining new capital projects, and developing an optimized investment plan.

# Pathway 2: Essential Plan (2 - 3 months)

Communities with more time and staff resources may be able to complete an Asset Management Plan that includes all essential elements with a basic level of analysis. This pathway should involve highlevel input from staff in different departments to identify key issues and define priorities for investment.

Communities should expect this level of detail to take 2 - 3 months to complete the first 6 sections of the Asset Management Plan Template including the current state of assets, risk assessment, documenting levels of service, key issues and options, and focusing on developing a plan for renewal and defining new capital assets in the cost requirements section. This pathway relies on existing information and involves a high level analysis of risk and financial planning. It does not focus on optimization. Information gaps should be clearly documented so they can be addressed in future iterations of the asset management plan.

Introduction



# Pathway 3: Complete Plan (1 Year)

Developing a robust asset management plan will involve leadership from one or a group of staff who will provide input into the plan at key milestones along the way. This pathway involves completing each section of the Asset Management Plan Template using existing information. Some communities may choose to collect additional data (such as selected asset condition) as part of the plan development process to fill information gaps.

Communities should expect this level of detail to involve up to a year of work and include multiple meetings with staff from across departments. It should involve a complete current state of assets, a comprehensive assessment of risks, and documentation of existing levels of service. Key issues should be documented for Sections 2, 3 and 4 in the Asset Management Plan Template, and synthesized to identify "priority key issues" to drive long term capital planning. Communities will also develop optimization strategies to make investments under the long term financial plan more sustainable and tailored to community objectives.

Asset management plans developed to this level of detail will provide the most robust direction for investment decision-making.



# 4. Developing Your Plan

The purpose of this Guide is to help communities use the Asset Management Plan Template and supporting Asset Inventory Template to create an AMP that is tailored to their community. Each subsection of this Guide directly mirrors the sections in the AMP Template.

The Guide includes sample tables and graphs in the AMP Template, each showing content from a hypothetical community, that help illustrate key concepts throughout the AMP template. These snapshots demonstrate the type of information and level of detail to expect.

# About the Asset Management Plan Template

The AMP Template provides the structure and sample content for creating a **corporate asset management plan for all community-owned assets**. It is designed to be "implementation ready" and communities can choose the degree to which they tailor the template to their needs.



- Yellow highlights in the Template show areas that communities will need to update to make the AMP their own.
- Blank tables and graphics have been included in the AMP Template to be filled in with specific information about your community. Refer to the samples provided in this Guide as an indication of information type and level of detail.

Completing an AMP for your community involves more than just replacing text in the template. Staff will need to complete analysis to determine asset management needs and priorities and develop strategies to address gaps. This can be done internally by seeking input from staff across the organization, or with the help of a consultant.

Having an asset inventory is an important starting point for developing your AMP. Communities can use the Asset Inventory Template provided as part of this Asset Management Toolkit to get started. Building your asset inventory by inputting **existing information** about community assets is the first step and necessary for completing the analysis that will go into the AMP.

## **Recommended Practices for Developing your Plan**

- Start Simple and build over time
- Use existing information and resources
- Link with existing record keeping and decision-making processes

## About the Asset Inventory Template

The Asset Inventory Template is designed to help communities consolidate relevant information to support asset management decision-making. This information in turn will enable communities to complete the analysis required to develop their AMP. Communities should use the Asset Inventory Template as a central database of key information about community-owned assets. The inventory will provide a living document that communities update over time as new information becomes available.

The Asset Inventory Template reflects best practices for organizing key asset information. It is "implementation ready" and includes simple calculated fields and graphs that can be transferred directly into the AMP Template once data has been added.

## **Sources of Information**

Community public infrastructure data is already available to communities from the NWTAC and MACA. This means that you a huge step ahead in terms of moving forward with asset management in your community. The data is ready for your use. The Municipal Funding Review (MFR) provides helpful information including the year of install for each asset as well as an estimated replacement value. It also indicates the amount of funding available to each community for capital and O&M purposes that can be used to supplement own source revenue. Additional relevant information was gathered as part of the Northern Communities Insurance Exchange (NORCIX) program; funding reports have been prepared and records are being maintained on the condition of all community facilities that are insured. Life expectancy, remaining life, quantities (length, area, units), and a schedule for capital expenditures is available.

The Asset Inventory Template includes individual spreadsheets that serve the following five main purposes. More information about how to populate the Template is included alongside the AMP Template sections

## 1. Introduction

Provide high-level information about the inventory, including guidelines for populating information and definitions of key terms. Sheets include:

- "Cover Sheet"
- "Definitions"

Start here to input basic data such as community name and tracking changes. As a future step, this could be an appropriate place to start tracking contracted services.

## 2. Inventory

These sheets are where you input the source data for charts and graphs in the AMP, and include:

- "Inventory Linear and Vertical": use for the majority of community-owned assets, including all linear assets (e.g. water/sewer/storm mains, roads, trails) and vertical assets (e.g. buildings, culverts, pump stations)
- "Inventory Vehicles and Equipment": use for all mobile community-owned vehicles and heavy equipment (e.g. public works vehicles, trucks, excavators, mowers, plows, pavers).

## 3. Long-Term Financial Plan

Schedules showing renewal costs and timelines for community assets over a 25-year period based on the remaining life of each asset. These charts will be important for determining priorities, costs, and timing of key issues and options in Sections 5 - 9 of the AMP Template. Sheets include:

- "25-Year Renewal Plan Static": The renewal schedule for all linear and vertical assets. This sheet is linked to the "Inventory Linear and Vertical" sheet and will automatically populate as information is added to the inventory.
- "25-Year Renewal Plan Vehicles": The renewal schedule for all vehicle and heavy equipment assets. This sheet is linked to the "Inventory – Vehicle and Equipment" sheet and will automatically populate as information is added to the inventory.
- "Renewal Chart Summary": Summary Chart showing Static and Mobile renewal needs. This sheet will automatically populate.
- "25-Year Non-Renewal Plan": The schedule for all non-renewal capital projects identified to address key issues. Communities should input data about non-renewal projects directly into this sheet.
- "Chart Unoptimized Plan": Summary chart showing renewal and non-renewal costs and timelines. This sheet is linked to the 25-Year Charts and will automatically populate.
- Chart Optimized 25-Year": Placeholder for a summary chart showing renewal and non-renewal costs and timelines, with adjustments to help balance revenue and expenses. Copy the chart unoptimized plan and adjust manually to reflect staff discussions and optimization results.

## 4. Current State Summaries

Sheets summarizing information about each asset category, including graphics and summary statistics. These sheets are linked to the inventory spreadsheets and will automatically populate as information is added to the inventory. Communities can use the information on these sheets to populate the Current State Factsheets in the AMP Template. Sheets include:

- Current State": Summary of information about all community-owned assets.
- Asset Category Current State: Separate sheets for each asset category (water, sewer, roads and drainage, buildings, recreation, vehicles, heavy mobile equipment.

## 5. AMP Tables

Sheets with populated sample text/numbers, for each AMP report table. These can be modified as needed and copied into the AMP Template.

Tables 1-14 from AMP Template

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## **Asset Management Plan Structure**

This figure provides an outline of the AMP Template (in green) and data inputs (in black) for analysis in each section. It is intended that communities will complete each section of the AMP Template in sequence, as each section builds on information provided in the sections before. The AMP outline can be described at a high level as follows:



# **Section 1: Introduction**

The Introduction (Section 1) of the AMP Template establishes the objectives and structure of the AMP and provides high level information on the community context, including community location, size, guiding policies, and major infrastructure assets.

The **Executive Summary** is an essential feature of the AMP and designed to be used by Council to inform decision-making about investment in community infrastructure. The Executive Summary should be relatively short (less than 10 pages) and use clear language to highlight the key issues and strategies identified through analysis in the body of the AMP. Each issue should be clearly linked with the section it relates to in the AMP so readers can quickly find details as needed.

# Asset Management Plan Scope

The first step in developing an asset inventory and AMP is to group community-owned assets into asset categories. These categories will determine how detailed information is summarized in the AMP and your inventory to inform decisions about asset management and investment.

Core asset categories will likely include:

| Asset Category         | Example Assets / Subcategories  |
|------------------------|---|
| Water                  | Reservoirs, pump stations, water mains, portable water pipes, hydrants, water trucks  |
| Sewer                  | Wastewater treatment plants, sewer mains, manholes, sewer vacuum trucks   |
| Roads and Drainage     | Asphalt roads, gravel roads, dirt roads, sidewalks, streetlights, ditches, culverts, detention ponds  |
| Buildings              | Community buildings including townhall, library, community center, cemetery facilities, waste transer station, fire hall, public works and maintenance, garage and fuel maintenance, and storage sheds. |
|                        | *Includes building components such as landscaping and parking   |
| Recreation             | Recreation centre and pool, arena trails, outdoor pools or rinks, baseball or<br>soccer fields, ball diamonds, playgrounds and parks, gardens, boat<br>launches, race tracks                            |
| Vehicles               | Cars, trucks, and small equipment such as mowers and zambonis   |
| Heavy Mobile Equipment | Water trucks, garbage trucks, excavators, plows   |

Deciding how to categorize your assets will be different for each community. For example, one community may categorize trails and pathways as road assets while another as recreational assets. The most important thing is to be consistent so that all assets of that type are grouped under the same asset category. As another example, if your community relies 100% on trucked water and has no other infrastructure, you may decide that a water system category isn't necessary. If you truck both water and sewer perhaps a utility category is more relevant, and associated vehicles and equipment could be moved into that category.

Communities may have other assets that don't fit into the categories noted above. These should be added on a case by case basis and may include:

- Solid Waste
   Protective Services (e.g. fire, ambulance)
- ► Cemetery ► IT
- Airport
   Natural assets (e.g. aquifers, forests, wetlands)

# Tailoring the Template for Individual Asset Management Plans

Larger communities may want to adapt the Template so that it focuses on a single asset category or service area, such as water, wastewater, or buildings. Creating separate AMPs for each individual category means that the plans can be completed one at a time as information becomes available about each asset category. It may also involve additional work and detailed analysis for each asset category.

Interested in developing individual asset management plans but unsure which asset categories to start with?

- Prioritize by need: Start with asset categories that you expect have significant issues or deficiencies that need to be addressed (e.g. risk to public health and safety, not meeting regulatory requirements). An AMP will outline strategies to address these issues.
- ► Prioritize by available information: Alternatively, you may want to start with categories that have more complete information as you work to improve information for other categories.



## **Considering Climate Change in Asset Management**

As the climate in the North warms faster than the rest of the world, melting sea ice is opening shipping routes and putting northern natural resources within reach. However, there are new concerns from increases in commercial and tourism, such as demand for search and rescue and addressing human-created disasters (Artic and Northern Policy Framework, 2022). Infrastructure investments will also be needed.

This has, and will continue to, affect the land, biodiversity, cultures and traditions. In turn, it challenges the ability for communities to deliver essential and relied upon services. Asset management is an approach that can assist communities in becoming more sustainable.

