



Asset Management BC  
Roadmap Project



**Guide for using the  
Asset Management BC Roadmap**

**Asset Management B.C.**

**ROADMAP**

**MAY 2011**

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# 1 Roadmap Approach

## 2. Know Your Financial Situation

## 1.1 Overview

The objective of this roadmap is to assist organizations to implement asset management practices. Throughout this document the term ‘organization’ refers to local governments, municipalities and any other organization that manages public infrastructure.

Implementing asset management practices may seem like a very daunting task to an organization just starting on the asset management journey. However when you begin this journey you will soon realize that many of the ideas, concepts, and or data collections tasks may already be part of your daily operations and culture.

This Roadmap has been designed to lead you through the steps of implementing basic level asset management practices using a modular approach. There is an overall Roadmap diagram that lists many asset management practices, arranged as separate ‘modules’ under six general category headings.

These categories are:



### 2.1 Current Asset Investment

- a) Replacement Value
- b) Depreciated Value

The modular format was selected to break out the core components of asset management into tasks or activities that could be individually actioned. The purpose of this was to make it easy for organizations to get started and to continue to make progress as time, resource and funding allow. It was also important to present each task in terms of what needed to be achieved without tying into any specific software, framework or format. This provides maximum flexibility and leaves the choice with the organization as to which (if any) of available systems and guidelines they might want to use to augment asset management practice.

For example the information sheet for module 2.1 under the category ‘Know Your Financial Situation’ advises the information that is needed in regard to current replacement value and depreciated value. The information sheet does not however prescribe the calculation method

or the post calculation storage of this data. Total flexibility remains with the organization to choose the software or systems they want to use. In a small organization they may take a simple approach using excel spreadsheets for calculation and store the information in their financial system. They may have the A to B software, and may want to use GIS for storing outcomes, or have it all in an Access dataset. They may have an enterprise system or commercial asset inventory package.

The important point is that the Roadmap is a simple 'to-get-you-started' tool that provides a good overview and sufficient detail to implement a basic level of asset management and it is complimentary to any currently available guidelines and manuals that can give you a greater level of detail when you are ready for that.

## **1.2 Levels of Asset Management**

In the AMBC Roadmap and in the case studies, there is reference to three levels of asset management; basic, intermediate and advanced. The key elements for each level are:

- Basic Level Asset Management (also called 'Core' Asset Management in some texts);
  - a) Is the starting point and foundation for all other asset management practices;
  - b) Does not require data to be fully complete or highly accurate, provided that what is known is sufficient for day to day management of the assets;
  - c) Documents the current situation and what the gaps in data, procedures, systems and knowledge are; and
  - d) Identifies the significance of any missing data and provides an improvement plan for progressing asset management.
- Intermediate Level Asset Management;
  - a) Is the name given to the phase of improved asset management practice between achievement of basic level asset management but before attainment of advanced level asset management;
  - b) Includes all basic level asset management practices but to an improved level of completeness and accuracy; and
  - c) Includes additional asset management practices to provide more detailed and accurate analysis and greater understanding of current and future situations.
- Advanced Level Asset Management;
  - a) Requires a range of key asset management practices to be implemented to a high level of accuracy and completeness and evidence that a comprehensive knowledge of current and future situations has been attained;
  - b) Includes all basic and intermediate level asset management practices but to much higher level of completeness and accuracy;

- c) Includes additional asset management practices to optimize current and future situations to effect long term sustainability for providing services; and
- d) Documents formal procedures to ensure currency of data and continuous evolution of asset management practice and improvement of knowledge as circumstances change over time.

Asset management in a business model for the purpose of sustainable delivery of specific services. It must therefore include to continually monitor outcomes and adapt as necessary.

### **1.3 Using the Roadmap**

The Roadmap is designed to follow-on from the Asset Management B.C. (AMBC) self assessment tool AssetSmart. This self assessment tool reviews the readiness for an organization to begin implementing asset management practices. The Roadmap tool is then an overview of the key asset management practices that an organization would need to complete to achieve at least a basic level of asset management implementation.

The roadmap is set out in modular form so that an organization can choose which ever module of asset management practice they would like to take action on. At any time the organization could be progressing several modules simultaneously. The modules have been colour-coded to indicate which asset management practices are essential for basic level asset management (pink) and which ones are at an intermediate level (green) or advanced level(blue).

Information sheets with basic guidance for implementing each of the basic level modules are included in this Roadmap.

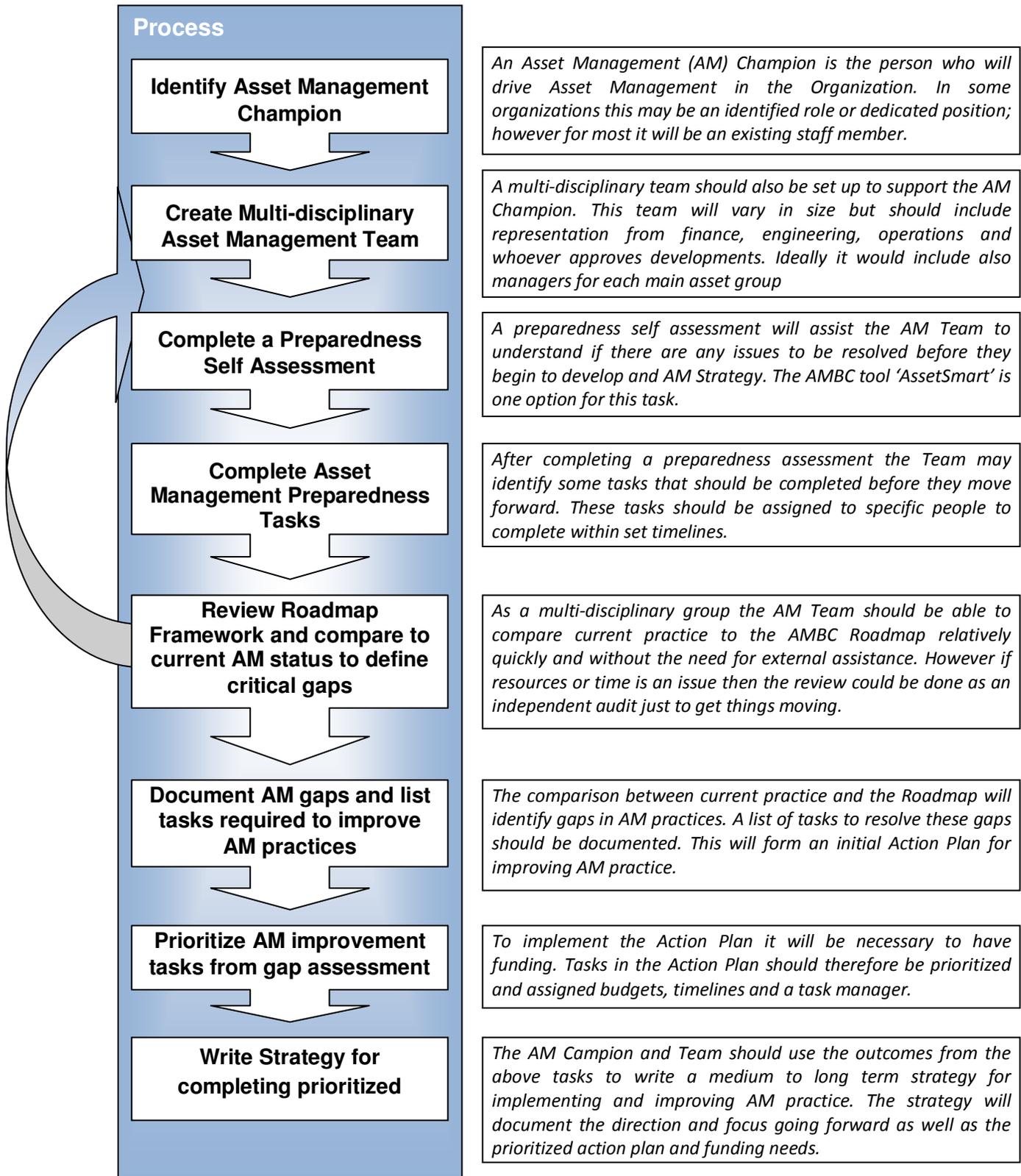
The Roadmap does not include a specific module for writing an asset management plan. The reason for this is that an Asset Management Plan can be written at any time and there are numerous formats that can be used. The roadmap details the asset management practice that needs to be implemented to produce the information that will then be collated and put into whatever chosen document format the organizations chooses to use.

The Roadmap also does not include a specific module for writing an Asset Management Implementation Strategy. However, it is expected that the person or committee within the organization who are responsible to initiate asset management implementation, will review the current processes and data within their organization against the modules in the Roadmap to determine for themselves:

- Which modules need to be implemented; and
- In what priority and timeframe should they be implemented?

This process of initial set up and evaluation is outlined in Figure 1.1 below.

Figure 1.1: Asset Management Planning using the Roadmap



## 1.4 Connection of Roadmap to other Documents

The following table shows the connection between modules in the Roadmap, InfraGuide Best Practice Documents and key questions for Asset Management (refer Figure 1.2).

The key Asset Management questions listed are universal to any asset management process. The Roadmap addresses each one of these questions and the Roadmap guidelines expand on these essential elements to assist organizations in developing and implementing basic level asset management practices.

**Figure 1.2: Links between Roadmap Modules and Key Asset Management Questions**

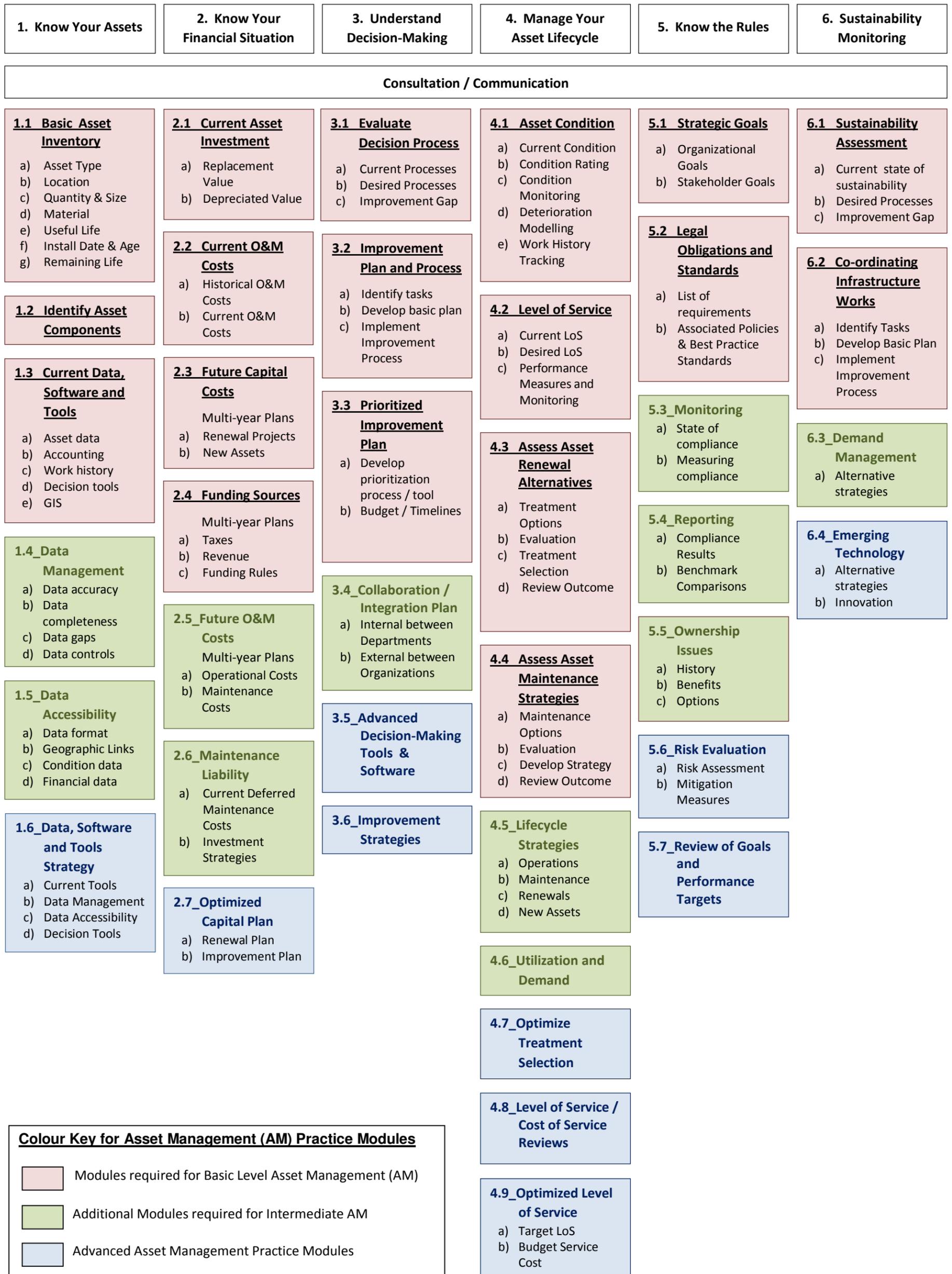
Asset Management Questions	Roadmap	InfraGuide
Essential Elements	Module #	Document Code * <sup>1</sup>
<b>Inventory</b>		
1. What do you have and where is it?	1.1 Basic Asset Inventory	A-1, A-7
	1.2 Identify Asset Components	A1, A-3,A-7,B-1
	1.3 Current Data, Software and Tools	D-1, D-6,E-8
<b>Costs/replacement rates</b>		
2. What is it worth?	2.1 Current Asset Investment	A-1. A-2, A-3, D-7
<b>Condition and capability analysis</b>		
3. What is its condition and expected remaining service life?	4.1 Asset Condition	D-1, E-8
	1.1 Basic Asset Inventory	A-1, A-7,B-1, C-3
	2.3 Future Capital Costs	A-6,A-8,A-10, B-3,
	4.4 Asset Maintenance Strategies	A-1,A-7,A-9, B-2
<b>Capital and operating plans</b>		
4. What is the level of service expectation, and what needs to be done?	4.2 Level of Service	A-3, C-3
	4.3 Asset Renewal Alternatives	B-2, C-2
	5.1 Strategic Goals	C-3, C-6
	5.2 Legal Obligations & Standards	C-1, C-2
	3.1 Evaluate Decision Process	A-1, B-1,
5. When do you need to do it?	2.3 Future Capital Costs	
	4.3 Asset Renewal Alternatives	A-4, A-6, A-8, E-1
	4.4 Asset Maintenance Strategies	A-7, D-1, D-9, F-1, F-6
	6.2 Co-ordinating Infrastructure work	A-1,. A-5, A-7
<b>Short- and long-term financial plan</b>		
6. How much will it cost and what is the acceptable level of risk(s)?	2.3 Future Capital Costs	
	4.3 Asset Renewal Alternatives	D-3, E-1, F-6
	4.4 Asset Maintenance Strategies	D-1, F-6

<b>Asset Management Questions</b>	<b>Roadmap</b>	<b>InfraGuide</b>
<b>Essential Elements</b>	<b>Module #</b>	<b>Document Code <sup>*1</sup></b>
7. How do you ensure long-term affordability?	6.1 Sustainability Assessment	B-2, C-6,
	6.2 Co-ordinating Infrastructure work	A-1,A-2,A-5,B-2
	2.2 Current O&M costs	
	2.4 Funding Sources	A-6, A-8,
	3.1 Evaluate Decision Process	A-9,
	3.2 Improvement Plan Process	A-7, A-9, B-2,
	3.3 Prioritized AM Improvement Plan	A-3,A-10, C-3

<sup>\*1</sup> A list of each InfraGuide Document relating to each reference code in the table is provided in section 6 “*Index of InfraGuide Best Practice Reports*”.

## 2 Roadmap Diagram

The following 'building block' diagram shows all of the Asset Management Practice Modules that are currently included in the Roadmap:



### 3 Roadmap

The Roadmap currently consists of the following Asset Management Practice Modules:

<b>Asset Management Practice Modules</b>	
	Consultation / Communication
1.1	Basic Asset Inventory
1.2	Identify Asset Components
1.3	Current Data, Software and Tools
2.1	Current Asset Investment
2.2	Current O&M Costs
2.3	Future Capital Costs
2.4	Funding Sources
3.1	Evaluate Decision Processes
3.2	Improvement Plan and Process
3.3	Prioritized Improvement Plan
4.1	Asset Condition
4.2	Level of Service
4.3	Assess Asset Renewal Alternatives (Basic)
4.4	Assess Asset Maintenance Strategies
5.1	Strategic Goals
5.2	Legal Obligations and Standards
6.1	Sustainability Assessment
6.2	Co-ordinating Infrastructure Works

## Consultation / Communication

Consultation/ Communication
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### *Why do I need Consultation?*

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Asset management requires multi-level consultation and communication at different stages of implementation. It also requires on-going consultation after implementation for continuous improvement and management of change.

The three main levels of Consultation are:

- With Council;
- Within the Organization;
  - *Between colleagues;*
  - *Between work groups and committees;*
  - *Inter-departmental between heads of Departments; and*
  - *Consultation with and Reporting to Corporate Management;*
- With Customers and Stakeholders.

### *How do I do Consultation?*

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#### ***Consultation with Council***

The time to start consultation with Council will vary depending on many factors specific to each organization. However as a guiding principle, the sooner you consult with Council and obtain buy-in from the elected representatives the better. The counter to this is going to Council too soon with insufficient information.

Ideally you should go to Council when you are able to clearly demonstrate or describe what the benefits of Asset Management Practices will be. Preferably you should be able to present at least one tangible example that is relevant to your organization.

After Council approval to progress implementation of asset management practices, it is important to regularly report back on progress. The Asset Management Champion needs to be committed to measuring progress in tangible ways and maintaining momentum through good communication.

#### ***Consultation within the Organization***

Consultation and collaboration should commence immediately within the organization and should be strongly encouraged through asset management practices.

There is a particular need for the Finance, Engineering and Public Works departments to work closely together on asset management practices to share different perspectives. This will improve the overall quality and robustness of decision-making. In addition to this each group manages different pieces of information.

Much of the power of asset management to effect real change in an organization is in bringing together different perspectives and sharing available data.

***Consultation with Customers and Stakeholders***

It is unwise except in special circumstances, to consult with customers and stakeholders until you have a good understanding of relevant critical issues such as:

- The current and future financial situation, forecast for at least 20yrs;
- The current level of service and cost of service;
- The key legislative obligations and standards that control activities; and
- The gap in data (i.e. what is not known at this time).

