Asset Management Strategy
City of New Westminster

Final



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Executive Summary

The Asset Management (AM) Strategy serves three functions:

a) It translates the City's top-level objectives into specific **Asset Management Objectives** – *documented objectives, defined by ISO 55000 as "a result to be achieved, which set the context and direction for the City's asset management activities;*

b) It defines the scope of the City's **Asset Management System** (AMS) - *the management system for asset management whose function is to establish the asset management policy and asset management objectives;* and

c) It outlines the approach to the development of detailed **Asset Management Plans** (AMPs) - *documented information that specifies the activities, resources and timescales required for an individual asset, or a grouping of assets, to achieve the organization's asset management objectives*

The City's AM strategy was developed over a six month period and required the input of numerous internal stakeholders. The keys steps in the process are listed below:

1. Recognize the three states of change
2. Recognize the City's AM journey to date
3. Identify the target AM future state
4. Assess the AM current state
5. Identify gaps relative to best practice
6. Develop improvement initiatives

In the process of developing the Asset Management Strategy, "three states of change" are considered for the City: a) *Current State* – how things are done today, b) *Transition State* – how to move from current to future; and, c) *Future State* – how things will be done tomorrow. Figure ES-1 provides an outline of the key steps associated with each of the three states of change.

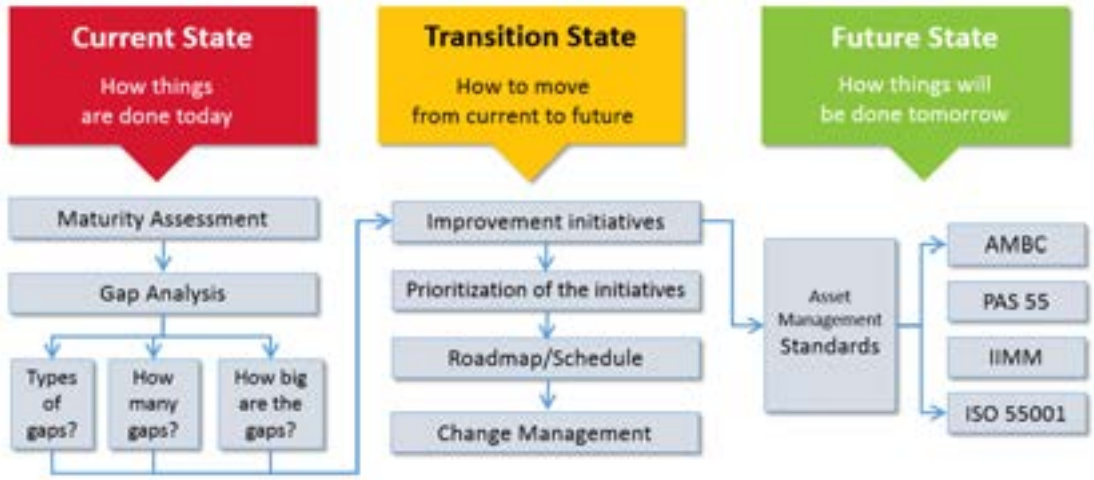


Figure ES-1 – Moving through the Three State of Change

Based on stakeholder interviews and a review of the City's existing artifacts there is anecdotal evidence that the City is in the early stages of its AM journey. The City is currently **"establishing"** its formal documentation of translating organizational objectives into AM objectives and defining the scope of its Asset Management System to achieve those objectives.

The desired Future State was derived from a variety of standards, including ISO 55001 (the International Standard for Asset Management) and the AMBC framework (the British Columbia standard for asset management). In comparing the City's current practice against best practice, approximately forty observations ("gaps") have been identified. These observations have been addressed through 10 improvement initiatives. The ten initiatives identified in the strategy are as follows:

1. Development of a stakeholder framework and register
2. Development of a level of service framework and register
3. Development of a climate change committee
4. Development of a risk framework and register
5. Development of a climate change adaptation strategy
6. Development of a decision-making criteria framework
7. Development of a condition and data framework
8. Development of a financial strategy
9. Development of a governance model
10. Development of a change management and communication plan

The City has selected the following three initiatives as top priority: 1) the **risk framework and risk register;** 2) the **level of service framework and register**; and 3) the **decision-making criteria framework**.

The ten initiatives in the strategy have been analyzed and prioritized through a matrix of their relative benefit to the City of implementing each initiative and the relative level-of-effort on the part of City staff. Figure ES-2 provides a conceptual overview of the matrix. Each initiative is addressed in detail more detail in **Section 5.0.**

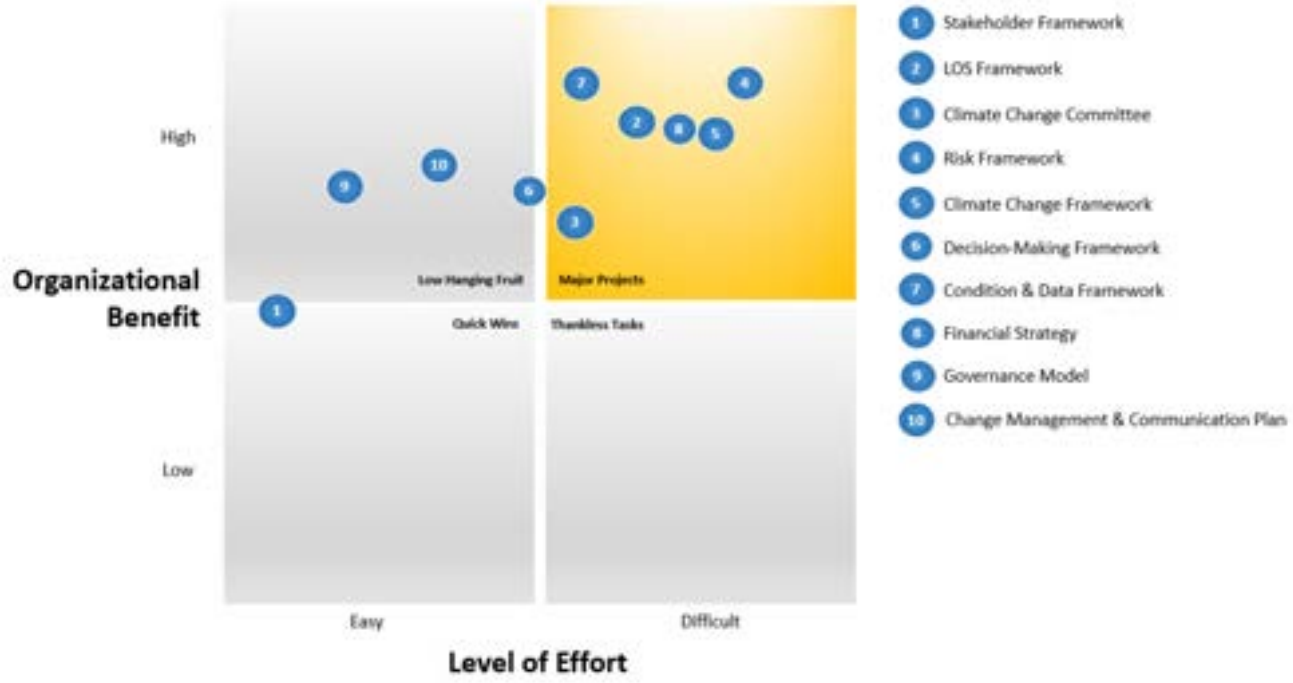


Figure ES-2 – The 10 Initiatives on the Benefit-Effort Matrix

Some of the initiatives are considered "low hanging fruit" and can be realized with relatively low effort. Other initiatives, however, are considered major projects that will require significant resources.

Coinciding with support from external resources, it is anticipated that for the City to successfully operationalize the full suite of initiatives it will require approximately 2.6 FTEs or 4,800 staff hours over approximately five years to realize the full benefits. Further detail on the prioritization and quantification of the ten initiatives is addressed in **Section 6.0.**

Provided below is a summary of the general observations regarding the completeness and effectiveness of the City's existing asset management strategic practices.

Strengths	Weaknesses
• The City has a fully developed sustainability framework • PS-3150 has helped raise awareness of asset management • Key staff members have a good level of awareness of asset management • There is a desire to increase public awareness of asset management • Making asset management a higher priority has advanced on some assets • The City has a sponsor for asset management and an asset management cross-disciplinary committee has emerged	• Strategic plans have not been developed within the majority of the service areas so the line of sight to the City's vision has not been formally translated • The City has been unable to operationalize its aspirations • Difficult for effective long-term asset management strategies to compete with short-term priorities • Lack of a process to regularly update Council and the public on asset management • Asset management is currently done off the side of the desk as other day to day activities are taking up too much time • Require further buy-in from senior management staff and public officials

Strengths, weaknesses, and opportunities have been observed across the City's service areas for each section of the Asset Management Strategy. This information is summarized in the various *Key Findings & Initiatives* sub-sections throughout this report.

Included as part of the Asset Management Strategy is a review of the City's existing AM Policy and AM Governance Structure. An example of improvement initiatives to the AM Governance Structure addressed in this report include:

- Refine the AM Committee governance structure to clarify roles and responsibilities
- Develop RACI Charts for core procedures
- Encourage the transfer of knowledge from staff who hold significant asset management Information
- Continue to promote asset management best practices, training, and awareness sessions

With respect to the AM Policy, Table ES-1 below provides a summary of good policy attributes and considers how the City's 2017 AM Policy conforms to best practice.

Table ES-1 – Best Practice Guideline for AM Policy

Best Practice	Bad Practice	City Practice, 2018
Clear and concise	Overly detailed and lengthy	●
Strongly linked to company vision and purpose	Unclear in scope and purpose	●
Commitment to delivery of organizational strategic plan	Unrelated to the adoption of organizational strategies and plans	●
Commitment to compliance with legislation, regulation and other policies	Non-compliant	●
Long-term time horizon	Short-term time horizon	●
Considers sustainable development	Sustainability considered irrelevant	●
Sets out unambiguous high-level principles for asset management	Vague or unstructured principles	●

Best Practice	Bad Practice	City Practice, 2018
Approved by top executives	Not clearly endorsed from the top (e.g. signed by department head)	●
Widely communicated	Not widely visible or transparent; Too internally focused and missing external perspective	●
Regularly reviewed	Reviewed intermittently	●
Allows continuous improvement and appropriate flexibility	Not reviewed when organizational strategy is updated	●
Commitment to workforce and supplier capability	Workforce and supplier capability not taken into consideration	●
Commitment to the 'right' culture	Culture is not considered	●
	Overall	●
● Aware ● Establishing ● Achieving		

Further information on the AM Policy and AM Governance Structure is included in **Section 2.2.1** and **Section 3.2.2**, respectively.

An example of a few recommendations identified throughout the AM Strategy are provided in Table ES-2 to address existing gaps and support the City's AM journey to its desired future state.

Table ES-2 – AM Recommendations

ID	Recommendations	Corresponding Initiatives in Chapter 5
1	Develop strategic plans for all assets classes	1, 2, 10
2	Develop departmental objectives in accordance with the SMART framework	1, 2,10
3	Prepare an inventory of natural assets within the City and correlate this with the existing PSAB 3150 inventory of engineered/built assets	7
4	Review the City's current data collection and data management practices and adjust as required to meet asset management objectives	7
5	Determine the status of data on the three facets of asset health: a) physical condition, b) functional condition and c) demand condition	6,7
6	Correlate the quantitative condition grades within each asset class to the 5-point scale in the Canadian Infrastructure Report Card (CIRC)	6,7
7	Establish an inter-disciplinary team including staff from engineering, planning, finance & IT, Parks & Recreations and Electrical to undertake detailed reviews of each asset class	1,7,9
8	Refine the AM Committee governance structure to clarify roles and responsibilities	9
9	Develop RACI Charts for core procedures	9

ID	Recommendations	Corresponding Initiatives in Chapter 5
10	Encourage the transfer of knowledge from staff who hold significant asset management information	7,9,10
11	Continue to promote asset management best practices, training, and awareness sessions	9,10
12	Develop a data management strategy	7
13	Develop a document and records management strategy	7
14	Assess the current IT technologies and identify gaps in meeting asset management needs	7
15	Refine the financial charts of accounts to enable whole life cost analysis	8
16	Continue enhancing the long term investment planning process	8
17	Examine methods to increase the reinvestment rates to meet CIRC target reinvestment rates	8
18	Provide Council with regular reporting on level of service and integrate into the decision-making process	1

The recommendations above are also grouped by AMS component in the *Key Findings & Initiatives* sub-sections in **Section 3.0.**

Figure ES-3 below includes a high level schedule for a prioritized and sequenced roll-out of the ten (10) initiatives over an approximate 5-year period.

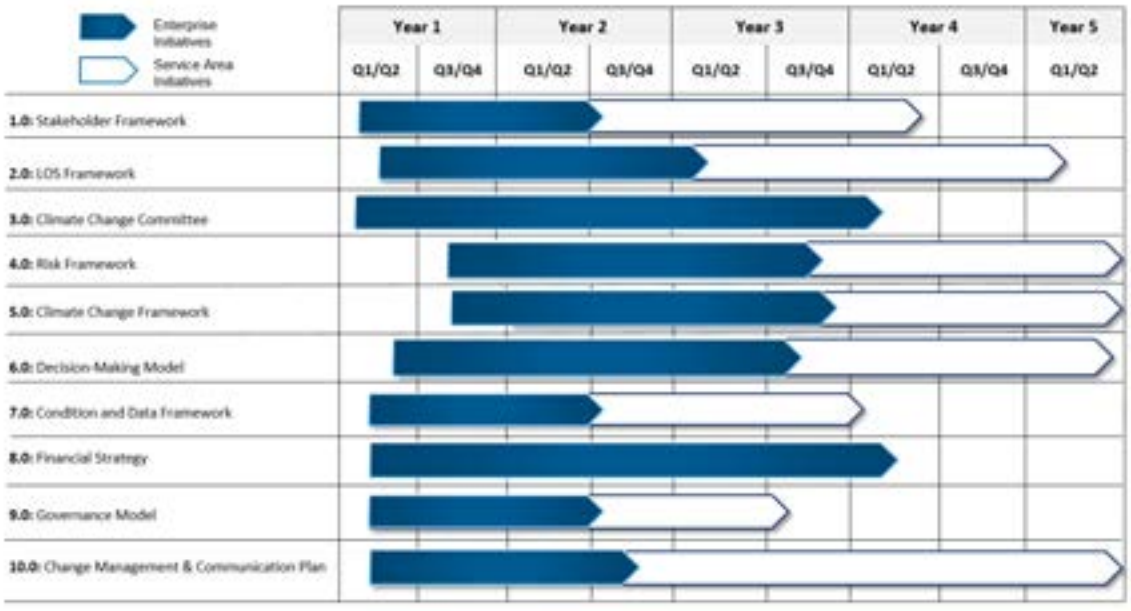


Figure ES-3 – Roll-out Timeline of Initiatives

Table ES-3 below provides a summary of three alternative strategies for implementation of the roadmap initiatives together with their respective advantages and disadvantages.

Table ES-3 – Alternative Implementation Strategies

Implementation Strategy	Description	Advantages	Disadvantages
Option 1: Practice Based Implementation	Implementation of improvement initiatives across asset groups/service areas City-wide, simultaneously.	A focused effort can create early successes City-wide. This approach would get all service areas involved and maintain the interest in AM practices.	There can be limitations on how far practices can be implemented without data and technology solutions in place. Internal resources could be spread too thin.
Option 2: Service Area Implementation	Focus on one asset group/service area and implement most of the initiatives before moving to another asset group/service area. Work can be done concurrently in all service areas.	A focused effort on one asset group can create early successes and demonstrate the return on investment across all asset groups. This approach would make fewer demands on internal resources.	There can be limitations on how far practices can be implemented without data and technology solutions in place. Other areas may have to wait too long for implementation and could lose interest
Option 3: Hybrid Implementation	Focus is on one asset group but teams are established in all other areas that can start some of the preparatory work while major implementation is occurring. This can be data collection, documentation, etc.	A focused effort on one asset group can create early successes and demonstrate the return on investment in asset management.	This approach would require more internal resources than Option 1.

The Strategic Asset Management Plan (SAMP) is a "living" document and is intended to have outcomes that are measurable, monitored, communicated, and updated periodically. Procedures for reviewing and updating the AM strategy are included in **Section 7.0.** This document is meant to support the City in its efforts to implement changes that will improve alignment of Council, Corporate, and Business Unit service delivery, planning, prioritizing, and costing. Further discussion on service performance evaluation is included in **Section 3.3**.

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Terminology

Term	Description
Accountabilities	The obligation to be answerable for the results, which is the liability created for the use of the assigned authorities.
Asset	An item, thing or entity that has potential or actual value to the City. See also: Tangible Capital Asset.
Asset Class	A group of assets with common attributes and/or objectives, such as the transportation asset class.
Asset Condition	The measure of the physical state of an asset, but may also include functional and demand considerations.
Asset Intervention	All the measures, funded from either capital expenditures or operating expenditures that are used to maintain or enhance the performance of an asset. Similar to the medical definition intervention that "...any measure whose purpose is to improve the health."
Asset Management (AM)	The coordinated activity of the City to realize value from its assets. This includes making decisions about the stewardship of infrastructure to deliver services in a way that considers current and future needs, manages risks and opportunities, and makes the best use of resources.
Asset Management Policy	The intentions and directions of the City as formally expressed by its senior management in the form of a suite of guiding principles for a structured and cohesive approach to AM.
Asset Management System (AMS)	The management system for asset management whose function is to establish the asset management policy and asset management objectives.
Asset Management Plan (AMP)	Documented information that specifies the activities, resources and timescales required for an individual asset, or a grouping of assets, to achieve the organization's management objectives.
Business Case	The framework to develop and evaluate business cases for investment decisions.
CAPEX	Capital expenditure.

Term	Description
Capital Assets	Include land, buildings, park improvement, and road, electrical, water, sewer and other transportation infrastructure, and vehicles and equipment. Capital assets have a useful economic life greater than one year and are used on a continuing basis.
Capital Maintenance	The capital-funded activities required to maintain the current level of service to the community and/or other stakeholders.
Consequence of Failure	A measure of the direct and indirect impacts on the City if an asset failure were to occur.
Critical Assets	Assets for which the financial, business, or service-level consequences of failure are sufficiently severe to justify proactive inspection and rehabilitation. Critical assets have a lower threshold for action than non-critical assets.
Funding Gap	The difference between the current capital funding and the recommended capital funding.
Gap Analysis	"A method of assessing the gap between an organization's current AM practices and the future desirable AM practices" (IIMM, 2015). A gap analysis may also be referred to as a needs analysis or improvement planning.
Infrastructure	The system of core assets, facilities and/or equipment.
Inherent Risk	The risk that an asset or activity would pose if no controls or other mitigating factors were in place to alter, mitigate, or reduce either the likelihood or impact of the risk; that is, the gross risk or risk before controls.
Level of Service (LOS)	The outputs or objectives that the City intends to deliver; includes measures at the corporate, customer, and asset levels of the organization.
Objectives	A result to be achieved. Objectives can be expressed in a variety of ways and can be either strategic, tactical or operational.
OPEX	Operating expenditure.
Output	Specific, measurable events that contribute to the desired outcome of a service.
Outcome	The overall desired or actual result of a service. Service level outcomes define what the service is supposed to achieve, for example, a "reliable" service.
Performance Indicator/Measure	A qualitative or quantitative measure of a service or activity used to compare actual performance against a standard or target. Performance indicators commonly relate to statutory limits, safety, responsiveness, cost, comfort, asset performance, reliability, efficiency, environmental protection and customer satisfaction.
Practices	The actual application, execution or use of the processes and procedures. It includes improvisational behaviours to address changing circumstances.
Probability of Failure	The likelihood or chance that an event will occur within a specified time frame.
Procedure	The sequence of steps taken to implement and achieve an activity within a process.
Process	The structured transformation of inputs into outputs. Processes typically operate across many functions and may cross department lines. A complex process may contain many procedures.

Term	Description
Remaining Life	The period from the current point in time to the time that an asset requires renewal.
Replacement Backlog	The estimated current replacement cost of assets that are still in-service but have exceeded their estimated useful lives.
Replacement Cost	The estimated cost to replace a capital asset with a similar asset based on studies, appraisals, industry standards and actual experience. Future estimated replacement costs are current replacement costs inflated by an appropriate factor.
Residual Risk	The risk that remains after controls are taken into account; that is, the net risk or risk after controls.
Responsibilities	The obligations or expectations to perform certain specific activities or duties according to a particular role.
Risk	The effect of uncertainty on objectives. An event that impacts the achievement of objectives and deals with the uncertainty. It is measured in terms of consequence and likelihood.
Risk Cost	The assessed annual cost or benefit relating to the consequence of an event. Risk cost equals the costs relating to the event multiplied by the probability of the event occurring.
Risk Management	The application of a formal process to the range of possible values relating to key factors associated with a risk to determine the resultant ranges of outcomes and their probability of occurrence.
Roles	The position(s) occupied ("the part played") by certain internal stakeholders (and external stakeholders).
Senior Management	The group of people at the City who direct and control the organization at the highest level. Senior management has the power to delegate authority and provide resources within the organization.
Stakeholders	A person, group, or organization that can affect, be affected buy, or perceive themselves to be affected by a decision or activity.
Tangible Capital Asset (TCA)	The physical assets addressed by the City's policy; including infrastructure and land.
Triple Bottom Line (TBL)	An expansion on the traditional view of an organization's financial bottom line by also measuring the organization's commitment to social and environmental factors.
Useful Life	The estimate of the number of years over which a capital asset is expected to be used.
Value Chain	A set of activities that an organization carries out to create value for its customers.