As we consider climate change, it provides an avenue for increasing resilience and ultimately sets a path forward for how we can continue delivering services to future generations. The Asset Management Plan enables us to strategically plan how we can adapt, by articulating our short and long term strategy for addressing climate impacts – through infrastructure renewal, enhancement/retrofits and new infrastructure – to ensure the reliability of our services and the longevity of our systems.

Each community is experiencing climate impacts differently, and it is important to recognize the local context and challenges being faced. This section is where these local hazards can be listed (eg. permafrost thaw, flooding, wildfires, plateau shrinkage, etc.). Each community has a climate change profile which can be accessed from the NWTAC Climate Change toolkit found here: https://climatechange.toolkitnwtac.com/ with an example seen below for Fort Simpson.

# Fort Simpson



Modelled historical values are taken from the DCCAQv2 dataset. Historical gridded data derived from babarvatoris are available on ChristelAlus za. The modernic (RCP 4.5) and high (RCP 8.5) almate change scenarios are only two possible future cilmate scenarios.

(a)

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1-833-517-0376

Canada.ca/climate-services

<sup>2</sup> Icing days are days where the maximum temperature does not go above 0 °C. Definitions for the other variables are available on ClimateAtlas.co. The climate is changing and poses risks to all Canadians. Climate information, traditional and scientific, can help us navigate these risks. This handout provides a sample of the scientific climate data available and provides guidance on how to work with scientific climate information.

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## Regional Impacts and Adaptation Examples

| Changing Winters  |   |  |  |
|---|---|--|--|
| Continued warming and thawing car<br>Shortened winter road and shippin<br>Threatened structural integrity of b<br>Increased winter precipitation can le<br>Increased winter precipitation can le<br>Increased winter precipitation can le<br>Coreased show load on infrastruct<br>Increased demand for snow remove<br>Shorter and less reliable ice seasons<br>Reduced safety of traditional hunti<br>Coastal erosion<br>Increases in marine shipping | 1 lead to Adap<br>19 seasons • Int<br>suildings Sta<br>10 | Itation Examples<br>tegrate best management pro<br>uncil of Canada's Northern Ir<br>andardization Initiative<br>onitor and adapt foundations<br>cks) built on thawing permafr<br>vised winter road loads and of<br>instruct all season roads and/<br>insportation<br>ccess to real time information<br>omote safety<br>proved methods to determine<br>triods | actices from Standards<br>Ifrastructure<br>s (e.g. steel piles, screw<br>rost<br>considerations to<br>for alternative methods of<br>n on ice thickness to<br>ne ice freeze-up time |
| Ecosystems and Heal   | th Hotter sun   | nmers Longer frost-free s  | eason Warmer all year  |
| Possible Regional Impacts   | Adapt   | tation Examples  |  |
| <ul> <li>Increase in forest fire risk for certai</li> <li>Loss of barrier to invasive species v<br/>extreme winter temperatures</li> </ul>  | n regions Imp<br>aro<br>with reduced Inc.   | alement 'FireSmart' practices<br>wind homes<br>reased awareness regarding i<br>ctor-borne diseases   | in communities and<br>invasive species and   |

# Canadä

It is also possible to develop hazard maps for your community to help understand what existing infrastructure might be at risk, what kind of emergencies to plan for, and to inform future decisions around where and how to build new development to maximize community resilience. For further details on undertaking hazard mapping, see the Northern Communities Guide on Integrating Climate Change Measures into Municipal Planning and Decision Making which is part of NWTAC's climate change toolkit: https://climatechange.toolkitnwtac.com/.

INTEGRATING CLIMATE CHANGE INTO ASSET MANAGEMENT Climate Catherine Simpson SNFRAstructure Change Temp warming more than Ax faster in North The impacts of the Changing Climate are already causing hazards and impacting our infrastructure and our ability to deliver services. WILDFIRES ! extreme CAUSE COMMUNI Flooding More LO ROAD ACCESS CAN BE WUNERABLE TO FIRES, FLOODING, EXTREME WEATHER ROADS - MILD WEATHER) (WINTER DUM MUNICIPA Infratructure not designed withstand curient IMPacts EROSION (RIVERS & COASTAL) PUTS BUILDINGS RESIDENTIAL AND WELIC INFRASTRUCTURE AMAGE Buildings, ROADS, RUNWAYS, ETC AT RISK. HIGH/LOW To address Climate Change threats to our communities, BARGES AND FERRIES asset management should be a priority. isolate communities + impact ability to deliver services

## **Examples of Climate Hazards Impacting Infrastructure**

A series of examples illustrating how climate hazards are affecting infrastructure in the NWT are described below.

#### **Coastal Erosion in Tuktoyaktuk**



Sea level rise has been measured at 2.75 mm per year. The curling rink (left) is one of the assets lost from coastal erosion. The elementary school and RCMP detachment are others. Coastal erosion is also threatening homes and the graveyard, and is an urgent issue for the community. They're exploring the relocation assets in order to adapt as the climate continues to change. Coastal erosion due to climate change could cost the hamlet of Tuktoyaktuk up to \$50 million according to Mayor Merven Gruben (CBC News, 2019).



## **Examples of Climate Hazards Impacting Infrastructure**

#### Wetter Snow in Inuvik



#### Flooding in Hay River

As our climate warms, we're experiencing an increase in snow. In addition, the snow is getting wetter and heavier. In many other northern communities this has caused the collapse of buildings. In Inuvik, the roof collapsed in the foyer of Samuel Hearne Secondary School in 2004. New design standards, and additional operations and maintenance activities such as the safe removal of snow from buildings are being considered. More information about managing changing snow load risks for buildings in Canada's North can be found here: https://climatechange.toolkitnwtac.com/wpcontent.



In 2022, spring flooding reached historic levels in Hay River and the surrounding areas, severely damaging roads, storm drains, lift stations, the water treatment plant intake, town buildings, recreational spaces and trails, the landfill, in addition to private homes and buildings. The recovery time is expected to take multiple years, and the costs estimated at approximately \$200 million including costs to protect key infrastructure such as the water treatment plant and the largest lift station against future damage.

#### Permafrost Thaw in Inuvik



At Inuvik Airport, the runways are one example where infrastructure is being destabilized by thawing permafrost. Inuvik is taking steps to adapt, for example adding pilings under new buildings that can be adjusted to compensate for shifting ground, or cooling sytems that insulate the pilings to maintain permafrost during warmer periods.



# **Strategic Alignment**

It is important to establish the regional and local governance frameworks that the AMP fits into. Providing a list of relevant local policies, reports, and plans articulates how the AMP is integrated with operations and processes across the organization. Relevant documents to list in this section may include:

- Asset management policy (see the Asset Management Toolkit for more detail)
- Community or neighbourhood plans
- Strategic plan
- ► Financial plan or strategy
- Capital Plan
- Master plans (e.g. water, sewer, drainage, buildings, transportation)
- ► Housing policy
- ► Water or sewer policy
- Development bylaw or policy
- Service demand studies



This is also where communities may choose to pause and discuss how to incorporate any relevant directions or actions set out in these documents that will influence how you move forward with asset management. For example, perhaps you have a financial policy that describes instances the community may borrow, and when borrowing may not be an option (eg. for projects over \$1 M or only renewal projects). That will influence the optimization strategies you take and ultimately influence the long term financial plan.

# Section 2: Current State of Assets

Defining the current state of assets involves an analysis of information in the asset inventory to answer the following questions:

- What do you own?
- What is it worth?
- What is its condition?

It also helps answer part of the question regarding 'What needs to be done?' specifically for the renewal of existing assets.



## **Building on Your Inventory**

An asset inventory is a record of key information about community-owned infrastructure assets. It provides a central location for accessing the information that is most important for asset management decision-making.

Building your asset inventory is an **important early step** in developing your AMP. It should serve as the primary source of information on the Current State of Assets in the AMP. The Asset Management Toolkit includes an inventory template for communities to begin consolidating key information about their assets.

| Address/Location   | Department    | Installation<br>Year | Historical Cost | Replacement Cost | Information<br>Source | Expected<br>Useful Life |
|--------------------|---------------|----------------------|-----------------|------------------|-----------------------|-------------------------|
| 104 Mackenzie St   | Sewer/Water   | 1990                 |                 | 2,969,951        | example               | 50                      |
| 1st St             | Sewer/Water   | 1960                 |                 | 53,755           | example               | 75                      |
| 1st Ave North Side | Sewer/Water   | 1990                 |                 | 57,471           | example               | 75                      |
| 1st St             | Sewer/Water   | 2006                 |                 | 54,373           | example               | 75                      |
| 345 Slave Lake     | Sewer/Water   | 2006                 |                 | 321,039          | example               | 25                      |
| 106 Mackenzie St   | Sewer/Water   | 2003                 |                 | 608,473          | example               | 15                      |
| 1st Ave            | Roads/Streets | 2016                 |                 | 77,901           | example               | 10                      |

Basic information to include in your inventory:

| Asset Information   | Source  |
|---|---|
| Asset name<br>Unique ID<br>Location<br>Material<br>Length/quantity/size<br>Installation or purchase year<br>Installation/purchase cost<br>Expected useful life<br>Condition assessment rating<br>Replacement cost<br>Remaining life | Your primary sources of information will be:<br>Community Public Infrastructure Data<br>Municipal Funding Review<br>Northern Communities Insurance Exchange<br>Other sources could include:<br>Internal records (equipment photos,<br>repair work receipts)<br>Spatial data (Google Maps, GIS)<br>Past engineering reports (master plans,<br>as-built drawings, condition assessment)<br>Financial records<br>Staff knowledge<br>Outside sources (e.g. MACA, NWTAC, |

## **Tips for Building Your Inventory:**

- Build your inventory over time. Start by compiling all of the relevant information you have, with information about the sources you use. This can be updated over time as more information becomes available.
- Focus on information relevant for high level asset management decision making as opposed to design and construction. For example, you will want a list of each water main segment, but don't need every individual service connection, valve and fitting.
- Highlight information that is uncertain and leave gaps where information is not known. Gaps are preferred to made up or incorrect information. However, placeholders (appropriately documented) may be used where necessary.
- Think like a detective to make logical assumptions to fill gaps. It is important to keep track of data that is added to the inventory based on an assumption or estimate, as this data is less reliable then known. Use a distinct text or highlight colour, or add notes for each asset and attribute that indicate where data is assumed.
- Establish a unique ID for each asset. Use whatever system works best for you; be consistent! (e.g. W-MN101 = water main segment #101).
- Check 3rd party data for reliability. Spot check some assets to confirm that your data is reliable. This could be as simple as checking some pipe diameters or confirming the length of a couple roads.

# **Quality Information**

Understanding the quality of information in your inventory is important for creating an accurate plan for the future. Consider what information you have, how complete it is, and how accurate or reliable it is.

For communities developing a very basic first iteration of their AMP, a simple list highlighting gaps and uncertainties about data is sufficient.

## Tailoring the Template to Include a Data Gap Analysis

Larger or more advanced communities may want to take this section a step further by undertaking a Data Gap Analysis.

Information quality can be evaluated on a three-point scale based on the "availability" and "reliability" of information for each asset category.