If you do not understand these, then consultation with customers will be ineffectual due to insufficient data to make decisions. It may also generate false expectations for services that cannot be delivered because they are subsequently found to be unaffordable or unsustainable.

**1.1 Basic Asset Inventory**

**1. Know Your Assets**

*What is an Asset Inventory?*

An Asset Inventory is the record of information about your infrastructural assets.

It can also be called an Asset Register. It needs to be an itemized list of all the assets and it must have some basic facts about each of those assets (attribute data). As a very minimum these basic facts should include:

- What type of asset is it;
- Where is it located;
- What size is it;
- What is it made of; and
- How old it is.

- 1.1 Basic Asset Inventory**
- a) Asset Type
  - b) Location
  - c) Quantity & Size
  - d) Material
  - e) Useful Life
  - f) Install Date & Age
  - g) Remaining Life

*Why do I need an Asset Inventory?*

The more information you know about an asset the easier it is to identify and respond to management issues such as:

- How long before we need to replace this asset;
- How much is this asset worth;
- How much money have we spent on fixing this asset;
- Should we keep fixing it or should we replace it;
- How many assets do we have that are similar to this one; and
- What is the overall state of our system?

An Asset Inventory is the foundation for building this understanding. It is a place where all information about the assets can be stored. This information can be used to make informed decisions about an individual asset. The collective information can also be analyzed and reported on for forward planning.

*How do I create an Asset Inventory?*

The first step is to collate and record what you currently have in the way of asset data. During this process identify:

- What information is missing;
- Is it important information that should be recorded; and
- How important is it compared to other information gaps?

Define what needs to be known about the assets, and what information is already stored. It is more useful to do this for the organization as a whole rather than for individual departments. After establishing this, determine:

- What format should the asset inventory be (Excel, GIS, Financial System);
- Who should manage the inventory;
- Who should have responsibility for maintaining the accuracy and completeness of which parts of the data;
- What information (attributes) should be stored;
- Who should have access and what type of access should they have; and
- Whether it is appropriate to have more than one asset inventory or data set and how will these be controlled and connected to each other?

*Targets to Achieve for Basic to Advanced Asset Management Practice*

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Basic	<ul style="list-style-type: none"><li>▪ Some attribute information may not be known about the assets.</li><li>▪ Where key attributes are unknown, some assumptions or default values should be used until these can be replaced with verified data.</li><li>▪ Users of the inventory must be able to clearly tell if recorded attributes are verified or assumed.</li></ul>
Intermediate	<ul style="list-style-type: none"><li>▪ Most attribute information will be known about the assets.</li><li>▪ The overall accuracy and completeness of information recorded will be moderate to high.</li><li>▪ Some additional attribute information such as capacity, maintenance history, criticality and financial details may also be recorded.</li></ul>
Advanced	<ul style="list-style-type: none"><li>▪ Information will be of high accuracy and completeness with no key attributes being unknown or assumed.</li><li>▪ More attribute data will be recorded for each asset such as service, capacity and performance data, maintenance history, risk and criticality values, condition, financial details and replacement program.</li></ul>

*Comments*

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Creating and maintaining an Asset Inventory is sound business management.

To create a basic level inventory, the following attributes should be recorded for each known asset:

a) Asset Type

What type of asset do I own? For example, is it a building, road or storm drain?

*Note that for each asset type you will need to identify the separable or individual components that the asset comprises of (refer to task 1.2).*

*For example the asset could be a bridge and therefore the components that make up the bridge would be the superstructure, deck, abutments, guardrail and so on. Components can simply be listed by the name of the component or they could be given a descriptive comment to help differentiate one component from another particularly when there are*

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*several components of the same type. Ideally, each asset and asset component in the inventory should be given some means of unique identification, whether by code, number or name.*

b) Location

Where is the asset located?

*To manage the assets it is necessary to be able to easily connect the recorded information about an asset component, with the location of the physical asset. This is so that work completed or observations in the field, about the asset, can be recorded in the data set and used to inform decision making. Similarly, it is also necessary for being able to instruct work to be done on a particular asset without ambiguity.*

*It is recommended therefore that the inventory contain some descriptive comment or an appropriate code or location name that allows people to readily find the asset at a site.*

c) Quantity and Size

What is the size of each asset or component and how many are there (what is the quantity)?

*The inventory record for say an asphalt road pavement will need to include both the area and the depth of each layer. Whereas the inventory for longitudinal assets such as curbs, require just the length. Pipe assets will require both the diameter and the length. A tank or reservoir will only require volume, for a pump the kW motor rating, whereas for a planted median the length, width (or surface area for non-regular shapes) as well as the height would need to be known.*

*As a guide, the dimensions and/or quantity values that need to be recorded are those that you would need to know in order to purchase (or specify construction of) a replacement.*

*Size and quantity information is used to understand the value of the asset or component and at a later stage to evaluate its capacity to provide an agreed level of service.*

d) Material

What material is it made of?

*This information primarily relates to expected lifespan or economic life (refer below). It helps to make an initial prediction on how long the component will last even when no condition data is known. Asset material can also be used to identify how much it will cost to replace the asset if it is going to be replaced in the same type of material.*

*Knowing the material of an asset will therefore assist you to assess both the lifespan and the likely replacement cost of that asset. And these are necessary inputs for predicting future work for financial planning and developing a life plan for the asset.*

e) Useful Life

What is the expected lifespan of this type of component?

*This is the asset component's typical or average physical and economic life i.e. asphalt pavements may have an expected life of 15 - 25 years whereas a building roof may have an expected life of 40 years and concrete bridge abutments 80 – 120 years.*

*Note: 'useful life' is not to be confused with 'remaining life'. Useful life is the full expected lifespan from the date of installation of the asset whereas remaining life is the length of time that the asset component will last from current year to the year it will need to be replaced. In determining the remaining life of an asset you can make an initial estimate based on age and material however as more information becomes available over time, you would also take the asset's condition into consideration to achieve better accuracy.*

f) Install Date and Age

When was the asset installed or constructed? How old is the asset now?

*Knowing the age of the asset components (or being able to calculate it from install date) is necessary for predicting when to plan for the asset's replacement and for calculating the asset's depreciated value (i.e. current value of the aged asset).*

*It is also very useful for making decisions on appropriate maintenance strategies to maximize the useful life of the component within acceptable risk limits.*

*These tasks are more advanced asset management practices, but even at a basic level of asset management, the information on either age or installation data is needed.*

g) Remaining Life

How long will the asset last? What is its remaining life, before it needs to be replaced or renewed?

*This can be calculated initially from the expected lifespan of the asset and its current age.*

*Over time however, the accuracy of predictions for the remaining life of an asset can be improved by also considering its condition and undertaking some form of deterioration assessment and/or modelling.*

## 1.2 Identify Asset Components

### 1. Know Your Assets

#### *What is an Asset Component?*

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Asset components and sub-components are parts of the overall asset or network.

The way to define a component is that it is an asset or part of an asset that can be independently replaced or has a significantly different life span.

#### *Why do I need to list Asset Components in my Inventory?*

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Recording components of an asset as separate items in the inventory will enable you to keep your inventory up to date and to manage and financially account for your assets more effectively.

For example if an asset in your inventory is made up of 3 components and these components have different life spans. At some stage one of the components fails and is replaced. Now:

How do you decide if the install date of the overall 'asset' should be updated? 1 of those 3 components is now new but the other 2 are unchanged. If the components are listed items in the inventory this is easy. If they are not, it is difficult to show that 1 out of the 3 components has recently been replaced.

Accounting for work completed is easy when asset components are itemized. When 'assets' are not componentized, the replacement of only 1 of 3 components cannot be recorded as a replacement of the total 'asset'. The cost of that component replacement may therefore have to be recorded as an expense cost (maintenance item) rather than a capital cost (asset renewal). This does not reflect the true nature of that cost or the true state of that 'asset'.

It is easy to use the inventory to manage the assets in a proactive manner when asset components are itemized. Reports can list components that need to be replaced in 1 year or 20 years. This will help work planning and financial planning. A list of 'assets' requiring replacement is not as useful if the 'asset' is comprised of 3 components and only one of the components may need replacing.

Componentization is also necessary to implement some intermediate and advanced asset management practices such as deterioration modelling and treatment option assessment.

#### *How do I identify Asset Components?*

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There are two parameters that need to be considered for componentization:

- Separable replacement (can parts of this asset be replaced independently of other parts?); and
- Different lifespan (are parts of this asset likely to be replaced more or less frequently than other parts?).

Two examples are given below. One for road pavements and one for pipe networks. These examples demonstrate how to apply a logical approach to identify separable asset components.

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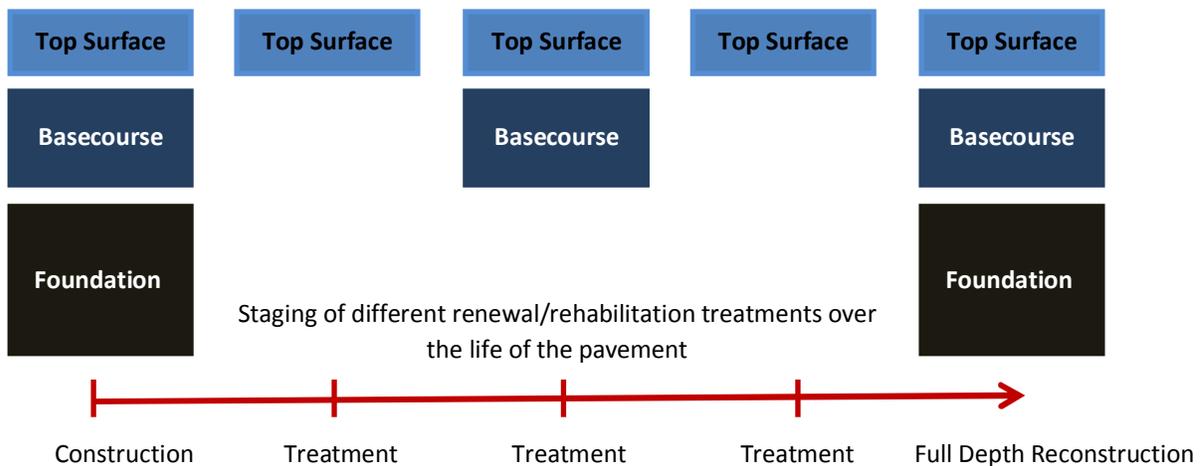
**Road Pavements**

Road pavements generally comprise of various structural and functional layers. Typically these will include a top surface, a basecourse layer, and a lower subbase layer.

Consider your work program in terms of these physical layers. The top surface is usually replaced at least once, or sometimes many times, before it is necessary to also replace the underlying basecourse layer. The top surface and underlying basecourse may be rehabilitated or renewed at least once before it is necessary to do a full depth rehabilitation that includes re-constructing the road foundation (comprising sub-base or lower structural layers).

Thus for optimal management of the road pavement, the assets (road sections) should be recorded as three distinctly separate layers with different expected life spans.

**Figure 1.2.1: Example – Lifespan Variation of Pavement Components**



**Pipe Networks**

Pipe networks generally comprise of various sections of pipe linked by a variety of fittings and structures. Some of these fittings and structures are points where the water flow can be stopped such as sluice valves and manholes. Other fittings and structures are not ‘stop points’ for the water flow, such as air valves, junctions and fire hydrants.

Consider your work program to understand what asset parts or components are independently replaced and what components have a different lifespan. In most cases, the fittings and structures within a pipe network will deteriorate at different rates to the connecting sections of pipe. For example the boundary valve on a water service line will be replaced several times before the connecting pipeline needs to also be replaced.

To manage and account for independent replacement of components, it is necessary that they are listed in the asset inventory.

*Targets to Achieve for Basic to Advanced Asset Management Practice*

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Basic	<ul style="list-style-type: none"><li>▪ All components will be listed in inventory but some attribute information may not be known about the components.</li><li>▪ Where key attributes are unknown, some assumptions or default values can be used until these can be replaced with verified data.</li><li>▪ Users of the inventory must be able to clearly tell if recorded attributes are verified or assumed.</li></ul>
Intermediate	<ul style="list-style-type: none"><li>▪ Most attribute information will be known about each asset component.</li><li>▪ The overall accuracy and completeness of information recorded will be moderate to high.</li><li>▪ Some additional attribute information such as capacity, maintenance history, criticality and financial details may also be recorded.</li></ul>
Advanced	<ul style="list-style-type: none"><li>▪ Information will be of high accuracy and completeness with no key attributes being unknown or assumed.</li><li>▪ More attribute data will be recorded for each component such as service, capacity and performance data, maintenance history, risk and criticality values, condition, financial details and replacement program.</li></ul>

*Comments*

---

All asset components listed in the inventory need key attributes recorded to manage them efficiently (refer to building block 1.1).

Some attributes are useful for operations and others are useful for planning future work and funding needs. Other key attributes need to be known for any decision area such as age, size, material and location.

Note that careful consideration should be given to establishing what is the most appropriate level of componentization for each of your particular asset groups.

Consider what you need to know for valuation and lifecycle management of the asset. If an asset is made up of several parts, but:

None of these parts could be replaced independently of the others (for example if one part fails the entire asset is replaced) then there is no need to identify the separate parts; or

These parts all have a similar lifespan (for example they will deteriorate at the same rate and need to be replaced at the same time) then again there seems little advantage to identify the components separately and they could be grouped together.

**1.3 Current Data, Software and Tools**

**1. Know Your Assets**

*What is meant by Current Data, Software and Tools?*

**1.3 Current Data Software and Tools**

Current data refers to any information that you have recorded about the assets. Information such as:

- a) Asset data
- b) Accounting
- c) Work history
- d) Decision tools
- e) GIS

Location and Inventory (attribute) data

- Condition data;
- Capacity / Performance data;
- Valuation data; and
- Maintenance Cost data and work history.

Software and tools refers to any systems that you use for:

- Storing data;
- Assessing or Analyzing data;
- Prioritization;
- Criticality or Risk evaluation;
- Treatment selection;
- Monitoring asset condition or performance;
- Tracking financial details and performance; and
- Recording and reporting on faults or work history.

*Why do I need to know about Current Data, Software and Tools?*

Understanding what information you currently have will identify gaps – what is it that you do not know? This will clarify where improvements can be made to increase knowledge of the assets.

Knowledge of the software and tools (and any type of assessment system) currently being used, helps to understand:

- How appropriate is the tool or software;
- How robust and accurate are these assessment systems;
- How should the outcomes from these systems be used; and
- What confidence can be put in those outcomes?

The first step in making improvements to anything is to understand what you currently have. And the first step to increasing confidence in decision-making about assets is to understand what they are based on.

All decisions about the assets are informed by:

- Currently available data; and
- Outcomes from any relevant assessment systems.

Improvements in the quality and completeness of data will therefore increase confidence in the decisions being made about the assets. Similarly, the robustness and suitability of software systems and tools used to store, evaluate and report on asset data will also increase confidence in and quality of decision-making.

Documenting current data, software and tools supports effective asset management.

*How do I identify and document Current Data, Software and Tools?*

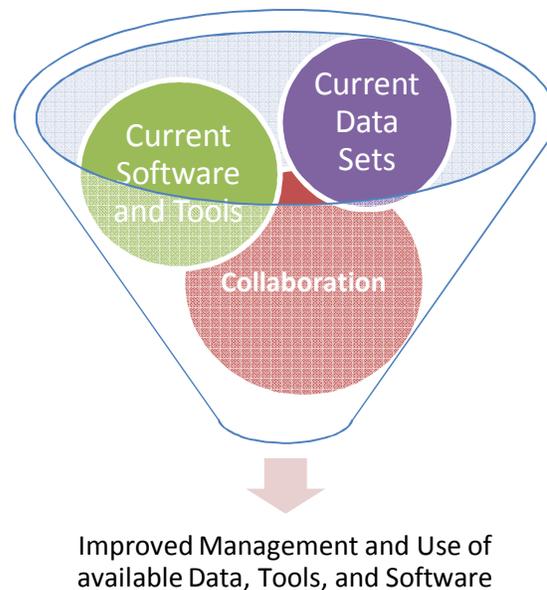
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Firstly document what you know relating to your own department or for each department in the organization. This can be recorded in any way you deem suitable, however, there is advantage in establishing a standard form to use in all departments.

Once each department has their list of current data, software and tools, you should collaborate across the organization to identify improvements. At the very least, assistance should be sought from Financial and IT departments to look holistically at the organization and collate a corporate list of these.

Collating and reviewing the list of current data, software and tools across the entire organization will more effectively identify such areas for improvement as:

- Eliminating unnecessary duplication of data;
- Providing data in a more useful format;
- Defining who is in the best position to be responsible for management of the data;
- Highlighting where integration of data sets is desired;
- Sharing data to those who should know about it; and
- Identifying more efficient ways of using current tools and software.



*Targets to Achieve for Basic to Advanced Asset Management Practice*

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- |              |   |
|--------------|---|
| Basic        | <ul style="list-style-type: none"><li>▪ The main details for all key data sets, software and tools will be known and documented.</li><li>▪ Collaboration across the organization to identify improvements is desired but may or may not occur at this level.</li></ul>  |
| Intermediate | <ul style="list-style-type: none"><li>▪ Every data set, software and tool in use within the organization will be known and documented.</li><li>▪ Collaboration across the organization to identify improvements will have occurred but improvement tasks may only be noted for future action at this level.</li></ul>   |
| Advanced     | <ul style="list-style-type: none"><li>▪ Every data set, software and tool available or recorded within the organization will be known and documented regardless of whether it is currently in use. The documentation will identify what the current status is i.e. In use or Abandoned etc. The documentation will also identify if it is not in current use, the reason why. The data and systems documented will include:<ul style="list-style-type: none"><li>○ Both Current records and Historic records;</li><li>○ Past, Archived or Abandoned datasets;</li><li>○ Current Software and Software no longer in use but still owned by the organization and able to be used; and</li><li>○ Tools that are owned by organization irrespective of whether they are being used or not.</li></ul></li><li>▪ Detailed collaboration across the organization to share data, systems and tools and to identify improvements has occurred.</li><li>▪ Agreed improvement tasks will be documented and an improvement plan will exist and be in the process of implementation.</li></ul> |

*Comments*

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**Data Type Groups**

It is possible to group all data, software and tools into Data Type categories. It can be helpful to do this to manage the collaboration and review process more efficiently.

Define names for your Data Type Groups that are appropriate to your organization. Suggestions include:

- Accounting/Financial/Valuation Data;
- Work History/Maintenance Records;
- Decision Tools (Prioritization/Risk); and
- GIS/Inventory.