Acronyms

Term	Description
AM	Asset Management
AMBC	Asset Management BC
AMO	Asset Management Objectives

Term	Description
AMS	Asset Management System
AMP	Asset Management Plan
Capex	Capital Expenditures
CIP	Capital Investment Prioritization
CAO	Chief Administrative Officer
CIRC	Canadian Infrastructure Report Card
CLT	Corporate Leadership Team
CMMS	Computerized Maintenance Management System
City	City of New Westminster
DSS	Decision Support System
EAM	Enterprise Asset Management
FCM	Federation of Canadian Municipalities
FTE	Full time equivalent
GIS	Geographical Information System
ISO	International Standardization Organization
KPI	Key Performance Indicator
LOS	Level of Service
LTFP	Long Term Financial Plan
MODA	Multi Objective Decision Analysis
NAMS	New Zealand Asset Management Support
NWWBI	National Water and Wastewater Benchmarking Initiative
O&M	Operations and Maintenance
Opex	Operating Expenditures
PM	Project Management
R2-A2	Roles, Responsibilities, Authorities, Accountabilities
RACI	Responsible, Accountable, Consulted, Informed
SAMP	Strategic Asset Management Plan
SMT	Senior Management Team
TBL	Triple Bottom Line
TCA	Tangible Capital Asset

1. Introduction

In 2017, the City of New Westminster (the "City") was selected by the Federation of Canadian Municipalities (FCM) to participate in the Climate and Asset Management Network (CAMN) for the next two-year cycle. As a result, the City is one of 19 communities across Canada to receive FCM's grant to integrate climate change and sustainability goals with its asset management planning and decision-making procedures.

The City faces many existing, new and emerging business drivers that pose serious challenges to meeting the needs of its customers.



Figure 1 – Challenges Facing Asset Owners

Many public sector municipalities are finding themselves being forced to do "more with less" and those that are unable to make this happen find themselves having to do "less with less".

1.1 Purpose of the Strategy

The City's Asset Management Strategy (hereinafter referred to as a "SAMP") is a high-level document whose purpose, in accordance with the ISO 55001 standard, is threefold:

- To document information that specifies how organizational objectives have been translated into **Asset Management Objectives**;
- To describe the **Asset Management System (AMS)** and its role in supporting achievement of the AM Objectives including cost effective delivery of appropriate Level of Service (LOS), while meeting legislative requirements and having regard for the long term stewardship of the asset base; and
- To inform the approach for developing **Asset Management Plans (AMP).**

The processes and activities described in this document are continually changing. Any significant changes to the City's strategic priorities and policy will trigger a review, but any other changes will be captured during the next periodic review.

1.1.1 Asset Management Objectives

Objectives are defined by ISO 55000 as "*a result to be achieved*" and are grouped into two categories: a) Organizational objectives that set the context and direction for all the City's activities; and b) Asset management objectives that set the context and direction for the City's asset management activities. The purpose of converting the City's organizational objectives into Asset Management Objectives will enable the City to:

- Create a line of sight between the City's organizational objectives and day to day activities on the assets
- Identify the risks that may impact upon the successful performance of the City's objectives
- Articulate the City's decision-making criteria

Further details on the City's aspirational artifacts and the City's Asset Management Objectives are included in Section 2.

1.1.2 Asset Management System

The Asset Management System (AMS) is defined by ISO 55000 as: "*the management system for asset management whose function is to establish the asset management policy and asset management objectives*". The SAMP should be used to guide the setting of asset management objectives, and to describe the role of the asset management system in meeting these objectives. To this end, the Asset Management System serves:

- To document and demonstrate an integrated approach to planning and coordination of Asset Management outcomes across the defined core services.
- To detail the role of the Asset Management System in supporting achievement in supporting the achievement of the asset management objectives.
- To identify key initiatives that support delivery of the Asset Management policy.
- To define what the City intends to achieve from Asset Management activities, and by when.
- To develop a set of actions aimed at improving AM practices across the City.

Further details on the City's management artifacts contemplated in the AMS are included in Section 3.

1.1.3 Asset Management Plans

An Asset Management Plan (AMP) is defined by ISO 55000 as "*documented information that specifies the activities, resources, and timescales required for an individual asset, or a group of assets, to achieve the organization's asset management objectives*". In this regard, this SAMP provides guidance regarding the following:

- To identify the asset classes for which AMPs are to be produced

- To establish the overall format and content for the AMPs
- To articulate the process for preparation of the AMPs
- To provide a high-level overview of resources and timescales for implementation

Further details on the AMPs are included in Section 4.

1.2 Intended Outcomes of the Strategy

Once implemented, the AM Strategy will support improved accountability, sustainability, risk management, service management and financial efficiency. The SAMP is intended to provide guidance and a framework to assist the City in achieving the following goals:

- Informed decision making
- Integrated planning
- Organizational accountability and responsibility
- Sustainable service delivery
- Efficient use of resources
- Defined service levels and outcomes
- Quality stakeholder engagement
- Managed risk
- Appropriate AM practices
- Transparent monitoring and reporting
- Continuous improvement

One of the primary outcomes of the SAMP is to provide a clear “line of sight” between the City’s high-level objectives and the day-to-day activities carried out on the City’s assets.

1.3 Scope of the Strategy

The scope of the asset management strategy is determined by three primary parameters: a) the assets contemplated; b) the services contemplated; and, c) the documented processes contemplated.

1.3.1 By Assets

This AM Strategy contemplates the majority of the Tangible Capital Assets (TCA) owned, operated, or maintained by the City, excluding land. The assets have been arranged into ten asset classes and the table below correlates the City’s asset categories with the asset class names referenced throughout the AM Strategy.

Table 1 – Summary of In-Scope Asset Classes

Asset Classes			Asset Elements
Current Arrangement	Proposed Arrangement		
Park Improvements	1	Parks & Recreation	Parks infrastructure; parks amenities; sport amenity; parks and recreation equipment
Buildings	2	Facilities	Systems: Electrical; envelope; finishing; mechanical; structure; etc.
Roads	3	Transportation	Roads - base and surface layer; Other transportation - bridges, sidewalks, streetlights, traffic lights, tunnel, retaining walls; etc.
Transportation - Other			
Sewer System	4	Storm Water	Outfall; sewer pump stations; sewer mains; green infrastructure; etc.
	5	Waste Water	Outfall; sewer pump stations; sewer mains; etc.
Water System	6	Water System	PRV stations; water meters; water mains; etc.
Electrical	7	Electrical	Transformers; switches; poles; electrical meters; manholes; substations; etc.
Vehicles & Equipment	8	Fleet & Equipment	Vehicles, etc.
	9	Solid Waste	Solid waste equipment, etc.
	10	IT	IT fibre; IT software; IT hardware; etc.

Detailed discussion on the hierarchy of assets, including the distinction between natural assets and built assets is included in Section 3.1 of the Strategy.

1.3.2 By Services

The City has identified fourteen service categories, which are articulated on the corporate website at *https://NewWestCity.ca*. To illustrate the correlation between the City's assets and services, the following table provides a summary cross reference.

Table 2 – Correlation of Services to Assets

Services			Corresponding Asset classes
ID	Categories	Core Services	
1	**Animal Services**	Dog licences; animal shelter	Facilities; Fleet & Equipment
2	**Arts & Heritage**	Art services; museums & archives; art programs; theatres & galleries	Facilities
3	**Bylaw Enforcement**	Noise; tree protection; street & traffic; business regulations & licencing; smoking control; water shortage response; parking tickets, etc.	Fleet & Equipment
4	**Cemetery Services**	Cremation; burial	Fleet & Equipment
5	**Community & Social Services**	Access & inclusion; age & ability; affordable housing; child care & child development; multiculturalism; health programs; poverty reduction; etc.	Facilities, Parks & recreation
6	**Electrical Utility**	Electrical service; billing and payments; metering program; design and engineering; etc.	Electrical Utility
7	**Environment & Sustainability**	Energy conservation; climate change; water protection; integrated storm water management; district energy; environmental initiatives; etc.	Natural assets, Parks & Rec Fleet & equipment
8	**Garbage & Recycling**	Curbside garbage and recycling collection; collection schedule; yard and food scraps collection; special pick-up services; etc.	Fleet & equipment
9	**Online Services**	Online forms; home and property information; payment and renewals; E-new; tickets and fines; open data etc.	IT
10	**Public Library**	Library services	Facilities
11	**Public Safety**	Fire & rescue services; emergency management; police; flood management; etc.	Facilities (e.g. fire halls); dykes
12	**Streets & Sidewalks**	City roadwork; snow removal; street sweeping; street occupancy permit; etc.	Transportation
13	**Trees**	Tree permits; City trees; tree care; urban forest management strategy	Natural assets - trees
14	**Water & Sewers**	Water services; regulations; potable water emergency response plan; etc.	Water, storm, and sanitary infrastructure

The preceding list is not exhaustive and is intended to provide an illustration of the relationship between the City's many services and assets. The Asset Management strategy is intended to help implement changes that will improve alignment of Council, Corporate, and Business Unit service delivery, planning, prioritizing, and costing. Further discussion on service performance evaluation is included in Section 3.3.

1.3.3 By Processes

The following table provides a summary of the City's current documented procedures, arranged by asset class. The list is not exhaustive of all City's procedures but rather those procedures that have been formally documented.

Table 3 – Existing Documented Processes

City Departments	City Asset Class		Documented Procedures
Parks & Recreation	1	Parks & Recreation	• Annual pressure w ashing list and schedule • Staff Training Manual
Finance & IT	2	IT	• Recording tangible capital assets
Engineering	3	Transportation	• Street sw eeping • Snow removal • Asphalt patching • Call before you dig • Inspection & maintenance of sidew alks
	4	Facilities	--
	5	Storm Water	• Call before you dig • Overflow s from sanitary sew er pump stations • Repairs to sew er system connections
	6	Waste Water	
	7	Water Supply	• Water main breaks • Water branch maintenance • Single family dw ellings w ork order deposits for w ater service connections • Hydrostatic testing of property w ater service connections for pipes 100 mm diameter or higher • Placing a fire hydrant out of service
	8	Solid Waste	--
	9	Fleet & Equipment	• Vehicle accidents • Vehicle inspections • Vehicle key access • Parking • Fueling • Forklift use
Electrical	10	Electrical	• Outages

As of late-2018 the vast majority of the city's procedures have not been documented and staff continue to work intuitively. Further discussion on AM processes, arranged by asset life cycle stage and decision-making requirements, is included in Section 3.3.

1.4 Methodology to Develop the AM Strategy

The City's AM strategy was developed over a six month period and required the input of numerous internal stakeholders. The keys steps in the process are listed below:

1. Recognize three states of change
2. Recognize the City's journey to date
3. Identify the target Future State
4. Assess the Current State
5. Identify gaps relative to best practice
6. Develop improvement initiatives

1.4.1 Recognize Three States of Change (Step #1)

The City has been on a formal asset management journey since 2005. The following diagram provides a conceptual outline of the three states of change contemplated in the asset management strategy and articulated within each of the improvement initiatives.

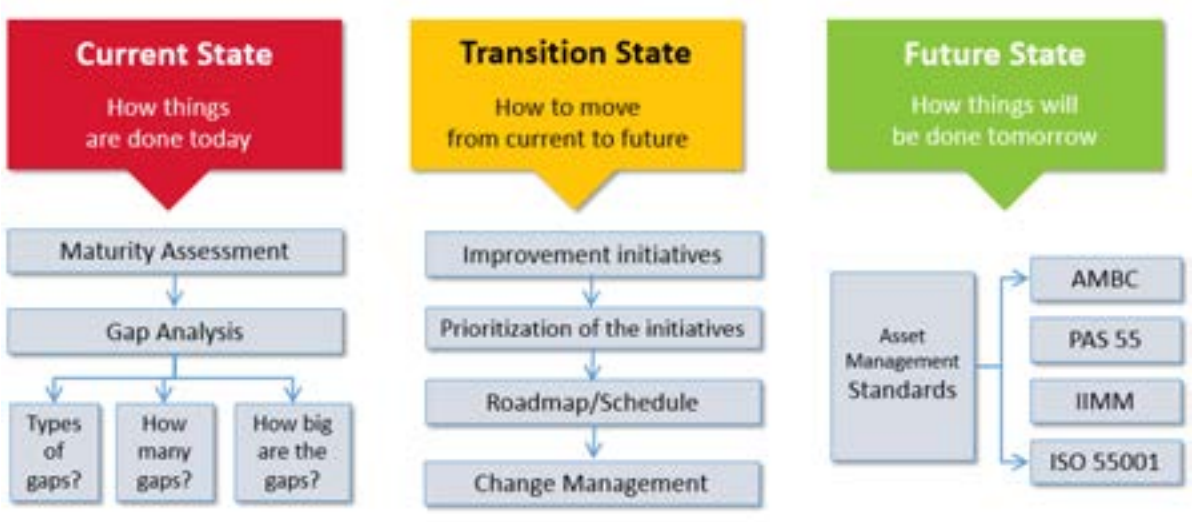


Figure 2 – Three States of Change

Throughout the City's AM strategy, the *current state* is represented as "strengths" and "weaknesses", whereas the *transition state* is represented as "recommendations" and "initiatives".

1.4.2 **Recognize the City's Background** (Step #2)

The City's history provides insight into the planning for the future trajectory of the asset management journey. A chronological summary of the City's AM journey over the past decade is provided in Section 1.5.

1.4.3 Identify Future State (Step #3)

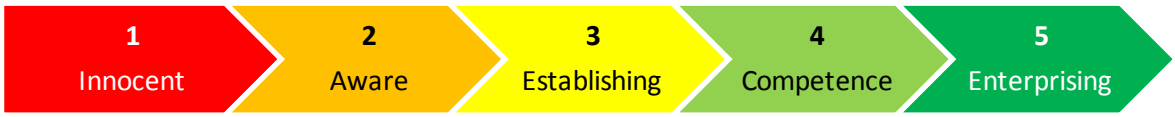
The SAMP contemplates a suite of standards and best practices, which serve as the benchmark for the gap analysis and roadmap. Listed below are some of the asset management standards that have been considered in the development of the AM strategy.

Table 4 – Standards for Asset Management

Standards	Description
ISO 55000, 55001, 55002	International standard for asset management
AMBC	Asset management BC – Asset SMART framework
IIMM	International Infrastructure Management Manual
PAS 55	Publically Accessible Specification
PSAB 3150	Public Sector Accounting Board of Canada
ISO 31000	International standard for risk management

1.4.4 Conduct a Maturity Assessment (Step #4)

To identify opportunities and to elevate the City from its current state to future state, a preliminary AM maturity assessment was conducted. This process entailed a series of workshops with the City's Asset Management Steering Committee and one-to-one interview sessions with staff across each service area to elicit qualitative input on the City's current asset management practices. Throughout the SAMP, traffic light symbols of red, green, or yellow are used to conceptually represent the different levels of maturity. The grading scheme of the maturity level is based off of the ISO 55000 standard, as per below.



1.4.5 Identify Gaps Relative to Best Practice (Step #5)

In order to facilitate the development of the improvement initiatives to support the City in reaching its desired future state, a gap analysis was conducted. The gaps are reflected in each chapter of the SAMP as an itemized list of "strengths and weaknesses".

1.4.6 Develop Improvement Initiatives (Step #6)

Each of the improvement initiatives identified in the strategy is written as a mini business case that articulates the "problem", the "solution" and the "outcomes". Also included with the initiative are the following elements:

- List of actions items required to completed the deliverable
- An estimate of full time equivalent (FTE) and costs required to complete
- Recommendations for actions to be completed in-house or outsourced

- Associated priority ranking
- Suggested schedule / timeframe

Asset Management is the effective management of all assets that the City uses directly or indirectly to deliver services to its customers. As a business practice, AM is based on the pillars of sustainability (economic, environmental, and social), risk management, and life cycle costing.

1.5 Background

The City's Asset Management Program was formally initiated in the spring of 2005. The following table provides a chronological history of key milestones along the City's asset management journey over the ensuing 12 year period.

Table 5 – The City's Asset Management Journey

Year	Month	Artifact	Asset Classes	Status
2005	Spring	Phase I: Common vision for the AM Program	All	--
		Phase II: High level assessment of City's assets	All	--
2006		Sustainable financing review	All	--
2007	May	Asset management program Phase III summary	All	--
		Risk assessment	Water, Sewer	--
2009		TCA Inventory	All	--
		10-year Capital Plan	Water, Sewer, Roads	--
2010	Nov	Asset Management Assessment	All	--
2011		Acquired CityWide and transferred data	All	--
2016	Jul	AM Steering Committee	All	--
2017		Asset Management Policy	All	--
	Oct	Risk framework and model	Transportation	--
2018	Apr	Asset Management Plan	Transportation	Draft
	Mar	CMMS Pilot in CityWorks	Water	Ongoing
	Jul	Strategic Asset Management Plan	All	Draft

The City's AM journey has included a combination of enterprise level efforts (such as the Common Vision) and some targeted efforts within certain asset classes (such as the risk assessments within water and transportation). Section 2.2.3 of the AM strategy provides a detailed matrix on the status of each of the key asset management artifacts that have been developed across the City's service areas.

1.6 Considerations in Using the Strategy

The SAMP is a "living" document and is intended to have outcomes that are measurable, monitored, communicated, and updated periodically. Procedures for reviewing and updating the AM strategy are included in Section 7.

2. Conversion of the City's Objectives

Pursuant to the international standard for asset management, ISO 55001, the 1st requirement of the asset management strategy is to convert/translate the City's organizational objectives into asset management objectives. An objective is defined under the standard as "*a result to be achieved*". The following table provides a summary of the seven layers of the City's aspirational-transactional hierarchy that underlies the translation process.

Table 6 – **The City's** Aspirational-Transactional Hierarchy

Translation	Attributes	Hierarchy		Description
The City's objectives	Aspirational Qualitative	1	**Values**	The City's guiding principles
		2	**Vision**	The City's view of the future
		3	**Mission**	Why the City exists
		4	**Goals**	Broad long-range outcomes
The AM Objectives	Transactional Quantitative	5	**Objectives**	The results to be achieved
		6	**Strategies/Initiatives**	Steps that deliver on goals and objectives
		7	**Measurements**	Department work plans and reports

The following figure illustrates how the hierarchy of objectives and performance reporting work together to achieve the organizational objectives.



Figure 3 – Hierarchy of Objectives and Performance Reporting

The City's overarching aspirations that set the context and direction for the organization's activities are to be converted in concrete departmental work plans and activities.

2.1 The City's Objectives

2.1.1 The BC Community Charter

The British Columbia Community Charter, Bill 14, 2003, is local government legislation that establishes principles for municipal-provincial relations and describes fundamental municipal powers and accountability. Part two of the Charter describes four core purposes of a municipality as follows:

- Provide good government for the community.
- Provide for services, laws and other matters for community benefit.
- Provide for stewardship of the public assets of the community.
- Foster the economic, social and environmental well-being of the community.

At a high level, these four principles provide core objectives for the City. In addition to these core objectives, the City's values, goals and aspirations are expressed in a number of documents, statements and policies, each with a unique perspective.

2.1.2 The **City's Aspirational Artifacts**

The City's suite of strategic planning documents set down the environmental and business context of the City and identify a number of opportunities and threats. In developing AM objectives and decision criteria, the City aims to focus its AM approach on realizing those objectives and mitigating potential threats/challenges. The following table provides a chronological summary of the City's enterprise level artifacts that have been established to capture the organization's guiding principles and objectives.

Table 7 – City Aspirational Artifacts, Listed Chronologically

ID	Aspirational Artifacts at the Enterprise Level	Date
1	Asset Management Policy	2017
2	Energy & Greenhouse Gas Emissions Management Plan	2008
3	Affordable Housing Strategy	2010
4	Community Energy & Emissions Plan	2011
5	Floodplain Management Strategy & Feasibility Plan	2011
6	Envision 2032 Sustainability Framework	2013
7	Child and Youth Friendly Community Strategy	2016
8	Official Community Plan: Our City 2041	2017
9	Draft Environmental Strategy Action Plan	2018

ID	Aspirational Artifacts at the Enterprise Level	Date
10	Future Forward: Economic Development Plan, 2018-2023	2018
11	Draft 5-Year Financial Plan	2018

The City's aspirational artifacts serve as the guiding principles for the development of the AM objectives. Included below for reference are some excerpts from some of the primary artifacts.

Table 8 – **The City's Aspirational Artifacts**

	Aspirations	Description
1	**Community Vision**	"A healthy, inclusive and thriving community where people feel connected with each other. The sustainable city showcases a spectacular natural environment, public spaces and unique neighbourhoods that are well-integrated and accessible. Superior urban design integrates its distinctive character, heritage assets and cultural identity. Growth and development provide a variety of services and employment opportunities that contribute to a high quality of life for all".
2	**Envision 32 Guiding Sustainability Principles, 2013**	• Apply long-term thinking to all decision making • Achieve lasting economic security and social well-being, with vibrant arts and culture • Recognize the intrinsic value of nature and work to enhance it • Minimize our ecological footprint, which is the total impact of our production and consumption activities on the earth, whether this takes place within or outside of the City • Strive to maintain harmony with natural systems when developing within the community • Recognize and build on New Westminster's distinctive characteristics, including our history, human and cultural values, and built and natural heritage • Support people with the resources they need to live more sustainable lifestyles and foster active participation in achieving the community's future vision together • Engage and enable community partners, including organizations, business, institutions and other levels of government, to work towards a common, sustainable future • Strive towards continuous measurable improvement in meeting sustainable objectives • Institutionalize accountability and transparency in governance practices
3	**OCP, 2017**	**Values:** • Grounded in the Past and Forward Thinking • A Riverfront City • Socially Minded • Socially Connected • Physically Connected • Our City, Our Future

	Aspirations	Description
		Themes: • Housing choice • Neighbourhood hearts • Strengthened Connections • Supporting Innovation • Heritage • Community Health • Resilience

The Official Community Plan provides direction to realize the City's opportunities and manage assets and issues to ensure that the city remains one of the most livable communities in Metro Vancouver. It describes the kind of community that the municipality wishes to evolve into and acknowledges the importance of shaping growth in a way that is responsive to the city's distinct circumstances. The OCP provides a vision, goals and policies for New Westminster to the year 2041. The following table includes examples of the 12 OCP goals correlated to the 10 asset classes.