#### **Information Quality Rating**

| <b>Availability=</b> does the necessary information exist? | <b>Reliability</b> = what is the accuracy, age, consistency of data? |
|--|--|
| 2 = all necessary data available                           | 2 = all necessary data is reliable                                   |
| 1 = some data available                                    | 1 = some necessary data is reliable                                  |
| 0 = little to no data available                            | 0 = data is generally unreliable                                     |

Communities should also keep notes on what information is missing or if there are issues with data reliability. These descriptions will be used to develop options to address information gaps in Section 5 and may also be considered when developing optimization strategies in Section 8.

A sample asset information summary table is shown below, with information from a hypothetical community as an example. This is an optional table that communities may choose to include in their AMP.

| Asset                 | Informatio<br>Rat | n Quality<br>ing | Description  |
|-----------------------|-------------------|------------------|--|
| Category              | Availability      | Reliability      |  |
| Water                 | 1                 | 2                | Information is missing about the length and material or water mains.   |
| Sewer                 | 1                 | 2                | Information is missing about the length and material of sewer mains; Information on installation year is widely unknown. |
| Roads and<br>Drainage | 1                 | 0                | Information about road and storm sewers is combined;<br>individual lengths for these assets is unknown.                  |

The table can be supplemented by a more detailed Data Gap Analysis spreadsheet showing an availability and reliability rating for each asset subcategory (by asset attribute - material, size, etc) as an appendix to your AMP.

# **Asset Renewal**

The expected remaining life of each asset can be evaluated at this point, either based on condition (the preferred method when available) or calculated remaining life according to standard life expectances for the asset's characteristics has been used. This tells us when assets need to be renewed or replaced, and informs a preliminary schedule for renewal.

| cost Catagony (Chaoco From |                            |                         |          | <br>     |           |          |        |
|----------------------------|----------------------------|-------------------------|----------|----------|-----------|----------|--------|
| Drop Down Menu)            | Asset Subcategory (KWL)    | Asset Name              | 2020     | 2022     | 2023      | 2024     | 2026   |
| Water                      | Water Treatment Plant      | East WTP                |          |          |           |          |        |
| Water                      | Water Mains                | 1st St Water Main       |          |          |           |          |        |
| Water                      | Service Connection         | Service Connections     |          |          |           |          |        |
| Sewer                      | Sewer mains                | 1st St Sewer Main       |          |          |           |          |        |
| Sewer                      | Pump stations              | North Pump Station      |          |          |           |          |        |
| Sewer                      | Sewage Lagoon              | Main Sewage Lagoon East |          |          | \$608,473 |          |        |
| Roads and Drainage         | Asphalt Roads              | 1st Ave                 |          |          |           |          | \$77,9 |
| Roads and Drainage         | Gravel Roads               | 2nd Av                  | \$23,040 | \$23,040 |           | \$23,040 | \$23,0 |
| Roads and Drainage         | ATV/Snowmobile Path        | Lake Trail              |          | \$36,817 |           |          |        |
| Buildings                  | Town Hall                  | City Hall               |          |          |           |          |        |
| Buildings                  | Recreation Centre and Pool | Memorial Pool           |          |          |           |          |        |
| Buildings                  | Arena                      | Twin Rinks              |          |          |           |          |        |

The peaks and valleys in spending needs shown in this figure indicate the real challenges that communities face when addressing aging infrastructure around affordability, staffing available to address increases in maintenance needs, unexpected failures, and to replace assets. The renewal schedule is the starting point for further analysis in later sections; it will be expanded to include new assets being proposed, plans and studies as well as operations and maintenance costs in Section 6: Cost Requirements and further constrained according to revenue availability and practicality in Section 8: Long Term Financial Plan.

# **Understanding Community Assets**

Core information about community-owned assets is summarized in one-page "factsheets" for each asset category. Communities may wish to share these factsheets with Council or the public to build awareness of assets and their connection to service delivery. The information in these factsheets can be drawn directly from the Asset Inventory Template.

A sample factsheet for a hypothetical community is provided on the adjacent page. A description of each information field is provided below:

Asset Subcategories & Quantity: A list of the major types of assets that make up each asset category. Example subcategories are shown in the table on page 11 of this Guide. Subcategories should be logical and consistent and may be different for each community. Communities are encouraged to add photos of community assets, or a map of their system, to each factsheet.

The quantity of each asset subcategory will depend on the nature of the asset. For instance:

- Buildings = area (m<sup>2</sup>, sq. ft)
- Roads and trails = length
- Water/sewer mains = length
- Vehicles and equipment = number of units

- Total Replacement Value: Sometimes referred to as current replacement value (CVR) or replacement cost, this presents to the funds that would be required if an asset were to be replaced, in today's dollars. On the factsheet, the total replacement value is calculated. A breakdown for each asset sub-category is displayed on a graph.
- Annualized Replacement Value: This tells us how much, in theory based on current dollars, should be set aside each year to replace an asset at the end of it's life. When looked at from a system perspective or community-wide it helps us measure whether we are consistently over or underinvesting in the renewal of our existing infrastructure.
- Average Age: This is the average of the age for each individual asset within the category, weighted by value. It gives us a picture of how old assets are.
- Average Estimated Remaining Life (%): Remaining life is the portion of an asset's life expectancy that is unused' based on the current year. This is an average, weighted by value, used to identify a categorywide remaining life percentage.
- Expected Useful Life: This is how long, on average, an asset category (or subcategory) is expected to provide service before requiring renewal or replacement. It gives us a picture of how long assets should last.

The remaining and expected useful life graph will be automatically populated in the Asset Inventory Template – "Current State" sheets as information is added into the inventory. This information will be useful when determining which assets are high risk and a priority for renewal or replacement. When no condition data is available, remaining life is calculated as life expectancy – age. A more accurate estimate would be based on asset condition, where a condition rating is translated into an adjusted remaining life. This tells us how much of an asset's life remains. It is an excellent indicator of how soon renewal could be required, and also indicates a higher risk of failure as end of life approaches.

Average Condition: This information is gathered through condition assessments. Communities may not have this information for their first AMP.

The factsheet shows the average condition score for all assets in the category as a colour block representing a three-point scale: poor (red), fair (yellow), good (green). It is not a scientific estimate, but a more subjective representation for the asset category. If this information is unknown, leave the cell grey.

## Assets are Deteriorating Faster as a Result of Climate Change

Assets deteriorate as they age. How fast often depends on conditions such as how they were constructed, where they have been situated, and ongoing operations and maintenance practices. However, the life expectancy of assets can be affected by climate change. In the north these impacts can be more severe than elsewhere in Canada. When planning for new assets, and also when looking towards renewal of existing assets, it is important to consider how the life expectancy of these assets may be affected already, and even more so into the future.

## **Current State of Assets Factsheet Example**

This page includes a sample factsheet showing the current state of assets for a hypothetical community. Details on each information field are provided on the adjacent page.

#### Sewer System

The community's sewer system provides sanitation to 4,523 customers through a community-owned sewer main that connects to a sewage lagoon on the eastern edge of town.

#### Asset Inventory

| Wastewater System Assets | Quantity |
|--------------------------|----------|
| Sewage Lagoon            | 1        |
| Lift Stations            | 1        |
| Sewer mains              | Unknown  |
| Manholes                 | 1        |
| Other                    | 3        |
| Sewage Lagoon            | 1        |
|                          |          |





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# **Community-Wide Summary**

The AMP Template and Asset Inventory Template also includes a community-wide factsheet summarizing information about all community assets at a high level.

As with the category-specific factsheets, information and graphics for the community-wide factsheet will automatically populate as information is added to the inventory.

# Summarizing Key Issues

Communities should aim to identify between two to five high-level "Key Issues" in each of Sections 2 - 4.

Key issues under the Current State of Assets (Section 2) will typically relate to three major areas:

- Data guality: where there is an absence of key pieces of information (important note this is specifically) asset management related information used to support decision-making), conflicting or outdated information (eg. condition assessments from more than 5 years ago)
- Asset condition and remaining life: issues where the known condition of assets is poor, or the life of assets shows less than 10 years left (in the case of vehicles and equipment this would be closer to 3-5 vears).

Communities may wish to identify other high-level issue areas, or add information on the nature of identified issues in paragraphs below Table 1 in their AMP or add more detailed key issues as an appendix.

| Example: 1   | Example. Table 1. Rey issues - Current State of Assets |  |  |  |  |
|--------------|--|--|--|--|--|
| Issue (Item) | Key Issue  | Description  |  |  |  |
| 2.1          | Data Quality   | All asset categories missing critical information (e.g., location, asset<br>attributes, historic cost, condition assessment).<br>Some discrepancies between NORCIX and the 2018 MACA<br>assessment for replacement costs for some vehicle and equipment<br>assets. |  |  |  |
| 2.2          | Asset<br>Condition                                     | Condition is unknown for all assets.   |  |  |  |
| 2.3          | Remaining<br>Life                                      | Assets will need to be renewed over the next 25 years. Some major water and sewer assets are already overdue and may need to be renewed in the short term.   |  |  |  |

In documenting key issues, confirm whether this detail will be internally or externally shared and used. The level of detail in the AMP should be tailored to the audience. In some cases, this will mean that staff keep additional operational data separate from the AMP, but in a form and location where it can be referenced and updated as required over time.

A subset of the key issues identified in Table 1 will be summarized in Section 5 and serve as the foundation for developing strategies to address priority issues.

## Section 3: Levels of Service

Communities build and maintain infrastructure to provide services that support their residents' quality of life, protect health and safety, and promote social, economic and environmental well-being. Sound asset management practices consider community priorities, informed by an understanding of the trade-offs between the available resources and the desired services.

This section in the AMP begins answering the question 'what needs to be done' by outlining the customer-oriented service level commitments that have been made or are regulated. An assessment of current practices against these commitments is undertaken, with any gaps flagged for further consideration. The intent in the AMP is not to define new levels of service, but to clearly document the levels of service commitments your community has already made (whether formal or informal).

## **NWT Online Resources**

Northwest Territories Municipal and Community Affairs has developed an Accountability Framework (AF) Tool designed to help communities self-assess their core operational requirements. The AF Tool states that the core responsibilities of NWT municipalities are:

- Good governance;
- Comprehensive planning;
- Sound financial management and administration; and
- ► Safe, healthy and vibrant communities.

Communities can access the full tool on the MACA website: http://www.maca.gov.nt.ca

This section of the AMP is intended to provide you with a simple starting point. Focus on documenting one level of service commitment for each asset category (or more if necessary to capture the regulated requirements) to begin with. Future iterations of your plan can take this to the next level.

## What are Levels of Service?

**Levels of service (LOS)** are goals or commitments for how the community delivers services. They provide a framework for tracking the community's performance in meeting commitments within each asset category over time.

There are two types of service levels: customer and technical. The focus of this AMP is on the customer levels of service: those commitments that the community cares about. Technical levels of service focus more specifically on the day-to-day performance of operating and maintaining systems, which staff use to ensure they can ultimately meet customer and regulating body requirements.