### **What to Document**

As a minimum, for each department or asset group, record the following information:

a) Data List and Description

*List all the types of information available about the asset group and describe the content of each data set.*

b) Data Format

*What format is the data available in, hard copy, electronic or both?*

c) Data Systems

*What systems, tools or software applications are currently being used to analyze, record, store and manage data. For example manual record keeping process, GIS, MS Excel spreadsheet, proprietary software, customized tools, reporting packages and so on?*

d) Data Location

*Where is the data stored? Is it stored in the filing room, on the corporate server or an employee's desktop computer?*

e) Data Currency

*How up-to-date is the data, or when was it last updated? Provide a general approximation or estimate of when the data was last updated. Where data is updated on a regular basis, provide the frequency for example weekly, monthly etc.*

f) Data Ownership

*Who is responsible for maintaining and/or updating the data? This may be a single person, group or department.*

g) Data Accuracy and Completeness

*Provide a general overview or estimate of the quality of the data. For example only 80% of the storm mains are recorded in the asset inventory and the accuracy level for the recorded data is estimated at 60% with many default values assumed for attributes such as pipe depth, install date and material type. This is just an initial estimate based on the judgement of the person who uses the data most often. The concept of assessing accuracy and completeness will be developed further in task 1.4 on Data Management.*

h) Data Controls

*Provide a general description of what procedures and processes exist to manage and use the data, to update and maintain the data and to control access to the data or tools or software.*

i) Data Backup

*Has the data been backed-up or are there other copies available should the original data be lost?*

***What about the Systems being used?***

Asset data may exist in hard copy or soft copy (electronic) format such as as-constructed drawings, bills of quantities, MS Excel Spreadsheets, financial accounting system records, Graphical Information System (GIS) data, Maintenance Management System data and proprietary software data.

Generally most organizations have a number of different methods for recording and storing data for each asset group. For example, pipe information may be recorded and stored in GIS whereas building asset information may be recorded and stored in an MS Excel spreadsheet and transportation information in a database.

Depending on an organizations size and needs, recording and storing data on as-constructed drawings and simple MS Excel spreadsheets may be entirely suitable, whereas for a large organization with complex assets, the use of GIS or proprietary software may be more appropriate.

The sophistication of the system (or the particulars of a software tool) is not the most important consideration at a basic asset management level. The critical first step is to know what data you have, where to find it and how useful is it to inform my decision making.

During the collaboration process to identify improvements, the issue of how appropriate a software system or tool is and whether various datasets should be stored in different formats or locations should be brought up for discussion.

## 2.1 Current Asset Investment

### 2. Know Your Financial Situation

#### *What is meant by Current Asset Investment?*

Current Asset Investment is an assessment of the current monetary value of the assets. This differs from the PSAB 3150 Tangible Capital Asset (TCA) reporting. The TCA reports are based on the historical cost of the assets when they were installed. Current Asset Investment is a measure of the assets value in terms of:

- What would it cost to replace the asset today (current replacement value); and
- What value is the current asset considering its age (current depreciated value)?

#### 2.1 Current Asset Investment

- a) Replacement Value
- b) Depreciated Value

#### *Why do I need to know the Current Asset Investment?*

Understanding the value of an asset helps to make good decisions about the best way to operate, maintain and plan for replacement of that asset.

All measures of value are useful for asset management. Historical cost is a true and correct record of what the asset was worth when it was installed. Current replacement cost however, is a better measure for decision making. This is because current replacement cost:

- Can be determined with reasonable confidence through current contracts, labour rates and suppliers price lists;
- Can be easily understood in terms of magnitude because people compare the cost to other items they are familiar with;
- Is directly comparable across all assets, which makes judgement on one asset versus another relatively easy; and
- Can be used along with the asset age details to determine the current depreciated value (i.e. how much the asset is worth in today's dollars)?

An understanding of Current Asset Investment is useful to determine:

- How long before we need to replace this asset;
- How much money should we put aside per annum to fund asset replacements;
- What is the asset currently worth (depreciated value in today's dollars);
- Should we keep fixing it or should we replace it;
- When should we replace it (from an economic point of view);
- Do we have any big financial hurdles looming up in the foreseeable future;
- Are there other options to provide this service, with or without this asset or with a different more cost effective asset; and
- Can we prove we are sustainable?

*How do I calculate Current Asset Investment?*

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The first step is to establish the typical current replacement cost for each asset type. The replacement cost should be all inclusive of material, plant, labour, engineering fees, administration costs and all other costs necessary for the replacement of the asset under typical conditions. This unit rate can then be applied to the asset inventory data to determine the current replacement value of each asset.

$$\text{Typical unit rate} \times \text{modifier} \times \text{asset data (length, area or number of)} = \text{current replacement value}$$

A 'modifier' can be set at 1 initially. As more information is known about the circumstances of each asset, the 'modifier' can be adjusted to reflect the cost impact of local conditions. Local conditions can add or reduce replacement costs. For example pipeline replacements under busy streets will be more expensive than pipeline replacements in open fields.

The next step is to establish the typical lifespan for each asset type. This is an assessment of how long the average asset will last, under typical in-service conditions before it needs to be replaced. The lifespan values should make allowance for assets made of different materials. Current depreciated cost for each asset can then be calculated as follows;

$$(\text{Expected lifespan of asset} \times \text{modifier}) - \text{Current asset age} = \text{Remaining Life}$$

$$\text{Current replacement value} / \text{Expected lifespan of asset} = \text{per annum depreciation}$$

$$\text{Remaining Life} \times \text{per annum depreciation} = \text{current depreciated value}$$

A 'modifier' for lifespan can be set at 1 initially. As more information is known about the circumstances of each asset, the 'modifier' can be adjusted to reflect the ageing impact of local conditions. Local conditions can increase or decrease the expected lifespan of an asset. For example pumps that run long hours and pump abrasive fluids will not last as long as a similar pump in a more typical environment. Pumps that run few hours and pump non-abrasive fluids will last longer than the average similar pump.

*Targets to Achieve for Basic to Advanced Asset Management Practice*

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|--------------|---|
| Basic        | <ul style="list-style-type: none"> <li>▪ The initial unit rates will be average values without modification for any local conditions.</li> <li>▪ Initial lifespan estimates are relatively generic (possibly manufacturer's values or rates in general use by other organizations), without any modification for local conditions. They are likely to be conservative lifespan estimates without any field verification.</li> </ul> |
| Intermediate | <ul style="list-style-type: none"> <li>▪ The overall accuracy of cost and lifespan information will have improved and be moderate to high.</li> <li>▪ Local lifespan values would be supported by some field testing.</li> </ul>  |

- Advanced
- Replacement values will be of high accuracy and completeness with well documented information on all cost components included and the basis of any assumptions.
  - Lifespan assessments will be supported by verified field data and materials testing.
  - Modifiers will be used as appropriate for increased accuracy for cost and lifespan assessments.
  - Asset replacement and depreciated value information will be used to inform decisions on:
    - Reducing whole of life costs;
    - Maintenance strategies;
    - Extending the life of the asset;
    - Replacement options;
    - Risk mitigation; and
    - The most cost efficient time to implement works.

*Comments*

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Consideration of value is mandatory for sustainable business.

The tasks that should be completed and the information that should be recorded include:

- a) Calculate current replacement cost (CRC) for all asset components

*To calculate credible CRC values, the essential attributes discussed in building block 1.1 must be known for each component, (or reasonable default assumptions and estimates made for missing data). In addition to this, a table of typical rates for current replacement cost of each type of component must be available or able to be produced.*

*It is important to know if any valuation information exists and the date that it was relevant for. If no valuation data exists this work needs to be completed. A good understanding of asset value supports good management decisions and sound financial planning.*

*At a basic level the calculation can be based on relatively high level generic unit rates multiplied by quantity. However it is desirable even at the basic level of asset management practice to calculate and record this information at asset component level and then aggregate results into overall summaries. This will then provide the platform for progressively improving the quality of cost data as more information becomes available.*

*At an intermediate and advanced level it is expected that costs will not only be known with more certainty and confidence but that the systems and procedures for keeping this information current and relevant will also be fully implemented.*

- b) Calculate current depreciated value for all asset components

*Similar to item 'a' above, understanding the depreciated value (or current value of aged asset) will also support good decision-making. It can be used to establish 'flags' to know*

*when to repair and when to replace an asset component. It can also be used to trigger implementation of different treatment options.*

c) Documentation of Assumptions and Default values

*Details of all key assumptions and default values used in the calculations must be recorded and available to the people who use the cost information for planning and operational decisions.*

**2.2 Current O&M Costs**

*What are O&M Costs?*

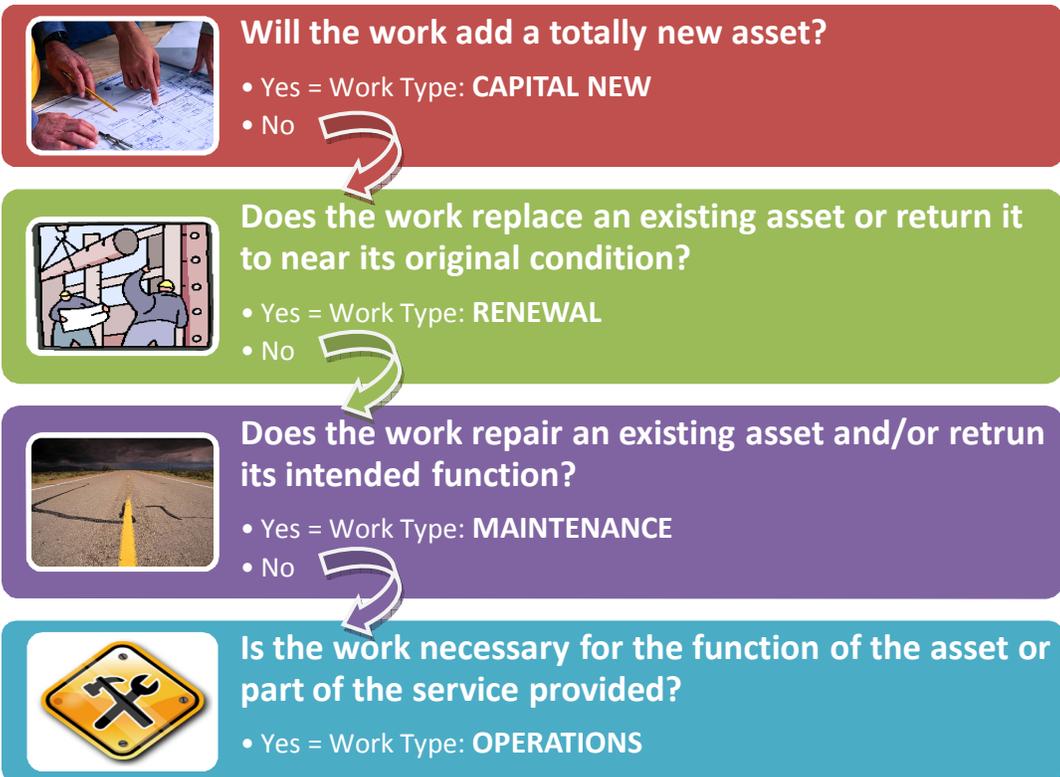
O&M stands for Operations and Maintenance. These costs are often grouped together but relate to different activities.

Operational costs relate to activities that are necessary to operate the asset or to provide a service using that asset. These costs may include things such as road sweeping, pipe cleaning, hydro, chemicals, labour costs to inspect and do routine operational tasks such as servicing pumps or engines etc. Many operational costs cannot be assigned to a particular or specific asset as it is a function that relates to the whole network or to the service being provided.

Maintenance costs however relate to the cost of actual physical repair work to a specific asset or group of assets. The physical repairs reinstate the function of the asset or assets but do not fully replace the asset nor does it extend the life of the asset significantly beyond what was originally expected. For example:

- In relation to a road pavement, pavement sweeping is an operational activity, crack sealing repairs are a maintenance activity and re-surfacing is a renewal activity.
- In relation to a sewer pipe, jet cleaning is an operational activity, replacement of a short length of broken pipe is a maintenance repair but relining is a renewal activity.

<b>2. Know Your Financial Situation</b>	
<b>2.2 Current O&amp;M Costs</b>	
a)	Historical O&M Costs
b)	Current O&M Costs



*Why do I need to record information about O&M Costs?*

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The primary reason for tracking operations and maintenance costs is to save money.

As time progresses and assets age, the occurrence and cost of maintenance repairs for any particular asset will increase. At some point in the life of an asset it will no longer be economic to repair the physical asset and it should be replaced. When you want to optimize your services to get the best value for money, you will need to track your maintenance costs to know when to intervene with the right type of treatment. Tracking operational costs can similarly assist in optimizing operational activities.

However, when operational costs are mixed with maintenance costs, the financial information is not useful for managing the asset or optimizing costs.

It is desirable therefore that:

- Operational costs and maintenance costs are separately recorded; and
- Maintenance costs are tracked against the relevant assets on which the work was done.

There are many advantages and opportunities that become available when operation and maintenance costs are separated and maintenance costs are tracked against the relevant assets. These include:

- Having an indication of likely condition and remaining life of an asset, based on how much maintenance work and the type of maintenance work that has been required over a period of time;
- Understanding when it is no longer economic to continue to repair an asset and it should be programmed for replacement;
- Tracking maintenance and operational expenditures (separately) over time to identify cost trends and adjusting operation and maintenance decisions and initiatives where necessary;
- Being able to report on the cost of providing a particular level or standard of service and therefore being able to quantify the likely cost outcome or consequence for decisions or proposals to increase or decrease aspects of the level of service provided;
- Being better able to assess the long term liability (whole of life cost) associated with any proposal to construct new assets or approve developments. This will enable decisions related to such assets, to be made with the full knowledge of what the cost obligations for ongoing operational and maintenance will be in addition to any project construction cost; and
- Generally better informed decision-making that will enable costs to be optimized.

Knowledge and tracking of maintenance and operational cost is also an important input to the long term sustainability of the assets and the services they provide. This is because to be sustainable you have to find the right balance between the cost to provide a service, the level or quality of service provided and the ability of the community to pay that cost.

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If you do not have a good understanding of the true cost of the service then you cannot confidently assess if it is sustainable in the long term.

*How do I implement O&M cost recording?*

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All organizations will have financial records for operation and maintenance expenses. However, the current structure used for expense recording may not easily identify maintenance costs separately from operational costs. In addition to this, for some organizations the definition of what is a maintenance expense versus an operational expense will not be clearly documented or widely understood.

The first step therefore is to collaborate with your Finance Department and all other departments and work groups associated with assets across your organization. Together, discuss the financial information needs that each group has and agree on the most effective cost recording structure for the organization. This structure will then need to be implemented along with training of personnel to differentiate between what are maintenance costs, operations costs, renewals or capital new costs.

Over time you will be able to build up a record of historical operations and maintenance costs. This information will support decision-making and sustainability by:

- Adding to the understanding of how operations and maintenance costs are changing;
- Providing cumulative maintenance costs against relevant assets to know when it is best to replace the asset; and
- Provide a measure such as total maintenance cost per kilometre (or other appropriate unit) of asset per annum that can be compared over time. This can indicate if the overall condition of the asset is improving or deteriorating. And therefore whether any level of deferred maintenance is being added to or reduced.

*Targets to Achieve for Basic to Advanced Asset Management Practice*

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- |              |  |
|--------------|--|
| Basic        | <ul style="list-style-type: none"><li>▪ If costs are not separated, only a combined total can be given.</li><li>▪ However a plan with timelines to implement the necessary cost recording structure will have been developed and approved.</li><li>▪ Any new procedures necessary for generating reports on separate operations and maintenance will also have been developed and documented.</li><li>▪ Work history tracking may not be linked to individual asset records and work history records may or may not include costs.</li></ul> |
| Intermediate | <ul style="list-style-type: none"><li>▪ Details of actual operations and maintenance expenditure are recorded separately.</li><li>▪ Maintenance costs are being tracked against relevant assets.</li><li>▪ Separately recorded historical cost information for operations and maintenance will be available for at least one previous year, more if possible.</li></ul>  |

- Advanced
- Recording and reporting systems are well established with at least 5 years of historical operations and maintenance data available for analyzing trends.
  - Decisions on effective intervention strategies consider maintenance cost trends.
  - Decisions on asset replacements consider cumulative maintenance cost compared to replacement value at a component level.

*Comments*

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You should aim to provide the following information in regard to expense tracking;

- a) Current and Historical Operations and Maintenance Costs

*Ideally this information should be tracked for 5 years or more to identify cost trends which can be used to inform predictions of future costs. This will take time to build up if no separated historical costs are currently recorded therefore it is important to agree and implement a suitable cost structure and reporting procedures, for the organization as soon as possible.*

- b) Details of maintenance expenditure recorded against relevant asset components

*This breakdown of cost information may not be currently available but procedures should be put in place to enable tracking of maintenance costs at the component level in the future. Operational costs can still be tracked at a total for the entire asset group or recorded by activity type, but maintenance costs relate to the condition and remaining life of a component therefore costs should be able to be reported by component.*

- c) Provide discussion with supporting cost data to indicate whether current maintenance expenditure is sufficient to maintain the asset without generating or increasing deferred maintenance levels

*Initially there may be insufficient information to assess this with any certainty therefore at the basic asset management level the response would have to be a comment based on the experienced judgement of a suitably qualified person. However in time it will be possible to start comparing maintenance expenditure to asset condition. Eventually it will be possible to provide trend information and factual evidence to verify if maintenance expenditure is sufficient or whether asset condition is deteriorating.*

**2.3 Future Capital Costs**

*What is meant by Future Capital Costs?*

Future capital costs is an estimate of the most likely future funding needs. It is usually determined for at least a 20 year forecast.

Capital costs refer to costs for new assets and costs for replacing existing assets as they age.

*Why do I need to know Future Capital Costs?*

Understanding likely future costs is critical to responsible and effective management.

It is only by looking ahead that it is possible to gauge the long term affordability of continuing to operate and manage the assets in the same way as we do now.