Table 9 – OCP Goals Mapped to Asset Classes

ID	OCP Goals	Description	No. of Policies	Example of Policy	Corresponding Asset Classes
1	**Community & Individual Well-Being**	To be an equitable, inclusive, and safe community where members have opportunities to contribute, while feeling connected and accepted	Ten	1.2 Create a safe community for residents, students, visitors, and workers	Facilities; Parks & Recreation
2	**Culture**	To encourage the generation and opportunity to encounter diverse features of the City	Four	2.3 Enhance the City's cultural facilities and creative community spaces	Facilities
3	**Economy & Employment**	To be a diverse and adaptive economy that is a desirable place to work, live, shop and invest	Seven	3.4 Promote a diverse range of retail and services for all residents	Facilities
4	**Energy, Emissions & Climate Change**	To be an energy-efficient and low-carbon community that takes action to reduce greenhouse gas emissions and is resilient to the impacts of climate change	Four	4.1 Reduce transportation energy use and related greenhouse gas emissions	Facilities; Transportation; Fleet & Equipment; Electrical; Parks & Recreation

ID	OCP Goals	Description	No. of Policies	Example of Policy	Corresponding Asset Classes
5	**Environment & Natural Areas**	To be a community that values natural habitat areas that support biodiversity and healthy communities	Four	5.2 Enhance and celebrate waterway corridors as a place of ecology, leisure and work	Parks & Recreation
6	**Hazard Management**	To protect against land use related hazards and manage associated risks	Four (4)	6.3 Use emergency management programs to protect critical City infrastructure from hazard events	All assets
7	**Heritage**	To be a community that has a strong sense of historic identity and promotes and protects its heritage assets	Three (3)	7.1 Retain and protect physical heritage assets city-wide	Facilities
8	**Housing**	To provide the community with neighbourhoods that are great places to live and have diverse housing choices	Six (6)	8.1 Facilitate access to affordable and non-market housing for low-to-moderate-income households	Facilities
9	**Parks & Recreation**	To provide excellent programs, events and recreation opportunities for all within a high-quality, comprehensive network of parks, open spaces and facilities	Five (5)	9.1 Maintain and develop a network of trails and greenways to ensure a high-quality recreational experience	Parks & Recreation
10	**Public Realm & Urban Design**	To be a liveable city, with an attractive, dynamic urban character demonstrating innovation and leadership in the design of the built environment	Two (2)	10.1 Require a high standard of urban design to facilitate attractive and well-integrated development throughout the City	Parks & Recreation; Facilities; Transportation
11	**Transportation & Accessibility**	To provide an accessible transportation system to people of all ages and abilities; supporting a compact, sustainable and prosperous community	Eight (8)	11.6 Manage the road network for the safety and reliability of all road users	Transportation

ID	OCP Goals	Description	No. of Policies	Example of Policy	Corresponding Asset Classes
12	**Utilities & Service Infrastructure**	To provide reliable and innovative servicing that efficiently and effectively meets the needs of the community and reduces impacts on the environment	Four (4)	12.4 Provide the infrastructure that enables a digital economy	Water; Storm Water; Waste Water

2.1.3 The City's Culture & Context

The culture of the City can be defined as "*the way we do things around here*" and includes the City's values, history, rites and rituals, attitudes, habits and perceptions. The City's culture sets the foundation for the success for asset management.

The first step in understanding the City's context is an awareness of the myriad of stakeholder groups that have requirements, perceptions and expectations of the City. Stakeholder identification is necessary for the City to establish how to realize value from its assets.

Table 10 – The City's Internal Stakeholder Groups

Category	ID	Stakeholder Group	Role
Senior Management	1	Mayor	Exerts leadership in City affair and serves as the City's representative
	2	Chief Administrative Office (CAO)	Administrative head, responsible for the day-to-day operations and ensuring programs and policies are implemented
	3	City Council	Endorse policies related to the assets and approve annual budgets
	4	Senior Management Team (SMT)	Approve, monitor and review business processes and policies
	5	Library Board	Approve, monitor and review business processes and policies for Library Services
	6	Police Board	Approve, monitor and review business processes and policies for Police Services
	7	Electrical Utility Commission	Approve, monitor and review business processes and policies for the Electrical Commission

Category	ID	Stakeholder Group	Role
Middle Management	8	Union	Protects the rights and interests of its members
	9	Department Directors	Develop and implement plans and goals for the department
	10	Supervisors	Give instruction and oversee the work of employees
Staff	11	Engineering Department	Provide traffic services, designs, maintain, and operate assets as their owner
	12	Parks & Culture Department	Provide recreational and cultural programs, and operate park improvement assets as their owner
	13	Electrical Utility	Design, construct, and maintain overhead and underground electrical distribution systems including street lights and traffic signals
	14	Finance & IT Department	Provide the financial and spatial data and develop financial and data management strategies for assets
	15	Development Services Department	Forecast growth in the City and its impact on asset requirements

The roles of some of the internal stakeholders is included in Section 3.2.2 of the AM Strategy. The following table provides a summary of some of the external stakeholders at different level of government and different sectors of the economy.

Table 11 – The City's External Stakeholder Groups

Category	ID	Stakeholder Group	Role
Public sector	1	Federal Government	Sets federal regulations related to the management of assets and their environmental impact
	2	Provincial Government	Provides assets and services for the provincial highways within the City; set provincial regulations related to the management of assets and their environmental impact
	3	Metro Vancouver	Supports regional transportation goals, especially in sustainability, through regional planning and land use coordination
	4	TransLink	Provides some assets and services for the Major Road Network (MRN) within the City; set regional targets in the management of transportation assets
	5	Neighbouring Municipalities	Influence local decision-making and are affected by the City's planning
	6	Fraser Health Authority	Responds to health care and emergency needs in the City
	7	Environmental regulators	Oversight of particular activities and outcomes
	8	Safety regulators	Oversight of particular activities and outcomes
	9	Local Authorities	Oversight of particular activities and outcomes
	10	Other special interest groups	--

Category	ID	Stakeholder Group	Role
Private sector	11	General public	Taxpayers and users of services provided by the City
	12	Residential property owners	Taxpayers and users of services provided by the City
	13	Local business owners	Taxpayers and users of services provided by the City
	14	Pedestrians, cyclists, motorists	Taxpayers and users of services provided by the City
	15	Developers	Create demand for the City to update exiting assets and contribute new assets to the City
	16	Industrial, commercial and institutional users	Large taxpayers and users of services provided by the City
	17	Contractors	Provide services in the City's supply chain
	18	Consultants	Provide services in the City's supply chain
	19	Suppliers	Provide services in the City's supply chain
	20	The Media	Reports on significant customer complaints and concerns
	21	Special interest groups	Such as: persons with disabilities

The preceding table is not intended as an exhaustive list of the City's external stakeholders and each service area is expected to identify and generate detailed stakeholder registers that are pertinent to their asset class.

Detailed growth forecasts are included in the City's OCP and Master Plans. For general reference purposes, the following table includes a summary of some of the key growth statistics.

Table 12 – City Growth Statistics

	2016	2041
Population	70,996	103,871
Total housing units	32,705	48,088
Total jobs	n/a	46,030

Detailed growth and demand data will need to be included in the Asset Management Plans. The following table provides an outline of the PESTLE framework for formally scanning and mapping the City's context.

Table 13 – **PESTLE Framework to Scan the City's Context**

Context	Internal Factors (examples only)	External Factors (examples only)
Political	• Clarity of the City's vision • Clarity of City's roles/responsibilities • The City's AM and supply chain policies • The City's structure and culture • The City's decision-making criteria, etc.	• The City's reputation in the local, regional, national and global spaces • Negative and positive media coverage • The public perception of the city and council • Community influence on decision-making, etc.
Economic / Financial	• Interest rates, inflation rates, etc. • Unemployment trends • Urban land economics, property prices • Economic growth • Regional multi-modal transit/transport – SkyTrain, etc. • Fuel costs (gas and electricity), etc.	• Operating budget and Capital budget • Adequacy of the replacement reserve fund • Impending capital projects • Funding sources – grants, etc. • Investment planning and prioritization • Staff efficiencies and productivity, etc.
Social	• Population growth • Demographic trends – childcare requirements, seniors requirements • Community language and cultural barriers • Relationship with stakeholders • Community homelessness; social housing, rental stock, market housing • Community mental health issues; drug use issues, etc.	• Recreation facilities – pools, arenas, etc. • Libraries and cultural facilities • Heritage properties and features • Age, sex, cultural profiles of staff/workforce • Impending retirements of key staff; training and competency development; succession planning • Communication protocols between departments and with the community • Motivation of staff, camaraderie, teamwork, etc.
Technological	• Rate of technological change • Availability of software products	• Legacy hardware and software • Information management systems • Data storage systems • High speed internet access • Telemetry, SCADA, GIS, CMMS, etc.
Legal	• Federal and Provincial laws – labour laws, consumer protection, health and safety laws, etc. • Codes and standards, etc.	• Contracts with service providers • Contracts with civic partners • Statutory rights of way, easements • Agreements - Lease agreements, etc. • Current/pending law suits • Liability exposures • Risk register and risk treatment plans • Insurance coverage, etc.

Context	Internal Factors (examples only)	External Factors (examples only)
Environmental	• Weather conditions, climate change • Local/regional pollutants • Regional fauna and flora • Energy consumption • Sea level rise • Proximity to water bodies, etc.	• Energy consumption; energy efficient equipment • Energy conservation measures (ECMs) • Natural features - water table, geology, soil conditions, micro-climate • Parks and trails in the City • Fuel storage, ACMs, PCBs in facilities, lead, etc. • Solid waste removal, etc.

2.1.4 The City's Sustainability

"Sustainability" is meeting the needs of the present generation in terms of social and cultural systems, the economy and the environment while promoting quality of life but without compromising the ability of future generations to meet their own needs.

This has also been described as "Triple Bottom Line" thinking, where in addition to thinking about the financial bottom line (the Economy), the impacts of our decisions on Society (Socially and culturally) and the Environment are equally important interests.

The City has taken the standard three-pillar concept further by establishing "Social and Cultural" as a distinct sustainability pillar. Illustrated below is an excerpt from Envision 2032 of the City's sustainability framework which include four overlapping spheres.



Figure 4 – **The City' Sustainability Framework**

The City's long-term financial performance can be considered sustainable only when the planned long-term service standards and associated infrastructure investment levels can be met without resorting to unplanned increases in property taxes/rates or disruptive cuts to/reductions in services. More specifically, the City is considered financially sustainable when the following conditions are met:

- A reasonable degree of stability and predictability exists for property taxes/rates.
- Future generations will not face massive decreases in services or unreasonable property tax/rate increases to deal with items deferred from this generation.
- The current generation does not bear all the burden of funding items that will benefit future generations.
- The City Council's highest priority programs (both capital and operating) can be maintained.

In recognition of the need to establish an appropriate balance between developing new assets and maintaining its existing asset base, the City is committed to managing its assets in accordance with sound, industry-recognized financial Asset Management practices.

Future service planning will increasingly need to balance the social, environmental, and economic interests of the community with their capacity and preparedness to pay for these services, both now and into the future. This SAMP is a key component of that process. Along with the Asset Management Policy, the SAMP is a key component of the planning integration process. Important to the success of the integrated planning process is the development of Departmental Asset Management Plans. These plans include information related to all key physical assets required to

support the delivery of agreed levels of service, along with the associated funding requirements. These plans will also need to be revised periodically in light of the service decisions resulting from the integrated planning process. As such, future strategic decisions can be made having the full understanding of the assets needed to support the delivery of the service.

2.2 AM Objectives

2.2.1 AM Policy

The City adopted an AM policy in April 2017 that includes a set of AM principles that, when translated down to the day-to-day activities on the assets, support delivery of the City's strategic goals and objectives. The AM Policy provides the foundational guidance that ensures staff are working on the right activities at the right time, at the right costs and for the right reasons. The City's Asset Management Policy has expressed ten core asset management principles, which are included in the following table.

Table 14 – The City's AM Policy Principles

	Policy Principles, April 2017	City Practice, 2018
1	Ensure a consistent approach for implementing systematic AM and appropriate AM best practices throughout all departments.	●
2	Take into account the future life cycle costs, relevant legislative requirements together with political, social, economic and environmental considerations in AM.	●
3	Consider the implications of climate change while assessing assets and analyzing true costs of long-term service delivery.	●
4	Proactively integrate climate mitigation and adaption considerations with AM Strategy.	●
5	Maintain organizational accountability and responsibility for asset inventory, condition, use and performance within the planning and operational processes.	●
6	Develop AM Plans for major asset categories. These plans will be used to update the City's long-term financial plan.	●
7	Conduct monitoring and inspecting as part of AM to ensure agreed service levels are maintained and to identify asset renewal priorities.	●
8	Provide systematic and cyclic reviews to all asset classes and ensure that the assets are managed, valued and depreciated in accordance with appropriate best practice using replacement values; not historical costs.	●
9	Engage the community on future service levels of infrastructure planning and maintenance activities, consistent with the corporate public engagement strategies, land use planning, financial planning and reporting.	●

	Policy Principles, April 2017	City Practice, 2018
10	Ensure staff resources and operational capabilities are identified and optimized; provide training in asset and financial management for relevant staff with an emphasis on multi-disciplinary team learning to build a strong foundation, sustain corporate memory, aid in succession planning and mitigate risks associated with staff turnover.	●
	Overall	●
● Aware ● Establishing ● Achieving		

To ensure the City is fully realizing its existing policy principles, the following two items have been identified for improvement in this AM Strategy:

- The appropriateness of the 2017 policy principles
- The strategic measures to facilitate the effective institutionalization of the guiding principles

With respect to the appropriateness of the policy principles, the following table provides a summary of the attributes of a good policy and considers how the City's 2017 AM policy conforms to best practice.

Table 15 – Best Practice Guideline for AM Policy

Best Practice	Bad Practice	City Practice, 2018
Clear and concise	Overly detailed and lengthy	●
Strongly linked to company vision and purpose	Unclear in scope and purpose	●
Commitment to delivery of organizational strategic plan	Unrelated to the adoption of organizational strategies and plans	●
Commitment to compliance with legislation, regulation and other policies	Non-compliant	●
Long-term time horizon	Short-term time horizon	●
Considers sustainable development	Sustainability considered irrelevant	●
Sets out unambiguous high-level principles for asset management	Vague or unstructured principles	●
Approved by top executives	Not clearly endorsed from the top (e.g. signed by department head)	●
Widely communicated	Not widely visible or transparent; Too internally focused and missing external perspective	●
Regularly reviewed	Reviewed intermittently	●
Allows continuous improvement and appropriate flexibility	Not reviewed when organizational strategy is updated	●

Best Practice	Bad Practice	City Practice, 2018
Commitment to workforce and supplier capability	Workforce and supplier capability not taken into consideration	●
Commitment to the 'right' culture	Culture is not considered	●
	Overall	●
● Aware ● Establishing ● Achieving		

It is proposed that the City's AM Policy be reworked to include the nine principles summarized in the table below.

Table 16 – Policy Principles

	Category	Policy Principles, April 2019
1	**Regulatory Compliant**	We shall comply with all relevant health, safety, environmental and other regulations and statutory requirements.
2	**Levels of Service Focused**	We shall clearly define and measure our Levels of Service for delivering on customer and other stakeholder requirements.
3	**Asset Whole Life Perspective**	We shall take a holistic and comprehensive approach to our service delivery, investment planning and decision-making that considers the combined impact on the entire asset life cycle, with a focus on balancing performance, risk, and cost.
4	**Integrated Approach**	We shall implement and sustain Asset Management practices in a structured and coordinated way across all our departments within the organization
5	**Robust, Repeatable & Defensible Decision Making**	We shall adopt a formal, yet flexible approach to the management of our assets in a way that ensures informed decisions are made and services are consistently provided in the most effective manner
6	**Risk-Based**	We shall direct our resources in a way that achieves our agreed levels of service at an acceptable level of risk to our organization.
7	**Forward Looking and Sustainable**	We shall assess our decisions about investing in our assets using triple bottom line sustainability criteria with respect to economic, environmental and social outcomes.
8	**Continual Improvement**	We shall make continual improvement a key part of our Asset Management approach, with a focus on driving innovation in the development of tools, techniques and solutions.
9	**Climate Change**	We shall formalize a commitment to integrate climate change response with implemented asset management practices through the identification of specific climate change impacts to levels of service, service delivery risks, and costs.

The preceding nine principles are also contemplated through the 10 improvement initiatives in the AM Strategy.

2.2.2 AM Framework

The City does not currently have an overarching asset management framework other than a loose conformity to the AMBC framework, as noted in the 2016 report to Council. Asset Management B.C. recommends integrating a bottom-up (operational) approach including detailed condition assessment with the top-down (strategic) approach to establish the overall asset management program with short and long-term financial plans. Included below is the expanded framework to be integrated into the City's AM practices.

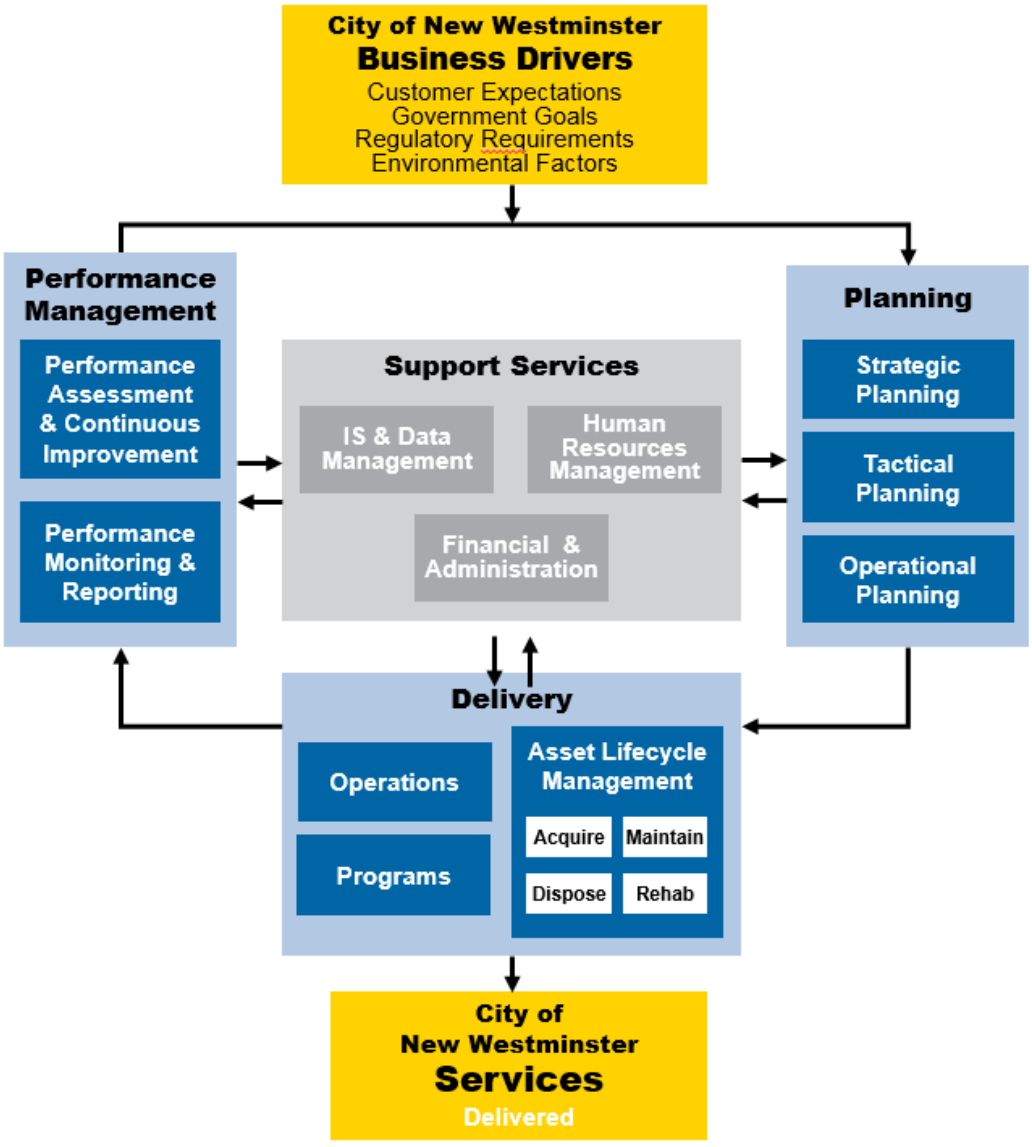


Figure 5 – Asset Management Framework

Alignment with this framework is addressed throughout the AM strategy.

2.2.3 Departmental Strategic Plans

The following table provides a summary matrix of the key departmental artifacts that have been developed as of mid-2018.

Table 17 – Departmental Artifacts, 2018

City Departments	City Asset Class		Departmental Artifacts		
			Strategic Plans	Master Plans	Asset Management Plans
Parks & Recreation	1	Parks & Recreation	Urban Forest Management Strategy, 2015 Environmental Strategy & Action Plan (ESAP), 2018	Queens Park Master Plan, 2013 Parks & Rec Comprehensive Plan, 2008	--
Finance & IT	2	IT	--	--	--
Engineering	3	Transportation	ESAP, 2018	2015	2018 (Draft)
	4	Facilities	ESAP, 2018	--	--
	5	Storm Water	ESAP, 2018	2015	--
	6	Waste Water			
	7	Water Supply	ESAP, 2018	2015	--
	8	Solid Waste	ESAP, 2018	--	--
	9	Fleet	ESAP, 2018	--	--
Electrical	10	Electrical	ESAP, 2018	2015	--
		Totals	**2**	**4**	**1**

The City has two departmental strategy documents, four master plans and one draft AMP. Completion of the artifacts for the remaining asset classes represents a significant undertaking and is addressed in the initiatives in Section 5.

Recognizing that a small minority of the City's asset classes have developed strategic plans and the City has limited experience in converting organizational objectives into AM objectives, the following table provides an excerpt of the AM objectives that have been developed and evaluates them against the SMART (Specific, Measurable, Achievable, Relevant, Time-bound) framework.