For example, a community's OCP might set a goal to provide safe and clean drinking water to all residents. A level of service to uphold that goal would be to ensure drinking water is delivered by truck to all houses three times a week.

Many communities, even those more advanced in their asset management implementation, struggle with the concept of levels of service. Start basic, use an iterative approach and remember that this can take time.

When you feel ready, further guidance on how to define and evaluate levels of service can be found in the Levels of Service Template prepared as part of NWTAC's Asset Management Toolkit.

Table 2: Levels of Service Commitments and Performance from the AMP is shown below, with sample content from a hypothetical community.

| Asset<br>Category     | Level of Service Commitment   | Туре               | Reference  | Current<br>Performance |
|-----------------------|---|--------------------|--|------------------------|
| Water                 | Trucked drinking water is delivered to all residents three times a week.  | Non-<br>Regulatory | Community<br>OCP                                       | Met                    |
| Sewer                 | Treated effluent does not exceed<br>parameters for effluent quality<br>objectives for municipal discharge.                                | Regulatory         | Land and Water<br>Boards, Waste<br>Discharge<br>Permit | Not Met                |
| Roads and<br>Drainage | 80% of sidewalks are accessible for<br>pedestrians, and people using<br>strollers, and wheelchairs and other<br>mobility aids year-round. | Non-<br>Regulatory | Transportation<br>Master Plan                          | Not Met                |

## **Step 1: Documenting Levels of Service**

As a first step, communities should document their existing customer (public-focused) LOS commitments for each asset category and state whether each indicator is driven by regulatory requirements ("regulatory") or community goals ("non-regulatory").

Levels of service in the AMP should be high-level and drawn from policy documents wherever possible. Detailed LOS indicators and performance can be added later, and technical levels can be documented separately from this AMP. At the very minimum, your AMP should list all LOS that are required by regulation. This information is included in the AMP template, but communities should check their specific permits and requirements to keep these LOS up to date.

Communities with many regulatory and non-regulatory customer levels of service may want to separate the LOS table in the Template into separate sections (one per asset category). Communities may also wish to provide additional detail (e.g. performance tracking) as an appendix to the AMP.

## **Step 2: Measuring Performance**

Once LOS have been documented in Table 2, the next step is to report whether indicators have been met continually over the past fiscal year. For communities wanting to take a more advanced approach, performance metrics could be listed as a new column in the table. It is important that communities are candid about performance so that issues can be identified and clear, time-bound strategies established to address gaps in service delivery. In some cases, this may require further discussion and analysis outside of this AMP. Consider the AMP a central location for summarizing more detailed discussions that will likely happen with staff from across departments.

# Effect of Climate Change on Service Delivery

Climate change could compromise our ability to provide needed and relied upon services to our community, either now or possibly in the future. As part of assessing levels of service, system wide or service specific climate vulnerabilities can be evaluated. Potential actions for reducing or eliminating these vulnerabilities can then be strategically identified, for example through adaptation measures such as utilizing natural assets.

## Cemeteries

Many communities are concerned about the impact that climate change is having on their cemeteries. From slumping as a result of permafrost melt, flooding and coastal erosion. Some communities, such as Dene and Tuktoyaktuk, are looking at opening new cemeteries. Work is also underway to determine how the shoreline can be protected to preserve the exiting cemetery.

## **Summarizing Key Issues**

Communities should aim to identify between two to five high-level Key Issues in Section 3 that reflect results from levels of service documentation and performance. Key issues associated with levels of service will typically relate to three major areas:

- Level of service definition: issues where levels of service have not been adequately defined for major services provided for the community.
- Performance gaps regulatory: cases where regulatory levels of service indicators not being met. These will be high-priority issues in Section 5.
- Performance gaps non-regulatory: cases where other levels of service commitments made to the community are not being met.

Communities may wish to identify other high-level issue areas as an optional addition.

Table 3: Key Issues – Levels of Service is shown below, with sample content from a hypothetical community.

| Example         | e: Table 3: Key I                    | ssues - Levels of Service   |
|-----------------|--------------------------------------|---|
| Issue<br>(Item) | Key Issue                            | Description   |
| 3.1             | Level of Service<br>Definition       | Formal levels of service have not been established. Service delivery goals extrapolated from MACA, Water and Sewage Facilities, Capital Programs: Standards and Criteria (July 1993) to achieve a minimum of 90 Litres per capita per day, with regular water delivery, in addition to fire protection. |
| 3.2             | Performance Gaps –<br>Regulatory     | Sewer system does not meet effluent quality parameter objectives<br>for municipal wastewater discharge. Oil and grease, total<br>suspended solids (TSS) and pH are regularly exceeding the<br>permitted discharge limits.   |
| 3.3             | Performance Gaps –<br>Non-Regulatory | Sidewalks meet accessibility levels of service except during winter<br>months when snow and ice often accumulate and obstruct travel of<br>pedestrians. It makes travel especially difficult for people who use<br>wheelchairs or other mobility aids.  |

Communities may also want to add information on the nature of identified issues in paragraphs below Table 3 in their AMP or add more detailed key issues as an appendix.

A subset of the key issues identified in Table 3 will be summarized in Section 5 and serve as the foundation for developing strategies to address priority issues.

# Section 4: Asset Criticality and Risk

Criticality and risk assessments can be used to answer the questions 'what needs to be done?' and 'when do you need to do it?'. The prioritization of asset renewal feeds directly into a long-range projection of funding requirements to achieve the sustainable delivery of services that balances risks, costs, and service levels.

The concepts of risk and criticality are intricately linked, where:

- Criticality is the relative importance of an asset in providing community service; and
- ► **Risk** is the <u>potential for undesirable outcomes</u> resulting from an incident, event, or occurrence (e.g. asset failure). This is made up of the consequence and the likelihood of the occurrence.

This section includes the identification of the community's most critical assets and an initial qualitative risk assessment.

## Criticality

The criticality of an asset is the inherent consequence of the loss of its function, including its impact on a system or network of assets.

Asset criticality informs strategies for maintenance, risk prevention, procurement of spare parts, and prioritization of renewals and performance upgrades.

Evaluating criticality enables communities to consider how essential certain assets are compared to others (i.e. those that would have significant, far reaching impacts if they were to fail or face major service interruption).

Determining criticality is a relative exercise that involves assessing assets and services in comparison to each other within a community.

## More about Criticality

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Determining criticality is a relative exercise that involves assessing assets and services in comparison to each other within a community.

# Work Together: Criticality Workshop

Staff knowledge and experience provides a valuable resource for determining which assets are most critical. Consider holding a meeting with operations or public works staff; particularly staff who have in depth knowledge of infrastructure systems and provide input on the relative importance of assets.

During the meeting, work together to identify 3-5 assets in each asset category that are considered the be the most important for delivering services. Rank critical assets on a three-point scale (low, medium, high).

Consider the following questions when considering if an asset is critical:

- > Does it provide services to a large proportion of the community?
- ▶ Would the community be able to provide the same level of service if the asset failed or service was interrupted?
- ▶ Would the community meet regulatory requirements if the asset failed or service was interrupted?
- ▶ Would the community meet established community goals if the asset failed or service was interrupted?

List critical assets in Table 4: High Criticality Assets, with a brief description of what service it provides and why the asset is critical for delivering that service. The intention is to list only the high criticality assets here. A complete list of critical assets ranked as low, medium or high could be included in an appendix to the AMP (or kept separately by staff for reference).

| Example: Table 4: Hig               | h Criticality Assets   |
|-------------------------------------|--|
| Critical Asset<br>(Asset Name)      | Description of Criticality   |
| Sewage Lagoon                       | The community's only sewage lagoon treats all wastewater prior to river discharge to protect public and environmental health and meet regulatory requirements. |
| Roads and Drainage -<br>Main Street | Main Street is the hub of the community and provides access to all community businesses.   |

# **Climate Vulnerabilities**

A major type of risk facing our community is from a changing climate. In order to become more resilient to climate change we need to understand our areas of both immediate as well as longer term vulnerability to our ability to deliver service. This will allow us to determine the most appropriate actions to take such as the use of natural assets and alternative, renewable energy.

If fact, we are already taking measures to reduce or eliminate some of our community's climate vulnerabilities. These should be identified and described in this subsection of the AMP. Despite the measures we're taking, there are still some areas where we are very vulnerable to the effects of extreme events. List the top remaining key climate vulnerabilities to our services and/or systems in Table 5. For many NWT communities the highest areas of impact are permafrost degradation, increased wildfires, and an increase in flooding.

| Services/Systems<br>(Name) | Vulnerabilities to Climate Hazards  |  |  |  |
|----------------------------|---|--|--|--|
| Bridges                    | There is only one route to access the community by road, and the bridge is a vital connection along this route. This bridge could become impassable in the future as a result of river erosion. Also, if there was a major flood it could wash out the bridge.  |  |  |  |
| Buildings                  | The community arena is also our designated emergency response<br>centre in the case of an emergency. It is located in the middle of our<br>community and is accessible to everyone. In recent years, it has been<br>affected by heaving due to permafrost thaw and may not be safe to use<br>in the near future |  |  |  |

When you feel ready, further guidance on how to undertake a Climate Vulnerability Assessment can be found in the Implementation Activity prepared as part of NWTAC's Asset Management Toolkit. This will enable you to think further about potential ways you can adapt, or further reduce greenhouse gas emissions (eg. partnerships, relocating assets at risk, improving energy efficiency, protecting permafrost when building new assets, preparing emergency response plans).

# About Permafrost – One of the North's Biggest Vulnerabilities

Permafrost is the foundation upon which we build northern infrastructure and much has been lost over the past several decades. In fact, permafrost is the glue that holds the northern landscape together, and our communities have been engineered to work with this frozen ground. However, changes in permafrost along with precipitation, drainage and temperature has been negatively affecting our infrastructure and how our communities function, with significant changes in surface ecology, water systems, and the built environment (eg. houses and community buildings, roads and airstrips).



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# Work Together: Climate Vulnerabilities Workshop

A workshop can be held with a community leader, operations staff (who understand key infrastructure systems), and possibly even a knowledge holder in the community to create a shared understanding of local climate vulnerabilities currently affecting your ability to deliver services, or those that are anticipated to affect service delivery in the future.

Consider the following key questions during the workshop:

- 1. What is the most immediate climate-related threat to your community?
  - Think first about the climate hazards your community experiences
  - ▶ Have everyone select the one that's top of mind, and write it on a sticky note
- 2. What would the effects be?
  - Now have each person write the effects of that climate hazard on a second sticky note, thinking about the consequences should this climate event occur and interrupt your ability to provide services
  - ► Go around the table and share your sticky notes for questions 1 and 2. Are there any that are the same amongst the group?
- 3. Have you already put in place measures to reduce the potential impact?
  - Together, discuss if there are already measures in place to reduce the potential impact for each hazard. If not, what strategies could potentially be put into place? Think about all possibilities and write on sticky notes, a flip chart or a white board
- 4. Are there a few potential strategies worth exploring further?
  - Agree as a group on the top 3-5 vulnerabilities for the community
  - Brainstorm together potential strategies for addressing the top vulnerability identified, and clearly articulate one action that will be taken coming out of the workshop.