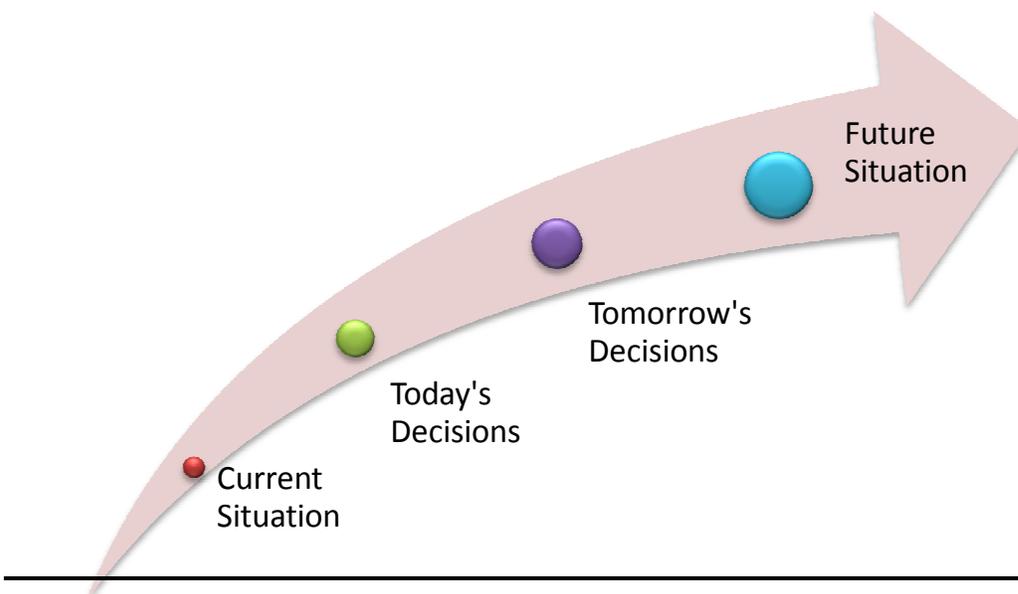
Future cost forecasts also provide warning for potentially adverse financial impacts. This forewarning provides opportunity to:

- Make suitable preparations to cope with the situation; or
- Take action to reduce the likelihood of the situation occurring; or
- Put in place measures to reduce the extent of adverse impact.

An example of this would be where the future cost estimates show a significant expense impacting at a specific time in the future. Now if this expense is thought to be unaffordable or cause severe cash flow problems, then mitigation measures can be put in place to reduce the impact. These mitigation measures might include implementing some action or strategy that will moderate the predicted expense, delaying the timing of the expense or generating funding to be able to afford the expense.

Future cost forecasts are therefore a fundamental component of ensuring long term sustainable management of the assets.

<b>2. Know Your Financial Situation</b>
<p><b>2.3 Future Capital Costs</b></p> <p>Multi-year Plans</p> <p>c) Renewal Projects</p> <p>d) New Assets</p>

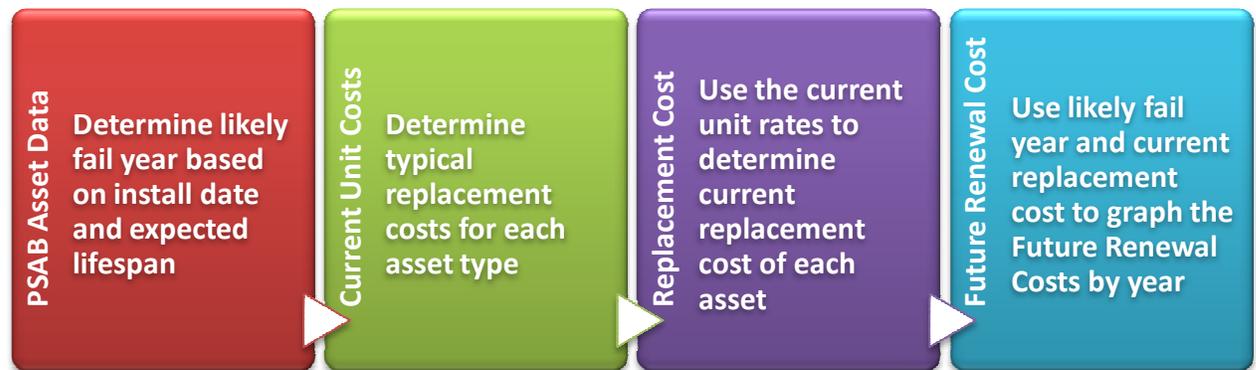


*How do I determine Future Capital Costs?*

Most organizations will have or be in the process of developing master plans for key asset groups. These plans will commonly identify both new asset and replacement asset needs for a planning period of at least 20 years. In such circumstances, the Future Capital Costs can be reported from these documents and then collated if need be to determine the total impact for the organization.

In circumstances where master plans have not yet been developed or the complete information required to estimate Future Capital Costs is not available, then the following procedure could be used:

a) Renewal Costs



b) Capital New Asset Costs

For a forecast of Capital New Asset Costs it will be necessary to undertake a study as these costs relate to assets that do not yet exist. The study (if not already available through Master Plans or similar planning projects), must identify what new assets will need to be built and when. The cost of these new assets will be determined in current cost terms so that figures are consistent with the renewal cost estimates (refer above).

New assets may be required for various reasons such as:

- *To support additional demand generated by increases in population;*
- *To comply with a potential increase in enviromental protection requirements;*
- *To support community development and industry;*
- *To upgrade existing facilities to new requirements and standards; and*
- *To provide additional facilities to improve available services.*

*Targets to Achieve for Basic to Advanced Asset Management Practice*

Basic	<ul style="list-style-type: none"> <li>▪ At least a 20 year cost forecast for asset renewals will be provided with total costs shown per year.</li> <li>▪ At least a 20 year cost forecast for new assets will also be provided, in a separate table or graph to the renewal cost data, and with total costs shown per year.</li> <li>▪ All assumptions included in the cost estimates will be documented.</li> </ul>
Intermediate	<ul style="list-style-type: none"> <li>▪ Separate future cost forecasts will be available for asset renewals and new assets.</li> <li>▪ The reporting period available for asset renewals is longer than 20 years and reflects the expected lifespan of the assets.</li> <li>▪ All assumptions and basis for estimates will be documented.</li> <li>▪ A rating for the confidence of the data used for future cost forecasts will also be documented.</li> </ul>
Advanced	<ul style="list-style-type: none"> <li>▪ Future cost forecasts are based on more accurate data and therefore have a medium to high level of confidence.</li> <li>▪ Asset condition and deterioration modelling will be used to more accurately assess likely fail year of existing assets. This information will be used in the future cost forecast for renewals.</li> <li>▪ Similarly more detailed analysis and assessment will be completed for the estimate of future new asset costs. This analysis includes consideration of:             <ul style="list-style-type: none"> <li>○ Demand management;</li> <li>○ Emerging technology;</li> <li>○ Alternative service delivery;</li> <li>○ Effects of climate change on future asset needs;</li> <li>○ Effects of demographic changes on future asset needs;</li> <li>○ Trends in changing attitudes of customers; and</li> <li>○ Education options to modify or manage expectations.</li> </ul> </li> </ul>

*Comments*

As a minimum the following details, with respect to Future Capital Costs, should be known and documented for a planning period of at least 20 years:

- Predicted cost for new assets (including upgrades and significant improvements as well as new assets or components); and
- Predicted cost for replacement of existing assets.

*The response should be a total expenditure for each year. Preferably details giving a breakdown of the total amount for each year will also be available. It is necessary to list any assumptions affecting the estimates such as using population growth as an indicator for increased demand in the future.*

*Notes on key points that have been considered or taken into account in the cost estimations should also be documented. These notes allow the predictions to be easily updated every year as a rolling program and as circumstances change regarding the assumptions and notes.*

*Ideally, the renewal expense for replacing existing assets should be shown separately from other capital works for projects such as new assets, upgrades (increasing size or capacity) and improvements (increasing service). The cost of asset renewals should be based on replacement of the assets with modern equivalents but without increasing size or service.*

**2.4 Funding Sources**

**2. Know Your Financial Situation**

*What is meant by Funding Sources?*

Funding sources refer to all the options where funding could come from and an estimate of how much that funding will be. The main funding sources for public assets will typically comprise of:

- Taxes;
- Fees and Charges;
- Reserves;
- Grants; and
- Loans.

**2.4 Funding Sources**

Multi-year Plans

- a) Taxes
- b) Revenue
- c) Funding Rules

However there could be a variety of other non-tax funding sources that are relevant to your organization.

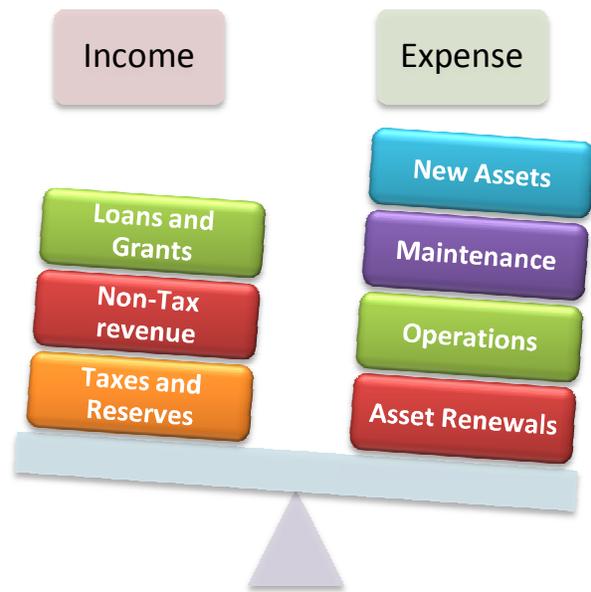
*Why do I need to do know about Funding Sources?*

Understanding where funds come from, how they can be used and how much can be expected, is equally as important as knowing how much money you need to spend. Both income and expense are needed to determine if:

- Current levels of service are affordable; and
- The way you currently manage your assets is sustainable.

In addition to this, assessment of income from various funding sources will:

- Provide forewarning of potential cash flow problems;
- Identify funding shortfalls; and
- Identify anomalies where reserves may be being built up for a particular purpose but are needed for a different purpose.



These circumstances may be manageable if sufficient forewarning is given and appropriate action taken. The fact that a shortfall in funds or cash flow challenges are predicted does not necessarily mean the current level of service is unsustainable. These issues may be short term issues and the overall long term situation is affordable. Alternatively these issues may be indicative of an escalating situation which is destined to become unaffordable.

It is essential therefore that equal consideration is given to assessing future income as predicting future costs. Understanding the full financial picture sooner rather than later allows appropriate decisions to be made and action to be taken to ensure adverse financial dilemmas are avoided.

*How do I determine Funding Sources?*

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For most organizations, the Chief Financial Officer will be responsible for assessing future funding. The necessary information should be readily available. However it is recommended that the review of income versus expense be done as a collaborative exercise. The person responsible for management of the assets and an appropriate financial officer should ideally consider the future forecasts together. The purpose of their joint assessment should be to identify potential risks and cash flow problems, and to consider possible solutions.

The outcome of their joint assessment should then be advised to Council for discussion and determination of the appropriate course of action to take. Depending on what issues are identified and solutions are proposed, the Council may also wish to consult with the community before finalizing the way forward.

*Targets to Achieve for Basic to Advanced Asset Management Practice*

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|--------------|--|
| Basic        | <ul style="list-style-type: none"><li>▪ Appropriate financial details will be readily available from the organization's finance department manager.</li><li>▪ Future expense costs are reviewed against income predictions to identify any concerns. Ideally this should be a collaborative project between the appropriate financial office and the manager of the assets.</li></ul>                  |
| Intermediate | <ul style="list-style-type: none"><li>▪ Although the assessment process may remain relatively unchanged, the degree of detail and accuracy in the future predictions for both income and expense will have increased noticeably from the data available at a basic level of asset management practice.</li></ul>   |
| Advanced     | <ul style="list-style-type: none"><li>▪ Future forecasts will be well researched and have supporting information to give a high degree of confidence to the predictions.</li><li>▪ Assessments will be a fully integrated process between the relative officers and departments within the organization.</li><li>▪ Procedures will be documented along with all considerations and outcomes.</li></ul> |

*Comments*

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Ideally an estimate of income should be generated for the same period that expense projections are calculated for (typically 20 years). Initially however this may not be the case and adjustments may need to be made until the two planning periods align.

There should be evidence that consideration has been given to the level of risk that projected funding will not be realized. In other words an assessment of vulnerability should be done.

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It will be essential that engineering and finance people collaborate on the necessary assessments to ensure outcomes are as reasonable and realistic as possible and that all risks and vulnerabilities are documented.

Details of the following funding sources should be known:

- a) Taxes
  - Details of amount of current revenue from taxes
  - Details of potential revenue from taxes
- b) Revenue
  - Details of the amount of revenue and source for non-tax revenue
  - Details of potential revenue and source for non-tax revenue
- c) Funding Rules, Regulations and Limitations
  - Details of funding source for operations expense
  - Details of funding source for maintenance expense
  - Details of funding source for asset renewals/replacements
  - Details of funding source for capital works (new assets and improvement upgrades)
  - Details of any pre-approved budgets or cost predictions for future works
  - Any limitations, regulations or requirements relating to tax revenue
  - Any limitations, regulations or requirements relating to non-tax revenue

Note that forecasts of revenue are as equally relevant to sustainable management as forecasts of expenditure.

The response should be a total per annum estimated income preferably with additional details giving a breakdown of the total by revenue source. It is also necessary to list all assumptions and to provide notes on key points that have been taken into account in the estimations. For example does the forecast include for any progressive increase or decrease due to property development and if so what basis was used for the variation; what are the key risks that could adversely impact on predicted income? The notes allow the predictions to be easily updated every year as a rolling program and as circumstances change regarding the assumptions and notes.

### 3.1 Evaluate Decision Processes

**3. Understand  
Decision-Making**

**3.1 Evaluate  
Decision  
Processes**

- d) Current Processes
- e) Desired Processes

*What is meant by Evaluate Decision Processes?*

Evaluate Decision Processes means to think about all the key decision areas regarding assets and services and to identify who is responsible for making these decisions, what information they use and whether there is any procedure on how they decide.

This establishes what the current decision process is. After that, consideration is given to what the ideal decision process should be. This includes looking at how the decision should be made, who should be involved and what information they should have. This establishes the desired decision process. The difference between the current process and the desired is the improvement gap.

*Why do I need to do Evaluate Decision Processes?*

Good decision making is an important part of being efficient and sustainable. Decision processes must be fair, transparent and robust. This is particularly true in a public organization environment where a high level of accountability is expected. All important decision processes should therefore be documented and periodically reviewed.

Reasons for evaluation and documenting decision processes are:

- 1) Identify Improvement  
Once a decision-making process is documented, it is easier to objectively see where improvements in the process can be implemented.
- 2) Quality Control  
Documented procedures help maintain consistency of approach over time. Consistency of approach allows comparison of results over time to track changes. It also makes the decision process more robust and defensible if challenged.
- 3) Business Continuity  
The basis used for making each decision (and the data inputs) are evaluated and recorded as part of documenting the decision process. This allows continuity when personnel changes inevitably occur.

*How do I Evaluate Decision Processes?*

The initial evaluation of decision processes includes the following;

- (a) Review and document the current decision processes;
- (b) Identify and document desired decision processes; and
- (c) Document the improvement gap between current and desired processes.

Documenting a decision process means writing down who is responsible for making certain decisions, how they go about making that decision, the information that is used, the criteria that

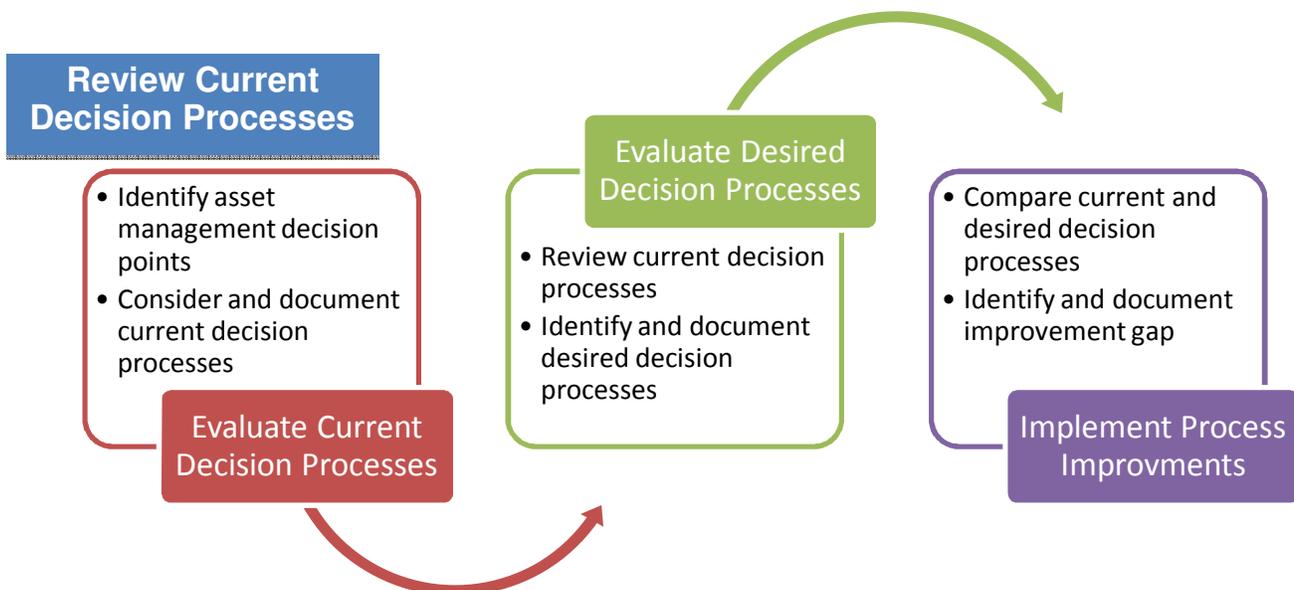
is considered, and if any assessment tools or scoring methods are used, what these systems are. To begin with, the process may simply be that personnel in charge use their experienced judgment to make the decision based on their personal knowledge of the situation. Once recorded, the decision process can be improved as and if appropriate. This is achieved by determining the desired or ideal decision process and comparing this to the current process to identify what needs to be improved.

The key objectives for desired decision processes are to ensure that:

- All important decisions are robust, consistent and repeatable;
- Decisions are not subjective unless this is deemed appropriate;
- The person accountable for a decision has all the necessary information; and
- Any assessment tools being used are being applied correctly and appropriately.

Accountability is an important issue when evaluating decision processes. Consider whether the person currently responsible for a decision is in the best position of knowledge to make that decision. Consider the risks associated with the decision. Determine whether appropriate risk issues are considered in the decision process or not. Understand what critical pieces of information are required for good decisions. It is then possible in a review to assess who is the best person to be responsible and accountable for the decision.

