

ASSET MANAGEMENT LIFECYCLE COST WORKBOOK GUIDE

BUILDINGS, ARENAS, POOLS



Canada **FCM**

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:



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1. About this Guide

The Asset Management Lifecycle Cost Workbook Guides (“The Guides”) was developed by the Northwest Territories Association of Communities (NWTAC). The Guides are designed to help local governments use the Lifecycle Cost Workbooks to evaluate projects based on their full cost.

This Guide is part of a set of two, and within 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
- ▶ Lifecycle Cost Workbooks (2) & Supporting Guides (this document)
- ▶ 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 is intended to provide a step-by-step information resource to support communities in the Northwest Territories as they evaluate a new capital building arena or pool, mid-life renewal (eg. roof replacement) or acquisition based on the full lifecycle cost of that asset. It is designed to help communities walk through the excel-based spreadsheet tool that accompanies this guide.

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.

Guide Structure

The Guide is designed to accompany the Lifecycle Cost Workbook for buildings, arenas and pools, which provides a starting place for communities to evaluate new capital projects, mid-life renewals, or acquisitions. It includes sections describing each component of the workbook to help local governments tailor the template to meet their needs.

The Guide is made up of four major sections:

- | | |
|------------------------------------|---|
| 1. About this Guide | Information on the purpose and structure of this Guide. |
| 2. Background | Details on what lifecycle costing is and how it fits with existing strategies and practices in the Northwest Territories. |
| 3. Using the Workbook | A description of each of the four worksheets. |
| 4. Putting it into Practice | An overview of next steps for using the results from the lifecycle costing workbook to support decision-making. |

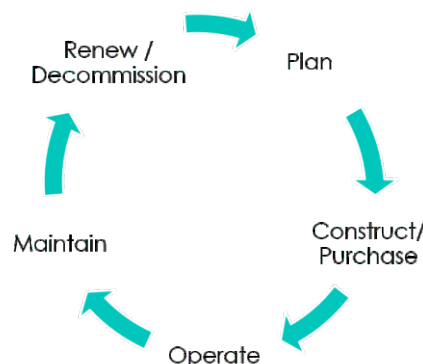
2. Background

One of the founding principles of asset management is that all assets exist to provide services needed by the users. Every community has competing needs for its resources, so every infrastructure investment decision also has implications for other infrastructure needs. The purpose and priority of the investment must be adequately described in order to make effective decisions – think of this as the project business case.

Lifecycle Costs

Lifecycle Costs are the true costs involved in owning and utilizing a community asset over its useful life: from initial planning, to purchase, to operations, to maintenance, to renewal and/or decommissioning. This is important because it:

- ▶ Provides a basis for maximizing the cost-efficiency of infrastructure-dependent services
- ▶ Enables fact-based decisions regarding a best value approach for providing services
- ▶ Helps understand and compare servicing alternatives, even when they may have markedly different initial capital costs and annual operation and maintenance costs
- ▶ Provides consistency and transparency in decision processes



Two workbooks have been developed to support local governments in assessing lifecycle costs, one focusing on fleet and equipment (which this Guide describes) and the other focusing on buildings, arenas and pools. These workbooks are intended to help staff, as well as elected officials, become more aware of the long term costs associated with infrastructure decisions within the Northwest Territories



3. Using the Workbook

You will need to save a new version of the workbook for each capital project being evaluated.

Worksheet 1: Introduction

This worksheet describes fleet and equipment assets and the components that make up their full lifecycle cost using a combination of graphics and checklists.

Worksheet 2: Asset Purpose and Priority

If you had to answer why you need a capital asset or why it needs to be renewed with one or two sentences, what would you say? How can you evaluate several capital assets with varying drivers?

The workbook template guides the user through two key objectives under the Asset Purpose and Priority Tab:

- ▶ Creating a Capital Asset Purpose Statement; and,
- ▶ Developing a Capital Asset Priority Rating

Guiding Questions

As you develop your Capital Project Purpose Statement, think about the following questions:

- ▶ What new services or level of service do you need to provide to your community members?
- ▶ Why do you need them?
- ▶ Can you provide the new service level or level of service with existing assets? If yes, what is the condition of the existing asset? Are major renewals required?
- ▶ What impacts or risks would your community be exposed to if you did not build/purchase/renew this asset?
- ▶ What new buildings do you need to provide the proposed service or increased level of service?
- ▶ How does this building fit into your overall community plan or objectives for community services?