## **Risk Assessment**

A risk assessment is a tool for helping communities prioritize which existing assets most urgently need to be repaired or replaced. There are many risk management approaches; however, a best practice is to consider risk as a combination of the likelihood and the consequence (severity) of an event.

Asset risk management is typically focused on events that could adversely impact assets, or events involving assets that could adversely impact service delivery, public safety, the environment, or life cycle costs of service.

## **NWT Online Resources**

Municipality and Community Affairs completed a Hazard Identification Risk Assessment (HIRA) in 2014 that identifies risks that pose the greatest threat to the people, property, environment and economy of the NWT.

Communities are encouraged to refer to this resource when assessing risk to community services and assets. The HIRA is available online at www.maca.gov.nt.ca

Managing risk could involve transfer, avoidance, mitigation, or acceptance. At this stage of the risk management planning process, risks are identified using qualitative criteria for likelihood and consequences of events occurring.

The objective for the AMP is to develop an initial inventory of potential risks affecting service delivery and begin the process of characterizing and prioritizing these risks. Further work may be needed to develop quantitative risk assessments for certain critical assets and risk scenarios, and ongoing updates are recommended on an annual basis.

The figure below provides a four-stage framework for risk assessment.



## Work Together: Risk Workshop

**The most efficient way** to complete a risk assessment is to hold a workshop with staff to get input on each stage of the process. It may be particularly valuable to include staff from different departments and in different roles (even two or three people in a room can make a big impact) across the organization to provide a more integrated picture of potential risks that face community infrastructure and services.

Have maps showing community infrastructure on hand to help staff visualize where critical assets are located and how they might be affected by risk events or hazards.

## Step 1: Risk Identification

Infrastructure risks may be threats to an asset, or from an asset. Risk identification considers the following questions:

- ▶ What can happen?
- ► Where/when could it happen?
- ► What are the outcomes?

Start by identifying significant events (perhaps something you've experienced in the last couple years) and think about how the event might the delivery of services. Events that may be relevant to communities in the NWT include:

#### **Natural Hazards**

Earth Movement – Earthquake/Tsunami/ Permafrost Degradation Fire/Explosion Flood Ice Snow Load Slope Failure Weather – Wind Storm Weather – Winter Storm Weather – Other Extreme (e.g. Drought)

#### Human-induced Hazards

Civil Infrastructure Failure Energy Crisis/ Water Contamination Acts by "Third Parties" Falling Debris Industrial Emergency Transportation Accidents Communication Failure Human Error or Accident

This list is based on the risks identified in the NWT HIRA (2014). Communities should adjust this list to ensure events considered are relevant to their local context.

List each event and brainstorm how it might impact critical community assets. For example, a wildfire could have broad reaching impacts on service delivery: flames could lead to downed trees that damage roads (preventing access to parts of the community) and powerlines (leaving areas without power), while smoke could affect visibility at the airport which would disrupt service (to passengers, emergency crews, etc.).

Risk identification results can be recorded using a Risk Register spreadsheet that lists the identified events with a separate line for each critical asset or type of asset that will be affected. Communities can also use a Risk Register to record other information about events, such as the cause, possible impacts, or existing controls the community has in place to minimize impacts. Refer to your community's emergency management plan or protocol as an important resource.

Consider how third parties provide services for assets. For example, fuel delivery interruptions could have an impact on how assets perform or are maintained.

#### Sample Risk Register - Identification

| What can happen? | Risk Category | When could it occur? | Likely Cause(s) | Impacted Assets | Existing Controls |
|------------------|---------------|----------------------|-----------------|-----------------|-------------------|
|                  |               |                      |                 |                 |                   |
|                  |               |                      |                 |                 |                   |
|                  |               |                      |                 |                 |                   |

Risk identification may be as far as you get during the first iteration of your AMP. Some communities may want to complete a more comprehensive risk assessment by identifying risks to non-critical community assets.

## Step 2: Risk Analysis

Analyzing risk in the AMP involves considering the likelihood that an event will impact critical assets, and the consequence of this impact on service delivery. Start by estimating the likelihood that the events identified might impact major community assets. A sample three-point scale is provided below and can be modified as needed:

- Rare (1): event is unlikely to occur within asset lifecycle (only in exceptional circumstances), i.e. a frequency of less than once every 80 years.
- ▶ Moderately Likely (2): event will probably occur at some time, i.e. a frequency of 2-80 years.
- Very Likely (3): event will probably occur within the next year, i.e. a frequency of less than once a year.

Then determine the consequence of the event impact on the identified asset or asset type. Start by considering consequences at a high level - if you have a map available, consider using this to help trace the effects. It may be helpful to think about the consequence in terms of four main categories of impacts:

- Public health and safety
- Financial loss
- Service disruption or loss
- Legal or regulatory action

Considering these categories, rank consequence. A sample three-point scale is provided below and can be modified as needed:

- ► Insignificant (1): minor or no injury/illness, insignificant financial implications, minimal service disruption (less than a week), minor or no legal/regulatory impacts.
- Moderate (2): severe injury/illness, financial implications below \$1 million, 1 day to 1 month service disruption (depending on criticality of asset), possible government review/order or legal impacts.
- Catastrophic (3): multiple deaths or widespread injuries/illness, financial implications over \$1 million, service disruption longer than 1 month, regulatory inquiry or legal action significant.

Use a risk matrix tool to determine a risk rating of low, medium or high based on the consequence and likelihood ratings for each critical asset that may be impacted by the identified events. A simple risk matrix is shown below:

|                      | Insignificant | Moderate | Significant |
|----------------------|---------------|----------|-------------|
| Rare                 | Low           | Low      | Medium      |
| Moderately<br>Likely | Low           | Medium   | High        |
| Very Likely          | Medium        | High     | High        |

An example risk rating analysis is shown in the table below, based on a five-point scale:

|                       |   |  |            |                          | Cor               | nseque                      | nce                         |                        |                          |
|-----------------------|---|--|------------|--------------------------|-------------------|-----------------------------|-----------------------------|------------------------|--------------------------|
| What Can<br>Happen?   | Assets Impacted                               | Existing Controls<br>(Minimize &<br>Mitigate Risk) | LIKELIHOOD | Public Health/<br>Safety | Financial<br>Loss | Service<br>Disruption/ Loss | Legal/ Regulatory<br>Action | HIGHEST<br>CONSEQUENCE | OVERALL<br>RISK<br>SCORE |
| Earthquake            | Buildings, Steps<br>and Ramps                 | None noted   | 1          | 4                        | 3                 | 4                           | 0                           | 4                      | 4                        |
| Slope failure         | Steps and Ramps                               | None noted   | 3          | 0                        | 2                 | 3                           | 1                           | 3                      | 9                        |
| Climate risks         | Steps and Ramps                               | None noted   | 5          | 4                        | 2                 | 3                           | 0                           | 4                      | 20                       |
| Fire                  | All assets                                    | Communications                                     | 4          | 2                        | 2                 | 3                           | 0                           | 3                      | 12                       |
| Acts by third parties | Steps and Ramps,<br>Buildings, High<br>Fences | None noted   | 5          | 3                        | 1                 | 1                           | 3                           | 3                      | 15                       |
| Asset failure         | Steps and Ramps,<br>Buildings                 | Corrective<br>maintenance                          | 5          | 2                        | 2                 | 2                           | 3                           | 3                      | 15                       |

## Step 3: Risk Proritization

The third step for risk assessment is to review results from the risk matrix and determine whether the level of risk for each asset is acceptable. Consider the trade-offs (e.g. cost) for reducing risks and identify which risks are a top priority for response. High priority risks will be summarized in Table 6 in the AMP, showing each identified risk event and critical assets affected.

Table 5: Key Issues – Risk Assessment (Medium, High) is shown in the table below with sample content from a hypothetical community.

| xamp            | le: Table 6:                         | Key Issues - Risk Assessment (Mediu                 | um, Hig        |
|-----------------|--------------------------------------|---|----------------|
| lssue<br>(Item) | Event                                | Impacted Asset(s)                                   | Risk<br>Rating |
| 4.1             |                                      | Community buildings, particularly the health centre | High           |
| 4.2             | vvildiire – smoke                    | Airport   | Medium         |
| 4.3             | Wildfire – flames                    | Primary highway access into town                    | Medium         |
| 4.4             | Flooding –<br>culvert<br>overtopping | 1st Avenue and Main Street intersection             | High           |

The results of the risk assessment inform the prioritization process in Section 5 of the AMP.

## Step 4: Risk Management

The risk management step will be addressed in Section 5 of the AMP by developing options to address unacceptable risk. Assets that have a high risk of failure, or that are critical for delivering core services, are generally prioritized for renewal, replacement, or upgrade work before other assets. Seven strategies for managing risks are identified in the ISO 31000: 2009:

- 1. Avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk
- 2. Accepting or increasing the risk in order to pursue an opportunity
- 3. Removing the risk source
- 4. Changing the likelihood
- 5. Changing the consequences
- 6. Sharing the risk with another party or parties (including contracts and risk financing)
- 7. Retaining the risk by informed decision

Risks are then re-assessed with the management strategy applied. The cost and benefit of each management strategy can then be considered as part of Section 5 – Key Issues and Options. Results from the risk assessment may also identify critical assets that may require more detailed assessment under the Section 7 – Optimization Strategies.

## Section 5: Key Issues and Options



Defining priorities and timing for asset management work is essential for answering part of the questions "What do you need to do?" and "When do you need to do it?". It summarizes priorities for addressing key issues identified in the AMP that relate to the state of assets (Section 2), service delivery (Section 3), and asset risk assessment (Section 4).

# **Key Issues**

Table 6: Priority Key Issues Summary lists only those key issues that staff determined should be a priority for response in the current AMP. This should include any climate-related priority issues. Depending on how many you have, this will either be all of your medium and high priority issues, or be limited to your high priority issues.

| lssue<br>(Item) | Key Issue                                     | Priority Description  | Priority |
|-----------------|---|---|----------|
| 2.1             | Data Quality                                  | All asset categories are missing critical information<br>(e.g., location, asset attributes, historic cost,<br>condition assessment).  | Medium   |
| 2.4             | Remaining Life                                | All assets will need to be renewed over the next 25 years.  | Medium   |
| 3.2             | Performance Gaps –<br>Regulatory              | Sewer system does not meet regulatory discharge requirements.   | High     |
| 3.3             | Performance Gaps –<br>Non-Regulatory          | Sidewalks not cleared regularly during winter<br>months.  | Medium   |
| 4.1             | High Risk of Failure -<br>Water Truck         | A new water truck is required to provide redundancy.  | High     |
| 4.2             | Catastrophic<br>Consequence - Sewer<br>Lagoon | The sewer lagoon is a critical asset that could have<br>a high consequence on the environment if effluent<br>overflows into the adjacent river during a 200-year<br>storm (low likelihood). | Medium   |

Table 6: Priority Key Issues Summary in the AMP should list only the priority key issues identified. The full list of key issues should be included as an appendix the AMP for consideration in future iterations of the AMP (or kept separately by staff). Provide a paragraph of text below the table in the AMP describing each priority key issue: what it is, why it's a problem, and what the consequence would be if it is not addressed. This information will be useful for communicating to Council the rationale for renewal and capital projects.