Table 18 – Example AM Objectives

Asset Classes		Sample AM Objectives from Existing Departmental Strategies	Evaluation	
			Qualitative or Quantitative	SMART framework evaluation
1	Parks & Recreation	To deliver the best service which will ensure that each resident has the feeling and confidence that they will be treated fairly, responsibly and with respect and will feel cared for by the actions we take on their behalf.	Qualitative	🟡
		Protect New Westminster's urban forest and its benefits to our community by: • Increasing canopy cover to 27% city-wide • Introducing a tree bylaw to protect existing canopy cover • Adapting the urban forest population, and the City, to a changing climate	Quantitative	🟢
2	Transportation	Make cycling a comfortable and attractive way to move throughout the City for people of all ages and abilities	Qualitative	🟡
		Create a walkable community that ensures walking is safe, convenient and universally accessible way to get around the City	Qualitative	🟡
3	Electrical	Modernize and grow electrical capacity	Qualitative	🟡
		Work with Planning, Engineering, developers and owners to increase energy efficiency in older buildings, promote the most energy efficient new buildings and encourage use of renewable, responsible and local energy sources in all buildings	Qualitative	🟡
		Continue to lay fibre conduit to support Smart Meter System	Qualitative	🟢
🔴 Fails to meet the SMART criteria 🟡 Partially meets the SMART criteria 🟢 Successfully meets the SMART criteria				

While some of the existing AM objectives conform to the SMART framework, there are numerous instances where the objectives are not sufficiently quantitative to enable the development of meaningful metrics. In accordance with ISO 55001, the AM objectives shall:

Table 19 – Best Practice for AM Objectives

	Best practice for Objectives	City Practice, 2018
1	Be consistent and aligned with the organizational objectives;	🟢
2	Be consistent with the asset management policy	🟡
3	Be established and updated using asset management decision-making criteria;	🟡
4	Be established and updated as part of the SAMP	🟢
5	Be measurable	🟡
6	Take into account applicable requirements;	🟢

	Best practice for Objectives	City Practice, 2018
7	Be monitored;	●
8	Be communicated to relevant stakeholders;	●
9	Be reviewed and updated as appropriate.	●
	Overall	●
● Aware ● Establishing ● Achieving		

To fulfill its obligations to deliver services to the community, the City must ensure that the assets supporting the services are managed in a way that balances service-level delivery/performance, risk, and affordability. The majority of the assets are long-lived, with useful lives measured in decades. The assets require significant ongoing investment in operation, maintenance, renewal, and enhancement activities to ensure they are fit-for-purpose to support the delivery of services, now and into the future.

The assets are essential to the well-being of the community and have significant budget implications; they, therefore, need to form an integral part of the City's long-term financial and service delivery planning.

2.3 Key Findings & Initiatives

As the City's AM System matures, AM objectives will be reviewed and refined. To monitor the effectiveness of the AM objectives, community consultation will be undertaken through specifically designed customer surveys and workshops. In addition, the community will be able to interact with Council about the level of infrastructure service provision through various media types, including: mail, e-mail and Facebook. Internally, a workshop will be held at least once every three years with key stakeholders to review the current AM objectives and service standards.

External communication to stakeholders of the AM policy and AM objectives will be undertaken through the publishing of the AM policy and SAMP on the City's website. Internal communication of the AM policy, AM objectives and other AM activities will be primarily undertaken through AM related meetings, workshops, training sessions and conferences, and development of the annual work programs.

The following table provides a summary of the general observations regarding the completeness and effectiveness of the translation across the City's Aspirational-Transactional hierarchy of AM artifacts.

Table 20 – General Observations Regarding Translation of Objectives

Strengths	Weaknesses
• The City has a fully developed sustainability framework • PS-3150 has helped raise awareness of asset management • Key staff members have a good level of awareness of asset management • There is a desire to increase public awareness of asset management • Making asset management a higher priority has advanced on some assets • The City has a sponsor for asset management and an asset management cross-disciplinary committee has emerged	• Strategic plans have not been developed within the majority of the service areas so the line of sight to the City's vision has not been formally translated • The City has been unable to operationalize its aspirations • Difficult for effective long-term asset management strategies to compete with short-term priorities • Lack of a process to regularly update Council and the public on asset management • Asset management is currently done off the side of the desk as other day to day activities are taking up too much time • Require further buy-in from senior management staff and public officials

The following table provides a high-level assessment of how the individual departments and asset classes are performing relative to the requirements to convert the City's objectives into asset management objectives.

Table 21 – Conversion of the City's Objectives into AM Objectives, 2018

City Departments	City Asset Classes		Observations	Maturity Score, 2018
Parks	1	Parks & Recreation	Strategy	●
Finance & IT	2	IT	No strategic artifact, no master plan and no AMP	○
Engineering	3	Facilities	There is no master plan or formal dept. strategy; Condition assessment is due for a review and update	○
	4	Transportation	Strategy, master plan, partially developed AMP	●
	5	Storm Water	*(See Waste Water)*	●
	6	Waste Water	Partially developed artifacts	●
	8	Water Supply	Partially developed artifacts	●
	9	Fleet	Partially developed artifacts	●
Electrical	10	Electrical Utility	Strategy, master plan	●

City Departments	City Asset Classes		Observations	Maturity Score, 2018
Vehicles & Equipment	11	Solid Waste	There is no master plan or formal dept. strategy	○
	12	Fleet	There is no master plan or strategy	○
			Overall	●

Based on a review of existing artifacts there is anecdotal evidence that the City is in the early stages of its journey and is currently "establishing" its formal documentation of translating organizational objectives into AM objectives.

Table 22 – Recommendations and Corresponding Initiatives

ID	AM Strategy Considerations	Initiatives in Chapter 5
1	Develop strategic plans for all assets classes	1, 2, 10
2	Develop departmental objectives in accordance with the SMART framework	1, 2,10

A roadmap of the City's suite of improvement initiatives are outlined in Section 5 and 6.

3. The Asset Management System

The Asset Management System (AMS) is defined as: *"the management system for asset management whose function is to establish and sustain the City's asset management objectives*".

The City currently has a broad suite of artifacts that are being used to support asset management within the service areas. It is recognized, however, that many of the artifacts are undeveloped and have not been formalized or standardized across the City.

The AM strategy has grouped the City's management artifacts into five primary categories that are necessary for sustainable service delivery across the City. The following table provides an overview of the five facets of the AMS and the corresponding management artifacts that are contemplated.

Table 23 – Five Key Facets of the AMS

Facets		Description of How Value is Realized	Management Artifacts (sample only)
1	**Assets**	The City is a complex service delivery organization with responsibility for managing a broad range of physical public assets. Stakeholder value is realized through healthy assets that are fit for purpose, kept in a state of good repair and adapted as required from time to time to meet changing needs.	• Asset inventory • Asset hierarchy • Condition assessments / state of infrastructure reports.

Facets		Description of How Value is Realized	Management Artifacts (sample only)
2	**People**	Value is realized through the coordinated and integrated activities of competent people with a range of education, skills and expertise. • **Governance** - Effective teamwork requires clear definitions of the roles and responsibilities within each of department. • **Communication & Awareness** - Identify which stakeholders are to be communicated with and what communications need to take place. Builds awareness and buy-in for asset management across the organization. • **Competency** - Clarification around the behaviours expected at vertically (at different levels) and horizontally (within different functional units) across the organization	• Job descriptions • Roles matrix • RACI charts • Org/Team charts • Team Charters • Competency framework • Training plan • Communication Plan • Succession Plan
3	**Processes**	Value is realized by ensuring consistency and repeatability in the way in which tasks are carried out within different departments, by different people and at different times. This facet of the AMS contains four parts: • **Supply Chain Management** – Procedures for management asset at different stages, such as O&M and renewals. • **Customer Focused** – Procedures for identifying stakeholder requirements. • **Risk Based Decision Making** – Procedures for identifying, analyzing and treating risks. • **Triple Bottom Line Decision Making** – Procedures for making optimized trade-offs between social, economic and environmental factors.	• Flow charts • Checklists • Templates. • Risk registers • LOS register • Decision making criteria • Decision Trees • Warranty certificates • Service level agreements
4	**Systems and Information**	Asset management requires appropriate systems and information to support the processes and to empower the people. This facet of the AMS contains three parts. • **Software Ecosystem** – The ecosystem refers to the collection of various proprietary and not proprietary platforms for holding data and generating business analytics • **Knowledge Management** – The combination of data management with documents and records management	• Data and information strategy • Data confidence grades • Software tools • Document inventory • Knowledge Management

Facets		Description of How Value is Realized	Management Artifacts (sample only)
5	**Finances**	Holistic understanding of the long-term costs of providing services and the infrastructure required is a critical element of asset management. Proactive asset management yields fewer service disruptions, more predictable results and lower total lifecycle costs than a reactive approach to repair and replacement.	• Operating budgets • Capital budgets • Whole life cost analysis • Financial analytics

This section of the SAMP explores the current state of the City's management artifacts and steps the City is taking towards a future state in alignment with best practice.

3.1 Assets (#1)

3.1.1 Inventory

The City provides a wide range of services to the community and stewards a portfolio assets for present and future generations. The AM strategy recognizes that assets can be grouped into two broad categories.

Table 24 – Two Primary Asset Types

Categories	Samples of Asset Types	Valuation	Attributes
Natural Assets	Also referred to as "eco-assets" or "natural resources", includes trees, ditches, water bodies and natural features within the City's boundaries.	Unknown	Appreciation
Engineered Assets	Also referred to as "built assets", includes physical assets such as transportation, water distribution, sewer and drainage systems, vehicle fleets, parks, and facilities.	$1.2 Billion	Depreciation

The methods for analysis and stewardship of the two asset categories vary dramatically. For example, natural assets generally appreciate in value over time, whereas built assets depreciate over time.

The City's portfolio of engineered assets (also referred to as tangible capital assets) is arranged into ten broad assets classes. The following table provides a high level summary of the nested hierarchy of assets across the four City departments, ten asset classes and myriad of elements within each class.

Table 25 – Portfolio of Tangible Capital Assets (Engineered Assets)

			Categories	
City Departments	City Asset Classes		Engineered Assets (samples only)	Natural Assets (samples only)
Parks & Rec	1	Parks & Recreation	Park infrastructure; park amenity; sport amenity; etc.	Trees and vegetation; etc.
Finance & IT	2	IT	Servers, UPS; IT fibre; IT software; IT hardware; etc.	--
Engineering	3	Facilities	Electrical; envelope; finishing; mechanical; structure; wharf; columbaria, etc.	Trees; vegetation; water features; etc.
	4	Transportation	Roads - base and surface layer; Other transportation - bridges, sidewalks, streetlights, traffic lights, tunnel, retaining walls; etc.	Boulevard trees; landscaped medians,
	5	Storm Water	Outfall; pump stations; mains; etc.	Fraser River estuary; drainage ditches; tide flats; Brackish marsh; salt marsh; floodplain forest; streams
	6	Waste Water	Outfall; sewer pump stations; sewer mains; etc.	--
	7	Solid Waste	Equipment, etc.	--
	8	Water	PRV stations; water meters; water mains; etc.	Water bodies
	9	Fleet & Equipment	Vehicles, furniture etc.	--
Electrical	10	Electrical Utility	Transformers; switches; poles; electrical meters; manholes; substations; etc.	--

City staff have suggested that natural assets should be contemplated within each of the ten asset classes rather than as a separate standalone group. Detailed inventories and hierarchies of assets are to be included in the Asset Management Plans and this is addressed in Section 4.

3.1.2 Statistical Profiles

The following table provides a summary of the statistics on some of the City's engineered assets.

Table 26 – Engineered Asset Statistics

City Departments	City Asset Classes		Summary Statistics
Parks & Rec	1	Parks & Recreation	Community parks (14); Neighbourhood parks (30)
Finance & IT	2	IT	Servers, UPS; Computers; Switches/Routers; Appliances
Engineering	3	Facilities	Buildings (45); Parkades (2)
	4	Transportation	Roads (252 km); Sidewalks (475,000 m^2); Bridges (11); Tunnels (1); Signs (5,459); Streetlights (3,812); Signal and traffic controllers (97); Wheelchair ramps (3,262); Retaining walls (27)
	5	Storm Water	*(see waste water)*
	6	Waste Water	200 km of force, combined, and sanitary sewer mains, Storm sewer mains (70 km); Sewer pump stations (33).
	7	Solid Waste	Containers (n/a)
	8	Water	Mains (20 km); PRV stations (13), Water meters (1100)
	9	Fleet & Equipment	Vehicles (n/a), Equipment (n/a)
Electrical	10	Electrical Utility	Meters (33,000)
		Natural Assets	Trees, water bodies

Detailed statistics are to be included in the Asset Management Plans (AMPs) to be developed for each asset class.

3.1.3 Age Profiles

As one of the oldest municipalities in British Columbia, New Westminster has some of the oldest infrastructure in the region, dating back to the late 1800s and early 1900s. In addition, many of the City facilities were constructed during the development boom of the 50s, 60s and 70s and are now nearing the end of their useful service life and requiring significant capital investment to renew and maintain.

The City has made significant advancement in asset renewal and replacement over the years. Financial plans in recent years have moved towards reducing the annual funding gaps in a number of asset classes. However, as the City continues to grow, there will be increased pressure on its existing infrastructure as well as continued expansion of the asset inventory.

Significant work still needs to be done to sustain all asset classes in support of the social, economic and environmental goals of the City. On-going delivery of the annual capital infrastructure program at the operational level is managed by individual City departments. These departments will need to

continue assessing the conditions of various asset classes and to replace or rehabilitate aging infrastructure based on operational needs and available funding.

3.1.4 Condition Profiles

To provide a framework for the development of an effective condition framework, the AM strategy recognizes that there are three primary types of condition associated with the City's infrastructure assets at different stages in their lifecycle. The following table provides a summary description and a few examples to illustrate.

Table 27 – Three Facets of Asset Condition

Types of Condition	Description	Distress Indicators (examples)
Physical Condition	An asset's degradation and deterioration in terms of the individual physical elements in the overall assembly.	• Corrosion, cracking, peeling, delamination, spalling, blistering, etc.
Demand Condition	An asset's capacity to meet the service needs of existing customers and future customers.	• Overloading • Under-utilization, etc.
Functional Condition	An asset's ability to meet the program and service delivery needs in an efficient and effective manner.	• Technological obsolescence (e.g. Spares availability) • Economic obsolescence (e.g. energy efficiency) • Legal obsolescence (e.g. code changes) • Functional obsolescence

The following table provides a comparative summary of the 5-point qualitative condition grading scheme contemplated in the Canadian Infrastructure Report Card (CIRC) and the City's quantitative grading scheme.

Table 28 – CIRC Condition Grading Scheme

CIRC, Qualitative			City, Quantitative	
Grade	Rating	Description	PQI	ACA
1	"Very Good"	The infrastructure in the system or network is generally in very good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.	PCI 100-80	0
2	"Good"	The infrastructure in the system or network is in good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.	PCI 66-79	1-5

CIRC, Qualitative			City, Quantitative	
Grade	Rating	Description	PQI	ACA
3	"Fair"	The infrastructure in the system or network is in fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.	PCI 55-66	5-10
4	"Poor"	The infrastructure in the system or network is in poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.	PCI 35-54	10-30
5	"Very Poor"	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service	PCI 0-34	30-100

The average 2016 estimated age, as a percentage of useful life, across the total $1.2 billion City-wide asset base is 63%. There is anecdotal evidence that as of 2016 the City's assets are generally in "fair" condition. Detailed condition analysis is to be included in the Asset Management Plans (AMPs) to be developed for each asset class.

3.1.5 Key Findings & Initiatives

The following table provides a summary of the general observations regarding the City's asset inventory and analysis of the asset portfolio.

Table 29 – General Observations regarding Asset Inventory

City Strengths	City Weaknesses
• Asset inventories have been created to comply with the requirements of PSAB 3150 • Staff have vast knowledge on the condition and performance of existing assets • Condition assessments have been completed for some asset classes • Some asset classes, such as transportation have detailed state of infrastructure reports	• There is no detailed inventory of natural assets • The engineering asset inventories do not all align with the PSAB inventories • Data collection frequency is not consistent across asset classes • State of infrastructure reports have not been developed for all asset classes • Lack of a standardized condition grading scheme across all asset classes in alignment with CIRC

The preceding observations have been used to develop the following considerations for the continual improvement of the City's asset management practices.

Table 30 – Strategic Initiatives

ID	AM Strategy Considerations	Initiatives in Chapter 5
1	Prepare an inventory of natural assets within the City and correlate this with the existing PSAB 3150 inventory of engineered/built assets	**#7**
2	Review the City's current data collection and data management practices and adjust as required to meet asset management objectives	**#7**
3	Determine the status of data on the three facets of asset health: a) physical condition, b) functional condition and c) demand condition.	**#6, #7**
4	Correlate the quantitative condition grades within each asset class to the 5-point scale in the Canadian Infrastructure Report Card.	**#6, #7**

A full suite of prioritized improvement initiatives have been included as a roadmap in Chapter 5.

3.2 People (#2)

Coupled with the City's physical assets, City staff are the cornerstone of effective delivery of services to the City's stakeholders. People as an asset within the City's Asset Management System are stewarded through four primary channels:

- Stakeholder Management
- Governance Framework
- Communications Plan
- Competency Framework

The AM governance structure is a key foundational element of the City's asset management program. When considering how to integrate these roles within the structure and function of an organization, note that one person may fulfill multiple roles or a single role may be shared. How these roles are filled is not as important as defining that these roles need to exist; ensuring that the requirements, authority, and accountability of each role is defined; and assigning each responsibility to a single individual.

3.2.1 Stakeholders

The City's AM Strategy recognizes that a stakeholder is any person or organization who can affect, or be affected by a decision or activity carried out by the City. The following table provides an outline of the sequence of steps that the City intends to follow in developing the stakeholder framework as part of its asset management Strategy.

Table 31 – Stakeholder Framework

Steps	Actions		Description
1	**Stakeholder Identification**	1.1	The City prepares a formal list of external stakeholder groups (such as regulatory authorities, contractors, suppliers) and internal stakeholder groups (such as staff, management and union). The City then organizes the stakeholders into general affinity groups.

Steps	Actions		Description
2	**Stakeholder Analysis**	2.1	The City determines the needs, requirements and expectations of each stakeholder group, relative to factors such as: safety, reliability, profitability, sustainability, etc.
		2.2	The City determines the relationships (both past and present) with each of the stakeholder groups in terms of perceptions, assumptions, etc.
		2.3	The City determines how each of its stakeholder groups has a particular level of interest and level of influence over the City. This correlation is plotted onto a matrix.
		2.4	The City determines the trade-offs are that are made between each of the stakeholder groups and these are then used to inform the development and maintenance of the asset Management objectives and the asset Management decision criteria.
3	**Stakeholder Management**	3.1	The City develops a plan to optimize relations with each stakeholder group. The plan includes the resources, activities and timeframes, the key performance indicators and measurement metric
		3.2	The City monitors and reviews its stakeholders

Stakeholders vary across service areas, thus it is important for each department to conduct their own stakeholder identification process. For illustrative purposes, a stakeholder matrix is provided in the figure below.

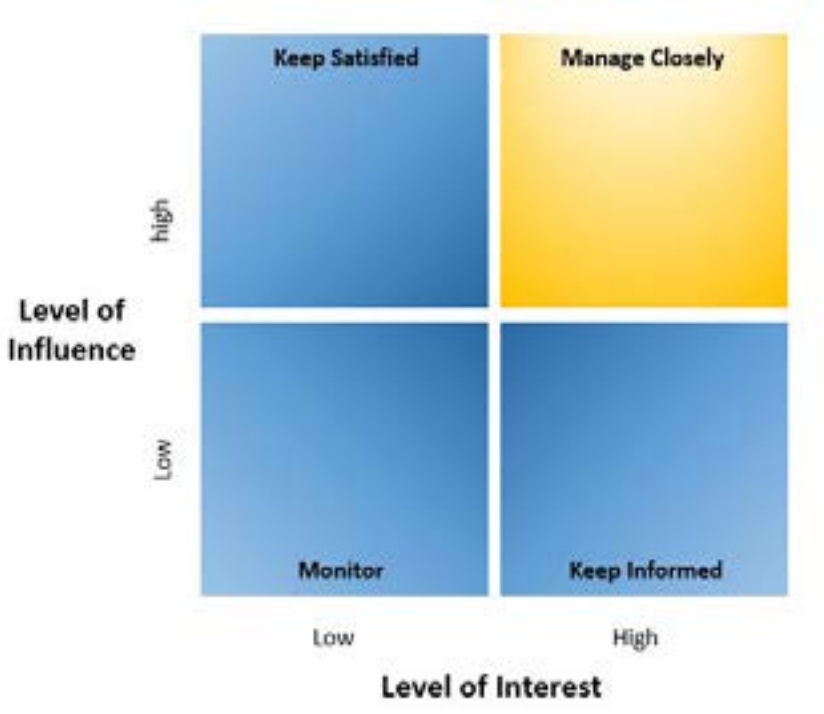


Figure 6 – Stakeholder Analysis and Engagement Matrix

The following table provides an outline of the different levels of engagement, and the corresponding communication goals, that the City intends to be mindful of when developing the stakeholder engagement plan for a project.

Table 32 – Levels of Stakeholder Engagement

Level of Engagement	City Goal	City Promise	Level of Effort
Inform	To obtain balanced and objective information in a timely manner	"We will keep you informed"	Low
Consult	To obtain feedback on analysis, issues, alternatives and decisions	"We will listen to and acknowledge your concerns"	Low
Involve	To work with public to make sure that concerns and aspirations are considered and understood	"We will work with you to ensure your concerns and aspirations are directly reflected in the decisions we make"	Med
Collaborate	To partner with the public in each aspect of decision making	"We will look to you for advice and innovation and incorporate this in decisions as much as possible"	High
Empower	To place the final decision making in the hands of the public	"We will implement what you decide"	High

The aim of the engagement analysis is to optimize relations with each stakeholder group, recognizing that optimization will require trade-offs.

3.2.2 Governance

The current AM Steering Committee has been instrumental in establishing AM awareness and developing some AM strategies and frameworks at the City. However, to effectively improve AM maturity at each of the City's departments/service areas, it is necessary to consider a formal approach to AM Governance. The City current AM governance structure is visually represented in the figure below.