Use the following sample sentence to prepare your asset purpose statement. Check your statement to see if it answers: What are we proposing to do? Why to we need to do it? What could happen if we didn't?

Our community needs to (description of project), **to** (service provided) **because** (current status of infrastructure and program need/protection). **This project aligns with our community goals/vision to** (insert relevant goals).

If we didn't build/purchase/renew this asset, we would experience the following impacts: (describe impacts, e.g. lost opportunity, people, assets, environment, financial)

To develop a capital asset priority rating, answer as many questions as possible by selecting the response from the drop down list that most closely reflects your answer:

Select the response from the drop down list that most closely reflects your answer:
Affects some groups of the community
Affects most/all the population in the community
Affects some groups of the community
Affects only certain individuals in the community
Mitigation possible at partial loss of program function and increase in O&M costs less than 50% of proposed project cost
Project used by most of the population on regional wide basis
Asset provides only available means to deliver services
Capital Plan Fiscal Year 1
Mitigation possible at partial loss of program function and increase in O&M costs less than 50% of proposed project cost
Yes, significant facility upgrades are required to meet legislative requirements
Issue impacts community area environment
Direct link to human potential impacts

Key Considerations

- ▶ Protection of People
- ▶ Protection of Assets
- ▶ Protection of Environment
- ▶ Financial Investments
- ▶ Program Need or Requirement



Worksheet 3: Lifecycle Costs

The workbook template is used to tabulate the estimated capital, operation and maintenance, administration and program delivery costs associated with the asset over its full lifecycle.

The worksheet has three different types of cells:

Input Cells	These cells allow you to manually type in your own values
Dropdown List	These cells allow you to select an option from a list
Automatically Calculated Cells	These cells are automatically calculated from the dropdown or input cells

As you are completing this worksheet, it may be helpful to reference the five examples provided in subsequent worksheets. These examples illustrate local communities with varying levels of detail. In particular: arenas, creation complexes, pools and multi-use facilities.

SECTION 1 - Building Details

Building Details	
Age of Asset	<input type="text" value="5"/> yrs
Expected Useful Life	<input type="text" value="80"/> yrs
Remaining Life	<input type="text" value="75"/> yrs

1. Enter the **Age** of Asset (use a best guess if you aren't sure). In most instances you will be considering new assets and so the age will be 0 years.
2. Enter the **Expected Useful Life** (use a best guess if you aren't sure) – the remaining life will populate based on your selections. Please note that this is the length of time, in service, as opposed to the tangible capital asset life expectancy used for financial depreciation.

Quantifying the Cost of Climate Change

Climate change can affect the expected useful life of infrastructure, operations and maintenance costs, costs of retrofits, and potentially result in additional renewal costs.

The costs of not taking action to adapt to a changing climate should also be considered. Early investment in adaptation can substantially reduce the costs and impact to infrastructure.

Evaluating projects involves more than just looking at infrastructure costs, and this is even more important when considering solutions that will be effective as our climate continues to change. Adaptive solutions may cost more up front, but the resulting social, environmental and economic impacts over the long term should be considered. "Developing infrastructure for the future of the North will require transformative adaptations as well as incremental adaptations. In many cases, this will mean following the lead of Northerners to reimagine the way that infrastructure services are delivered and support education and community knowledge-sharing networks." (Canadian Climate Institute, 2022)

Additional information on the costs of climate change for northern infrastructure can be found here: <https://climateinstitute.ca/wp-content/uploads/2022/06/Due-North.pdf>

If you need to borrow money to finance the purchase the asset complete **SECTION 2 - Borrowing Capital for Financing**. Otherwise, set 'Percentage of Total Capital for Financing' to 0%.

Borrowing Capital for Financing

Interest Rate for Capital Expenditures

Amortization Period for Loan

Percentage of Total Capital for Financing

3%

30

20%

1. Enter the **Interest Rate for Capital Expenditures** – this is the interest rate for any money spent on acquiring or maintaining the asset and applies to system capital renewals during the asset's lifecycle
2. Enter the **Amortization Period for Loan** – this is the time you think it will take to repay your loan in full
3. Enter the **Percentage of Total Capital for Financing** – what percentage of the asset are you financing?

Complete as much as you can about the asset in **SECTION 3 – Capital Cost for Initial Acquisition / Major Renewal of Asset**. In many cases, you may have one number to work with. If so, you can write it directly into the 'TOTAL INITIAL CAPITAL COST' cell.