In the evaluation processes it is also important to determine if there are any assessment systems, rating or scoring systems or priority ranking methods currently being used to assist decision-makers. Are these tools appropriate and accurate? Do any of these tools or systems allow decision-makers to make fair comparisons between assets or between asset groups? Are these systems being used correctly and to their potential? Alternatively if no tools are currently being used, should they be?



*Targets to Achieve for Basic to Advanced Asset Management Practice*

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Basic	<ul style="list-style-type: none"><li>▪ Many decisions will not have any formal processes and this will be the first evaluation and documentation.</li><li>▪ The improvement gap will identify many tasks and the list to action should be prioritized.</li></ul>
Intermediate	<ul style="list-style-type: none"><li>▪ The overall robustness of decision making will have improved and documentation of processes will be complete.</li><li>▪ Many improvement tasks may still require action and the list will still be prioritized.</li></ul>
Advanced	<ul style="list-style-type: none"><li>▪ The overall robustness and quality of decision making will be high.</li><li>▪ Procedures will be in place to easily demonstrate that correct processes were used for all important decisions.</li><li>▪ Most improvement tasks will already have been implemented and any remaining ones will be low priority items only.</li></ul>

*Comments*

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The documentation for current decision processes should include;

- a) A list and description of the main decisions that are relevant to each asset group

*At a basic level of asset management, you may only identify a few main decision processes for each part of the lifecycle of an asset, which includes; decisions about creation of a new asset, developments, capital projects; decisions about operation and maintenance; decisions about policy, strategies, planning for the future; acceptable risk levels and scheduling asset replacements, and; decisions about disposal of assets and emergency works.*

*At an intermediate and advanced level of asset management it is expected that the list of documented decision processes would be more detailed, more structured and more clearly defined.*

- b) Details of who currently makes various types of decisions relating to the asset and services and what types of decisions these are

*For each decision process noted in 1 above, it is necessary to identify the person or position within the organization who participates in making that decision.*

- c) Details of how decisions are currently made and any formal processes or tools that are used

*At a basic level of asset management, it is quite probable that many decisions are made on the experienced judgement of people in specific roles or with particular experience, and that no formal process of consultation or decision making is followed. None-the-less it is important to document that this is the case so that it can be evaluated as to whether it is appropriate to continue making decisions in this way or not.*

*At an intermediate and advanced level of asset management it is expected that documented decision processes would reflect a higher level of integration across the organization, particularly in regard to sharing information and consulting with other departments on major decisions. Processes would also be expected to be more robust and the logic of the decision process more easily understood.*

d) Details of desired decision-making processes and roles of personnel

*This relates to item 3 above except that instead of noting how decisions are made now, it should be noted how decisions should be made in the future. It is an opportunity to think about and write down the parts of the process that need to be improved so that decisions are responsible, based on good information, consider all relevant perspectives and needs and the process is logical, repeatable, robust and defensible.*

e) Details of gap between current and desired decision-making processes

*This information considers what needs to be done to move forward from the current decision processes to the desired decision processes. The items included here will form the beginning of an improvement plan.*

### 3.2 Improvement Plan and Process

*What is meant by an Improvement Process?*

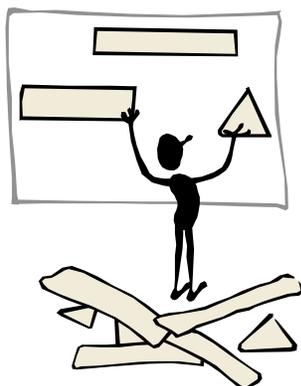
An Improvement Process involves:

- Reviewing current practice;
- Determining if anything needs to be changed; and
- Developing a plan to implement changes.

*Why do I need to develop an Improvement Plan?*

Generating and implementing an improvement plan is fundamental to sustainable asset management. This is because:

- There are always things that can be improved over time;
- Parameters change, assets age, funding levels change;
- Customer expectations change;
- The actions taken today cause change; and
- In response to change it is prudent to check if the original action plan is still the most appropriate course of action.



The overall goal of asset management is to provide sustainable services. This requires flexibility and adaptation to changing circumstances. It is important that business decisions are made in the context of the latest information. This will ensure that they are equally applicable to the current situation and to affecting the long term sustainable goal. In the same way therefore, it is important that all asset management practices are treated as 'live' and evolving. For it is the outcome of the asset management practices that effects and informs business decisions.

*How do I develop an Improvement Plan and Process?*

A basic process for an improvement plan is any process that:

- Identifies improvement tasks;
- Assigns responsibility for completing the tasks;
- Determines what funding is required;
- Documents the tasks in a schedule for completion (Improvement Plan); and
- Has a regular review cycle (typically completed at least once per year).

The process could be completed by one person, by committee or by independent review. It should be as simple or detailed as is appropriate to the organization, the assets and the amount of information available to base an assessment on.

### 3. Understand Decision-Making

#### 3.2 Improvement Plan & Process

- a) Identify tasks
- b) Develop basic plan
- c) Implement Improvement Process

The process should always be documented even if this is a simple paragraph of explanation as to who, why and how often the improvement plan is reviewed and updated. Over time the Improvement Plan process should consider the results of measured performance as a means of gauging whether current practice is achieving desired results.

All improvement plan processes must include consideration of long term goals and some form of assessment as to whether any current practices need to change.

The following diagram outlines the key steps and cyclic nature of a basic Improvement Plan process:



The initial Improvement Plan and Process may or may not include some assessment of relative priority between one task and the others. However over time some form of prioritization should be included in the process and used to set appropriate timing and support funding applications.

*Targets to Achieve for Basic to Advanced Asset Management Practice*

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- |              |  |
|--------------|--|
| Basic        | <ul style="list-style-type: none"><li>▪ A basic improvement plan process will be documented and implemented.</li><li>▪ The improvement plan will include a list of tasks, assigned responsibility, timeline for completion and funding requirements.</li><li>▪ The relative priority of one task versus another may or may not be assessed. Therefore scheduling of improvement tasks is more likely to be driven by funding approval than cost/benefit or risk assessment.</li></ul>                                |
| Intermediate | <ul style="list-style-type: none"><li>▪ The documented Improvement Process will include some consideration of measured performance to assess whether current practice is achieving desired results toward long term goals.</li><li>▪ Improvement tasks will be prioritized and outcomes used to set appropriate timeline for completion of each task.</li></ul>  |
| Advanced     | <ul style="list-style-type: none"><li>▪ Current and historical measured performance data will be compared to long term goals. This review will be used to determine if changes need to be made to current practice, and what those changes should be.</li><li>▪ Prioritization assessment of improvement tasks will include consideration of risk as well as cost/benefit.</li><li>▪ Collaboration across the organization in regard to the improvement plan will be part of the Improvement Plan Process.</li></ul> |

*Comments*

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In preparation for development of an improvement plan, it is good practice to record improvement ideas and recommendations resulting from other asset management practices. For example many asset management practices include a review of current practice and some include a gap assessment. The outcomes of these identify improvements. Some of these improvements may be implemented as part of that process but others will just be noted. These tasks that are noted but not implemented should be included in the overall improvement plan and prioritized along with all the other improvement tasks.

The improvement plan must consider all aspects of asset management practice, such as improvement in asset data, condition data, value information, management systems, decision processes and anything that will progress and enhance effective and sustainable asset management.

### 3.3 Prioritized Improvement Plan

**3. Understand Decision-Making**

**3.3 Prioritized Improvement Plan**

- a) Develop prioritization process / tool
- b) Budget / Timelines

*What is meant by a Prioritized Improvement Plan?*

The improvement plan referred to in this module is a list of tasks or actions for implementing improved asset management practices. A prioritized improvement plan consists of listing the improvement tasks in order of importance or priority.

As well as being ordered by importance, each task in a prioritized improvement plan should also have a specified budget and timeline for completion. The plan should also note against each task, the name of the person responsible for ensuring the work is completed to time and budget.

*Why do I need to develop a Prioritized Improvement Plan?*

Most organizations will not have sufficient funding and resource to action all the desired Asset Management improvement tasks as and when they are identified. Typically the work will be staged over a number of years with budget allocated specifically for completing planned tasks.

Tasks will therefore need to be ranked to ensure the most important works are completed first.

Budget allocations will need to be determined to ensure sufficient funds are allocated to complete each task. Setting timelines and assigning responsibility for completion of each task are strongly recommended tactics to encourage successful implementation of the plan.

A list of desired tasks that do not have budgets are unlikely to be completed regardless of their priority ranking. Similarly setting timelines and assigning responsibility encourages action.

Refer to Module 3.2 for information on the importance of generating and implementing an improvement plan

*How do I develop a Prioritized Improvement Plan?*

A basic process for prioritizing an improvement plan is to:

- Determine what criteria should be considered to assess how important a task is;
- Establish a scoring system for the criteria;
- Assess each task according to the criteria and scoring system; and
- Order tasks by outcome score (priority).

The process must be documented and repeatable. It should use measurable rather than subjective assessments for each criteria and be as simple or detailed as appropriate to the organization, the assets and the amount of information available for the assessment.

The documentation of the prioritization process should explain the criteria, how they are measured and why they were selected. Secondly it should explain the basis for and application of the scoring system. And thirdly it should identify how often the prioritization process should be applied and when the overall process, scoring system and criteria should be reviewed.

There are many options for criteria and scoring systems to use. However it is very important that a clear link can be shown between the prioritization process and the Strategic Goals of the organization. This will ensure that improvement of asset management practices is consistent with the objectives of the organization.

A very simple initial approach can be to group the organization's strategic goals into 3 or 4 broad categories and then to have a group of people representing different departments assign a low, medium or high score against each strategic goal category, for each improvement task. An example of this approach is shown below.

Goals	Task 1	Task 2	Task 3	Task 4
Governance	L	H	L	M
Economic	M	H	M	M
Environment	H	L	H	L
Social / Cultural	M	L	H	M
Service	M	L	M	L
Overall Priority	MH	M	MH	ML

The subjectivity of this initial approach is moderated by using a group of people with different perspectives to collaborate on the assessment. This is not however encouraged as a long term solution to the prioritization of improvement tasks. It should be used only as an interim first cut approach to facilitate action being taken on scheduling and implementing improvement tasks while a more robust measurable system for prioritization is developed.

*Targets to Achieve for Basic to Advanced Asset Management Practice*

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|--------------|---|
| Basic        | <ul style="list-style-type: none"><li>▪ The list of tasks in the improvement plan will as a minimum be graded for high, medium and low priority.</li><li>▪ The method of prioritization will be documented.</li><li>▪ All high priority tasks will have a budget, timeline and responsible person assigned.</li></ul>   |
| Intermediate | <ul style="list-style-type: none"><li>▪ The list of tasks in the improvement plan may be shown in groups of high, medium and low priority but each task will have an individual priority score.</li><li>▪ The documented prioritization process will include measured criteria and assessments will be related to organizational goals.</li><li>▪ Prioritization scores will be used to set appropriate timeline for completion of each task.</li></ul>   |
| Advanced     | <ul style="list-style-type: none"><li>▪ All tasks in the improvement plan will have an individual priority score.</li><li>▪ The documented prioritization process will include measured criteria.</li><li>▪ Priority assessments will be related to both current organizational goals and long term desired goals.</li><li>▪ Priority assessments of each improvement task will include consideration of risk as well as cost/benefit.</li><li>▪ Collaboration across the organization in regard to implementing the improvement plan will be part of the prioritization process.</li></ul> |

*Comments*

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In considering prioritization methods and scoring systems, Organizations are encouraged to focus on defining how important a task is to the long term goals of the organization. This will avoid the trap of becoming asset focussed instead of activity or service focussed. The assets are used to provide a service and it is provision of the service that must take precedence. Management of the assets is then designed to fit that service provision.

At an advanced level it is recommended that the prioritized plan include a specific statement of what the desired outcome of each improvement task is and that an annual audit occur to determine if the desired outcomes have been achieved. This will assist the organization to appreciate (and quantify) the tangible benefits that improvement in asset management practices are making to service and long term sustainability.

**4.1 Asset Condition**

**4. Manage Your Asset Lifecycle**

*What is meant by Condition?*

The condition of an asset component is a measure of its physical state compared to a brand new component.

*Why do I need to know Asset Condition?*

Tracking the change in condition over time will:

- Provide an indicator for rate of deterioration;
- Identify what type of remedial treatment is appropriate;
- Help determine the best timing for a remedial treatment;
- Support more accurate estimates for remaining useful life; and
- Indicate the most likely year that the asset will fail.

This information can be used to better predict optimal intervention treatments and future budget requirements to get the best service life out of your assets.

Not tracking condition increases the risk of sudden unexpected failures occurring. Such failures usually incur greater costs for remedial works in emergency situations compared to planned maintenance or renewal costs. Not tracking the remaining life of an asset increases the risk of being unprepared for large unavoidable expenditures.

*How do I implement Asset Condition recording?*

The first step is to identify any asset condition data that is already recorded.

The second step is to consider your assets and determine what condition data needs to be recorded. This should include updating old data if it is out of date.

Determine:

- The most appropriate condition data to measure;
- How condition data should be recorded (including what rating system to use);
- How often measured data should be collected (condition monitoring interval);
- Who should be responsible for tracking condition data;
- How the condition data should be analyzed and used (deterioration modelling);
- How work history records should be linked to asset records; and
- How work history records can be reliably used to indicate condition.

The third step is to implement what you have determined is the appropriate condition monitoring for your assets.

- 4.1 Asset Condition**
- a) Current Condition
  - b) Condition Rating
  - c) Condition Monitoring
  - d) Deterioration Modelling
  - e) Work History Tracking

*Targets to Achieve for Basic to Advanced Asset Management Practice*

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- |              |  |
|--------------|--|
| Basic        | <ul style="list-style-type: none"><li>▪ The condition may not be measured but may be known anecdotally or there may be some holistic indicators that could be stated as an interim position until measured data becomes available.</li><li>▪ Work history tracking may not be linked to individual asset records and work history records may or may not include costs.</li></ul>  |
| Intermediate | <ul style="list-style-type: none"><li>▪ All important assets will have measured condition data recorded and being tracked over time.</li><li>▪ Work history records will be categorized by work type; be linked to individual assets; and include cost details.</li></ul>  |
| Advanced     | <ul style="list-style-type: none"><li>▪ Measured condition data will exist for most assets.</li><li>▪ Deterioration analysis will be implemented for important assets.</li><li>▪ Procedures will be in place to use measured condition data to amend planning inputs such as:<ul style="list-style-type: none"><li>○ Remaining life and likely fail year;</li><li>○ Maintenance strategies;</li><li>○ Replacement options;</li><li>○ Risk mitigation; and</li><li>○ The most cost effective time to implement works.</li></ul></li></ul> |

*Comments*

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The following information needs to be determined and documented in regard to your assets:

a) Current Condition

Is the current condition of the asset known? Is it recorded?

*This refers to having some measure of the current condition of your assets recorded. At a basic level of asset management condition may not be measured but may be known anecdotally or there may be some holistic indicators that could be stated as an interim position until measured data becomes available. At a basic level, even the absence of complaints can be an indication that the assets are not badly damaged or at imminent failure point, or complaints could indicate that some problems do exist.*

*Where no measurements or indicators exist, the approximate age and type of material of the asset can be used as a first estimate of probable condition.*

*At the intermediate level of asset management there would be progress towards specific measured condition values for each asset component and a formalized process for determining condition and monitoring and updating condition.*

*At an advance component level of asset management condition data would be known or reasonably assumed from measured indicators, for every component in the asset inventory and this information would be used for predictive modelling to determine most likely fail*

*year and most appropriate treatment intervention, including optimal time for intervention.*

b) Condition Rating

Is the condition represented as a comparable rating score or as a description only? And if it is a comparable score what scoring system or standards were used?

*In reality, any condition data is better than none. However condition assessments and inspections completed in accordance with a recognized standard, and derived from a measurement are more reliable and robust than ones derived from observation. Where measured data is not available, assessments from observations using a prescribed rating manual are better than ones based only on opinion or an arbitrary rating system.*

c) Condition Monitoring

*It is important to monitor the condition of your assets. Condition inspection and assessment reports provide condition information that is valid at a particular point in time. When the condition assessments are repeated, the difference in condition compared to the time between assessments becomes relevant. Over time as assessment cycles are repeated and recorded it will be possible to build up a history and observe any trend in condition (deterioration – refer to d below).*

*This is particularly useful to inform decisions about how to most effectively and efficiently manage the asset through the latter stages of its useful life.*

d) Deterioration Modelling

*It is desirable to know some past condition data so that the rate of deterioration over time can be assessed and predictions of when it will need repair or replacement can be made. As more and more condition data is collected, monitored and assessed, these predictions will become more and more accurate.*

e) Work History Tracking

*Another important source of information that indicates asset condition of your assets is work history. What work (repairs, maintenance etc) have been completed on the asset component, when was it done, and how much did it cost. It is important therefore to track all work done on assets and to record this in a dataset that links work history to the specific asset component so that assessments can be done on cumulative value of maintenance versus replacement cost of the component or compared to the remaining value of an older component. This information can be set to 'flag' asset components that should be considered for replacement and will help to optimize maintenance treatment.*

*At a basic level of asset management, there may not be any current means to track work history in a way that is useful for asset management. Therefore the need to implement a process would be listed as a task in the improvement plan (refer 3.2).*

*At an intermediate level of asset management practice, it is expected that a process for tracking work history against the relevant asset that was worked on, would be*

*implemented and active. At an advanced level of asset management practice, it is expected that the data collected from work history would be regularly assessed and outcomes used to inform decision-making and optimization.*

**4.2 Level of Service**

*What is Level of Service?*

Level of Service is all about understanding what is being provided by the asset and to whom.

The level of Service is defined by the following elements:

- Quantity (expressed in terms relevant to the asset group i.e. for roads it may be lane kilometres whereas for water it may be number of connections or total length of mains);
- Location (in terms of where is the assets, and therefore the service, located);
- Availability (is the service available 24/7 or are there some seasonal or other conditions that limit when the service is available); and
- Quality of Service (this is a measure of the benefit that the customer receives).

*Why do I need to document the Level of Service?*

An asset owner should know about current service levels being provided and this should be recorded and tracked on a regular basis with outcomes reviewed at least annually.

The importance of knowing and tracking levels of service includes to:

- Provide a clear understanding of what value for money is being provided to the community or customers;
- Optimize operational activity to match the required standard. There may be areas of service delivery that need to be improved to meet the required standard. There may be areas that exceed the required standard and current level of operations could be reduced, saving costs. However until levels of service are known and tracked, it can be hard to identify these situations with any certainty;
- Identify options for reducing levels of service if affordability becomes an issue. With levels of service being identified in a tangible way, it is easier to identify potential cost trade-offs and understand the consequence of reducing costs;
- Be able to demonstrate and quantify what impact reduced funds will have on the level of service that can be provided. This is particularly important if budgets become constrained and operation and maintenance allocations are reduced; and



**4. Manage Your Asset Lifecycle**

- 4.2 Level of Service**
- a) Current LoS
  - b) Desired LoS
  - c) Performance Measures and Monitoring

- Be able to identify what needs to change (gap assessment) to update current levels of service to achieve a specified future desired level of service.