# Work Together!

The process for determining which key issues are priorities involve input from staff across the organization. Consider holding a meeting to review the key issues related to the current state of assets, service level review, and risk assessment.

At the meeting, work together to develop a set of three to five criteria for how to prioritize key issues. Refer to existing community goals and policies as a starting point. Criteria could include:

- Protect public safety
- ► Minimize environmental impacts
- ► Focus on public health, culture or education
- Meet regulatory requirements
   Support a strong economy

Compare the full list of key issues with the criteria to identify "priority key issues" to be addressed in the AMP. Priority key issues should also include those that relate to failure to comply with regulatory requirements or high-risk assets that pose significant health and safety impacts to the public.

## Options

Once priority key issues are identified and summarized, the next step is to begin developing options for addressing these issues. To start this process, consider:

- ▶ What option(s) or project could address the issue?
- ► Are there other issues that this project could address?
- What would it cost for each viable option?
- ► When will further actions be needed?
- ▶ What alternatives are there? Which of these is most appropriate for your community?

Table 7: Options to Address Key Issues should provide a short list of the options developed to address priority key issues. A more comprehensive list of options identified and considered should, at a minimum, be kept by staff and may also be appropriate to include as an appendix to the AMP. Options proposed can range from capital projects (asset renewal or non-renewal projects), further studies, assessments, or reporting initiatives. A sample of Table 7 with content from a hypothetical community is shown below:

| Examp           | ole: Table 8: Op   | tions to Address Key  | Issues          |           |          |
|-----------------|--|---|-----------------|-----------|----------|
| lssue<br>(Item) | Preferred Option   | Description   | Project<br>Type | Timeframe | Cost     |
| 2.1             | Detailed Gap Analysis<br>and Inventory Update –<br>Linear Infrastructure | Complete a study to identify and<br>fill information gaps for water,<br>sewer, road, and drainage assets  | Non-<br>Renewal | 2025      | \$       |
| 2.4             | Asset Renewal  | Renew assets based on<br>replacement life to meet existing<br>levels of service   | Renewal         | Ongoing   | \$\$\$\$ |
| 3.1             | Municipal Wastewater<br>Effluent Management<br>Plan                      | Complete a Municipal<br>Wastewater Effluent<br>Management Plan that includes<br>defining levels of service and<br>includes review of sizing and<br>possible overland or wetland<br>discharge rather than discharging<br>directly to river outfall receiving<br>waters | Non-<br>Renewal | 2020      | \$       |

Determining project timeframes will be an iterative process when developing the AMP. For example, timeframes could be based on the remaining life for assets associated with each key issue. For instance, if replacing the community water truck is a priority issue, the timeframe for this option would be the year the truck needs to be replaced based on its remaining life or condition.

The cost for each identified option could be determined at a very high level using a four-point scale:

\$ - <\$50,000

0 \$\$ - \$50,000 - \$499,000

\$\$\$ - \$500,000 - \$4.9 million

\$\$\$\$ - \$5 million+

The full lifecycle cost should be considered for capital projects proposed, including the cost to build or renew the asset as well as the annual cost for operations and maintenance of that asset over time. Communities can refer to the Lifecycle Costing Tool developed as part of the Asset Management Toolkit. This will allow you to compare full lifecycle costs among alternatives to identify the best option.

Additional detail on cost estimates for each identified option can be included as an appendix. Further analysis will be required to confirm capital costs during any project design stage.

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# Section 6: Cost Requirements

An important outcome of the AMP is to develop a long-range projection of cost requirements to understand what is needed in order to achieve the sustainable delivery of services over the short and long term (greater than 20 years).

This section focuses on answering the question: **"How much will it cost?**" It considers current revenue and expenses including addressing the key issues identified in Section 5. Financial records on current revenue and expenditures are an important input to this section. Balancing expenses with available revenue over a long-term period is undertaken through the optimization process (Section 7) for the Long Term Financial Plan (LTFP) (Section 8).

The cost requirement components are described in the subsections below, with sample completed tables from the AMP.

# **Current Annual Revenue**

Communities receive revenue from a variety of sources to finance government operations and service delivery. Revenue sources may include:

- Own source revenue
  - Property taxes (where applicable);
  - Special levies or development finance tools;
  - Service rates and fees, such as for water, sewer or recreation services; and
  - Economic development revenue from community-owned enterprises.
- Community public infrastructure funding
  - Capital contributions; and
  - Operations and maintenance contributions.

For the purposes of the AMP and completing the tables in this section, focus on the revenue specifically used for delivering services that are supported by infrastructure. For example, we only care about the portion of property tax revenue that is used to support capital projects, or the operations and maintenance of assets (including direct staffing costs). This process is not always straightforward, and may involve a conversation with the finance department/representative to come up with a reasonable estimate.

## **Costs of Climate Change**

Climate impacts are significant, and the resources needed for adaptation are expensive.

Some NWT communities have small populations with little or no tax revenue which restricts their ability to address climate vulnerabilities independently.

Capital costs can increase as a result of climate change impacts, and new projects should be focused on being more resilient which often costs more. For example, building foundation upgrades to adapt to thawing permafrost across the NWT are estimated to between \$230 million and \$420 million, based on an assessment of six representative communities (Potential Cost Impacts for Adaptation of Building Foundations in the Northwest Territories, 2006). Additionally, if asset lifecycles are shorter because of increased stressors then renewal will need to occur more frequently.

While historical O&M costs can be useful to predict future needs, this does not take into consideration costs that could be associated with addressing climate impacts through operational activities. For example, increased de-icing frequency and quantities.

The good news is, if we invest now we will experience the benefits well into the future, and can act more proactively. This will cost significantly less than reacting to emergency situations. There are two approaches you could take:

1. Net out the revenue used for all non-capital purposes first (including operations and maintenance). The remainder is what you have available to support capital renewal as well as new capital projects. The assumption here is that your current revenue covers O&M first, with a variable amount left over to make improvements. This would look like:

## TOTAL REVENUE – NON-CAPITAL EXPENDITURES = REVENUE AVAILABLE FOR CAPITAL

2. Drill deeper and for each source of revenue, or fund (general, water, sewer, etc.), to determine what proportion of revenue is applicable for both capital as well as O&M purposes.

Table 8: Current Annual Revenue outlines the annual revenue applied to capital and O&M for a hypothetical community. Communities should adapt this table by adding or adjusting revenue sources to reflect your local context.

| Revenue Source <sup>1</sup>             | Annual Revenue |
|---|----------------|
| Own Source Revenue                      |                |
| General Revenue                         | \$1,300,000    |
| Water Revenue                           | \$65,000       |
| Sewer Revenue                           | \$85,000       |
| Community Public Infrastructure Funding |                |
| Operations and Maintenance              | \$250,000      |
| Capital                                 | \$110,000      |
| Subtotal                                | \$1,810,000    |
| Notes:                                  |                |

## **O&M** Costs

This section provides a summary of the operations and maintenance (O&M) and administration costs spent over the past five years. O&M refers to ongoing and repeated annual costs incurred to keep all systems in working order. This includes all costs incurred in providing services, except those that are related to the acquisition, renewal, or disposal of assets.

Table 9: O&M Costs is shown below. The cost categories are examples, which may need adjustment to match your community's approach to grouping costs. Information to complete this table can be taken from your community's financial statements.

| Example: Table 10:     | O&M Co                 | sts                    |                        |                        |                        |             |
|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------|
| Cost Category          | Estimated O&M Cost     |                        |                        |                        |                        |             |
|                        | (year 5 –<br>eg. 2014) | (year 4 –<br>eg. 2015) | (year 3 –<br>eg. 2016) | (year 2 –<br>eg. 2017) | (year 2 –<br>eg. 2018) | Average     |
| Wages and Benefits     | \$370,000              | \$414,916              | \$477,372              | \$551,097              | \$636,844              | \$490,046   |
| Equipment Use          | \$95,000               | \$106,457              | \$123,947              | \$127,309              | \$146,335              | \$119,810   |
| Utilities              | \$40,000               | \$44,098               | \$48,602               | \$53,115               | \$60,510               | \$49,265    |
| Materials and Supplies | \$40,000               | \$41,905               | \$43,528               | \$44,475               | \$46,922               | \$43,366    |
| Contracted Services    | \$250,000              | \$266,159              | \$296,024              | \$299,566              | \$321,168              | \$286,583   |
| Administration         | \$120,000              | \$138,752              | \$157,022              | \$176,487              | \$193,323              | \$157,117   |
| Subtotal               | \$915,000              | \$1,012,287            | \$1,146,495            | \$1,252,050            | \$1,405,103            | \$1,146,187 |

- ► Wages and Benefits refer to the staffing costs required for operations and maintenance activities (i.e. water system operators, field staff, etc.)
- Equipment Use where there is a fee for using light or heavy (whether it is internal or external), or fuel required to operate
- ► Utilities include hydro, gas, etc.
- ▶ Materials and Supplies include chlorine, spare parts, etc.
- Contracted Services refer to hiring outside support whether it's for an activity like condition assessments or for hands-on work
- ► Administration refers to a reasonable proportion of overhead

Communities should keep in mind that O&M costs will increase as major capital projects are added.

# **Existing Debt Servicing**

Debt servicing refers to the amount the community spends on interest and fees to pay down the existing debt commitments on an annual basis. Note that this does not included the principle portion of debt servicing because this has already been accounted for as part of the capital project expenditure. If you have borrowed funds for capital purposes, the finance department/representative should be able to provide a schedule for each loan. This section of the AMP may not be relevant for all communities and can be removed as required.

## Reserves

Some communities have established reserve funds to spread out the cost of implementing large future renewal and capital projects. Communities may have one general reserve fund, or separate funds for individual asset categories such as the water or sewer systems.

Where relevant, communities should describe the existing balance in reserve(s) and any regular annual contributions being made. This section of the AMP may not be relevant for all communities and can be removed as required.

## **Renewal Projects**

This section should summarize the total costs for all renewal projects identified in Section 5, focusing on the next 25year period but also summarizing the implications based on the full life expectancy of existing assets.

For major renewal projects (generally with a value of greater than \$1 million), communities should provide high level detail about each project, including the name of the asset being renewed, the estimated renewal cost (based on the replacement value for that asset), and the year(s) when the work is proposed.

The renewal program is evaluated from several perspectives: total replacement cost (over a 25 year and full life expectancy perspective) and annualized cost (again over a 25 year and full life expectancy perspective).