Capital Cost for Initial Acquisition of Asset

Construction

Site Work and Landscaping

Infrastructure Servicing

Commissioning

Staff Training

Land Costs

Furnishings

Legal

Architectural Engineering

Environmental

Archaeological

Project Administration

TOTAL INITIAL CAPITAL COST

\$	2,500,000.00
\$	-
\$	-
\$	-
\$	-
\$	-
\$	-
\$	-
\$	-
\$	-
\$	-
\$	-
\$	2,500,000.00

If you have additional costing detail, enter the relevant details below and leave the remainder blank.

1. Enter the **Construction** cost
2. Enter the **Site Work and Landscaping** cost
3. Enter the **Infrastructure Servicing** cost
4. Enter the **Commissioning** cost – how much will it cost to test and/or verify that the assets or systems are in proper working condition?
5. Enter the costs associated with **Staff Training** – how much will it cost to train the necessary staff for this project? Will you need to train staff to use the new facility or systems?
6. Do you need to purchase land? Enter the **Land Costs**
7. What furnishings (desks, phones, chairs) are needed? Enter the **Furnishings** cost
8. Enter the **Legal** costs – will there be any legal fees associated with the project?
9. Enter the **Architectural / Engineering** costs
10. Enter the **Environmental** costs
11. Enter the **Archaeological** costs
12. Enter the **Project Administration** fees for the project

If some of these costs aren't available or relevant, leave them blank.

What will it cost to operate and maintain the facility each year? Fill in any relevant blanks for the project in **SECTION 4 – Asset Annual Operation and Maintenance (O&M)**.

Asset Annual Operation and Maintenance (O&M)	
Staffing	\$ 150,000.00
Electricity	\$ 6,000.00
Natural Gas/Diesel	\$ 10,000.00
Water/Sewer	\$ 500.00
Telephone	\$ 3,600.00
Office Expenses	\$ 1,500.00
Lease Expenses	\$ 1,000.00
Chemicals and Other Cleaning Supplies	\$ 200.00
Solid Waste and Recycling	\$ 200.00
Building Maintenance and Repairs	\$ 2,500.00
Site and Landscape Maintenance	\$ 500.00
Spare Parts Procurement and Storage	\$ 350.00
Contracted Services	\$ 750.00
Security	\$ -
Maintenance Equipment	\$ 1,200.00
Administration and Overhead	\$ -
Facility Insurance and Legal Costs	\$ 3,600.00
TOTAL ANNUAL O&M COST	\$ 181,900.00

1. Enter the **Staffing** costs – talk to a person in your accounting department and/or look at past expenses for similar assets to determine this value
2. Enter the **Electricity** costs – installation (if this is an recurring cost), servicing, etc. Past electricity bills are a great resource
3. How will you heat the building? Enter the costs associated with one of the following: **Natural Gas/Diesel**, if applicable

4. Enter the costs associated with **Water/Sewer** – installation, treatment, etc.
5. Enter any **Telephone** billing costs
6. Enter any **Office Expenses**
7. Enter any **Lease Expenses** – this only applies if you're leasing the building
8. Enter the costs for any **Chemicals and Other Cleaning Supplies**
9. Enter the costs for **Solid Waste and Recycling**
10. Enter any **Building Maintenance and Repairs** costs
11. Enter any **Site and Landscape Maintenance** costs
12. Enter the costs associated with **Spare Parts Procurement and Storage** – how much will it cost to control the quality, quantity, sourcing, and timing of the asset? Will you need to store this asset while it's not being used?
13. Enter any **Contracted Services** costs – did you contract any part of this project to another company?
14. Enter any **Security** fees
15. Enter the **Maintenance Equipment** fees
16. Enter any **Administration and Overhead** fees
17. Enter the **Facility Insurance and Legal Costs**

A table of cost estimate classifications has also been included as a supporting worksheet and reference. It is intended to be a guide for reference when using outside support to determine capital costs, and provides cost variances which are helpful benchmarks when considering contingencies.

SECTION 5 – Program / Service Delivery

1. Enter the costs related to programs or services delivered through the building facility. This is particularly important for recreation, and other staff - intensive, buildings because these costs can be comparable over the lifetime of an asset with initial construction.

Program/Service Delivery	
Activities and Programs	\$ -
Program Staff Labour	\$ -
Program Staff Training	\$ -
Administration	\$ -
Licensing	\$ -
Program Insurance and Legal	\$ -
TOTAL ANNUAL COST FOR PROGRAM/SERVICES	\$ -

SECTION 6 – System Renewals During Asset Lifecycle

accounts for building upgrades and renewals during its full lifecycle.