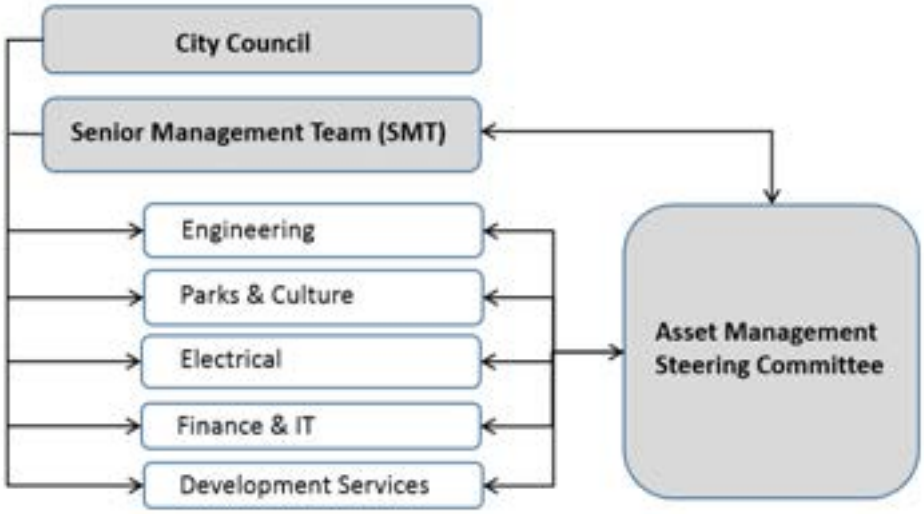


Figure 7 – Current AM Governance Structure

Cleary defined Roles and Responsibilities (R2) and Authorities and Accountabilities (A2) are one of the essential ingredients for effective teamwork across the City. The City recognizes that it cannot achieve integration and alignment without the complex interplay and nuanced balance of the R2-A2 controls distributed vertically across the different levels of the organization (Council, management, staff, etc.) and horizontally across the functional groups (HR, Finance, Parks & Recreation, Engineering, etc.). The table below provides an outline of the R2-A2 framework.

Table 33 – R2-A2 Framework

Framework	Description	Flow	Delegated	Duration
Roles	This is the part played (or position occupied) by certain internal stakeholders (e.g., Members of staff, board of directors) and external stakeholders (e.g., service partners).	It flows from top to bottom	It cannot be delegated	The obligation may continue after a task/duty is complete
Responsibilities	These are the obligations or expectations for City staff (and/or external service partners) to perform specific activities or duties according to their respective roles.	It flows from bottom to top	It cannot be delegated; but it can be shared	The obligation ends when the task is complete
Authorities	These are the powers or rights assigned to City staff (and/or its service partners) to give instructions (regarding duties) or to make decisions towards the achievement of the City's objectives.	It flows from top to bottom	It can be delegated	The obligation continues after a task is complete

Framework	Description	Flow	Delegated	Duration
Accountabilities	These are the obligations of City staff (or external service partners) to be answerable for their results. Accountability is the liability created for the use of the assigned authorities.	It flows from top to bottom	It cannot be delegated and it cannot be shared	The obligation continues after a task is complete

The City recognizes that the lack of a clear R2-A2 framework often leads to issues such as inefficient operations, misunderstandings amongst team members, rework of assigned activities, and unclear communications with the City's stakeholders.

The AM governance structure is a key foundational element of the City's asset management program. Governance refers to the set of policies, regulations, functions, processes, procedures, and responsibilities that define the establishment, management and control of projects and programs. The governance framework is a necessary part of organizational governance. It gives the City the required internal controls, while externally, it reassures stakeholders that the projects being prioritized and money being spent is justified.

3.2.2.1 Leadership

Senior management has the power to delegate authority and provide resources within the organization. Senior management has the ability to influence the culture and empower the organization by advocating AM objectives. Commitment to asset management can be demonstrated by:

- Making reference to asset management policy in communications.
- Engaging in setting the objectives and measures of success for the people responsible for the asset management system.
- Establishing a strong collaborative work culture that is focused on delivering the asset management objectives.
- Using agreed decision-making criteria for asset management decisions.
- Supporting asset management-related improvement activities.
- Supporting personal and career development pathways that encourage and reward time spent in roles associated with asset management and the operation of the asset management system.
- Monitoring the asset management system performance and ensuring corrective or preventive actions, including opportunities for continual improvement.
- Addressing asset-related risks and incorporating these risks into the organization's risk management processes.
- Aligning asset management and the asset management system to other functions and management systems in the organization; for example, its approach to risk management.
- Ensuring collaboration across the organization to achieve the organizational objectives.

3.2.2.2 AM Steering Committee

The three primary objectives of the AM steering committee are summarized in the table below.

Table 34 – Objectives of the AM Steering Committee

	Objectives	Actions to Achieve Objectives	
1	**To establish frameworks and strategies for the New Westminster Asset Management Program**	1.1	Assessing challenges, corporate capacity, risk management, best practices and opportunities for efficiencies and cost savings from planning, designing, construction, and maintaining municipal assets.
		1.2	Developing common vision, policies, standards and practices of an integrated asset management framework across city departments.
		1.3	Analyzing asset management business flow, with details on how each department maintains, records and use their current asset inventories and their needs for reports and other key outputs.
		1.4	Strategic planning of corporate asset management initiatives, advising on priorities and supporting the ongoing monitoring of the implementation of the program. Initial priorities include the development of: – Corporate Asset Management Policy and Governance Framework – Corporate Asset Management Strategy – Framework for defining Level of Service and risks – Corporate Asset management Communication Plan – Asset Management Plans for major asset classes – Selection and implementation of new technology
		1.5	Maintenance Management Program ensuring integration with PSAB 3150 reporting of Tangible Capital Assets (TCA) and the Long Range Financial Model(LRFM)
2	**To advocate and promote asset management within City strategic plans**	2.1	Reporting on asset management program status to council.
		2.2	Making recommendations to and soliciting resources from Corporate Administration Committee and Council to enable informed asset management decisions.
		2.3	Promoting the Asset Management program and practices within individual departments and ascertain staff cooperation, support and commitment to ensure successful delivery of the asset management program
3	**To monitor progress of the City's asset management program**	3.1	Addressing specific issues and priorities as they arise.
		3.2	Establishing performance measurement matrices for AM
		3.3	Recommending short and long range plans for asset management expenditure.
		3.4	Identifying potential funding sources and/or financing strategies for each asset category

The following table includes a summary of the composition of the City's AM Steering Committee, comprising ten roles across five departments.

Table 35 – **Composition of the City's AM Steering Committee**

Department	No. of Members	Role(s)	Asset Classes
Engineering	3	• Director of Engineering • Manager of Infrastructure Planning • Asset Management & Project Engineer	7 – Transportation; Water; Storm Water; Wastewater; Solid Waste; Facilities; Fleet
Electrical	1	• General Manager of Electrical	1 - Electrical
Parks & Recreation	1	• Director of Parks & Recreation	1 - Parks & Recreation
Finance	2	• Director of Finance • Finance Project Manager	--
IT	2	• Manager of IT Applications Group; • GIS Coordinator	1 - IT
Development Services	1	• Director of Development Services	--
Total	**10**	**10**	**10**

At this juncture, no changes are being considered to the composition of the AM steering committee other than confirmation that all ten asset classes are represented and clarity around the division of responsibilities.

3.2.2.3 Roles & Responsibilities

When considering how to integrate asset management roles within the structure and function of the City it is noted that one person may fulfill multiple roles or a single role may be shared. How these roles are filled is not as important as defining that these roles need to exist; ensuring that the requirements, authority, and accountability of each role is defined; and assigning each responsibility to a single individual.

The complex interplay of the R2-A2 controls is achieved through a number of management artifacts, including organization charts, job descriptions, and RACI Charts (Responsible, Accountable, Consulted, Informed). The following tables provides an outline of the four parties to a typical RACI Chart and how this can be distributed across the City.

Table 36 – RACI Framework

RACI Framework		Description	City Staff (Internal)	Service Providers (External)
R	**Responsible**	Those who perform the tasks and are responsible for its completion. Every task must have at least one responsible party.	Controlled by job description and project mandate	Controlled by service contract

RACI Framework		Description	City Staff (Internal)	Service Providers (External)
A	**Accountable**	Those who have the authority to approve or disapprove. The decision makers at certain go-no-go points in the project cycle.	Controlled by job description, project mandate, policy or strategy	Controlled by service contract
C	**Consulted**	Those who have the expected expertise and whose opinions are sought, typically subject matter experts. There is two-way communication between those that are consulted and those that are responsible and accountable.	Controlled by project mandate	Controlled by service contract
I	**Informed**	Those who are kept up-to-date on progress, often only on completion of the task or deliverable. There is just one-way communication, which is often done simply to manage stakeholder relations.	Controlled by policy and strategy	Controlled by service contract

The table below provides an example of key roles and descriptions involved in the stewardship of City asset management practices.

Table 37 – Stewardship

Role	Description	Notes
Senior Management team (SMT)	Executive leadership of the corporation – the most senior group of administrative officials. Responsible for the organizational management system and the administration of transparent local government services and decision making. This includes maintaining, the necessary corporate capacity (including, but not limited to, resourcing, financial support, staff competencies, business processes, data and integrated information systems) to manage risk and support the elements of sustainable service delivery.	The Senior Management Team typically consists of the directors of business units from across the City who work collaboratively to: Advise on strategic issues related to corporate decision making; Generate solutions to organizational challenges; Provide direction on corporate-wide projects and initiatives; and Empower employees through the corporation's core values.
AM Champion	Principle advocate and sponsor of the AM program in the corporation and chair of the Steering Committee.	Must have a sufficiently senior role in the organization to lead the steering committee, direct the allocation of resources and manage relationships with key stakeholders on behalf of the corporation.

Role	Description	Notes
Steering Committee (SC)	A "direction setting" and "decision-making" committee which provides common and efficient management of the AM System. The committee is accountable to the SMT and provides assurance that corporate requirements are being implemented. The committee's other purposes include championing the AM program within the corporation; defining enterprise level program objectives and recommended funding proposals; projecting current practices and procedures to future years to assess trends and sustainability and provide recommendations for improvements; and directing multi-business unit initiatives and inter departmental matters.	The committee should include broad director level representation covering all aspects of the AM system, including: • Engineering & public works; • Land use planning and development; • Corporate and strategic planning • Finance • Stakeholder engagement and public affairs • IT & records management
Program Manager	The program manager is accountable to the SC for facilitation and co-ordination of prioritized implementation, sustainment and improvement of the AM system. Co-ordinates tactical and operational level feedback, and technical advice related to the AM System by selecting and leading cross-divisional task specific teams (may also include external service partners).	This position requires support of department directors to commit resources and direct completion of AM program related tasks that have been prioritized by the SC
AM Network & Implementation Team	Cross departmental teams of AM change leaders and technical specialists who are accountable to the program manager who lead production and implementation of AM System components and improvements.	This group also facilitates discussion and networking between asset managers and is responsible for: carrying out community education relating to AM Practice, including acting as conduit for the sharing of knowledge and making necessary information available to all required parties and teams.

Based on the complexity of the City's asset portfolio and the large number of staff at various levels of the organization, it is inevitable there will be some interface challenges, potentially ill-defined assumptions and misunderstandings around roles, and responsibilities, authorities and accountabilities (R2 A2).

Table 38 – Accountabilities

Practice/Process	Related Accountabilities	Senior Management	AM Champion	Steering Committee	Program Manager	AM N Implementation
AM Strategy and Policy	1) Lead discussions with Council regarding the scope, objectives and policy goals for asset management	**A,R**				
	2) Set AM policy & strategy (includes principles, AM Objectives etc.)	**A**		**R**		
	3) Identify key requirements and objectives for the AM policy and alignment with other Corporate objectives/plans		**A**	**R**		
	4) Advise on strategic issues related to corporate decision making, including ensuring that adequate investment planning and prioritization processes, criteria and guidelines are in place to support long term cross-asset optimization and short term prioritization and co-ordination of work programs		**A**	**R**		
	5) Generate solutions to the City's challenges		**A**	**R**		
	6) Provide direction on corporate-wide projects, initiatives, and disputes		**A**	**R**		
	7) Advocacy and authentic leadership/leadership by example	**R**	**R**	**R**	**R**	**R**
	8) Empower employees through the City's core values	**R**				
AM Program Development, Implementation & Management	1) Oversee the AM governance processes and structures within the City	**A**		**R**		
	2) Ensuring approved policy is properly and effectively implemented		**A**	**R**		
	3) Approving enterprise AM priorities and resources		**A**	**R**		
	4) Corporate AM program direction and priority setting		**A**	**R**		
	5) Defining and communicating AM roles & responsibilities		**A**	**R**		
	6) Ensure practice consistency across the City as applicable and appropriate			**R**		

Practice/Process	Related Accountabilities	Senior Management	AM Champion	Steering Committee	Program Manager	AM N Implementation
	7) Ensure integration of the AM System with corporate Policies / SOPs / Management systems. (includes implementing and influencing)	**A**		**R**		
	8) Understanding, making decisions, and co-ordinating various AM programs, projects and initiatives that have a broad corporate scope and influence				**A**	**R**
	9) Maintaining, the necessary corporate capacity (including, but not limited to, resourcing, financial support, staff competencies, business processes, data and integrated information systems) to manage risk and support the elements and practices of the AM System	**A, R**				
	10) Corporate data governance - creating guidelines & standards for collecting and storing asset data throughout the City including documenting systems, content and quality of available information			**A**	**R**	
	11) Championing the AM program within the corporation;	**R**	**R**	**R**	**R**	**R**
Continuously Improving AM	1) Ensuring the implementation of the AM System meets the purpose and objectives of the AM Policy			**A**	**R**	
	2) Ensure AM status/maturity assessments are completed on a regular basis to identify gaps, and recommend improvement actions			**A**	**R**	
	3) Undertaking performance and quality reviews to monitor the achievement of AM Objectives and ensure that the AM System is achieving intended outcomes			**A**	**R**	
	4) Ensure an improvement plan / roadmap is developed and maintained with clear targets, prioritized improvements, and well specified deliverables			**A**	**R**	
	5) Maintain peer relationships and understanding of evolving good practices and ensure that the City's AM program is appropriately aligned with them			**A**	**R**	
	6) Stewarding and continuously improving corporate AM program documents (Policy, Strategy, guidelines, standards etc.)			**A**	**R**	

Practice/Process	Related Accountabilities	Senior Management	AM Champion	Steering Committee	Program Manager	AM N Implementation
	7) Defining and supporting AM sustainment activities across the City				**A**	**R**
	8) Manage AM competency, capability and capacity within the City	**A**		**R**		
	9) Develop necessary training programs for development and ongoing support of asset management program			**A**	**R**	
	10) Monitor and manage the effectiveness of the overall AM System in achieving and supporting the City's objectives		**A**	**R**		
Sustainable Practices	1) Establish sustainability goals for the AM program		**A**	**R**		
	2) Assess if AM outcomes are meeting the sustainability goals		**A**	**R**		
	3) Ensure energy efficiency, other carbon footprint reduction initiatives, climate change adaptation and resilience, and other relevant Council sustainability policies are included in the AMPs			**A**	**R**	**R**
	4) Ensure adequate corporate direction on long term planning assumptions and sustainability policies is developed and provided to planning and investment teams	**A, R**				
	5) Ensure that the long term plan is updated and aligned with the AM Objectives		**A**	**R**		
	6) Ensure integration of long term planning and TBL into AM practices			**A**	**R**	
Managing Risk	1) Identify and manage risk in the AM system			**A, R**		
Stakeholder Consultation/ communication	1) Identify, engage and inform internal stakeholders		**A**	**R**		
	2) Identify, engage and inform external service and investment partners		**A**	**R**		
	3) Oversight of external stakeholder engagement practices			**A**	**R**	
	4) Provide a communication / translation interface between political & administrative elements (via CAO)		**A**	**R**		

3.2.3 Communication & Awareness

Communication is recognized in the AM strategy as a two-way mechanism that utilizes various channels (newsletters, intranet, face-to-face, etc.):

- To engage the City's stakeholders at all levels and
- To give them an opportunity to provide valuable feedback on the transformation which can often improve deliverability.

Collectively this helps build awareness and desire to achieve buy-in for the change with a common understanding of asset management principles and the asset management roadmap across the City. As the transformation gathers momentum, these tools will help with embedding the change and the business transformations remain sustainable. The following table provides a summary of the four dimension of the City's AM communication plan.

Table 39 – Dimensions of the Communication Plan

Dimensions	Description
What is being communicated	This part of the plan includes information on the message to be conveyed regarding AM policy, AM objectives, etc.
When to communicate	This part of the plan indicates the frequency and timeline for the messages.
With whom to communicate	This part of the communication plan identifies the different internal and external stakeholders and the different messages to be communicated based on stakeholder requirements.
How to communicate	This part of the communication plan includes the various channels, such as corporate website, newsletters, intranet, meetings, etc.

Components on coaching and training (to build knowledge and ability across the organization) will need to be considered as the asset management roadmap moves forward.

3.2.4 Competency

Competence is defined under ISO 55000 as the *"ability to apply knowledge and skills to achieve intended results*". The City initiative therefore focuses on the development of competency framework as a model that broadly describes performance excellence within the City.

Competency frameworks provide clarification around the behaviours expected at different levels throughout the organization. A foundation for integrating all HR processes around selection, retention, development and career transition.

Table 40 – **Components of the City's Competency Framework**

	Components	Description
1	**Core Value**	These are principles that influence people's actions and the choices they make. They are ethical standards that are based on the standards of conduct for the international civil service and are to be upheld by all staff.
2	**Core Competencies**	These provide the foundation of the framework, describing behaviours to be displayed by all staff members. They are defined by occupational roles for a given job.
3	**Functional Competencies**	These are defined by duties and responsibilities assumed by staff members for a given job. Based on the job complexity and level of responsibility, and the seniority of the occupational role, an average of three to five functional competencies are assigned to a given job.

Competencies ensure that:

- Clear expectations are set and staff members are guided as to how they can assume and reinforce behaviours in line with the City's mission, culture and goals.
- A shared language is created to describe what is needed and expected in the work environment, thereby providing for reliable and high quality performance delivery.
- The various facets of human resources management can be integrated, enhancing consistency in human resources planning, recruitment, learning and development, and performance management, and thereby contributing to the streamlining of human resources operations and ultimately to efficiency gains.
- Skills gaps are addressed, strengths are further developed and requirements for career progression are clarified.
- Staff mobility, organizational change and shaping of the organizational culture are fostered.

The following table provides an outline of the three steps in the competency management process contemplated in the City's AM strategy.

Table 41 – Competency Management Process

Process		Description
1	**Planning**	Competencies are applied in job design, which involves the determination of the job content, the requirements to carry out the job and the relationships between the job holder and other staff. In this context, competencies ensure that the attributes, skills and behaviours necessary to achieve the highest performance standards for a given job are specified. Identify and assess 'competency gaps' in individuals and groups, thereby providing valuable insights for creating highly targeted development and training initiatives.
2	**Recruitment**	Competencies form an integral part of the selection process, facilitating the assessment of candidates to determine their suitability for a given role in the City.

Process		Description
3	**Performance Management & Staff Development**	Competencies facilitate the establishment of performance standards/ expectations against which staff will be assessed, and the identification of individual and city wide staff development priorities. Focus employees on what is critical to enhancing their performance and increasing their level of work satisfaction. Provide a roadmap for employee development and career planning. Succession planning.

3.2.5 Key Findings & Initiatives

The following table provides a summary of the key findings associated with the City's stakeholder engagement plan, AM governance framework, communications plan and competency framework.

Table 42 – General Observations Regarding Governance

	City Strengths	City Weaknesses
Stakeholder analysis	• Some departments, such as IT, have established working groups for cross-disciplinary discussions	• Lack of a stakeholder register and formal stakeholder analysis
Governance	• The City has established an integrated AM Steering Committee	• Lack of formal RACI charts to clarify roles and responsibilities for AM procedures • Limited resource dedicated to asset management procedures • Limited staff time available for asset management. Work being done at the side of the desk
Communication & awareness	• The AM steering committee is actively engaged in pursuing the development of AM practices and recruiting input from different service areas	• Lack of a formal communication plan
Competency framework	• Staff members involved in asset management want to expand their knowledge and understanding	• Lack of a formal AM competency framework • No succession planning and knowledge transfer from framework

The preceding observations have been used to develop the following considerations for the continual improvement of the City's AM governance framework.

Table 43 – Strategic Initiatives

ID	AM Strategy Initiatives	Initiatives in Chapter 5
1	Establish an inter-disciplinary team including staff from engineering, planning, finance & IT, Parks & Recreations and Electrical to undertake detailed reviews of each asset class	1, 7, 9
2	Refine the AM Committee governance structure to clarify roles and responsibilities	9
3	Develop RACI Charts for core procedures	9
4	Encourage the transfer of knowledge from staff who hold significant asset management Information	7, 9, 10
5	Continue to promote asset management best practices, training, and awareness sessions	9, 10

The governance initiatives developed from the above opportunities is provided in further detail in Section 6. A full suite of prioritized improvement initiatives have been included as a roadmap in Chapter 7.0.

3.3 Processes (#3)

ISO 55001 promotes the management systems approach to managing an organization's assets, which includes the documentation of key asset management processes. Some of the attributes of an organization that has adopted a management system approach are included below:

- Leadership must be committed to leveraging a management system approach, including documented processes for organizational results.
- Employees are each aware of the value that they bring through their involvement in the organization's processes.
- Processes have well-defined ownership.
- There is a focus on the continual improvement of the processes.

The output of this initiative will then be a prioritized plan for the development and revisions of the organization's processes and procedures. This will include the workflow for creating and managing processes and procedures and will set down standard templates for future procedures and processes following a standard template.

The purpose of this initiative is therefore to create a (documented) plan for the organization that covers what existing documented processes and procedures are in place, what are the key missing documents and, based on limited resources, what are the priorities for updating existing and creating new processes and procedures.

Whilst staff within the City will likely already have a view on the priorities for filling in the gaps, without a documented plan, there is a danger that individuals may be still working to their own priorities, which may lead to inefficiencies due to resources being expended in the wrong areas.

It is not expected that documented processes and procedures will be necessary for all activities performed by the organization, but the aim is to focus on those key activities identified in ISO 55001, where the maximum value will be released by the documenting of processes along with the subsequent training of staff.

3.3.1 Framework

They following figure provides an illustration of the different types of processes associated with the overall AM Framework.