*How do I define the Level of Service?*

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There are several different approaches that can be taken in defining levels of service. This roadmap report does not intend to presuppose that any particular method should take precedence over another. Selecting the method for defining levels of service is a decision that the organization should make in consideration of their assets and customers.

However, the following are some key elements that should be understood and considered in relation to defining levels of service:

- Any level of service statement that cannot be verified by measurement (i.e. is purely subjective), is unable to be proven or disproven. Therefore the organization's performance in relation to the services cannot be stated with confidence or reliably defended if challenged;
- Consideration of desired levels of service must include consideration of related cost of service and sustainability issues. Independently defining desired level of service targets without this balance will increase the risk of setting up an unaffordable unsustainable expectation for services;
- Consultation with customers should not occur until the current level of service and cost of service relationship is understood, able to be demonstrated and can be clearly articulated in terms that the customers will understand. Ideally at least two options for future desired levels of service should be presented complete with cost of service estimates. One should be for an increase in level of service and one for a decrease. Consultation will then be suitably informed and the outcomes are more likely to be realistic and sustainable;
- The first level of service definitions should define what is being provided now. And as soon as possible, some estimation or measurement of the current cost to provide this service should be established and linked to the definition of the current level of service. This establishes the core cost/quality relationship;
- The second level of service definitions should be to identify through consultation, what the desired levels of service should be (refer to the bullet point on consultation with customers above). The gap between existing and desired levels of service can then be understood. It can also be quantified in terms of cost and specified in terms of what actions need to be taken to implement the desired level of service; and
- Provision of 'Customer Level of Service Statements', being statements in everyday language describing the benefits of the service as experienced by the customer, are a useful communication tool. However, to be effective, they must be underpinned by measurable standards. The definition of levels of service using descriptions of measured standards is sometimes referred to as Technical Levels of Service. Any Customer Level of Service statement that does not have a measurable Technical Level of Service cannot be verified or proven except by opinion poll through customer survey.

## One Methodology

A starting point, for an organization that has not yet considered what definition method may be appropriate for them, is the following basic approach for levels of service:



### Quantity :

- How much asset do you have associated with this service?
- Are there any other relevant quantity measures i.e. traffic volume, water storage, hectares of trees etc?



### Location :

- Geographically where is the service located?
- Are there any physical location constraints?
- Is it a holistic service available to everyone in the area?



### Availability :

- Under what conditions is the service available?
- Are there any seasonal constraints?
- Is it a constant service available 24 hours / 7 days a week?



### Quality : *Select just 3 to 5 key quality indicators that are relevant to the asset.*

- Safety / Health / Legislative compliance
- Condition
- Responsiveness / Customer service
- Scope of services / Other indicator relevant to asset

## *Targets to Achieve for Basic to Advanced Asset Management Practice*

- |              |   |
|--------------|---|
| Basic        | <ul style="list-style-type: none"> <li>▪ Some effort has been made to quantify in measurable terms, the current level of service being provided.</li> <li>▪ Some indication of the cost of service / level of service relationship will be provided. However the cost of service may only be available as a high-level total cost or as an estimate drawn from combined operation and maintenance costs.</li> </ul> |
| Intermediate | <ul style="list-style-type: none"> <li>▪ In addition to quantified, measurable level of service statements for the current situation, there is some indication of future desired level or service or at least of future level of service options.</li> <li>▪ Level of service options will have estimated costs calculated but these options may or may not have been consulted with customers.</li> </ul>          |

- Advanced
- Current level of service will be defined in measurable terms and will be being tracked through specified performance measures.
  - Costs for current and future level of service options will be recorded.
  - Consultation on desired level of service / cost of service options have been undertaken and an action plan exists for implementing the agreed changes to level of service.

*Comments*

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The information that will need to be determined and documented includes the following:

List all the types of information available about the asset group and describe the content of each data set.

a) Current Levels of Service (LoS)

*This refers to a list giving a number of details about the quality and reliability of the service being provided and the cost to provide that service. When determining level of service it is important to consider where and when a service is available, how much of the service is being provided (quantity) and to what standard (quality).*

b) Quality of Service.

*The measure of quality of service needs to include consideration of legislative requirements and organizational goals as well as criteria relevant to each particular asset group. All criteria used to define the quality of service must be able to be measured so that performance achievements can be reported and tracked over time.*

c) Cost of current Levels of Service (CoS)

*Once existing levels of service are known, the cost or service should be determined. It is important to understand the relevant service/cost relationship to ensure that the current level of service being provided is affordable and sustainable long-term.*

*In understanding the relationship between cost of service and level of service we can identify options and consequences. For example the level of service could be increased for a certain cost or decreased for a certain amount of savings. This allows more quantified and defensible arguments to be made regarding the asset. This increases confidence in decision outcomes.*

d) Cost of Service scenarios / options

*Subsequent to the initial service/cost assessment, and in preparation for public/customer consultation, it will be necessary to identify service/cost scenarios and options. It may be prudent at this time to gain a better understanding of community expectations. This would involve consulting with key customer groups, documenting customer needs, projecting future needs, considering demand management proposals, identifying possible funding options and alternatives for provision of some services.*

- *It is a matter of choice as to which stage and to what degree customer consultation is included in the process of defining future levels of service. For example:*

- *A selection of cost/service scenarios could be developed first and then consulted on; or some initial targeted consultation could be used to identify service options and then costs determined for these options and the results presented back to the wider group of customers for further consultation.*

e) **Desired Levels of Service (LoS)**

*This refers to a list giving a number of details about the desired quality and reliability of the service being provided and the desired cost to provide that service.*

*What is the desired level of service to be provided? Are you providing a higher level than is necessary or is the level of service too low? Once you have established a desired level of service you can then determine what it will cost to provide that service and whether that cost is feasible. Can plans be made to obtain the necessary funding or will the desired level of service have to be lowered (but still within an acceptable level) because of insufficient funding? Thus it is somewhat of an iterative process to determine the right desired cost of service/level of service relationship for the organization's assets taking into consideration its financial position.*

f) **Performance Measures and Monitoring**

*Performance monitoring relates to any checking that is done to compare the actual level of service to the desired level of service and is an essential tool for sustainability.*

*Monitoring provides the confidence that the asset is being sustainably managed or it alternatively alerts decision-makers to the need for change if results are demonstrating that current practices and costs are not sustainable. In order for performance to be monitored it first needs to be measured. For example, surface condition and maintenance response times are good performance indicators for roadways.*

*Is performance of the asset monitored? Is there a gap between current and desired performance? Is there an improvement plan to increase performance?*

**4.3 Assess Asset Renewal Alternatives (Basic)**

**4. Manage Your Asset Lifecycle**

**4.3 Assess Asset Renewal Alternatives**

- a) Treatment Options
- b) Evaluation
- c) Treatment Selection
- d) Review Outcome

*What is meant by Asset Renewal Alternatives?*

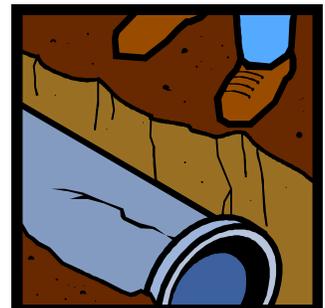
To assess Asset Renewal Alternatives means to look at:

- Technologies and methods to replace an asset by a method that is different to how the asset was originally installed; or
- Technologies and methods that do not replace the asset but are appropriate to the circumstances; or
- New and emerging technologies relating to asset replacement or in-place rehabilitation.

*Why do I need to assess Asset Renewal Alternatives?*

There can be many circumstances where it is appropriate and necessary to consider an alternative treatment option for replacement of an asset (asset renewal), for example:

- **Limited Funds:** For example if there is insufficient funding to complete all the necessary asset renewal work by traditional or expected methods it will be necessary to look at alternative options such as:
  - *Interim (non-renewal) treatment that will extend the life of the asset and defer the current renewal for number of years. For example, doing crack filling as an alternative to resurfacing; or*
  - *Cheaper (renewal) treatment that will replace the asset but may not last as long as the original or preferred treatment if funding had not been limited.*
- **Limited Site Conditions:** This relates to situations where site conditions have changed since the original asset was installed and a different construction method will now be required. For example:
  - *A pipeline may have originally been installed by open excavation but there is now a major road over the top of it therefore replacement by open excavation is not appropriate or practical and a suitable alternative must be found.*
- **Generally:** There should always be some consideration of whether viable alternatives exist for a proposed asset renewal. Then if viable alternatives exist, which option is the most appropriate and/or cost effective for the situation. For example:
  - *In some circumstances a pipe lining treatment could create an effective replacement of a pipeline without totally removing it and installing a new one.*



Alternative options need to be evaluated to come up with the best practical program. This may or may not be the optimum treatment in all cases, but it should be the most appropriate and effective treatment within the constraints of available funds, site conditions and local circumstances.

The process for assessment of alternatives for asset renewals will depend on:

- The quantum and complexity of programmed work;
- Whether any treatment selection tools are already in use; and
- The structure of the organization and the responsibilities of various positions.

If the organization has a software tool or decision matrix that it currently uses to run an evaluation of alternatives then the process need only identify:

- a) When an assessment of alternatives should be undertaken.  
This can be specified as being:
- b) Who should be involved or consulted with regarding the assessment; and
- c) When, how often and who should review the parameters within the software tool or decision matrix that determine the evaluation outcomes.



If no software tool or decision matrix is currently in use, the process can initially be done manually or using simple calculations and standard business software such as Microsoft Excel or Microsoft Access. The cost/benefit of purchasing specific software or developing a customized tool can be evaluated at a later date and implemented as part of the Asset Management Improvement Plan (refer 3.2).

The following steps outline a basic process for assessment of asset renewal alternatives:



*Targets to Achieve for Basic to Advanced Asset Management Practice*

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- |              |   |
|--------------|---|
| Basic        | <ul style="list-style-type: none"><li>▪ Some consideration of whether viable alternatives exist for proposed renewal projects will be undertaken. However the process may be simple and only involve one or two people.</li><li>▪ Whatever the current process is and any tools or software programs (if any) used, should be documented in a standard operating procedure.</li></ul>   |
| Intermediate | <ul style="list-style-type: none"><li>▪ The process for assessment of alternatives for renewal projects will have been reviewed.</li><li>▪ Improvements identified from the process review will have been documented in the Asset Management Improvement Plan or have been completed.</li><li>▪ The improved process will be fully documented and implemented.</li></ul>  |
| Advanced     | <ul style="list-style-type: none"><li>▪ The process for assessment of alternatives for renewal projects will be fully integrated within the organization's business practice.</li><li>▪ A regular review of the process will be completed annually at or about the time that the assessment of renewal alternatives is undertaken.</li><li>▪ Any improvements identified in the annual review will be completed or documented in the Asset Management Improvement Plan.</li></ul> |

*Comments*

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The process to assess asset renewal alternatives should be tailored to suit:

- the organization;
- the number of renewal projects; and
- the annual budget for renewal projects.

Considerations for Software Purchase or Development

*The cost of implementing a sophisticated analysis tool for option selection is unlikely to be cost effective or appropriate if the quantum of projects are small or the options can easily be evaluated by existing experienced staff.*

*However some organizations may have insufficient resources to implement a formal assessment process, due to demand for existing experienced staff on other activities. In such situations, the support of some form of decision tool or software program may be essential to implementing the process.*

*Cost effective solutions are readily available through development of customized decision tools such as weighted matrices that rate a number of criteria to derive a score for each option. Some commercially available software packages for asset inventory and maintenance management offer add-on modules for treatment selection. These can be cost competitive if they are available for a package that the organization is already using.*

*In each situation, before committing to a particular software purchase or system development, it is good practice to consider not just options and costs, but also:*

- how the system will be incorporated into the organization,*
- can it be used by more than one asset group? and*
- who will manage, operate and maintain the system.*

**4.4 Assess Asset Maintenance Strategies**

**4. Manage Your Asset Lifecycle**

- 4.4 Assess Asset Maintenance Strategies**
- a) Maintenance Options
  - b) Evaluation
  - c) Develop Strategy
  - d) Review Outcome

*What is meant by Asset Maintenance Strategies?*

An Asset Maintenance Strategy is a document that identifies the:

- Key goals that maintenance activities seek to achieve;
- Service level to be maintained;
- Parameters or criteria to be used for decision-making; and
- Rules and standards that the activity must comply with or within which it must operate.

*Why do I need to assess Asset Maintenance Strategies?*

The existence of an Asset Maintenance Strategy provides guidance to ensure all work tasks are focused on achieving the same goals. It also provides for knowledge transfer when key people retire or staff change.

Without a strategy document it can be difficult to verify that:

- There are controls for maintenance activities;
- Assets are being maintained in a best practice, cost effective manner;
- Alignment exists between maintenance activities and organizational goals;
- Maintenance activities supports sustainability; and
- Decisions are being made within known parameters in a responsible manner.

The role of maintenance management has a much larger significance to the organization than just keeping assets functioning. Timely intervention with the right techniques can extend the life of the asset for a cost saving to the organization. Conversely, poor decisions on maintenance intervention and treatment will increase costs.

When a maintenance strategy exists, and it is regularly assessed, an organization can have greater confidence that maintenance work is being optimized.

*How do I implement Assessing Asset Maintenance Strategies?*

The assessment of current maintenance strategies is part of the process for developing and keeping a maintenance strategy up to date.

If the organization does not currently have an Asset Maintenance Strategy, then the steps to generate one are:

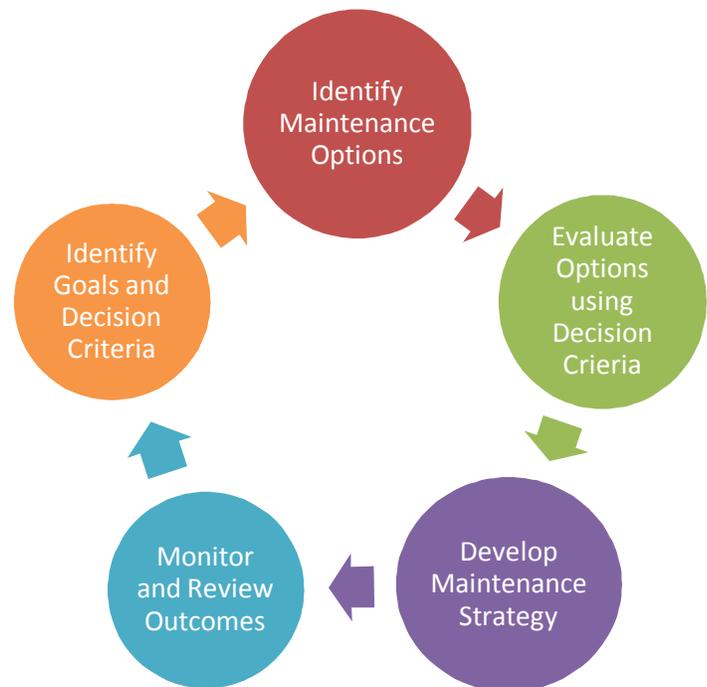
- (a) Consider (and document) how maintenance options are currently being decided and by whom (refer 3.1);
- (b) Identify (and document) what the maintenance goals are and any criteria or rules applying to maintenance decisions (refer 5.1, 5.2);



- (c) Identify what the typical maintenance options are;
- (d) Evaluate the maintenance options using the decision criteria and rules (identified in (b) above);
- (e) Develop (and document) a maintenance strategy that defines how maintenance work is to be done to achieve the maintenance goals;
- (f) Monitor maintenance activities and review overall outcomes once a year; and
- (g) Based on the outcome of the maintenance activities, determine if any of the decision criteria for the Maintenance Strategy should be changed.

It is important to identify and monitor maintenance outcomes to know if the current way of doing work is still appropriate. If it is not, changes can be made and outcomes reviewed again the following year.

The particular aspect to measure will need to be something that is an indicator for how effective the Maintenance Strategy is in achieving the maintenance goals. This may be the dollars spent on particular types of work or the number of different types of faults occurring. The decision will depend on the asset group and nature of the network or system being managed.



The diagram above outlines a basic process for development and periodic review of an Asset Maintenance Strategy.

Each asset group may have a separate strategy or these may be combined into one strategy document. This will depend on the size and structure of the organization. If maintenance is managed by different people for different asset groups then it is more appropriate to have separate strategy documents.

*Targets to Achieve for Basic to Advanced Asset Management Practice*

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|-------|--|
| Basic | <ul style="list-style-type: none"> <li>▪ An Asset Management Strategy will exist. However it may or may not be detailed. An initial strategy may only highlight a few major issues pending future review of the strategy.</li> <li>▪ A review process including a decision on what outcomes will be monitored and the procedure for monitoring these will be documented and in place.</li> </ul> |
|-------|--|

- Intermediate
- The effectiveness of the Asset Maintenance Strategy will have been assessed at least once and the strategy reviewed.
  - Improvements identified from the strategy review will be documented in the Asset Management Improvement Plan or have been completed.
  - The improved strategy will be fully documented and implemented.
- Advanced
- The process for assessment of the Asset Maintenance Strategy (or strategies) will be fully integrated within the organization's business practice.
  - A regular review of the maintenance outcomes will be completed annually in conjunction with the assessment of the effectiveness of the maintenance strategy.
  - Any improvements identified in the annual review will be completed or documented in the Asset Management Improvement Plan.

*Comments*

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The process to assess asset renewal alternatives should be tailored to suit the needs of the organization as outlined in these guidance notes.

**5.1 Strategic Goals**

**5. Know the Rules**

*What is meant by Strategic Goals?*

The strategic goals of the organization are the guiding principles for all activities of the organization. They are usually printed in a strategic plan document and reported on annually.

It is common for strategic goals to incorporate sustainability objectives as well as social, economic, environmental and governance goals.

**5.1 Strategic Goals**

- a) Organizational Goals
- b) Stakeholder Goals

*Why do I need to do know about Strategic Goals?*

Everything that is done and every decision that is made within the organization should be in keeping with and supportive of the strategic goals.

If individual departments and work groups are operating in isolation to the strategic goals they may not be completing work that is necessary to achieve those goals. They may also be doing additional work that is not required by the strategic goals and therefore spending funds inefficiently.