Table 10: Annualized Renewal Program shows these costs for each asset category. A sample for two categories is shown on the next page.

| Asset Category | 25 Year<br>Replacement Cost | 25 Year<br>Annualized Cost | Total<br>Replacement Cost | Life Expectancy<br>Annualized Cost |
|----------------|-----------------------------|----------------------------|---------------------------|------------------------------------|
| Water          | \$6,050,000                 | \$242,000                  | \$12,800,000              | \$188,235                          |
| Sewer          | \$7,800,000                 | \$312,000                  | \$8,500,000               | \$154,545                          |
| Subtotals      | \$13,850,000                | \$554,000                  | \$21,300,000              | \$342,780                          |

**25-Year Annualized Cost** refers to the total cost for renewing assets that are coming due for replacement within the next 25 years, where costs are divided over a 25 year period.

For example, a pump station with a replacement value of \$200,000 and an expected useful life of 30 years would have a "total replacement cost" of \$200,000 over a 25-year period and a remaining life of 10 years. The 25-year annualized cost would be \$8,000, as this is the amount the community would spend on average if costs were divided on an annual basis.

Table 10 shows the sum of the 25-year annualized costs for all assets in each asset category. This information is important to determine how sustainable the proposed renewal program for the next 25 years is based on the community's current revenue. There could be instances, like the example above, where assets have aged to the point where a significant proportion of the assets in each system need to be renewed during this period. This is a common situation right now for many communities across Canada. It means higher costs for the 25-year period than when looking at the full life expectancy of assets. In other words, a need to budget more in the shorter term to address pending expenditures.

Life Expectancy Annualized Cost refers to the cost to renew an asset, where the renewal cost is divided over the expected useful life of the asset.

For example, the annualized lifecycle cost for the \$200,000 pump station would be \$6,667 per year of its expected useful life of 30 years.

Table 10 shows the sum of the life expectancy annualized costs for all assets in each asset category. This is helpful when establishing reserve contribution levels, and to consider the more absolute sustainability of a system.

# **Non-Renewal Projects**

This section summarizes all projects proposed in the AMP that do not involve renewing existing assets. These projects will include non-renewal capital projects, studies, assessments, or engineering reports identified in Section 5 to address key issues. This section may also include new capital projects that are recommended by Council but not explicitly associated with addressing key issues.

For major capital projects (generally with a value of greater than \$1 million), communities should provide high level detail about each project, including the name of the asset being constructed/purchased, the estimated cost, and the year(s) when the work is proposed.

Table 11: Projected Non-Renewal Costs shows the average estimated cost of non-renewal work planned for each asset category.

| Asset Category         | 25 Year Total Cost | 25 Year<br>Annualized Cost |  |  |  |
|------------------------|--------------------|----------------------------|--|--|--|
| Water                  | \$0                | \$0                        |  |  |  |
| Sewer                  | \$0                | \$0                        |  |  |  |
| Roads and Drainage     | \$0                | \$0                        |  |  |  |
| Buildings              | \$200,000          | \$8,000                    |  |  |  |
| Recreation             | \$135,000          | \$5,400                    |  |  |  |
| Vehicles               | \$125,000          | \$5,000                    |  |  |  |
| Heavy Mobile Equipment | \$0                | \$0                        |  |  |  |
| Subtotal               | \$460,000          | \$18,400                   |  |  |  |
|                        |                    |                            |  |  |  |

## Example: Table 11: Projected Non-Renewal Costs

Communities should use the same approach for determining 25-year annualized and annualized lifecycle costs described for renewal projects in Table 11.

Figure 5: 25 Year Schedule of Non-Renewal Projects shows the total cost for non-renewal work each year over a 25 year period. The annualized cost during this period is also illustrated. This graph will be automatically created in sheet "Chart 25-Year Non-Renewal Plan" of the Asset Inventory Template.



# **Cost Requirements Summary**

Table 12: Estimated Cost Requirement Summary summarizes all cost requirement components described throughout Section 6. Drawing from any reserves, if available, will be considered in Section 7.

| Example: Table 12: Estimated Cost Requirement Summa  |                        |  |
|--|------------------------|--|
| Requirement  | Annual                 |  |
| Current Annual Revenue   |                        |  |
| Own Source Revenue   | \$1,450,000            |  |
| Community Public Infrastructure Funding  | \$360,000              |  |
| Projected Annual Expenses  |                        |  |
| O&M  | \$1,146,187            |  |
| Existing Debt Servicing  | \$0                    |  |
| Renewal (annualized)   | \$367,443              |  |
| Non-Renewal (annualized)   | \$18,400               |  |
| Surplus (Shortfall)  | \$ 277,970             |  |
| Notes:<br>1. Revenue sufficient until 2022 w here initial shortfall<br>funds for renew ing the arena | is due to insufficient |  |

Table 12 outlines the following information:

- Current Annual Revenue as described earlier in Section 6
- Projected Annual Expenses focusing on:
  - The average annual cost of O&M over the past 5 years as a projection for the future (this is only expected to increase significantly if new capital is constructed that requires additional O&M to support service delivery) (subtotal from Table 9)
  - An average contribution each year, based on commitments over the next 25 years, towards interest on existing debt servicing
  - Total renewal costs (annualized) based on the 25-Year schedule for all asset categories (subtotal from Table 10)
  - Total non-renewal (annualized) based on the 25-Year schedule for all asset categories (subtotal from Table 11)

It is common for communities to have an imbalance – the goal through the subsequent sections in ths AMP is to take important steps towards minimizing this imbalance over the long term.

Figure 6: 25-Year Unoptimized Plan is a bar graph showing projected expenses over the next 25 years. Renewal and non-renewal projects are shown in the year they are expected to occur, while O&M and administration and debt servicing costs are shown as annual averages. Current annual revenue and total projected annual expenses are shown as horizontal lines on the graph. The area between these two lines is the sustainability gap.



Section 7 will describe strategies that the community will use to optimize the long-term plan by minimizing the sustainability gap between expected revenue and expenses.

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## Section 7: Optimization Strategies

For many communities, the unconstrained asset management need is larger than funding capacity. A realistic and affordable plan for the community's infrastructure that balances revenues and expenses over the long term is needed. A series of optimization strategies balance 'how much will it cost' with the question 'how will you pay for it'. Working towards long term financial sustainability is key. Example strategies are described, and where appropriate, actions have been included in the LTFP (Section 8).

The optimization process should result in a list of action items that staff feel will lead to a more balanced Long Term Financial Plan. Communities should document these strategies in Table 13, along with a brief description, information on project status, and a high-level estimate of the financial impact the action will have on the 25-Year Unoptimized Plan. Strategies may:

- Reduce overall cost of the asset management program (e.g. where a project is cancelled or scope is reduced);
- Increase overall cost (e.g. where new information or studies are planned) in the short term, with the objective of delaying or reducing costs longer term; or
- Result in no change to 25-year costs (e.g. where a project is delayed but stays within the 25-year horizon).

# Work Together: Optimizing Your Plan

Getting input from staff across the organization with different expertise and experience with service delivery is very valuable for identifying creative strategies to balance priorities with what is reasonable.

Use the 25-Year Unoptimized Plan (Figure 6) as a starting place and think about different ways to adjust expenditures or increase revenue to make the plan more affordable. Consider the following questions:

- What new information can we collect to reduce uncertainty and make more informed decisions about project cost and timing (e.g. condition assessment)?
- Can we adjust our risk acceptance in some areas to delay projects to address risks (e.g. run-to-fail, preventative maintenance)?
- > Are there maintenance practices or changes to operations and maintenance that could result in efficiencies?
- > Are there non-regulatory levels of service we can adjust to reduce or change the services we provide?
- How should we communicate these changes to the public and what groups are most important to reach out to?
- Can we adjust project timelines (e.g. advance, delay, or phase) to spread out costs?
- ► Can we adjust project scope to address multiple key issues and leverage cost efficiencies?
- Can we combine projects to save on fixed costs like mobilization and project management?
- ► Are there new technologies that can decrease either our capital or O&M costs?
- Can we increase our debt or reserves to spread out costs?
- Are there alternative revenue sources to consider (e.g. utility rates, taxes, special levies, grants, own-source)?



Table 13: Optimization Actions is shown below as an example for documenting optimization strategies. Communities may choose to have separate tables for each type of optimization strategy (e.g. new information, alternative revenue, etc), or may have a single table listing all strategies.

| Example: Table 13: Optimization Actions   |   |          |               |  |
|---|---|----------|---------------|--|
| Action  | Description   | Status   | Impact        |  |
| Risk Acceptance   |   |          |               |  |
| Increase risk<br>acceptance for all<br>non-critical assets<br>(Issue Item 2.4)                                      | Delay renewal projects for all non-critical assets to -25% remaining life (e.g., 25% overdue for replacement).  | Pending  | N/A           |  |
| Maintenance Management  |   |          |               |  |
| Explore new<br>material for road<br>patching  | If successful, this pilot project would<br>enable staff to more cost effectively<br>maintain our existing road network, as<br>the maintenance requirements would<br>decrease  | Pending  | (\$5,000)     |  |
| Levels of Service A   | djustment   |          |               |  |
| Reduce Level of<br>Service for Roads<br>and Drainage<br>(Issue Item 3.3)  | Adjust the acceptable time period for response to sidewalk obstructions on minor streets during winter months.  | Adjusted | (\$50,000)    |  |
| Public Meeting on<br>Level of Service –<br>Non-Critical Assets<br>(Issue 2.4)                                       | Hold a public meeting that provides<br>information on existing levels of service,<br>with a focus on (Community)'s decision<br>to run non-critical assets to 150%<br>remaining life.  | Adjusted | \$50,000      |  |
| Public Meeting on<br>Level of Service –<br>Sidewalk<br>Accessibility<br>(Issue 3.3)                                 | Hold a public meeting that provides<br>information on existing levels of service,<br>with a focus on how to address sidewalk<br>accessibility challenges throughout the<br>community during the winter months,<br>considerations for bylaws to require<br>businesses and community residents to<br>clear snow, ice and other obstructions   | Adjusted | \$16,000      |  |
| Extending Timeline  | s   |          |               |  |
| Condition<br>Assessment<br>(Issue Item 2.1)   | For all assets to adjust renewal timelines<br>to reflect actual condition, rather than<br>remaining life estimates  | Pending  | N/A           |  |
| Negotiate temporary<br>exceedance permit<br>to meet effluent<br>quality parameter<br>objectives<br>(Issue Item 3.3) | Sewage lagoon effluent quality<br>parameters negotiated to allow for time to<br>complete study to investigate and<br>upgrade this critical asset.   | Adjusted | (\$2,000,000) |  |
| Phased renewal of<br>major road and<br>utilities (buried and<br>utilidor) (Issue Item<br>2.4)                       | Complete renewal of linear infrastructure<br>components (e.g. water, sewer, roads<br>and drainage) on an ongoing basis to<br>spread expenditures out over time,<br>synchronize buried infrastructure and<br>utilidor works (along road corridors) with<br>road renewal projects.<br>While this does not reduce the total cost<br>of the renewal program it makes spending<br>more manageable. | Adjusted | No net impact |  |

| Example: Table 13: Optimization Actions   |  |               |               |  |  |
|---|--|---------------|---------------|--|--|
| Utilizing Debt or Reserves  |  |               |               |  |  |
| Apply for a loan to<br>purchase a backup<br>water truck<br>(ltem 4.1)                                 | Already included in financial plan. This<br>allows us to reduce the consequences<br>should our existing (and very old) water<br>truck stop working. Costs will be spread<br>over a 10-year period. | Complete      | \$1,000       |  |  |
| Revenue Alternatives  |  |               |               |  |  |
| Grant funding for<br>Management of<br>Municipal<br>Wastewater Effluent<br>(Issue Item 3.4 and<br>4.2) | Pursue grant funding to investigate and<br>upgrade the sewage lagoon, which is a<br>critical community asset.  | Pending Award | (\$2,500,000) |  |  |

You may also want to consider optimization strategies associated with **new technology**. An example could be installing solar panels and energy storage to offset diesel use in summer months.