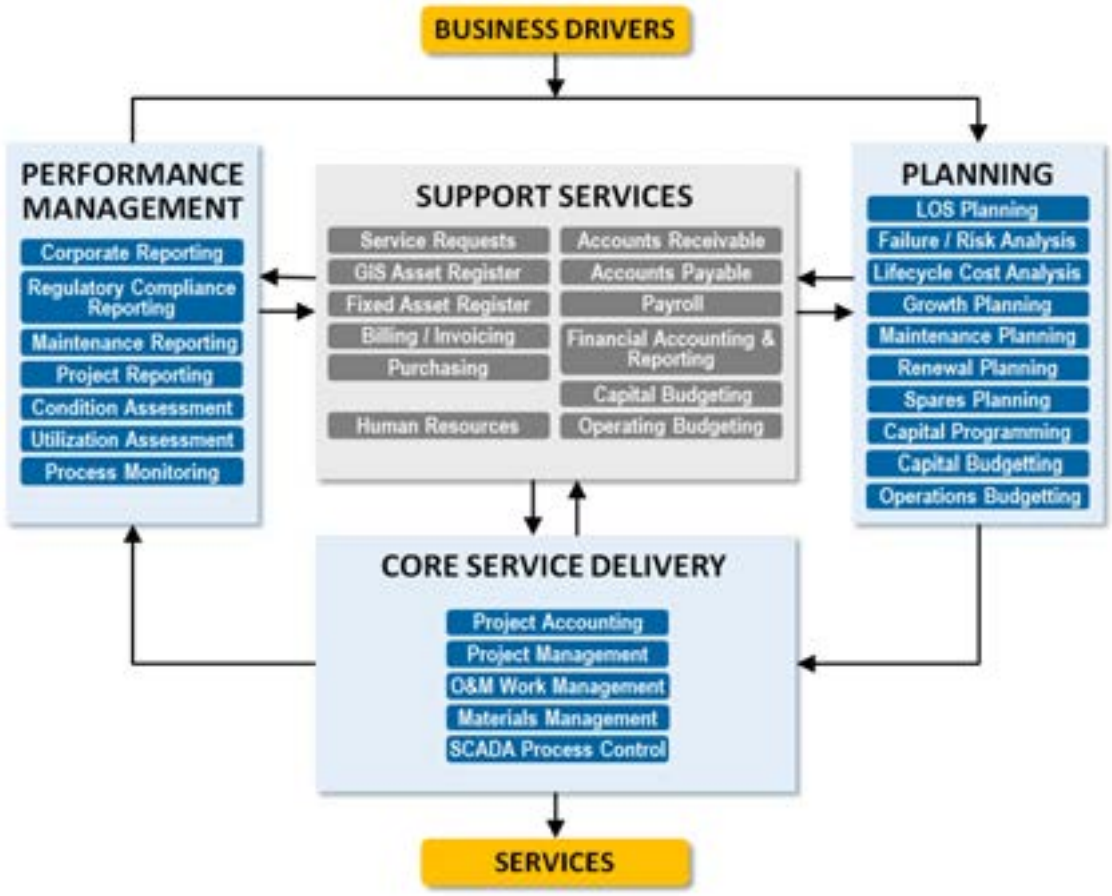


Figure 8 – Business Processes Aligned to the AM Framework

The following table provides a summary of how the City makes the distinction between a process, procedure and work instruction.

Table 44 – Distinction between Process, Procedure and Work Instruction

	Processes	Procedures	Work Instructions
Definition	"The transformation of inputs into outputs" (ISO 55000). Processes typically operate across many City functions and cross department lines. A complex process may contain many procedures.	A sequence of steps taken to achieve an activity within a process.	Detailed information on how to perform a task(s) within a procedure or set of procedures.
Purpose	• To establish the City's business expectations • To link people, information, systems and other assets to deliver value to customers • To provide high-level structure to activities or tasks that produce a specific service or product for particular stakeholders	• To describe how the City operates and controls its business • To define, document, and maintain control • To ensure consistent results • To ensure compliance	• To clarify details within some of the steps of a procedure • To prevent errors from the execution of a procedure • To ensure consistent results • To ensure quality control
Interactions	• A complex process may contain many procedures	• Procedures often interact with one another • Procedures are used to implement processes • Procedures are supported by work instructions, as may be required	• Work instructions serve to support procedures • Work instructions are typically restricted to single functions and single departments within an organization

A process defines "what" needs to be done and the roles that are involved. The following table illustrates the three main types of processes that are contemplated in the City's AM strategy: a) primary processes, b) support processes and c) management processes.

Table 45 – Different Classes of City Processes

Classes	Description and Purpose	Examples
Primary Processes	These are cross-functional and deliver value to the City's customers. They are the essential activities that the City performs to accomplish its mission.	• Customer complaint/service request • Equipment maintenance process
Support Processes	These are designed to provide support the City's primary processes. Support processes do not generate direct value to the City's customers but they are still critical to the organization.	• Document control processes • Work order completion process

Classes	Description and Purpose	Examples
Management Processes	These processes are used to monitor measure and control the City's business activities. These ensure that the City's primary and support processes meet operational goals. Management processes do not directly add value to customers but are integral to the City's policies and objectives.	• Quality review process • Internal audit process

The following table provides a description of core processes and practices within the AM system that support each step of the AMBC Framework.

Table 46 – Core Processes under the AMBC Framework

Core Process / Practices	Scope / Intended Outcome	References
Framework Reference: ASSESS		
AM Maturity Assessment	Assessment of the AM system and improvement areas.	SAMP
State of Infrastructure	Document the inventory, asset condition/performance, and value of assets. This assessment is the foundation for the development of AMPs.	AMPs
Information Management	Define which data on assets and AM practices need to be recorded, the process for recording it, and where it is recorded. This includes asset condition, utilization and performance.	AMPs
Framework Reference: PLAN		
Plan and document the AM System	Document the City's commitment to AM, overarching AM principles, and AM governance structure. Document AM object and the role of the AM System in supporting those objectives.	AM Policy/ SAMP
Levels of Service (LOS)	Define LOS measures at the corporate level, at the customer level, and at the asset level. Set targets and track performance again targets.	AMPs
Long Term Financial Planning	Develop a plan for meeting future demand and infrastructure needs.	Financial Plan
Asset Lifecycle Planning	Develop lifecycle models to forecast long-term investment needs based on asset lifecycle management strategies.	AMPs
Risk Management	Use risk to develop short-term (1 to 3 year) investment needs to maintain and deliver target levels of service. Empower service areas to plan actions to prevent or reduce undesired effects.	AMPs
Demand Forecasting & Management	Forecast and plan for meeting future growth and demand; including capital, operating and non-asset solutions.	AMPs/ AM Master Plans

Core Process / Practices	Scope / Intended Outcome	References
Investment Planning	Apply the LOS, risk and demand forecasting process to develop 10-year capital and operating plans.	Capital Plans/ Operating Plans
Framework Reference: IMPLEMENT		
Implement AM work programs	Implement programs of work contained in planning documents.	SAMP / AMPs
Performance reviews & reporting	Continuous improvement in the effectiveness and efficiency of the AM System and service delivery.	Annual & Financial Reports

3.3.2 Supply Chain Management

The City has sophisticated supply chain management procedures that are captured in management artifacts such as the procurement policy. The following table provides a summary of the City's existing documented procedures arranged by asset life cycle stage.

Table 47 – Existing Documented Processes Arranged by Asset Lifecycle

Asset Life Cycle Stages	Documented Processes & Procedures (and policies)
General	• Asset Management Policy (2017) • Staff training manual (Parks & Rec) • After-hours access to the work yard • Call out procedure • Overtime
Asset Acquisition	• Procurement Policy (Nov. 2013) • Recording new tangible capital assets (May 2018) • Calls for Service

Asset Life Cycle Stages	Documented Processes & Procedures (and policies)
Asset Maintenance	• Annual pressure w ashing • Street sw eeping • Snow removal • Asphalt patching • Call before you dig • Inspection & maintenance of sidew alks • Overflow s from sanitary sew er pump stations • Repairs to sew er system connections • Water main breaks (Water) • Water branch maintenance (Water) • Vehicle accidents (Fleet) • Vehicle inspections (Fleet) • Hydrostatic testing of property w ater service connections for pipes 100 mm diameter or higher • Pigeon dropping small area clean-up • Regulatory sign inspection • Placing a fire hydrant out of service
Asset Operations	• Vehicle key access • Parking • Fueling • Forklift use • Handling of sharps • Hazardous spills • Oil spill response • Packing of the asphalt truck and off-loading of roller from trailer • Snow plow installation • Storage of file boxes • Use of air shoring • Safe use of a chainsaw
Asset Renew als	• Annual capital projects
Asset Upgrades	• Annual capital projects
Asset Decommissioning	• Single Family Demolition – Disconnection of services & new connections to developed and previously undeveloped lots

There are many other life cycle stewardship procedures being followed by staff but these have not yet been formally documented.

Core practices and processes within the AM system assist staff in the efficient and effective management of assets and delivery of services. The development, implementation and improvement of asset management practices, and the documentation of associated processes is an ongoing

activity. The AM Steering Committee is responsible for developing guidance that facilitates a consistent approach for these processes and practices across the organization.

Core practices and processes within the AM system are summarized in the following table.

Table 48 – Types of Documented Procedures

Process	ID	Process or Practice	Scope / Intended Outcome
Assessment Processes	**1**	AM Maturity Assessment	Assessment of the AM System and improvement areas.
	2	State of Infrastructure	Document the inventory, asset condition/performance, and value of assets. This assessment is the foundation for the development of Asset Management Plans.
	3	Information Management	Define which data on assets and AM practices need be recorded, the process for recording it, and where it is recorded. This includes asset condition, utilization, and performance
Planning Processes	**4**	Levels of Service (LOS)	Define Levels of Service measures at the corporate level, at the customer level, and at the asset level. Set targets and track performance against targets.
	5	Long Term Financial Planning	Develop plan for meeting future demand and infrastructure needs.
	6	Asset Lifecycle Planning	Develop life-cycle models to forecast long-term investment needs based on asset lifecycle management strategies.
	7	Risk Management	Use risk to develop short-term (1 to 3 year) investment needs to maintain and deliver target levels of service; empower service areas to plan actions to prevent or reduce undesired effects.
	8	Demand Forecasting & Management	Forecast and plan for meeting future growth and demand, including capital, operating and non-asset solutions.
	9	Investment Planning	Apply the LOS, Risk, and Demand Forecasting processes to develop 10 year capital / operating plans.
Implementation Processes	**10**	Management & business reviews	Continuous improvement in the effectiveness and efficiency of the AM System.
	11	Performance review & reporting	
	12	New asset introduction and legacy asset removal	
	13	Management of change to assets	

The City currently does not have a full suite of flow charts and decision trees to formalize its processes. Included below is an example of one of the flow charts that have been develop by the Engineering Department for its water assets.

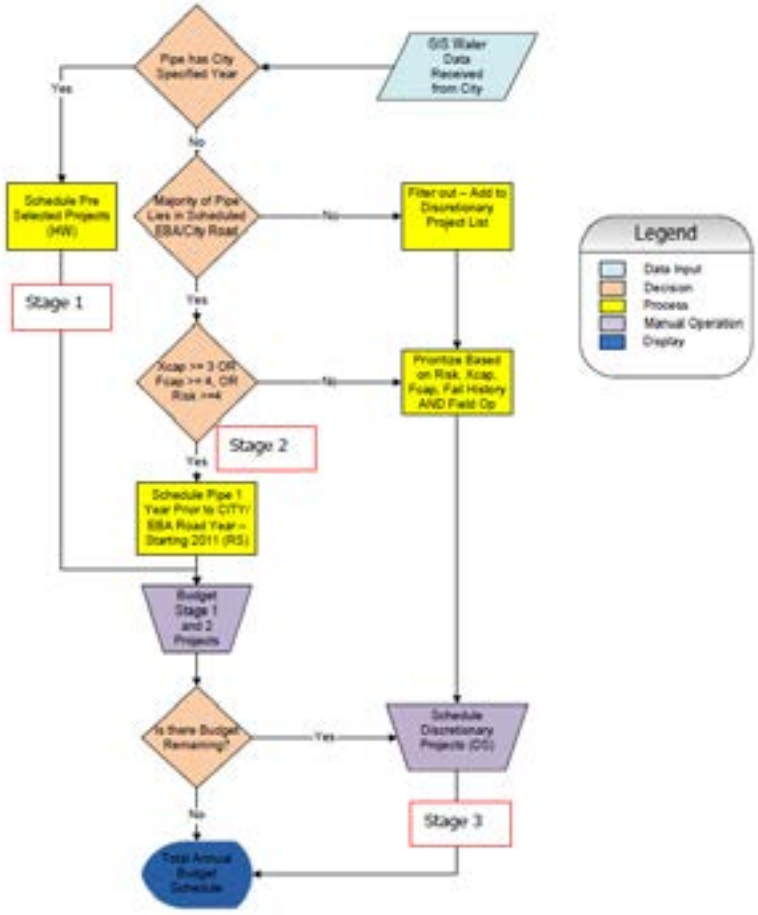


Figure 9 – Example Flow Chart

As of late 2018 the vast majority of the City's documented processes have not been mapped as workflow diagrams.

3.3.3 Service-Based Decision Making

Assets exist to provide a service to the customers. Decision-making should therefore be centered on maintaining service and not just on maintaining assets. Customer Level of Service (CLOS) measures the customers' experience of municipal services and it is a critical mechanism for driving a customer focus into decision-making in an asset-intensive organization. It is closely related to but distinct from customer service policies. CLOS is often set up to measure the degree of compliance with those policies. CLOS takes a wide interpretation of the term "customer" to include all major stakeholders such as the environment, legislation and staff. It is useful to think of it as a contract between customers and the service provider.

Current CLOS may not entirely meet customer expectations and so it is a primary tool for the management team to drive improvement through both capital and operational strategies. The Service Provider should publish performance to customers when the numbers have stabilized and consult customers on the affordability of any major improvements in CLOS.

CLOS are created from the core customer values of municipal services. The following table provides an outline of the seven (7) universal values.

Table 49 – The Universal Customer Values

Need/Value		Description
1	**Available**	Services of sufficient capacity are convenient and accessible to the entire community
2	**Cost Effective**	Services are provided at the lowest possible cost for both current and future customers, for a required level of service, and are affordable
3	**Reliable**	Services are predictable and continuous
4	**Responsive**	Opportunities for community involvement in decision making are provided; and customers are treated fairly and consistently, within acceptable timeframes, demonstrating respect, empathy and integrity
5	**Safe**	Services are delivered such that they minimize health, safety and security risks
6	**Suitable**	Services are suitable for the intended function (fit for purpose)
7	**Sustainable**	Services preserve and protect the natural and heritage environment

This initiative serves to close the gaps between the City's current state and the requirements of ISO 55001. Table 5-18 includes some definitions of terms that are central to this initiative.

Table 50 – Key Measurement Terms

Dimensions	ISO 55000 Definitions	Scope
Objective	"A result to be achieved".	It can be strategic, tactical or operational. It can relate to different disciplines (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product and process).
Performance	"A measurable result"	It can relate either to quantitative or qualitative findings. It can relate to the management of activities, processes, products (including services), systems or organizations.
Requirement	"A need or expectation that is stated, generally implied or obligatory"	"Generally implied" means that it is custom or common practice for the organization and stakeholders that the need or expectation under consideration is implied. A specified requirement is one that is stated, for example in documented information.

Asset management translates the organizational objectives into technical and financial decisions, plans and activities. Asset management decisions (technical, financial and operational) collectively enable the achievement of the organizational objectives.

The scope of Asset management objectives, requirements and performance apply at different levels. The views of stakeholders can have a significant impact on the organization's asset-related decisions.

Table 51 – The Different Levels at which Performance is to be Measured

Levels of Performance	Description	Example
Asset Performance	How well the City's individual assets (such as a roof or boiler) are doing	The failure of a piece of equipment due to inadequate care and maintenance during its lifecycle.
AMS Performance	How well the City's asset management system is achieving its intended purpose	The failure of an organizational process to adequately achieve an objective.
Asset Management Performance	How well the principles and concepts of asset management are being embedded at the City	The failure to communicate asset management awareness due to inadequate stakeholder engagement.

Criteria are the principles or standards by which something may be judged or decided. Listed below are some examples of the criteria and the associated measures that could be used by the City's departments in the setting of their respective Asset Management Objectives.

Table 52 – Examples of AM Objectives and Corresponding KPIs

Criteria	Measuring at the City Level	Measuring the Customer Level	Measuring the Technical Level
Safety Keep people away from harm	• Number of successful law suits; • Number of successful insurance claims; • % of staff lost time to injuries; etc.	• Number of reported hazards; etc.	• Number of recordable Incidents; • Time to respond to hazards; etc.
Accessibility The ease of access to the services/assets	• Number of SkyTrain Stations within the City; etc.	• Number of road closures; etc.	• % compliance with standards; etc.
Reliability Minimize downtime and interruption of services.	• Number of references in the press, journals and at industry conferences; etc.	• Duration of shutdowns; etc.	• Number of shutdowns; • % compliance with standards; etc.

Criteria	Measuring at the City Level	Measuring the Customer Level	Measuring the Technical Level
Quality The functionality of the services/assets, relative to nuisances such as noise, vibration, olfactory issues, etc.	• Number of references in the press, journal paper and industry conferences; etc.	• Number of functional complaints; • Types of repeat functional complaints; etc.	• Number of corrective work orders; • Number of active maintenance work orders; • % compliance with standards; etc.
Aesthetics Keep the assets looking good	• Number of references in the press, journal paper and industry conferences; etc.	• Number of aesthetic complaints; etc.	• Number of active maintenance work orders; etc.

A trade-off is defined as "a balance achieved between two desirable but incompatible features; a compromise." A trade-off is considered appropriate if the organization understands where it is has made compromises and those compromises are in alignment with the organization's objectives. In setting realistic Asset Management Objectives, the City will need to consider a number of trade-offs. These will need to be documented in the SAMP.

Supporting the customer service levels are operational or technical measures of performance. These technical measures relate to the allocation of resources to service activities to best achieve the desired customer outcomes and demonstrate effective performance. Technical service measures are linked to the activities and annual budgets covering:

Table 53 – Technical LOS Parameters

Life Cycle Activities	Description	Examples
Operations	The regular activities to provide services	Opening hours, cleaning, mowing grass, energy, inspections, etc.
Maintenance	The activities necessary to retain an asset as near as practicable to an appropriate service condition. Maintenance activities enable an asset to provide service for its planned life	Road patching, unsealed road grading, building and structure repairs
Renewal	The activities that return the service capability of an asset up to that which it had originally	Road resurfacing and pavement reconstruction, and building component replacement
Upgrade/New	The activities to provide a higher level of service or a new service that did not exist previously	Widening a road, sealing an unsealed road, replacing a pipeline with a larger size

Stakeholder objectives should be classified into two groups: customer vs. technical. For instance, customer objectives are those requirements that are important to the public, such as pedestrian safety. On the other hand, technical objectives are important to internal staff, such as number of planned maintenance tasks completed per month.

The following table includes a summary of the key steps to be considered the future development of the City LOS framework.

Table 54 – The LOS Process

Steps	Tasks	Details
Step 1	**Identify universal customer values**	Industry standards suggest that level of service measures be arranged into the following categories: availability, cost-effectiveness, reliability, responsiveness, safety, suitability, and sustainability
Step 2	**Establish business objectives**	Business objectives are defined for each customer value and then CLOS measures are defined for each business objective. A CLOS measure may not be a complete and thorough measure of whether an objective has been achieved but should be a good, representative measure.
Step 3	**Develop CLOS measures**	Develop customer service measure that are arranged into the universal customer values: a) safety; b) quality; c) reliability; d) accessibility
Step 4	**Establish TLOS measures**	Develop technical service measured arranged into four categories, as follows: a) operations; b) maintenance; c) renewals and d) upgrades
Step 5	**Monitor performance – collect data**	Once CLOS measures have been defined then data can be collected to provide a performance baseline. It is important to achieve a robust performance baseline that accurately reflects the experience of the customer
Step 6	**Set targets**	Then the Service Provider can start to set performance targets and develop strategies to gradually improve towards targets
Step 7	**Benchmark results**	Compare the organization's performance scores against other similar organizations within different regions.
Step 8	**Publishing of performance results and consulting with customers**	Publishing performance to customers and consulting with customers on targets and affordability of strategies should be done as soon as there is confidence in the numbers

Through participation in the NWWBI initiative, the City has developed KPI reports using the prescribed formats. The following table provides a summary of the twenty-one (21) performance measures developed by the water asset class and categorized by implementation phase.

Table 55 – Examples of LOS Measures in the Water Asset Class

Goal	ID	Performance Measure	System
Provide reliable service and infrastructure	1	# of main breaks/100 km of length	Cityworks/GIS
	2	% of valves cycled	Cityworks/GIS
	3	% of inoperable or leaking valves	Cityworks/GIS
	4	% of hydrants inspected and winterized	Cityworks/GIS
	5	% of inoperable or leaking hydrants	Cityworks/GIS
	6	# of emergency service connection repairs & replacements/# of service connections	Cityworks/GIS
	7	# of unplanned system interruptions/100 km length	Cityworks/GIS

Goal	ID	Performance Measure	System
	8	Total customer days without service/total # of service connections	Cityworks/GIS
	9	Total corrective maintenance hours/total maintenance hours	Cityworks/GIS
	10	Total maintenance hours/km length	Cityworks/GIS
Meet service requirements with economic efficiency	11	# of O&M FTEs/100 km length	Cityworks/GIS/JDE/Kronos
	12	Total # of FTEs/100 km length	Cityworks/GIS/JDE/Kronos
	13	# of in-house metering field FTEs/1000 meters	Cityworks/GIS/JDE/Kronos
	14	O&M cost ('000)/km length	Cityworks/GIS/JDE/Kronos
	15	Pipes O&M cost ('000)/km length	Cityworks/GIS/JDE/Kronos
	16	Metering O&M cost/# of meters	Cityworks/GIS/JDE/Kronos
	17	Cost of fire hydrants O&M/# of fire hydrants	Cityworks/GIS/JDE/Kronos
Provide a safe and productive workplace	18	Total available O&M hours/total paid O&M hours	Cityworks/GIS/JDE/Kronos
	19	Total overtime O&M hours/total paid O&M hours	Cityworks/GIS/JDE/Kronos
Have satisfied and informed customers	20	# of water pressure complaints by customers/1000 people served	Cityworks/GIS
Protect public health and safety	21	% of cumulative main length cleaned	Cityworks/GIS

As of late 2018, similar criteria has not yet been formally developed by the other service areas.