*How do I apply Strategic Goals to Asset Management?*

The first step is to be aware of what the Strategic Goals are for the organization.

The second step is to be aware of your relevant stakeholder groups and consult on what their expectations are for management of the assets and delivery of services.

The third step is to define supporting 'business level' goals.

These should be written for each major asset group (i.e. Transportation, water, storm drainage, sanitary sewer, parks and recreation, facilities). The wording of these goal statements should clearly indicate how both stakeholder expectations and strategic goals can be met by management of the assets.

The business level goals establish a tangible bridge between all the activities related to the assets, and the strategic goals of the organization.



*Targets to Achieve for Basic to Advanced Asset Management Practice*

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- |              |  |
|--------------|--|
| Basic        | <ul style="list-style-type: none"><li>▪ The connection between the strategic goals and the day to day business decisions and management of assets may not be understood or clearly defined.</li><li>▪ As an absolute minimum, the strategic goals will be known and documented.</li><li>▪ Any existing business level goals will also be documented and if there is a known relationship between any of these goals, this will be discussed.</li><li>▪ Stakeholder groups will be known and consulted on levels of service to be provided.</li></ul> |
| Intermediate | <ul style="list-style-type: none"><li>▪ The relationship between strategic goals and business level goals for each asset group will be stated.</li><li>▪ Stakeholder expectations will be known and documented.</li><li>▪ Connectivity between business goals, stakeholder expectations and level of service targets will be documented.</li></ul>   |
| Advanced     | <ul style="list-style-type: none"><li>▪ The connectivity between strategic goals and business level goals should be clearly documented and easily understood.</li><li>▪ Stakeholder expectations will be known, documented and regularly reviewed with stakeholders.</li><li>▪ Connectivity between business level goals and the relevant levels of service goals, performance targets and stakeholder expectations for each asset group will be documented and easily understood.</li></ul>   |

*Comments*

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The information required to be known and documented for this task includes:

(a) Organizational Goals

i. Strategic Goals

*Details of the organizational goals and objectives relating to assets should be stated. It is very important to keep focus on the relevant high level objectives and goals when making significant decisions about an asset. The first step toward ensuring decisions and actions are consistent with the direction and long-term strategy of the organization is to be aware of the organizations strategic goals.*

ii. Asset Group Goals

*Details of the business level goals for each asset group should be stated and where known, the relationship between business (asset group) and corporate (strategic) goals documented.*

*At a basic level of asset management practice the connections between asset group and strategic goals may be unclear. In this case, the asset group goals (if they exist) should be stated and an improvement task identified to review these goals and define the connection to*

*the corporate goals. This may need to include redefining the asset goal statements if necessary so that they support the strategic goals.*

*At an intermediate and advance level of asset management practice the connections between all of the following aspects of asset management should be clearly understood and documented:*

- *Strategic goals;*
- *Stakeholder goals;*
- *Asset group goals (business level goals);*
- *Levels of service (refer task 4.2); and*
- *Performance targets (refer task 4.2 & 5.2).*

(b) Stakeholder Goals

i. Stakeholder List

*Stakeholders are the people who have an interest in the asset or the associated activity or the community or the land or natural environment that may be impacted by activities associated with the asset group.*

*Part of good stewardship is consultation with stakeholders prior to making significant decisions. It is therefore important to know and have an up-to-date list of who the interested parties are and their contact information. This list should be regularly reviewed (at least annually) to ensure it remains current. A list of stakeholders may include but is not limited to:*

- *Users of the asset;*
- *Tax Payers (i.e. local residents);*
- *First Nations;*
- *Environmental Groups;*
- *Heritage Group;*
- *Animal Protection Groups; and/or*
- *Adjacent Land Owners.*

ii. Stakeholder Expectations

*At a basic level of asset management practice, there may or may not exist some communication forums such as periodic interest group meetings that can be used for consultation on stakeholder (or user/community) expectations. If these exist they should be documented and the process for communication with that group also documented. However for many organizations, consultation with stakeholder occurs at a corporate level only and relative to a specific project or to strategic planning. Whatever the organizations means and procedure for understanding stakeholder expectations is, it should be documented.*

*At an intermediate and advanced level of asset management practice, there would be more detail available on stakeholder expectations and there would be some level of formal on-going communication with stakeholders implemented. This may include a communication plan and documented consultation procedures or similar documents can be referred to. These documents could be corporate level documents governing all asset groups and activities.*

## 5.2 Legal Obligations and Standards

### 5. Know the Rules

#### *What is meant by Legal Obligations and Standards?*

Legal Obligations and Standards relates to all legislation, regulation, policies, standards and any other requirements that impact on or relate in some way to the assets or the services associated to them.

Essentially, reference should be given to any document that:

- Sets out parameters within which the asset must be operated; or
- Has a requirement or condition that the asset must comply with (i.e. the 'rules').

These requirements can generally be grouped into legal obligations (legislation and regulation) and general standards (industry best practice, guidelines, organizational policy).

#### *Why do I need to document references to Legal Obligations and Standards?*



Understanding the 'rules' within which the asset must operate is essential to being able to effectively manage legal compliance.

Many asset activities and services have numerous rules from numerous sources. It can also be difficult to prove all activities are fully compliant with necessary requirements. Simply due to the fact that data about what must be complied with and how it is monitored are embedded within numerous documents. Therefore having a single collated list with reference to all relevant legislation, regulation, policies, standards and other requirements, will provide:

- A means to effectively transfer corporate knowledge on compliance when staff changes occur;
- A check list for compliance auditing; and
- A 'big picture' overview to:
  - Increase understanding of the rules;
  - Identify the relationship between various rules;
  - Define the comparative importance of different rules;
  - Select opportunities for efficiency in compliance monitoring (i.e. where one test or check being done for one rule can also be used to confirm compliance with another rule); and
  - Highlight opportunities operational savings (i.e. where operational effort can be streamlined without compromising legislative compliance).

#### *How do I document references to Legal Obligations and Standards?*

As with most asset management practices, the starting point is to document the current status or situation. Then as necessary and appropriate, effect improvements from that point. In the case of rules and regulations, it is possible that some personnel in some organizations may not

### 5.2 Legislation, Regulation, Policy & Standards

- a) List of requirements
- b) Associated Policies & Best Practice Standards

be fully aware of all the requirements that apply. Therefore the first step is to document what requirements and rules are generally known.

This can be done relatively quickly by holding a meeting of relevant personnel and documenting from the shared knowledge, the requirements that each person is aware of. Most organizations will have people who are highly familiar with:

- The main compliance requirements;
- The method of monitoring compliance;
- The location of compliance results;
- The current compliance status; and
- Any relevant historical issues.

This first list will document this corporate knowledge.

Following this (if necessary), an appropriate person could be tasked with researching the documents identified from the meeting. This research would be aimed at confirming the specific clause numbers or relevant reference to be included in the collated list. Depending on the degree of corporate knowledge, the researcher may also review the document for any other requirements that may exist but were not initially noted.



This process will assist in expanding the corporate knowledge and improving overall compliance and reporting.

*Targets to Achieve for Basic to Advanced Asset Management Practice*

Basic	<ul style="list-style-type: none"> <li>▪ As a minimum the first list of references to the legal obligations and standards for the assets will identify the names of all key documents, but may not necessarily reference all of the rules within the document.</li> </ul>
Intermediate	<ul style="list-style-type: none"> <li>▪ The list of referenced documents for legal obligations and standards will include either a general description of the types of rules within each document or a sub-list of the key rules that are relevant.</li> <li>▪ The collated list of references will also indicate against the key rules, whether compliance is checked or monitored and if so provide some detail about the monitoring.</li> </ul>
Advanced	<ul style="list-style-type: none"> <li>▪ The information in the collated list of legal obligations and standards will be more detailed.</li> <li>▪ A summary of the current state of compliance in regard to key rules</li> </ul>

will be documented along with reference to any remedial procedures that must be taken in the case of non-compliance.

- Reference will be included as to where details of any measured compliance data can be reviewed.
- Consideration will have been given to any opportunities to optimize compliance monitoring and a compliance monitoring plan should exist.
- Consideration has also been given to whether any opportunities exist for operational efficiencies and the outcome documented and where appropriate auctioned or scheduled for future action.

### Comments

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The details to be determined and recorded for this task are to provide a list of all relevant rules. This includes;

a) Legal Obligations

*This refers to legal documents that impact on or relate in any way to the asset and its operation; for example the Canada Health Act and the Canada Transportation Act. It also includes any relevant requirements within permits and contractual agreements.*

*The response should as a minimum be a list giving the official name and relevant number and date for each legal document.*

b) Standards and Guidelines

*This refers to all other non-legislative or contractual rules and obligations that impact on or relate to the asset or its operation. For example bridge standards, highway standards, non-legislated water requirements, monitoring guidelines, work procedures etc.*

*The response should as a minimum be a list giving the official name, date and any relevant reference number for each document.*

c) Corporate Policy

*This refers to all relevant in-house policy documents that impact on or relate in any way to the physical assets, the services provided by the assets, or any activities associated with the assets.*

*The response to this should as a minimum be a list of the policies and relevant reference number or date of policy, or the file reference for a document that holds this information.*

**6.1 Sustainability Assessment**

**6. Sustainability Monitoring**

*What is a Sustainability Assessment?*

A Sustainability Assessment is a review of whether or not sustainability goals are being met.

In the context of asset management practice this will include an assessment of current business processes and outcomes relative to sustainability goals.

The sustainability goals of an organization are usually documented in a Sustainability Plan or Charter. They may also be incorporated into the Strategic Goals. All activities within an organization should be consistent with achieving sustainable outcomes. The overall objective of Asset Management Practice is sustainability.

- 6.1 Sustainability Assessment**
- a) Current state of sustainability
  - b) Desired Processes
  - c) Improvement Gap

*Why do I need to do a Sustainability Assessment?*

At a corporate level, having sustainability goals does not necessarily mean that an organization is sustainable. Likewise, at an asset management level, implementing sustainability programs (such as energy efficiency targets; reduction of carbon footprint; or greenhouse gas emissions etc.), does not mean the assets and services are sustainable.

A Sustainability Assessment however compares the outcome of asset activities to the ideals of the organizations' sustainability goals. This is necessary to identify if:

- The sustainability goals are being met;
- The outcome of asset activities supports sustainability;
- The business goals for management of the assets are promoting sustainability;
- The sustainability goals are still appropriate and provide the right drivers; or
- The sustainability goals should be amended.

*How do I implement Sustainability Assessments?*

The information to be determined and documented for this task includes:

(a) Current Sustainability Status

Consider the following questions and complete a review of programs, procedures and results to provide answers.

- *What processes are currently in place that contribute towards sustainability?*
- *What is the current assessment of how sustainably the assets and activities are being managed?*
- *What evidence is there to support this assessment of current sustainability?*

The detail of the review and the process for assessing sustainability should be subject to on-going improvement to incrementally increase confidence in the outcomes.

(b) Desired Processes

With consideration to the current sustainability status of the management of each asset group, identify the following:

- *What processes should be implemented to better ensure long-term sustainability?*
- *What strategies are needed to manage long-term sustainability of the asset?*

(c) Improvement Gap

For this task, answer the following:

- *What is the gap between current processes contributing towards sustainability and those processes desired to ensure sustainability?*
- *What specific action should be taken to address the gaps identified?*
- *What measurements should be used to assess the level of sustainability being achieved?*

The actions identified from this review of the 'improvement gap' will then be added to the overall improvement plan (refer task 3.2).

*Targets to Achieve for Basic to Advanced Asset Management Practice*

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Basic	<ul style="list-style-type: none"> <li>▪ The connectivity between sustainability goals and outcomes of current business practice may not be known.</li> <li>▪ Initial sustainability assessments for each asset group will, as a minimum, identify and document:             <ul style="list-style-type: none"> <li>○ The sustainability goals to be achieved by that asset group; and</li> <li>○ All of the programs that are currently implemented or scheduled to be implemented.</li> </ul> </li> <li>▪ A general assessment of sustainability under the three main categories Financial, Environmental and Social will be completed if there are no organizational sustainability goals to assess.</li> </ul>
Intermediate	<ul style="list-style-type: none"> <li>▪ The consideration of sustainability issues and the assessment of current sustainability will be more detailed.</li> <li>▪ Assessment statements will be supported by evidence.</li> <li>▪ Assessments will include reviewing strategies that have been implemented to manage assets i.e. maintenance strategies. And assessing whether they are delivering desired outcomes.</li> </ul>
Advanced	<ul style="list-style-type: none"> <li>▪ Sustainability assessments will include specific measurement, monitoring and reporting of progress towards clearly stated performance targets for sustainability.</li> </ul>

*Comments*

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There are many things to consider when assessing sustainability however these can usually be grouped into one or more of the following main categories;

a) Financial sustainability

*Is the current level of service affordable when you consider all costs through the whole lifecycle of the assets including the cost to replace the asset at the end of its economic life?*

b) Environmental sustainability

*Do any of the current activities and assets adversely impact the environment and can this be repaired and mitigated?*

c) Social sustainability

*Do the assets and services meet the community's needs and can they continue to meet those needs into the future. This includes cultural needs and business needs as well as all things relating to the lifestyle, character and priorities of the community?*

In completing a sustainability assessment it is important to try to provide factual verification for statements. For example in regard to financial sustainability reference could be made to the multi-year plans for future capital costs (refer task 2.3) and for funding sources (refer task 2.4) to demonstrate that the continued provision of services at least to the current standards, is or is not financially sustainable.

In regard to non-financial issues, reference could be made to the outcomes of tasks 4.2 on levels of service and 5.2 on legislation, regulation, policy & standards.

The assessment should also include reviewing any strategies that have been implemented to manage asset sustainability. The review should define whether those strategies are delivering the desired outcomes. For example, is there a maintenance strategy and does it provide the best outcome for whole of life cost, service delivery and risk management?

At an advanced level of asset management practice, sustainability assessments would include specific measurement, monitoring and reporting of progress towards clearly stated performance targets for sustainability. This will provide a high level of confidence that progress towards a sustainable future is occurring. It will also provide early alert for programs that are not generating desired results and allow for modification of strategies over time to adjust to changing circumstances.

## 6.2 Co-ordinating Infrastructure Works

### 6. Sustainability Monitoring

#### 6.2 Co-ordinating Infrastructure Works

- a) Identify Tasks
- b) Develop Basic Plan
- c) Implement Improvement Process

*What does Co-ordinating Infrastructure Works refer to?*

Co-ordinating Infrastructure Works refers to taking practical steps to try to coordinate physical works projects for the purposes of:

- Saving on total costs by combining projects where possible;
- Reduction in overall disturbance; and
- Increased confidence in efficiency of organization.

*Why do I need to Co-ordinate Infrastructure Works?*

Co-ordinating physical work programs (wherever practical), across the entire organization is an action that will identify opportunities to:

- Reduce total project cost to the community by;
  - *Collaborating and cost sharing on work elements*
  - *Eliminating duplication of work elements on different projects*
  - *Obtain more competitive pricing for bundled work*
- Improve service standards;
- Reduce disruption;
- Identify innovative solutions;
- Increase understanding of issues for different asset groups; and
- Collaborate in other service areas for increased efficiency.



For example co-ordinating a pipe replacement project with upgrade or resurfacing work on the road above the pipe will:

- (a) Reduce reinstatement costs on the pipe line project;
- (b) Prevent the road surface from having a patched surface from after the pipe work project until the road is resurfaced;
- (c) Reduce the overall time of the combined project as the separate reinstatement of the surface of the pipe trench surface will be incorporated into the road project.

The expected outcomes of project/program co-ordination will also support sustainability objectives by optimizing costs and reducing adverse impacts on the community.

*How do I implement procedures to Co-ordinate Infrastructure Works?*

Some organizations may already have varying degrees of program co-ordination in place.

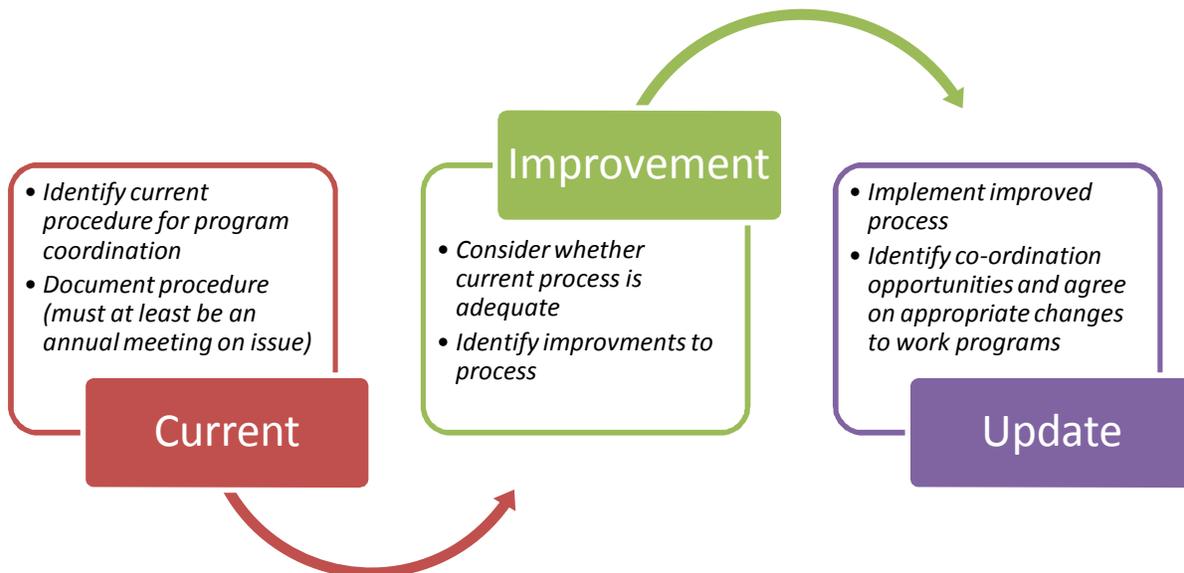
Co-ordination processes could be basic or detailed depending on the needs of the organization and the quantity and complexity of projects.

The co-ordination process could be as simple as scheduling a meeting of relevant staff once a year to review and discuss each of their physical works programs. The objective of the meeting will be to identify opportunities to co-ordinate project work, agree on actions to take and document outcomes.



In other circumstances the co-ordination process may need to be more sophisticated. Where the physical works programs that need to be co-ordinated are very large, it may be appropriate and efficient to use some database analysis. Another option is to use GIS spatial queries to identify projects that are in the same location. These projects can then be reported and appropriate scheduling and co-ordination agreed between the relevant managers of the assets or projects.