In building asset management, it is generally assumed that the building is a collection of systems, each of which can be independently renewed on different lifecycles. In practice, systems such as branch wiring and plumbing in the walls cannot be renewed except during a major renovation that also involves replacement of partition wall and ceiling finishes. Since renewal of many systems disrupts the use of the asset, they are often grouped in major mid-life projects and therefore can only be done once or twice over the life of the building. Other systems such as the foundation and structure can only be partially renewed except at the end of the asset's lifecycle. If you aren't sure, some example costs and frequencies are provided as placeholders.

If you have detailed construction cost estimates, you can use the component costs here. It is not necessary to worry about any inflation because it unnecessarily complicates the process with minimal significant impact.

System Renewals During Asset Lifecycle		Renewal Frequency	Renewals in Asset Life	Cost per Year
Roof Cover Assembly	\$ 100,000.00	80	0	\$ -
Exterior Finishes	\$ 100,000.00	40	1.875	\$ 2,500.00
Interior Finishes	\$ 375,000.00	20	3.75	\$ 18,750.00
Furnishings	\$ 125,000.00	20	3.75	\$ 6,250.00
Communications and Data Systems	\$ 300,000.00	20	3.75	\$ 15,000.00
Security and Alarm Systems	\$ 250,000.00	20	3.75	\$ 12,500.00
Electrical and Lighting Systems	\$ 300,000.00	40	1.875	\$ 7,500.00
HVAC and Mechanical Systems	\$ 500,000.00	40	1.875	\$ 12,500.00
Doors and Windows	\$ 100,000.00	50	1.5	\$ 2,000.00
TOTAL SYSTEM RENEWALS COST	\$ 2,150,000.00			\$ 77,000.00

1. Enter any **Roof Cover Assembly** costs
2. Enter the **Exterior Finishes** costs
3. Enter the **Interior Finishes** costs
4. Enter any **Furnishing** costs
5. Enter the costs for the **Communications and Data Systems**
6. Enter the costs for the **Security and Alarm Systems**
7. Enter the costs for the **Electrical and Lighting Systems**
8. Enter the costs for the **HVAC and Mechanical Systems**
9. Enter any costs for **Doors and Windows**

SECTION 7 – Indirect Lifecycle & Risk Costs

Are there any other costs you might incur in terms of environmental impacts, greenhouse gas emissions, additional safety risk? If so, fill in any relevant blanks for the asset in **SECTION 7 – Indirect Lifecycle & Risk Costs**.

Indirect Lifecycle & Risk Costs	
Environmental impacts & risks	\$ -
Greenhouse gas emissions	\$ -
Safety risks	\$ -
	\$ -

Carbon Pricing

Carbon pricing can be considered to make more informed decisions about new infrastructure projects. There are three aspects of carbon pricing – the NWT carbon tax, and the embodied carbon (the total GHGs emitted during the construction of infrastructure) alongside the carbon footprint (activities such as electricity, fuel consumption, heating and lighting).

As a result of carbon pricing, the GNWT is providing an annual carbon tax revenue-sharing grant for communities that demonstrate efforts to adapt to climate change, reduce reliance on fossil fuels, and/or support the overall reduction of GHGs. This may be an opportunity for some projects your local government is considering.

For the purposes of the lifecycle model, it's possible to consider the carbon emitted during the construction and operations of the proposed infrastructure, either as a an amount of overall carbon or as a cost associated that carbon. There are various freely available models to assist in identifying the embodied carbon and carbon footprint of infrastructure projects.

Worksheet 4: Decision-Making Process

The workbook template contains questions that will help you decide whether to proceed with building/acquiring or renewal of the asset based on factors such as purpose, cost, and impacts on other infrastructure. You may wish to print out this page of the workbook to compare multiple options to one another.

The first section pertains to basic project information; fill in as much as you can:

Department:	_____	Class Estimate:	_____
Asset Number:	_____	NTPC:	_____
Activity:	_____	Previously Submitted:	_____
Project Number:	_____	PPD:	_____
Project Title:	_____	Fiscal Year:	_____
Approval Status:	_____	Facility Condition Index Score:	_____
Community:	_____	Replacing an Existing Asset (Y/N)	_____
FY Approved:	_____	Federal Fund (Y/N):	_____
Land Availability:	_____	Date Prepared:	_____
Multiyear:	_____		
Site Development:	_____		

What is the driver for this project? Why do you need this asset? Check all that apply:

What is the driver for this project?	
<input type="checkbox"/> Improvement order from authorized jurisdiction	<input type="checkbox"/> Potential return on investment
<input type="checkbox"/> Legislated requirement from body with authority close infrastructure or impose penalties	<input type="checkbox"/> Formal agreements for investment which require matching funds from other jurisdictions
<input type="checkbox"/> Imminent structural failure; critical infrastructure	<input type="checkbox"/> Avoidance of cost for major repairs or replacements
<input type="checkbox"/> Catastrophic equipment failure	<input type="checkbox"/> Avoidance of cost for environmental remediation
<input type="checkbox"/> Severe flood, fire or storm damage	<input type="checkbox"/> Cost savings which exceed investment and payback period of 5-7 years
<input type="checkbox"/> Requirement for demolition of hazardous infrastructure	<input type="checkbox"/> Energy conservation/energy achievement
<input type="checkbox"/> Advanced age of infrastructure	<input type="checkbox"/> Environmental protection
<input type="checkbox"/> Essential legislative service to community	<input type="checkbox"/> Demonstrable environmental risk from inaction
<input type="checkbox"/> New/Expanded/Adapted infrastructure to address growth	<input type="checkbox"/> Other: _____
<input type="checkbox"/> Exceeded capacity of infrastructure	<input type="checkbox"/> Other: _____
<input type="checkbox"/> Failure to meet program requirements	<input type="checkbox"/> Other: _____
<input type="checkbox"/> New/Expanded/Adapted infrastructure to address service level	<input type="checkbox"/> Other: _____

The asset purpose statement you filled out in **1. Asset Purpose and Priority** is included to help you in the decision-making process:

Purpose
Our community needs a new (description of project), to (service provided) because (current status of infrastructure and program need/protection). This project aligns with our community goals/vision to (insert relevant goals). If we didn't complete this project, we would experience the following impacts (describe impacts, e.g. lost opportunity, people, assets, environment, financial)

What are some of the potential **Impacts on Other Infrastructure**? Fill in this information in the box provided:

Impacts on Other Infrastructure

The following questions are related to **Asset Cost Estimate** and included to provide reflection prompts:

1. What needs are addressed, or benefits achieved by the assets? Are they justified with full lifecycle costs?
2. What are the lifecycle implications (O&M and renewals costs, risks, human resources) of acquiring the new asset and providing the new or expanded service?
3. How do you plan to pay for this project?



A summary of the estimated costs for the project/asset is displayed, based on answers provided in worksheet

2. Lifecycle Costs

Annualised Capital Cost for Initial Acquisition of Asset	What would it cost if the total capital cost for an asset was divided up over each year for the life of an asset?
Annualised Cost for Borrowing for Initial Acquisition	What would it cost if the total cost of borrowing to purchase an asset was divided up over each year for the life of an asset?
Operation and Maintenance (O&M) Costs	What does it cost each year to keep the asset running for its expected life?
Program / Service Delivery Costs	What does it cost to use this asset and deliver services to the community?
Annualized Cost for System Renewals During Asset Life	What does it cost to undertake component replacements so the building remains usable to its fullest extent, and safe?
Annualised Indirect Lifecycle & Risk Costs	What other risk costs will impact the total cost of this asset over its expected life (e.g. greenhouse gases, safety, environmental risks, etc.)?

The next section explores alternatives as you evaluate more than one project

1. What alternatives have been considered?
2. Why is this asset the preferred alternative?
3. How does this asset address the described need?

Finally, the last section asks: what is the status of **Community Consultations**?



4. Putting it into Practice

This lifecycle costing workbook is an excellent tool to inform the prioritization of projects being considered within a local government's capital plan. It can also be helpful when looking at optimization strategies as part of the long term financial planning process. Sometimes these exercises will be undertaken as part of developing an asset management plan, while other times they may be done separately.

Sphere of Influence

This tool is most effective when used as early as possible in the capital planning process. When a local government first starts considering a new asset, you have 100% of the control regarding cost implications. And that's extremely significant because these are building assets which will likely still be using in use 50 years, and maybe even 100 years later!

As you move into design, then construction then use of the asset, your ability to influence the costs related to this asset becomes smaller and smaller. Decisions have been made which remove some or all of the flexibility in considering alternatives.

As your sphere of influence decreases, your investment in the asset grows. So, consider taking a bit of extra time at the beginning of the process to ensure your decision is affordable for the *full lifecycle* of the building you are planning to construct. Ensure you know – and can accept – the cost implications of this new asset.