3.3.4 Triple-Bottom Line Decision-Making

The City currently follows a traditional maintenance management approach to delivering services and does not have a consistent, documented method of investment decision making. This makes it difficult for decision makers to objectively judge how best to balance needs and benefits and to assign appropriate funding. The current situation also makes it difficult for decision makers to know the long-term impacts of their funding choices.

Rather than a piecemeal approach, the City views the community in ways that take into account the interconnection between the economy, the environment and society. TBL is a method for ranking alternatives based on how well they rate against a chosen set of objectives. It is an aid to making decisions about major infrastructure improvements. The three groups of TBL objectives (social, environmental and financial) are weighted by relative importance, and the overall "decision score" of an alternative is the weighted sum of its rating against each criterion.

TBL Assessment is a form of MODA (Multi-objective decision Analysis) that ensures that the objectives being considered include the triple bottom line of People-Planet-Prosperity.

There is considerable research demonstrating that good decision outcomes are influenced more strongly by the quality of the process rather than the quantity and detail of analysis . When projects are complex technically with many important, diverse stakeholders, GHD uses best practices from decision theory to ensure project success. A structured decision process utilizes a series of techniques within a flexible, proven framework. The following table provides a summary of the different elements of the TBL framework.

Table 56 – TBL Framework

TBL Framework		Description
1	**Affordability and Economic Viability**	The City's long-term financial performance can be considered sustainable only when the planned long-term service standards and associated infrastructure investment levels can be met without resorting to unplanned increases in property taxes/rates or disruptive cuts to/reductions in services. More specifically, the City is considered financially sustainable when the following conditions are met: • A reasonable degree of stability and predictability exists for property taxes/rates. • Future generations will not face massive decreases in services or unreasonable property tax/rate increases to deal with items deferred from this generation. • The current generation does not bear all the burden of funding items that will benefit future generations. • The City Council's highest priority programs (both capital and operating) can be maintained. • In recognition of the need to establish an appropriate balance between developing new assets and maintaining its existing asset base, the City is committed to managing its assets in accordance with sound, industry-recognized financial AM practices.
2	**Environmental Responsibility**	Decision makers must consider environmental factors over the entire life cycle of the proposed asset. These considerations need to inform asset planning, design, tender specifications, construction materials selection and techniques, operating models, and disposal procedures. In addition, the effects of climate change (such as increased potential for flooding and/or drought and freeze-thaw cycles) must form part of the decisions for long-lived assets that may be significantly affected by these changes. Environmental responsibility goes beyond managing hard physical assets in an environmentally conscious manner. The need to effectively manage green assets to deliver environmental, economic, and social benefits to the community is also important. Similar to infrastructure assets, green assets must be managed from a life cycle perspective.
3	**Social Responsibility**	The City is a creative, engaged, and inclusive community that celebrates its rich culture. It is a place where people are welcomed and where they want to be. The City's population is rapidly increasing, outpacing previous forecasts. e. Residents depend on the City's infrastructure. The sidewalks, walkways, roads, and transportation networks allow them to get to school, work, and play. Their health relies on the safety and security of the water, sewer, and storm water systems. This SAMP and related supporting documents will inform decision making so that issues such as access, equity, health, and safety can be considered during service/asset planning. Infrastructure assets must be designed and managed with the needs of growing and changing demographics in mind. The quality of these assets will ultimately affect the City's operational, maintenance, and renewal costs, which are recouped from property owners through annual property taxes/rates and charges.

One of the fundamental goals of the City's asset management (AM) system is to support informed decision making that is based on the whole of life costs of delivering levels of service which support the organizational objectives. By following an AM approach, decision making will be linked to

achievement of organizational objectives and will reference and be supported by information contained in the City's AM documentation.

Table 57 – Triple Bottom Line Decision-Making Process

Decision Criteria Process		Description
1	**Frame the Problem**	The process beings with a clear understanding of the problem or issue being assessed • Clarify the project purpose. • Clarify who will ultimately make key decision • Understand who the key stakeholders are that will influence the decision or may be influenced by the decision. • Document the boundaries and key assumptions surrounding the project (these can be geographic, regulatory, political i.e., what's "on the table" or "off the table"). • Brainstorm and document anticipated issues and challenges (document key risks and uncertainties). • Clarifying the timing for key decisions that may affect this project. Understand the City's critical success factors (which will form the basis for the criteria used to evaluate project alternatives).
2	**Develop Objectives and Measurement Scale**	Objectives are grouped and categorized into a hierarchy, typically referred to as an objectives hierarchy. This grouping process is done to help structure the evaluation and distinguish between fundamental (ends) objectives, and sub-objectives that clarify and describe the fundamental objectives (means to the end). The SMART Framework suggests that objectives should be specific, measurable, achievable, realistic and time bound. Once the objectives have been structured, measurement scales are defined for each lowest level sub-objective within the objectives hierarchy. Measurement scales are used to specify the extent to which each alternative meets each sub-objective. Also, they can be used to: • Compare alternatives accurately and consistently. • Expose choices including choices among different degrees of uncertainty. • Generate productive discussion about better alternatives. • Prioritize information needs. • Communicate the rationale for and improve the transparency of choices among alternatives.

Decision Criteria Process		Description
3	**Develop Options to Achieve the Objectives**	Developing good alternatives is an iterative task. Initially, the task will be to develop a range of exploratory alternatives that may reflect substantially different approaches to the problem or different priorities across objectives. Eventually, alternatives will be carefully evaluated technically, to determine the extent to which they meet each sub-objective, and deliberatively, in terms of their relative desirability across the range of participants. By the time a final set of alternatives is developed, they should be: • **Value-focused** - meaning that they are explicitly designed to address the fundamental values or ends of the decision • **Technically sound** - meaning that in developing alternatives for achieving the objectives, the process has drawn on the best available information about cause and effect relationships and has designed creative and diverse alternatives based on sound analysis. • **Clearly and consistently defined** - meaning that all alternatives are defined to a sufficient and consistent level of detail using logically consistent assumptions, and that a base case or reference alternative against which all alternatives can be compared has been clearly established. • **Small in number and high in quality**, meaning that poor (dominated) alternatives have been eliminated and those remaining have been iteratively refined to incorporate new ideas and joint gains. • **Comprehensive and mutually exclusive**, meaning that individual elements or components of a strategy are combined into complete packages, and that the packages are directly comparable. • **Able to expose fundamental choices among competing objectives**, meaning that they emphasize rather than hide difficult but unavoidable value-based choices.
4	**Measure Alternatives**	Once the objectives, measurement scales, and alternatives have been articulated, they are linked in a performance table. This is a summary matrix illustrating how well each alternative achieves each objective.

Decision Criteria Process		Description
5	**Evaluate Trade-offs**	There are many types of trade-offs that need to be made in complex decisions. Listed below are some examples of trade-off frameworks: • Risk-cost-performance • People-planet-prosperity (TBL) • Short-term, medium-term, long-range MODA has been demonstrated to be practical, transparent, and builds trust with stakeholders. The monetary and non-monetary aspects are combined to show decision makers how much "non-monetary value" is associated with the net life cycle cost of each option. The process of conducting trade-off analysis comprises two primary steps: MODA establishes relative value weights for each criterion, then uses a weighted average of normalized scores and weights to achieve an overall "value score" for each alternative. Relative value weights for each criterion are established in facilitated workshops where the facilitator ensures that participants think clearly about the relative importance of different values. Weights are established using a modified swing weighting approach which allows consideration of each criterion's relative contribution to the decision goal as it is varied from the lower end of its measurement scale to the upper end of that scale. In other words, relative value weights are a function both of the intrinsic importance of a criterion and the extent to which that criterion varies among the suite of options. The weighting process can be conducted in a number of ways with decision makers and with stakeholder groups such as seeking a consensus set of weights for evaluation, testing some sensitivity weight groupings, or by reporting results for each stakeholder present in the room. Differences in the subjective preferences of stakeholders often brings out insights into how different value systems may affect the preferences for one alternative over another.
6	**Decide and Implement**	After deciding on a preferred approach, we will provide a discussion of key issues, challenges, opportunities, and constraints that should be evaluated to implement the selected alternative.

The following figure illustrates the planned evolution of the decision making approach in the City's AM system.

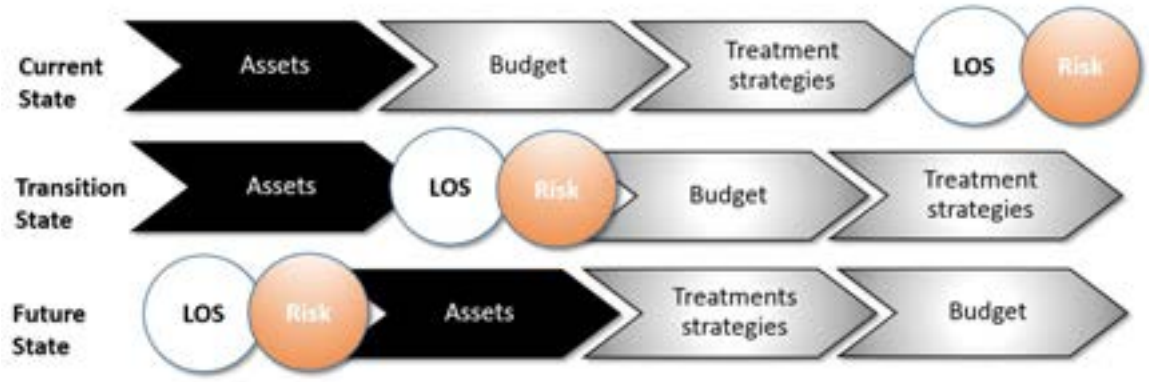


Figure 10 – **LOS and Risk Embedded into the City's Capital Planning Processes**

The City's current decision making processes use simple decision criteria to prioritize investment decisions. Currently the City has no formal overall defined method to compare the priority of different recommendations/requests coming from different service areas. The following table includes a summary of simple decision criteria that can be applied across the City's different lifecycle stewardship programs.

Table 58 – Decision Criteria across the City's Asset Life Cycle Stewardship Programs

Programs		Criteria for Each Program		Weightings
1	**Maintenance**	1.1	Service continuance and risk	n/a
		1.2	Existing contract commitments	n/a
		1.3	Asset condition	n/a
		1.4	Lifecycle maintenance strategies	n/a
		1.5	Coordination with others	n/a
			Total	**100%**
2	**Capital Renewal**	2.1	Public safety risk	n/a
		2.2	LOS performance	n/a
		2.3	Operating cost and efficiency	n/a
		2.4	Critical resilience and asset related risks	n/a
		2.5	Proactive renewal targets	n/a
		2.6	Adoption of a sustainable approach	n/a
		2.7	Coordination with others	n/a
			Total	**100%**

Programs		Criteria for Each Program		Weightings
3	**Capital new and Improvement**	3.1	Legislative requirements	n/a
		3.2	Committed / phased projects	n/a
		3.3	Serious threat to public health and safety	n/a
		3.4	Existing service gaps	n/a
		3.5	Alignment to Council's strategic direction	n/a
			Total	**100%**
4	**New Services**	4.1	Legislative requirements	n/a
		4.2	Growth adjustments	n/a
		4.3	Cost savings or inherent efficiencies	n/a
		4.4	Identified need with self-sustaining revenues available	n/a
		4.5	Identified need with no corresponding revenue possibilities	n/a
			Total	**100%**

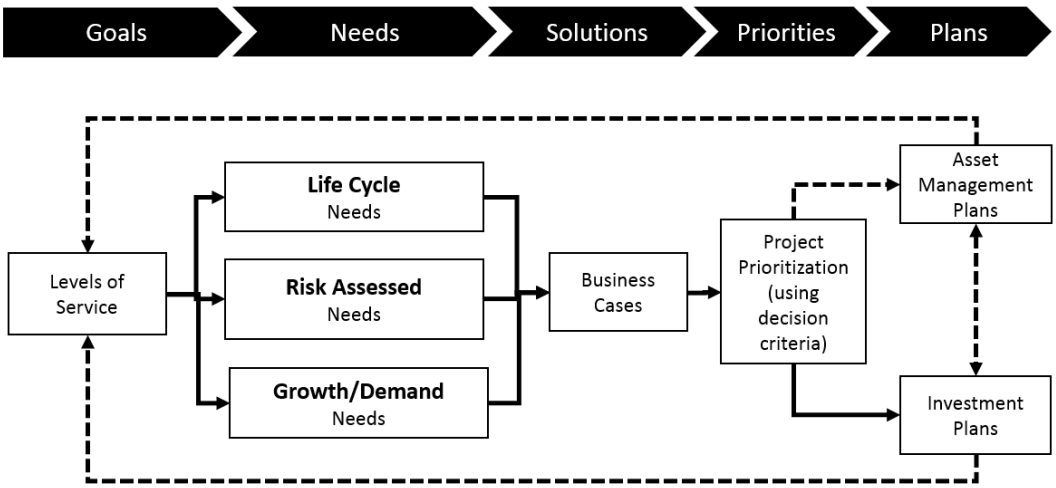


Figure 11 – Decision-Making in the Capital Investment Planning Process

Recognizing that some of the City's departments have started to formalize decision-making criteria, the following table provides a summary of the criteria, and corresponding weightings, developed within the transportation asset class.

Table 59 – Decision Criteria Developed by the Transportation Dept.

Decision Criteria		Description	Weightings
1	**Economic**	Financial impact on the community and its stakeholders	0.15
2	**Operational**	Impact on operational ability	0.19

Decision Criteria		Description	Weightings
3	**Social**	Impact on the community (also has a political aspect)	0.38
4	**Environmental**	Impact on the natural resources and environment	0.28
		Total	**100%**

As of late 2018, similar criteria has not yet been formally developed by the other service areas.

3.3.5 Risk-Based Decision Making

Risk is an integral part of managing the life cycle of infrastructure assets. Risk is defined by ISO 55000 as "the effect of uncertainty on objectives". The following table provides an outline of the six step risk management process that is contemplated in the City's AM Strategy.

Table 60 – Risk Management Process in Six Steps

Risk Process		Description
1	**Risk Context**	The process of scanning the context.
2	**Risk identification**	The procedures by which the City finds and describes its risks within the context of the organization. This include a scan of the City's internal and external parameters that must be considered when managing the City's risk. Risks are arranged into the following two types of risk management: • Enterprise risk (such as seismic events, pandemics, strikes, acts of war, dissatisfied stakeholders, reputational damage, etc.) • Asset risk (such as equipment failures, warranty failures, deferred maintenance backlogs, vandalism, injuries, inclement weather, service interruptions)
3	**Risk Analysis**	The procedures that the City uses to understand the nature, sources and causes of risks that have been identified. Here we focus on:: • Risk equations (PoF x CoF) • Consequences matrix • Likelihood matrix • Causal chains (root causes, proximal causes, fishbone diagrams, etc.)
4	**Risk Evaluation**	The procedures that the City uses to compare risk analysis results with its risk criteria in order to determine whether or not a specified level of risk is acceptable or tolerable to the City. Here the focus on things like: • Risk appetite and tolerance • Identification of critical assets • Risk scoring systems and ranking schemes • Risk matrix correlations (High-probability-high-impact; low-probability-low-impact, etc.)
5	**Risk Treatment**	The procedures the City uses to modify its risks by selecting one or more treatment and/or control options, such as: avoid the risk, reduce the risk, remove the source of the risk, and transfer the risk. Treatments are grouped into two broad categories: • Modifying the likelihood of the risk through measures such as: asset renewal, asset rehabilitation, standard operating procedures (SOPs); rigorous maintenance program, enhanced monitoring regime • Modifying the consequences of the risk through measures such as new redundant assets, contingency planning, and staff training Residual risk left over after treatment/control

Risk Process		Description
6	**Risk Monitoring & Risk**	The procedures the City uses to supervise and continually check and critically observe the risk register and risk plan. Review activities are carried out in order to determine whether something is suitable, adequate and effective way of achieving objectives.

In simplest terms, the City recognizes that risk can be calculated as the product of the likelihood of an "event" occurring and the consequence to the City when it does happen. In this context, the following table includes some examples of risk equations of different degrees of sophistication that can be applied to the City's assets.

Table 61 – Risk Equations of Varying Degrees of Complexity

Levels of Complexity	Risk Formula
Level 1	$Risk = Likelihood \times Consequences$ This formula utilizes the consequence with the maximum value
Level 2	$Risk = Likelihood \times \sum Consequences$ This formula sums up the value of all the consequences
Level 3	$Risk = Likelihood \times \sum (Probability \times Consequences)$
Level 4	$Risk = Likelihood \times \sum (Probability \times Severity \times Scale)$

Since the City is still in the early stages of the development of its risk framework, it is anticipated that the risk equation will be kept to Level 2 complexity. To this end, the following table provides an outline of the City's likelihood matrix, which represents one of the elements of the City' overall risk equation.

Table 62 – Likelihood Matrix

Likelihood		Score	Description
Almost Certain	≥90%	5	Very high probability that risk will occur in the next 36 months
Likely	≥70% to <90%	4	High probability that risk will occur in the next 36 months
Possible	≥25% to <70%	3	Moderate probability that risk will occur in the next 36 months
Unlikely	>1% to <25%	2	Low probability that risk will occur in the next 36 months
Rare	≤1%	1	Very low probability that risk will occur in the next 36 months

The likelihood bands in the preceding likelihood matrix will need to be reviewed and calibrated by the subject matter experts in each of the City's service areas.

A consequences matrix represents the second key element of the risk equation. The following table includes a summary of the strategic, political and reputational consequences and corresponding severity bands, with scores ranging from 1-5 points.

Table 63 – Consequences Matrix

Consequence Categories	1 Insignificant	2 Minor	3 Moderate	4 Severe	5 Catastrophic
Financial	Damages, losses (including 3rd party) or fines less than $10,000	Damages, losses (including 3rd party) or fines $10k to $100k	Damages, losses (including 3rd party) or fines $100k to $500k	Damages, losses (including 3rd party) or fines $500k to $1M	Damages, losses (including 3rd party) or fines greater than $1M
Health & Safety	No impact to health and safety	Minor injury or illness without lost time	Illness/injury resulting in lost time	Illness/injury resulting in permanent or long-term disability	Illness/injury resulting in fatality
Availability/ Reliability	Small number of customers experiencing disruption / impact (less than 100 people or up to 2 hours)	Localized service disruption / impact (100 to 500 people or up to 1 day)	Significant localized disruption / impact (500 to 1,000 people or up to 1 week)	Major service disruption / impact (1,000 to 5,000 people or up to 2 weeks)	Organizational wide service disruption / impact (greater than 10,000 people or loss of services for longer than 2 weeks)
Legislation	No expected violations of regulations, Acts or bylaws	Potential verbal or written warnings/ notices	Compliance orders or notice of violations	Potential for charges to individuals or the Corporation	Numerous charges to individual or the Corporation or labelling as a repeat offender
Environment	Very negligible impact or can be restored within 1 week	Material damage / improvements of local importance. Minor, short term (within 1 month) very isolated damage / improvements to the environment	Significant short term (up to 2 months) local damage / improvements to the environment	Significant long term (up to 1 year) widespread damage / improvements to the environment. Some Provincial importance.	Major long term (greater than 1 year) or permanent widespread damage / improvements to the environment. Federal importance.

The risk bands in the preceding consequences matrix will need to be calibrated as the City develops its risk framework. Once the likelihood matrix and consequence matrix have been developed and

calibrated by the City's subject matter experts in each service area, the resultant risk scores are plotted on a risk matrix. The figure below includes an illustration of the 5-by-5 risk exposure matrix.

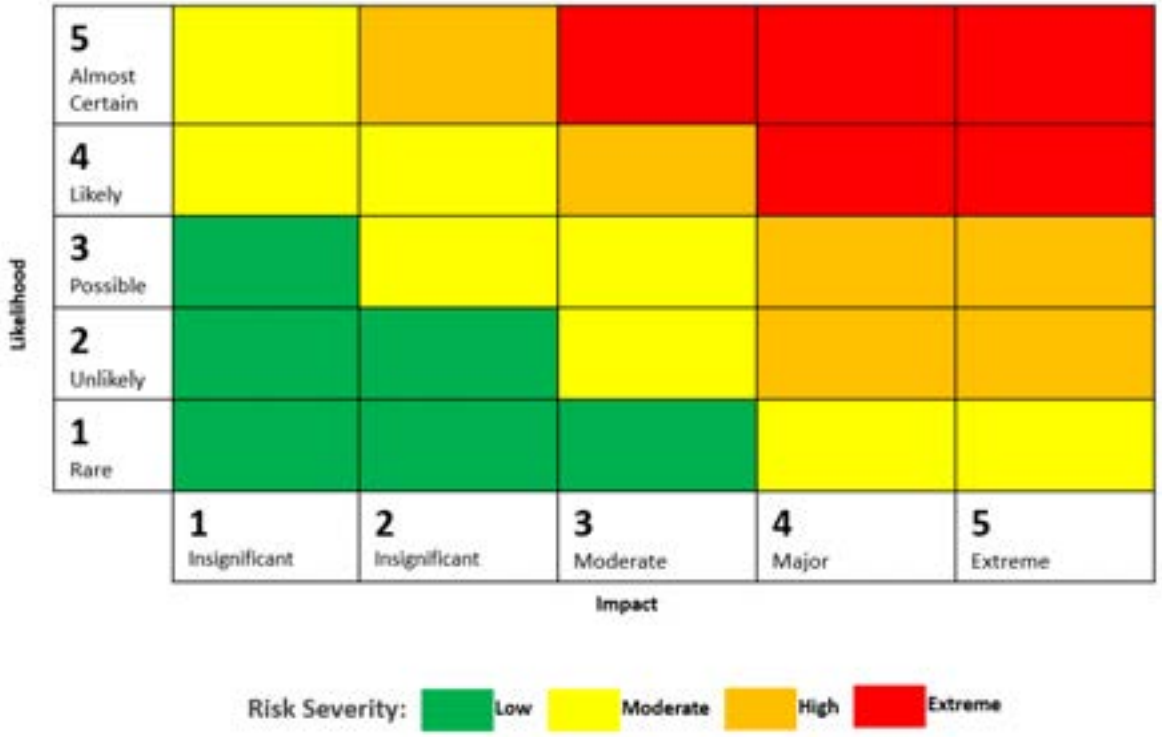


Figure 12 – Risk Exposure Matrix

Recognizing that some of the City's asset classes have embarked upon the journey of formalizing a risk framework, the following table provides a summary of some of the risk assessment outputs developed by the water and sewer asset classes. The established results below are from the Asset Management Program Phase III Summary conducted by Urban Systems in 2007.