The first step therefore is to identify and document the current procedure for co-ordination of infrastructure works programs. Note it is very important that some procedure exists. Therefore if there is none currently, then at least the minimum requirement for an annual co-ordination meeting should be implemented.



The next step is to consider if and how the co-ordination process should be improved. And if improvement is desired, what actions need to be implemented.

These improvement actions can then be completed and the co-ordination of infrastructure works undertaken. All of this should be documented.

*Targets to Achieve for Basic to Advanced Asset Management Practice*

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|--------------|---|
| Basic        | <ul style="list-style-type: none"><li>▪ A process will exist for coordination of infrastructure works.</li><li>▪ The current coordination process may be relatively simple but it should be documented none-the-less.</li></ul>   |
| Intermediate | <ul style="list-style-type: none"><li>▪ The current process for coordination of infrastructure works will have been reviewed for the purpose of identifying if and what improvements to the process should be implemented.</li><li>▪ Process improvements to achieve more efficient and effective coordination of infrastructure projects may or may not be fully implemented. However these improvement actions will be documented and scheduled for implementation.</li></ul>                               |
| Advanced     | <ul style="list-style-type: none"><li>▪ A robust and efficient process will exist for coordination of infrastructure works.</li><li>▪ The coordination process will be formally documented.</li><li>▪ The coordination process will occur at least annually and there will be a record that it occurred and what the outcomes were.</li><li>▪ The annual coordination process will include a review of the actual process to ensure that it is still appropriate and achieving the desired outcomes</li></ul> |

*Comments*

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What process is appropriate and practical for your organization could be entirely different to what is appropriate for another organization.

The points to consider when establishing what approach is best suited to your organization include the following:

- The quantum and complexity of work to be co-ordinated;
- The overall quantity of assets managed by the organization;
- Whether any co-ordination procedures or tools are already in use;
- The size and structure of the organization;
- The expected savings that co-ordination could realistically achieve; and
- The number of staff that will need to be involved in the co-ordination decisions.

It does not make sense to have a highly sophisticated procedure for program co-ordination, utilizing advance computer software and detailed analysis if the program for physical works projects for the entire organization is developed by one or two persons and the quantum of work and potential cost savings and customer benefits are small.

For an organization like this, a simple procedure requiring that at some point a meeting is held with relevant people and the opportunities to co-ordination work are considered and appropriate action taken.

The tasks to be completed for program co-ordination include:

(a) Identify Current Program Co-ordination

*Identify whether any degree of co-ordination of physical works projects currently occurs. If it does, describe how this co-ordination is done.*

*At a more advanced level of asset management practice, this would include a formal detailed procedure, evidence that this occurs and some discussion of the successful outcomes achieved.*

(b) Identify Process Improvements

*Consider the successful outcomes achieved from the current co-ordination procedure, or any adverse events that have occurred due to the lack of program co-ordination process. Then identify what actions need to be completed to improve program co-ordination. These actions can then be added to the overall improvement plan for managing assets (refer task 3.2).*

## **4 Roadmap Improvement Plan**

The current Roadmap only provides information sheets and guidance notes for the basic level modules. It is expected that future reviews and updating of this Roadmap will include to provide information sheets and guidance notes for the intermediate and advanced modules.

Over time as organizations progress, their general level of asset management implementation should advance. In subsequent reviews and updates of the Roadmap, it should be possible to remove the detailed information for some of the basic level modules and add new modules for other asset management practices that have not been included at this initial stage.

A full list of improvement projects will be provided after further consultation with participating local authorities.

## 5 Glossary of Technical Terms

The following terms relating to asset management practices and have been defined below for clarity.

Term	Description	Similar Terms
<b>Activity</b>	The work undertaken on an asset or group of assets to achieve a desired outcome.	Work Service Delivery
<b>Asset</b>	A physical component of a facility or network which has value, enables services to be provided, and has an economic life of greater than 12 months i.e. has a future benefit or capacity to provide future net cash flows beyond one fiscal year. <i>Refer also Tangible Capital Asset</i>	Tangible Capital Asset
<b>Asset Group</b>	A group of assets that are similar in nature and useful life.	Asset Type
<b>Asset Management Plan</b>	A written document (plan) detailing the required management of infrastructure assets over the entire lifecycle of the asset in a manner to cost effectively and efficiently provide an identified level of service.	Activity Management Plan
<b>Asset Inventory (Register)</b>	A record of assets that includes unique identifying information and key attribute data such as installation or construction date, size, material, location and any other relevant operational and technical information.	Asset Registry
<b>Betterment</b>	A cost incurred that either increases the capacity, extends the useful life, or reduces the operating cost of an asset.	
<b>Capital</b>	Expenditure used to create new assets or to increase the capacity of existing assets beyond their original design capacity or service potential.	
<b>Current Depreciated Cost</b>	Is the amount at which a tangible capital asset is recognized after deducting any accumulated amortization and accumulated impairment losses.	Carrying Amount Current depreciated Value
<b>Current Replacement Cost</b>	Is the total estimated amount that it is would cost to replace the tangible capital asset today. The cost includes administration, survey, design and management costs as well as the construction costs.	Current Replacement Value

<b>Components</b>	An asset that forms part of a larger or wider asset. Components are individual (separable) parts of an asset having independent physical or functional identity and specific attributes.	
<b>Condition Monitoring</b>	A program of periodic or regular inspection, measurement or assessment of the physical condition of an asset to determine any maintenance works required and to estimate the remaining useful life of the asset.	
<b>Depreciation</b>	Is the expense in an accounting period from application of depreciation accounting; wherein the cost or other recorded value of an asset (less any value at disposal) is distributed over the useful life of the asset. It provides a measure of the rate of consumption of the asset and is typically expressed as a per annum amount.	Amortization
<b>Disposal</b>	The activities necessary to dispose of decommissioned assets.	
<b>Asset Management Practice</b>	A process of integrating management, financial, economic, engineering, operations and other practices applied to assets with the objective of providing the required level of service in the most cost-effective manner.	<b>Infrastructure Asset Management</b>
<b>Gap Assessment</b>	A method of assessing the gap between a business's current asset management practices and the future desirable asset management practices. Also called needs analysis.	
<b>Geographic Information System (GIS)</b>	Software which provides a means of spatially viewing, searching, manipulating, and analyzing an electronic database.	
<b>Level of Service</b>	The defined service quality for a particular asset or service, against which performance can be measured.	
<b>Life</b>	A measure of the anticipated life of an asset or component.	
<b>Economic Life</b>	The period from the acquisition of the asset to the time when the asset, while able to provide a service, ceases to be the lowest cost alternative to satisfy a particular level of service.	Useful Life
<b>Maintenance and repairs</b>	Maintain the predetermined service potential of a tangible capital asset for a given useful life. Such expenditures are charged in the accounting period in	

	which they are made	
<b>Maintenance – Corrective maintenance</b>	Maintenance repair works carried out after a failure has occurred. Also called reactive maintenance and/or emergency maintenance. The repair works are intended to restore the asset to operational status i.e. it can perform its required function.	
<b>Maintenance – Emergency maintenance</b>	Maintenance repair works carried out after a failure has occurred. The repair works are intended to restore the asset to operational status i.e. it can perform its required function. Ideally this should be equivalent to ‘corrective maintenance’ however sometimes the emergency repair involves some temporary works as an interim measure. These are usually replaced at a later time after the initial crisis with more permanent or suitable repair works.	
<b>Maintenance – Preventative maintenance</b>	Maintenance works that repair or protect an asset to avoid a more serious failure occurring. Also referred to as planned maintenance	
<b>Maintenance History</b>	Collated information on all repair works undertaken on an asset.	

<b>Operations</b>	All actions necessary to keep the asset operating and which form part of the annual operating budget, but excluding physical repairs (maintenance), capital improvements.	
<b>Performance Monitoring</b>	Continuous or periodic quantitative and qualitative assessments of the actual performance of an asset compared with specific objectives, targets or standards.	
<b>Rehabilitation</b>	Work to rebuild or replace parts or components of an asset, to restore it to a functional condition and extend its life (may involve some modification).	
<b>Renewal</b>	Works to upgrade, refurbish or replace existing assets with assets of equivalent capacity or performance capability. See also Replacement	
<b>Repair</b>	The action required to restore a component or asset to its previous condition after failure or damage. See also Maintenance.	
<b>Replacement</b>	The complete replacement of an asset that has reached the end of its life, so as to provide a similar or agreed alternate level of service. See also Renewal.	
<b>Service Potential</b>	Is the output or service capacity of a tangible capital asset normally expressed in terms of (or with reference to) various attributes of the asset such as physical output capacity, quality of output or service, associated operating costs and useful life.	
<b>Useful Life</b>	Is the estimate of the period over which the owner expects to use the asset. For a tangible capital asset it is the shortest of the physical, technological, commercial and legal life. The physical life of an asset may extend beyond its useful life.	Economic Life
<b>Upgrades</b>	Additional physical assets, components or features that enable a higher level of service to be provided by an existing asset or that increase in size or capability the existing asset.	Betterment

Further edits to glossary will occur after consultation with participating local authorities

## 6 Index of InfraGuide Best Practice Reports



### InfraGuide Best Practice Reports

[www.sustainablecommunities.fcm.ca/InfraGuide](http://www.sustainablecommunities.fcm.ca/InfraGuide)

InfraGuide is a series of “Best Practice” reports to help decision makers plan infrastructure and fund it on a life-cycle basis. They include best practices for alternative funding, for co-ordinating infrastructure projects, and for applying useful reference points for investment policies and planning decisions.

The following is a list of the “Best Practices” available. They are categorized into the following functional groups:

- **Governance and Integrated Sustainable Development:**
  - a) Decision Making and Investment Planning
  - b) Integrated Infrastructure
  - c) Environmental Protocols
- **Water**
  - d) Potable Water
  - e) Storm and Wastewater
- **Transportation**
  - f) Roads and Sidewalks
  - g) Transit.

## **Governance and Integrated Sustainable Development**

### **(A) Decision Making and Investment Planning**

#### **(A-1) Planning and Defining Municipal Infrastructure Needs**

*Tools for defining community needs and developing strategic plans to address them.*

#### **(A-2) Developing Indicators and Benchmarks**

*A framework for developing the right indicators to support decision-making.*

#### **(A-3) Developing Levels of Service**

*Steps for setting levels of service that articulate tradeoffs between services and costs.*

#### **(A-4) Alternative Funding Mechanisms**

*Eight approaches to funding infrastructure beyond property taxes.*

#### **(A-5) Coordinating Infrastructure Works**

*Successful strategies for coordinating infrastructure projects.*

#### **(A-6) Investment Parameters for Municipal Infrastructure**

*Four approaches to setting parameters for timely and adequate spending on infrastructure.*

#### **(A-7) Managing Infrastructure Assets**

*This document describes the fundamental concepts, components, and considerations inherent in an asset management plan as a municipal best practice.*

#### **(A-8) Dedicated Funding**

*An overview for developing methodologies and applications of dedicated funding mechanisms for potable water, wastewater, storm water and road infrastructure.*

#### **(A-9) Public Consultation for Infrastructure Renewal**

*The document sets out approaches and benefits of public consultation. It provides practical tools for soliciting feedback from the community.*

#### **(A-10) Managing Risk**

*An overview of risk management and its value in the development of efficient management programs and corporate policies for sustainable municipal infrastructure assets.*

#### **(A-11) Selecting a Professional Consultant**

*The concept of 'value for services' to consulting procurement was the impetus for this document.*

**(B) Integrated Infrastructure**

(B-1) Best Practices for Utility-Based Data (water, stormwater and wastewater)  
*A framework for acquiring the utility data needed for sound decisions.*

(B-2) An Integrated Approach to Assessment and Evaluation of Municipal Road, Sewer and Water Networks  
*A guide to establishing renewal planning that will maintain a high level of service while minimizing impacts on the environment and communities.*

(B-3) Water and Sewer Rates: Full Cost Recovery  
*This document focuses on the development of a full cost recovery plan for municipal water and sewage services.*

**(C) Environmental Protocols**

(C-1) Strategic Commitment to the Environment by Municipal Corporations  
*A guide to making an environmental commitment beyond compliance with regulations.*

(C-2) Accounting for Environmental and Social Outcomes in Decision Making  
*New ways to estimate the value of services provided by nature and to integrate them in cost-benefit analysis.*

(C-3) Demand Management  
*This best practice provides senior municipal officials with guidance on the concepts behind Demand Management (DM), current best practices, and information needs and tools for initiating and implementing Demand Management programs.*

(C-4) Environmental Assessment  
*A systematic process used to identify, analyze, and evaluate the potential effects of proposed activities and projects on the environment.*

(C-5) Environmental Management Systems for Municipal Infrastructure  
*Gives municipalities insight into the most effective and efficient means of developing and implementing environmental management.*

(C-6) Land Use Planning  
*This best practice assists municipalities with management of all components of municipal infrastructure and provides a road map to solve today's municipal infrastructure challenges.*

## **Water**

### **(D) Potable Water**

#### **(D-1) Deterioration and Inspection of Water Distribution Systems**

*A primer on inspecting distribution and transmission mains.*

#### **(D-2) Water Use and Loss in the Water Distribution System**

*The basics of water auditing - a tool for reducing costs and improving accountability.*

#### **(D-3) Selection of Technologies for the Rehabilitation or Replacement of a Water Distribution System**

*Current options for pipe repair or replacement and how to make the best choice for local conditions.*

#### **(D-4) Water Quality in Distribution System**

*Common water quality problems in distribution systems and how to address them.*

#### **(D-5) Establishing a Metering Plan to Account for Water Use and Loss**

*A primer on water metering, current equipment, and options for pricing water.*

#### **(D-6) Developing a Water Distribution System Renewal Plan**

*Basic approaches to planning renewal of water distribution systems.*

#### **(D-7) Speed and Quality of Linear System Repairs**

*A road map for water utilities planning and improvements related to the speed and quality of linear system repairs.*

#### **(D-8) Monitoring Water Quality in the Distribution System**

*This document outlines the best practice for monitoring water quality in the distribution system.*

#### **(D-9) Small Systems Operation and Maintenance Practices**

*Best Practice for good design, construction, and inspection practices as well as proper operations and maintenance (O&M).*

#### **(D-10) Methodology for Setting a Cross-Connection Control Program**

*Outlines the best practice for setting a cross-connection control program.*

**(E) Storm and Wastewater**

**(E-1) Selection of Technologies for Sewer Rehabilitation and Replacement**

*Current options for pipe repair or replacement and process for best choice for local conditions.*

**(E-2) Inflow/Infiltration Control/Reduction for Wastewater Collection Systems**

*An overview of methods to reduce infiltration and inflow in sewer systems.*

**(E-3) Source and On-Site Controls for Municipal Drainage Systems**

*A new approach to stormwater management.*

**(E-4) Wastewater Source Control**

*A primer on controlling pollutants at source.*

**(E-5) Wastewater Treatment Plant Optimization**

*A guide to improving performance of existing wastewater treatment plants.*

**(E-6) Biosolids Management Programs**

*A framework for managing biosolids, advice on technologies and end uses.*

**(E-7) Solids Inventory Control for Wastewater Treatment Plant Optimization**

*A framework for solids inventory control to optimize wastewater treatment plant operation.*

**(E-8) Assessment and Evaluation of Storm and Wastewater Collection Systems**

*A systematic and proactive approach for the assessment and evaluation of storm and wastewater collection systems.*

**(E-9) Optimization of Lagoon Operations**

*Guidelines to optimize the performance and capacity of lagoon-based wastewater treatment plants.*

**(E-10) Communication and Public Consultation for Biosolids Management**

*This is equally useful for municipalities planning a biosolids management program as it is for those that already have a program in place.*

**(E-11) Stormwater Management Planning**

*Some guiding principles that should be used in implementing stormwater management planning.*

**(E-12) Quality Management for Biosolids Programs**

*Ways to develop implement and integrate quality management principles into municipal biosolids management programs.*

**(E-13) Conveyance and End-of-Pipe Measures for Stormwater Control**

*An overview of the rationale behind stormwater management principles and why implementing runoff controls is important for sustainable development.*

## **Transportation**

### **(F) Roads and Sidewalks**

#### **(F-1) Timely Preventive Maintenance for Municipal Roads**

*A primer on preventative maintenance - methods, setting priorities and cost analysis.*

#### **(F-2) Construction of Utility Boxes in Pavements**

*Step-by-step procedures to minimize the impact on pavement of new access boxes.*

#### **(F-3) Restoration and Repair of Utility Boxes in Pavements**

*Step-by-step procedures to minimize the impact on pavement of access box repairs.*

#### **(F-4) Guidelines for Sealing and Filing Cracks in Asphalt Concrete Pavements**

*A guide to treating cracks in pavement based on Canadian experience.*

#### **(F-5) Rut Mitigation Techniques at Intersections**

*Recent advances in materials and methods to minimize ruts.*

#### **(F-6) Priority Planning and Budgeting Process for Pavement Maintenance and Rehabilitation**

*An eight-step approach to budgeting and timely maintenance.*

#### **(F-7) Road Drainage, Design Alternatives, and Maintenance**

*This best practice describes the main features of road drainage, selection of design alternatives, and maintenance of road drainage systems.*

#### **(F-8) Sidewalk Design, Construction, and Maintenance**

*The purpose of this best practice is to help decision makers understand the importance of safe and accessible sidewalks and provide managers and staff with tools to improve sidewalk infrastructure.*

#### **(F-9) Preservation of Bituminous Pavement Using Thin Surface Restoration Techniques**

*Included are thin surface restoration techniques that are applied to the pavement surface that increase pavement thickness by less than 40 mm.*

#### **(F-10) Dust Control for Unpaved Roads**

*Provides a readily available source of information for minimizing or controlling dust from unpaved roads in rural and urban areas by using a dust suppressant.*

#### **(F-11) Reuse and Recycling of Road Construction and Maintenance Materials**

*Describes the current practices in use by municipal agencies to reuse and recycle asphalt pavements and concrete recovered during road construction and maintenance work carried out within the public right-of-way.*

(G) **Transit**

(G-1) Transit Primer

*This primer was for participants taking part in the Transit Best Practices Workshop on May 31, 2003. Its purpose was to provide information and a framework for discussions.*

(G-2) Strategies for Implementing Transit Priority

*This best practice document is concerned with both physical measures that can be put in place to provide priority for public transit and the process by which those measures are developed.*

***InfraGuide documents can be downloaded from the FCM website quoted above. InfraGuide is the property off FCM and the National Research Council.***