Many of the strategies identified will be long term initiatives to be completed over the upcoming months or years after the first iteration of the AMP has been finalized. These actions should be listed as recommendations under Section 9: Conclusions of the AMP with a goal to implement these initiatives before the AMP is updated in the future.

Some strategies can be applied immediately to revise the 25-Year Unoptimized Plan into the optimized Long Term Financial Plan in Section 8 of the AMP. In most cases, immediate changes will relate to changing project scope or adjusting risk acceptance or project timelines.

Communities can use the Asset Inventory Template to make these changes by saving a new version of the "25-Year Plan" spreadsheets and adjusting content to reflect the optimization decisions. The outcome will be a new summary graph to be included in Section 8 as the Long Term Financial Plan.

## Managing Backlog

Managing assets that are in a failed state or older than their expected life can be a challenge. Backlog can happen for a variety of reasons, such as assets not lasting their design life, unusual events stressing an asset, or insufficient long-term funding levels.

Assets that are in backlog should be looked at carefully. Some assets can operate in a lower level of service while in backlog. An example of this would be a low volume asphalt road that has functionally degraded into a gravel road. Other assets will not work while in backlog, such as a building with a collapsed roof, or a truck missing a major component like a transmission. A good target is to have backlogged assets replaced within 10 years.

Maintenance and operations are impacted by backlog. If you know an asset is in backlog and will be replaced soon, consider if maintenance is warranted.

# **Template Section 8: Long Term Financial Plan**



This section focuses on answering the question: "**how will you pay for it?**" It presents the Long Term Financial Plan based on the optimized strategy outlined in Section 7. The LTFP has been designed around a 25-year time horizon but communities may want to adjust this to match other planning horizons used across the organization.

The LTFP is centred around using the priorities and timing identified to inform a strategy that most effectively enables a community to manage their infrastructure gap according to the revenue they have available to them. This is essentially the 'business case' for how infrastructure decisions are made. The Plan will need to be updated over time as longer-term optimization strategies are put in place and more information about assets becomes available.

# **Optimized Plan**

Table 14: Optimized Cost Requirement Summary updates the content in Table 12 to reflect a first round of adjustments to optimize the Long Term Financial Plan. Refer to page 37 in the Guide for details on calculating each component.

| Example: Table 14: Optimized Cost Requirement Summary |             |  |  |
|---|-------------|--|--|
| Requirement   | Annual      |  |  |
| Current Annual Revenue                                |             |  |  |
| Own Source Revenue                                    | \$1,450,000 |  |  |
| Community Public Infrastructure Funding               | \$360,000   |  |  |
| Projected Annual Expenses                             |             |  |  |
| O&M   | \$1,143,987 |  |  |
| Existing Debt Servicing                               | \$0         |  |  |
| Renewal (annualized)                                  | \$290,083   |  |  |
| Non-Renewal (annualized)                              | \$8,440     |  |  |
| Surplus (Shortfall)                                   | \$ 367,490  |  |  |

*Figure 7: 25-Year Optimized Plan* illustrates the projected annual expenses that make up the Long Term Financial Plan, including the most reasonable schedule for renewal and non-renewal projects. This figure should include the same features as Figure 6: 25-Year Unoptimized Plan to make it easier to see the financial impact that optimization strategies have had on the Plan. Ideally, the sustainability gap between current annual revenue and projected annual expenses will have been reduced through optimization.



## **Building Reserve Funds**

In years where the projected annual expenditures for renewal and O&M combined is lower than the annual average cost requirements, it is recommended that those funds be set aside in a reserve or carried forward. This will help to build funds that can be drawn on in the years where expenditures are higher than annual requirements, thus balancing out spending while ensuring that required work can be completed.

Contact MACA for further information on establishing reserve funding levels for NWT communities is provided in the, which can be found at this link: www.maca.gov.nt.ca.

## Managing the Sustainability Gap

Despite efforts to balance the optimized plan, it is expected that most communities will still have a sustainability gap. The community will need to decide if this residual gap is manageable and may need to consider additional optimization strategies over the next few years, and longer term, repeating the process until the gap is considered acceptable. Any future strategies being recommended should be listed here.

# **Template Section 9: Conclusions**

This is the final section of the AMP Template and serves to summarize conclusions from the AMP process.

# **Key Findings**

List key findings about community assets and service delivery overall. Consider the following questions to summarize conclusions from each section in the AMP:

- Section 2: Where are there major gaps in information? What assets are highest value or have the lowest remaining life?
- Section 3: Where are there major service level gaps? Which asset categories need more defined commitments?
- Section 4: What are the community's highest risk asset categories?
- Section 5: What type of options are preferred (e.g. renewal? studies?)
- Section 6: How significant is the revenue requirement gap?
- Section 7: What are key strategies to optimize the plan? What can be done immediately? What can be done longer term? What is the residual sustainability gap?
- Section 8: What are the major spending trends in the optimized long term financial plan?

## **Recommendations for Implementation**

Communities should also list recommendations for next steps to implement the AMP and outstanding optimization strategies identified in Section 7. Also consider when the AMP should be updated and how the AMP might be integrated with existing decision-making processes and policies.

# 5. Putting it Into Practice

Once you've completed your AMP and arrived at an initially optimized Long Term Financial Plan that is practical, the next step is to communicate the plan to staff (who haven't been involved in the process) and Council. It may be helpful to have a workshop to introduce main components of the AMP and discuss how the information should be used to influence planning and decision-making across the organization. Highlighting next steps from the recommendations section will also be important for creating buy-in for further action.

Have a discussion with MACA and NWTAC as well, if you haven't already. There may be areas where they can provide support.

Think of your AMP as a business case for the capital and maintenance work that needs to happen. It's also a clear indication of resources needed to support service delivery both now and into the future. Remember, the AMP should be updated approximately ever 5 years (or sooner if there is a major shift in community direction or a significant amount of new information becomes available).



# 6. Glossary of Terms

#### Asset Category

Also referred to as asset classes, these are major infrastructure groupings by system type. Different communities have different types of assets. Typical asset categories include water, sewer, roads and drainage, buildings, recreation, vehicles, and heavy equipment. Other categories could include solid waste, cemetery, airport, protective services, and IT.

#### Asset Management

Asset management is an integrated process for making informed decisions, considering the present and future needs of users and the services being provided.

#### Asset Management Plan (AMP)

A document that describes how one or more groups of assets are to be managed over a period of time in order to deliver an agreed upon standard of service.

#### <u>Asset</u>

A physical component that has value, enables services to be provided, and has an economic life of greater than 12 months. This is also referred to as a tangible capital asset (TCA).

#### Asset Renewal

Capital works including major upgrades, refurbishment, or replacement of existing infrastructure with that of equivalent capacity or performance capability (i.e., bringing the asset to as near new condition as possible).

#### Annualized Replacement Value

The average cost for renewing an asset (or group of assets) where cost is divided over the next 25 years, or over the full life expectancy of the asset.

#### Capital Plan

A summary of the major and minor projects that involve restoration of capacity or function (deficiencies), replacement or rehabilitation of existing assets at the end of their life (renewal), system expansion (growth), or addressing other changes to the level of service being provided, such as changes in strategic direction corporately, or shifts in regulation or industry standards (levels of service).

#### **Condition**

A snapshot in time of an asset's current state of repair.

## **Consequence**

The magnitude of impact that a possible event or scenario has considering the financial, social and/or environmental effects. This is one of the two criteria used in assessing risk.

#### **Criticality**

The relative importance of an asset in providing community services (i.e. the severity of the consequence from an asset's failure or loss of function).

#### Facility Condition Index (FCI)

A measure of a building's condition, calculated by dividing the cost requirements (cost to correct current deficiencies) by the current replacement value of the asset.

#### **Historical Cost**

The original cost paid to purchase or construct an asset. Where this information is unavailable, an estimate can be made using the replacement value and the Consumer Price Index (CPI) / Engineering News Record (ENR).

#### Infrastructure

Assets that are generally made up of components to form complex systems (e.g. water systems, sewer systems, roads networks, drainage systems, and buildings).

#### **Inventory**

A record of key information about individual community-owned assets, and the collective systems they make up, including key attributes to support decision-making (e.g. age, material, size, condition, etc.).

#### Level of Service

The level of service the municipality actually delivers to its customers. This measure reflects the quality or quantity of a given service for a particular asset category.

#### Level of Service Commitment

The level of service the municipality aims to deliver to its customers.

#### Lifecycle

The stages an asset passes through during its useful life (e.g., construction » operations and maintenance » replacement).

#### **Likelihood**

The statistical probability or frequency of a possible event or scenario, typically considered within the lifespan of an asset. This is one of the two criteria used in assessing risk.

#### Long Term Financial Plan

A plan to fund a community's long-term (20+ year) capital and operating needs by balancing these costs with available revenue, considering risk, criticality, levels of service and maintenance practices.

#### Maintenance Management

A systematic approach to repairing and undertaking preventative work to optimize asset life expectancies, manage risks and sustain target service levels.

#### Non-Renewal Capital Projects

Projects designed to increase current levels of service, e.g. through upgrading or expanding existing assets, conducting studies or assessments, or building new assets.

#### Performance Measure

The means used to assess a level of service (e.g. direct measurement, customer survey, complaint, internal review).

#### **Replacement Cost / Value**

The funds required if an asset had to be renewed or replaced, in today's dollars.

#### Remaining Life

The number of remaining years in which an asset is expected to continue to be functional. When calculated simply, this is based on the attributes of an asset, its expected useful life, and current age. A more accurate estimate would be based on observed asset condition.

#### Cost Requirement

Summarizes expenses, which is sometimes referred to as revenue requirements, consisting of capital (renewal and new works), debt servicing, operational and maintenance activities.

#### <u>Risk</u>

The potential for undesirable outcomes resulting from an incident, event, or occurrence. This is made up of the consequence and likelihood of asset failure or service disruption.

#### Sustainability Gap

The difference between revenue available over the long term and associated expenses in order to continue providing community services at a defined level. This is often annualized for comparison purposes.

## Tangible Capital Asset (TCA)

As stated in PS 3150, tangible capital assets are non-financial assets having physical substance that:

- ► Are held for use in the production or supply of goods and services, for rental to others, for administrative purposes or for the development, construction, maintenance, or repair of other tangible capital assets;
- ► Have useful economic lives extending beyond an accounting period;
- Are to be used on a continuing basis; and,
- Are not for sale in the ordinary course of operations.