Table 64 – Risk Assessment of the Water and Sewer Assets

Risk Level	Length of Water Main (km)	Length of Sanitary Main)
Highest	38.8	20.1
Moderate	132.9	132.9
Low	28.5	35.8
Unknown	0.3	2.2
Total	200.3	191.1

Approximately 38.8 kilometres (km) of the City's water mains and 20.1 km of the City's sewer mains fail into the highest risk category and therefore should be considered high priorities for replacement.

The following table provides a summary of eleven different types of risk reduction options contemplated in the City's AM strategy.

Table 65 – Range of Risk Reduction Options

Risk Reduction Options		Reduce Likelihood	Reduce Consequences
Capital Investments			
1	Asset Renewal	●	
2	Asset rehabilitation	●	
3	New redundant asset		●
O&M Protocols			
4	Enact Policy	●	
5	Develop SOPs	●	●
6	Rigorous maintenance program	●	
7	Enhanced monitoring regime	●	
8	Contingency planning	●	●
9	Staff training	●	●
10	Signage	●	
11	Critical spares inventory		●

The City currently employs a variety of these risk reduction strategies but has not formalized this into a formal risk treatment plan for each asset class.

3.3.6 Key Findings & Initiatives

The following table provides a summary of the key findings related to the City's documented procedures for asset management.

Table 66 – General Observations Regarding Documented Processes as Part of the AMS

Processes	City Strengths	City Weaknesses
Supply Chain Management	• Supply chain management procedures are sophisticated and well documented • There is a desire to address asset management in a more systematic manner • Planning processes aer sophisticated when assets are being replaced and costs are high	• There is a lack of documented asset management procedures

Processes	City Strengths	City Weaknesses
O&M	• Some documented procedures related to O&M • Documented procedures exist for planned maintenance procedures that require regulatory compliance (e.g. Fraser Health Authority, etc.)	• Documented processes are lacking for asset lifecycle stages beyond O&M, such as asset renewal and asset decommissioning
LOS	• Some KPI's have been established for departments in various departmental artifacts, such as electrical • Some demand/growth analysis analysis conducted when department's are proposing large projects	• Lack of a framework for level of service that can be used to communicate with Council and the public • Level of service not clearly defined or integrated into decision making • LOS measures are generally qualitative and do not include response time requirements • Lack of awareness among Council and the public of downward trend in level of service • Lack of systems or tools in place to collect, measure and review data • Public surveys do not correlate with specific asset classes • Performance quality is measured on the absence of complaints, such as for Parks & Rec
Risk	• A risk assessment has been conducted for the transportation asset class	• Risks to assets and service levels are not understood or documented • Asset risks are primarily based on staff experience and addressed intuitively/ subjectively by each department • There is no consistent approach to risk management across the service areas • The City has not quantified its residual risk

Processes	City Strengths	City Weaknesses
Decision-Making	• Priorities are set for some assets, but not all assets • There is conformity across most departments of the City's prioritization criteria, such as regulatory requirements, life and safety • IT has implemented a help desk tracking software which prioritizes requests from 1 through 5, with level 5 being the most complex	• Inconsistent decision-making across departments • Non optimized tradeoffs between risk, cost and performance and between the triple bottom line of social, economic and environmental factors • Lack of formal decision-making criteria and weightings • Decisions are typically derived from experience, regulation requirements, and senior management discussions • Discussions around decision-making are free-flowing and include a review of the supervisor's "wish lists", as is the case with Parks & Rec
Climate Change		• City is unaware of the level of risk the City's assets are currently exposed to, in regards to Climate Change impacts • Low resourcing to city wide climate change initiatives

The preceding observations have been used to develop the following considerations for the continual improvement of the City's documented AM procedures.

Table 67 – Strategic Initiatives Associated with Documented Procedures

Category	ID	Recommendations	Initiatives in Chapter 5
General	1	Refine the asset management policy	10
Life Cycle Stewardship	2	Develop documented procedures for each stage of the asset life cycle, including acquisition, maintenance, renewal and decommissioning	7
	3	Perform condition assessments on infrastructure that has a high likelihood of failure, where data is missing, or where there is a high overall risk assessment. A schedule of condition assessments should be prepared to provide guidance to City staff.	7
LOS	4	Develop and adopt an enterprise LOS framework that builds upon the work done in the water and sewer service areas	2
	5	Streamline surveys in an effective manner so the feedback can be converted into qualitative LOS measures	2
	6	Provide Council with regular reporting on level of service and integrate into the decision making process	1
	7	Engage the community in a level of service review for the City's assets to aid in the overall prioritization of services	2

Category	ID	Recommendations	Initiatives in Chapter 5
Risk	8	Develop and adopt an enterprise risk framework that builds upon the work done in the transportation and water/sewer service areas	4
	9	Update the existing transportation risk assessment and water and sewer risk assessment every 3-5 years	4
DM Criteria	10	Develop and adopt an enterprise decision criteria framework that builds upon the work done in the water/sewer service areas and enables the City to make defensible trade-offs between social, environmental and economic factors (Triple Bottom Line)	6
Climate Change	11	Develop a Climate Change Adaption Strategy that is aligned with the City's Asset Management Program	3,5

3.4 Systems and Information (#4)

Good information is necessary when making informed decisions. An asset information management strategy includes a systematic approach to managing asset information and needs to define how the City intends to assure collection, organization, maintenance, use and analysis of asset information in order to effectively support processes of both strategic and operational execution. Information management strategy includes objectives that need to be specific, measurable, achievable, realistic and timed.

AM tools used across all Departments are managed by Department Directors and the AM Steering Committee, but other specific tools in use are managed by the Asset Manager for the respective service areas. Tools will vary according to need and may be updated and changed as new technology becomes available or the Municipality's needs change over time.

The following table highlights a list of key International Standards to guide the Systems & Data component of the Asset Management System.

Table 68 – Standards for Data and Information Management

	Standard or Guide	Description	Provisions dealing with information & data
1	IAM Anatomy of Asset Management Version 3: 2015 and SSG 222, 23, 25	An overview of asset management including a conceptual model which illustrates best practices of 39 subject areas; of which four are focused on asset information	The four subject areas focused on asset information include: 1) Asset Information Strategy; 2) Asset Information Standards; 3) Asset Information systems; and 4) Data & Information Management
2	ISO 55001: 2014 Asset Management – Management Systems Requirements	Provides an overview of asset management, guidance on implementing an asset management system, and the expected benefits from adopting such a management system	The standard specifically focuses on the requirements of an asset management system for all sizes and types of organizations

	Standard or Guide	Description	Provisions dealing with information & data
3	ISO 8000: 2011-2017 Data Quality Family of Standards	Provides guidance on data quality and enterprise master data	Provides concepts on data-specific aspects of quality data management systems; and master data quality metrics
4	ISO 19770: 2006-2015 Information Technology – IT Asset Management Family of Standards	Defines processes which enable organizations to demonstrate that they are performing software asset management to a level sufficient to satisfy the overall objectives and governance requirements	Assists with the implementation and operation of software asset management systems for the purpose of data interoperability and effective security of the software
5	ISO 19115-1:2014 Geographic Information Metadata	Defines the schema required for describing geographic information by means of metadata	The standard provides guidance on: 1) Cataloguing all types of assets, including the full description of datasets; and 2) Defining mandatory and conditional metadata elements

This section of the SAMP outlines responsibilities surrounding information – who is responsible for updating the system, where the system is stored/how it is accessed, and how frequently the system is updated. Information management is a key element of AMPs, as data is the underlying source for most Asset Management decisions.

Table 69 – Information Management Strategy

Components	Is data currently being tracked? (Y/N)	Where is data currently stored?	Where should data be stored?	Who is responsible and should have access to the data? (role/department)	How often should data be updated?
State of Infrastructure					
Asset Inventory	Y	Excel Spreadsheet	EAM/GIS	Analysts; Managers; Technicians	As needed
Asset Hierarchy	Y	Excel Spreadsheet	EAM/GIS	Analysts; Managers; Technicians	Seldom
Asset Age	Y	Excel Spreadsheet	EAM/GIS	Analysts; Managers; Technicians	Yearly
Asset Condition	Y	Excel Spreadsheet	EAM/GIS	Analysts; Managers; Technicians	Yearly
Level of Service					
Performance Measures	Partial		EAM	Analysts; managers;	3-5 years
Targets	Partial		EAM	Analysts; managers;	1-2 years
Monitoring	Partial		EAM	Analysts; managers;	Yearly

Components	Is data currently being tracked? (Y/N)	Where is data currently stored?	Where should data be stored?	Who is responsible and should have access to the data? (role/department)	How often should data be updated?
Risk Analysis					
Assessment/Evaluation	Y		EAM	Analysts; managers;	Yearly
Treatment and Control	Partial	--	EAM	Analysts; managers;	Yearly
Monitoring and Review	Partial	--	EAM	Analysts; managers;	Yearly
Lifecycle Strategies					
Operational Strategy	N	--	EAM	Management; Analysts	Yearly
Maintenance Strategy	N	--	EAM	Management; Analysts	Yearly
Renew al Programs	N	--	EAM	Management; Analysts	Yearly
Upgrade/Enhancement	N	--	EAM	Management; Analysts	Yearly
Grow th Strategy	N	--	EAM	Management; Analysts	1-2 Years
Regulatory Compliance Strategy	N	--	EAM	Management; Analysts	Yearly
Financial Strategies					
Asset Values	Y	Excel Spreadsheet	EAM	Finance; Management; Analysts	Yearly
Operating budget	Partial	--	EAM	Finance; Management; Analysts	Yearly
Historical operating expenses	N	--	EAM	Finance; Management; Analysts	--
Historical capital expenses	N	--	EAM	Finance; Management; Analysts	--
Revenue Sources	Y	--	EAM	Finance; Management; Analysts	Yearly

The Data Governance Framework (DGF) takes into consideration the City's goals and objectives, as well as requirements from the City's internal and external stakeholders to allow for the efficient delivery of services and operations.

3.4.1 Software Ecosystem

The majority of asset management analysis is undertaken using the City's GIS data in combination with Excel. The City has decided to take a less automated approach, utilizing its existing GIS system, spreadsheets and the results of the master planning studies.

The collection of sufficient data is important when deciding to implement a CMMS to enable operations staff to access all the information that allows them to be effective. It is generally not sufficient to just have location, type and installation date for instance.

Table 70 – The City's Software Ecosystem

Systems	Department	Background	Observations & Application at the City
Citywide	Finance	The software was purchased and implemented in 2011. The TCA assets were previously maintained in excel spreadsheets up to December 31, 2010 prior to being transferred over to Citywide.	CityWide Tangible Assets is a software the City uses to record and maintain the TCA inventory. The software maintains individual asset records by asset category and segment and includes the following for each asset: • A unique Asset ID assigned by CityWide • Import ID which is the City assigned ID which would be the GIS ID for assets in the GIS system or folio # for land parcels • Asset category and segment • Asset name, description and location if applicable • Historical cost • In-Service date (the City uses January 1 of the in-service year) • Useful life and estimated residual value • G/L codes for asset cost, accumulated amortization, and amortization expense • Disposal date (the City uses January 1 of the disposal year) • Other information specific to the type of asset, for example length, road class, unit #, tax roll #
ESRI ArcGIS	Engineering; Electrical; Parks & Recreation; Development Services	--	The City's GIS maintains the City's water, sewer and electrical infrastructure. The GIS assigns the various asset segments a unique ID # that is referenced in the CityWide system for these assets. When new infrastructure assets are constructed, the GIS system is updated using the as-built drawings from the project. Any corresponding asset segments demolished or decommissioned are removed. The new GIS ID's are included in the CityWide data for those asset additions. There is generally a delay in receiving as-built drawings, which results in the assets additions not having a GIS ID immediately.

Systems	Department	Background	Observations & Application at the City
CMMS		2018	The City of New Westminster has decided to begin the implementation of a Computerized Maintenance Management system (CMMS) in a phased approach. The first phase will be completed using the Water System as a pilot. It is anticipated that Cityworks will be the system of choice, the approach is to undertake a pilot implementation using the Water System as the first area to be incorporated into the CMMS with other divisions following in a second phase after undertaking a lesson learned review.
Decision Support System (DSS)	--	--	There is currently no DSS implemented at the City
JDE	Finance	--	Each approved capital budget project is set up with a separate capital business unit in JDE. Each business unit has object accounts to accumulate the costs of the project.
Tempest	Development Services	The City has been using Tempest for many of its processes since 2003, adding components as they became available.	Prospero is Tempest's program for managing the permitting and application process across various departments within local government. It is designed to integrate with Tempest's Land system and related modules to provide a seamless enterprise-wide solution to address all requirements involved in the Community Development process.
Kronos Workforce	HR	--	--

3.4.2 Data Management

The following table provides an outline of the seven key attributes of quality data.

Table 71 – Attributes of Asset Data Quality

Attributes		Description
1	**Accuracy**	The City's data is a true and high quality reflection of the physical entities it represents
2	**Completeness**	The City's data is sufficiently comprehensive for their intended purpose(s) and the City has all necessary data is present.
3	**Consistency**	The City's data conforms in its definitions, rules, format and value. It complies with organizational standards
4	**Timeliness**	The City's data reflects the current state of its assets
5	**Validity**	The City's data complies with data storage rules
6	**Uniqueness**	The City's data keys contain one-of-a-kind identifiers with no duplication of data.
7	**Traceability**	The City's data can be tracked back to its parts and sources. Data can be rolled up to aggregate analysis and drilled-down to details.

This initiative will focus on the first three of the following four key areas related to asset information.

Table 72 – Information Framework

Elements	Description	Scope
Asset Information *Strategy*	The strategy is intended to ensure that the City's asset information meets current and future requirements. The strategy therefore articulates the approach to the definition, control and overall governance of asset information. It defines an "end state" in terms of organization capability, along with the supporting rationale behind what data is required to enable that end state. The strategy identifies the City's key stakeholders, their requirements, and the processes that will provide them with the information they need and then identify the data required to feed the processes.	• Stakeholders' information requirements • Asset Information policy • Responsibilities & accountabilities for information management • Gap analysis of current information against information needs, including costs and benefits of collecting data • Asset information improvement program
Asset Information *Standards*	The standards ensure the asset information is collected, categorized, and provided to agreed levels and timescales; The standards ensure a consistent approach to creating/managing data. Processes for the management and governance of data and information.	• The asset hierarchy • Classification of data • Format of data • Quality of information • Accuracy of information • Reliability of information • Consistency of information

Elements	Description	Scope
Data and Information ***Management***	This element considers processes for the management and governance of data and information.	• Use of data • Prioritization of data • Cleansing of data • Monitoring of data • Evaluating of data
Asset Information ***Systems***	The systems are the collection of processes, applications and technology, to automate asset management processes.	• Asset information systems and hierarchy • Cost and benefits of new /updated systems • IT systems migration/implementation plan • IT system ownership

The elements of the asset information strategy, standards, systems and management will need to cover all stages of the City data lifecycle. The following table provides an outline of the different life stages of the City's data that the Asset Information Standards and the Data and Information Management processes will need to consider.

Table 73 – Lifecycle of **the City's** Asset Information

Life Stages	Description
Creation of information	This includes the identification, generation and collection of the City's data/information, some of which may be originate from internal or external sources.
Format of information	This includes the standards for definition, classification and structure of the City's data for the purpose of ensuring appropriate quality, accuracy and reliability.
Storage of information	This includes the use of methods to retain the City's data/information in paper and/or electronic format in filing cabinets and/or computer servers. Storage may occur on-City premises or appropriate off-premises.
Preservation of information	This includes the means and methods to safeguard the City's data/information and the integrity of the data.
Access to information	This includes the range of permissions granted to different stakeholders to be able to retrieve, view, analyze, and update the City's information.
Retrieval of information	This includes the means and methods to gain access to the City's documents and server folders.
Distribution of information	This includes the scope and intervals of dissemination of the City's data/information to its internal and external stakeholders, who are appropriately authorized.
Use & Analysis of information	This includes the use and evaluation of the City's data so that it is transformed into information and the City can make informed decisions.
Updating of information	This includes the procedures for the control of changes to the City's information, including the editing, revising, cleansing and modification of the City's data/information
Disposal of information	This includes the permanent deletion and removal of the City's data/information.

Life Stages	Description
Controlling of information	This includes the various means and methods to ensure overall stewardship of the data/information, including all the life cycle stage of the information from creation to storage to distribution to access to retrieval, use and preservation of the City's data/information

The City's asset data sits almost entirely within the City's Geographic Information System (GIS); however, the inventory is not 100% accurate due to data entry lag, especially for new or replaced assets. The AM Strategy recommends that data confidence standards be established and the following table provides a summary of the 5-point scale.

Table 74 – Data Confidence Grades

Grade	Reliability	Description	Accuracy
1	**Highly reliable**	Data based on sound records, procedures, investigations and analysis, documented properly and agreed as the best method of assessment.	Dataset is complete and estimated to be accurate ± 2%
2	**Reliable**	Data based on sound records, procedures, investigations and analysis, documented properly but has minor shortcomings, for example some of the data is old, some documentation is missing and/or reliance is placed on unconfirmed reports or some extrapolation.	Dataset is complete and estimated to be accurate ± 10%
3	**Uncertain**	Data based on sound records, procedures, investigations and analysis which is incomplete or unsupported, or extrapolated from a limited sample for which grade 1 or 2 data are available.	Dataset is substantially complete but up to 50% is extrapolated data and accuracy estimated ± 25%
4	**Very uncertain**	Data is based on unconfirmed verbal reports and/or cursory inspections and analysis.	Dataset may not be fully complete and most data is estimated or extrapolated. Accuracy ± 40%
5	**Unknown**	None or very little data held.	

The first iteration of the dart AMP for the transportation assets included data confidence grades and this practice is to be carried through all the AMPs.

3.4.3 Documents & Records Management

The Asset Management System includes a variety of documents; some of which already existing in the City's library of artifacts.

Table 75 – AM Documents/Artifacts

Document Title	Scope / Intended Outcome	References/Relationships
AM Policy	Provide leadership and commitment to asset management and provide a set of principles to guide development and implementation across the organization.	Parallel document to support and guide the delivery of AM throughout the organization.
AM Strategy	Document corporate level AM objectives and how they are linked to Council priorities, inform the approach for developing AM Plans and how AM will be carried our throughout the organization.	Parallel document to support and guide the delivery of AM throughout the organization.
Asset Management Plans	Overall organizational plan for managing assets and services. The AM Plan contains Levels of Service, Demand Management Strategies, Lifecycle Management Strategies, Capital Investment and Renewal Plans, Resource Requirements and Resource / Training Plans.	This document provides a link (through levels of service) between higher level Corporate Objectives, and more detailed Operational Objectives. It allows the relationship between cost, performance, and risk to be determined.
Service Area Masterplans	Long-range plans that contains planning, developing and operating strategies for each network. Contains major demand and risk forecasts and capital programs as well as any legislated management plans (e.g. Water and Sewer Master Plan).	These documents provides a link (through levels of service) between higher level Corporate Objectives, and more detailed Operational Objectives including specific legislative requirements.
Supporting documents	Drawings Specifications Warranty certificates Maintenance manuals Other	

The City manages a range of asset management documents and records of varying format, characteristics and mediums of storage. The City's asset management documents consist of information or data that can be structured or unstructured. Some, but not all, documents within an organization become records. Records are considered a special class of document and must be carefully controlled. The following table provides an outline of the distinctions between document management and records management that are contemplated in the City's AM Strategy.

Table 76 – Distinguishing Documents and Records

	Document Management	Records Management
Definition	A document is piece of written, printed, or electronic matter that provides data or information.	A record is information created, received, and maintained as evidence in pursuance of legal obligations or in the transaction of business.
Goals	Efficiency and business continuity. City staff and service partners need documents to do their jobs.	Compliance and business continuity. City staff and service partners need records to prove they did their jobs.

	Document Management	Records Management
Type of Information	Transient content	Historical content
Methodology	Content-driven	Context-driven
Process	Document management focuses on: • Reducing lost and misfiled documents. • Providing faster search and retrieval of documents. • Helping to better organize existing documents. • Improving general work processes and organizational efficiency. • Reducing the amount of physical space used to store documents, such as file cabinets, boxes and shelving. • Preserving documents throughout their life cycle. • Applying required retention periods to stored items. • Managing disposition (disposal of documents).	Records management includes the functions of document management, plus: • Determining when documents become records. • Which documents need to be retained and for what period of time documents need to be retained to meet legal, business, or regulatory requirements. • Identifying the owner of each records series. • Determining that a chain of custody and a proper audit trail both exist. • Assisting in e-discovery issues and applying legal holds to records when needed. • Developing and administering defined records policy and procedures, regardless of if the records are electronic or paper.

The extent of the documented information for an asset management system can differ from one organization to another due to many factors, including: its size and its type of services; the complexity of processes and their interactions; the competence of staff and service partners; and the complexity of asset. For each type of document and record, the management and control phases contemplates a process that comprises a number of distinct procedures, which are summarized in the following table.

Table 77 – Phases of Documents & Records Management

Management & Control Phases	Description
Identification	The procedures for determining what types of documents and records are required by the City to achieve its asset management objectives and to satisfy regulatory requirements.
Creation or Acquisition	The procedures for generating documents and records, either internally by the City itself of obtained from 3rd parties, such as vendors, contractors and consultants, and approval of documents for adequacy prior to issue.
Storage	The procedures for retaining documents and records within the City's filing system. • Documents – These are to be kept so that users who need to access the information stored in those documents can do so quickly and easily. • Records – These are to be kept in their original format in case they are needed for compliance or legal reasons.
Protection	The procedures for safeguarding the City's documents and records, including backup and recovery; version control, etc. for the capture and preservation of authentic and reliable records. This also includes procedures to ensure the documents remain legible and readily identifiable.

Management & Control Phases	Description
Retrieval & Use	The procedures for indexing the City's library of pertinent documents and records so as to enable efficient searching, report generation and metrics. Review, update as necessary, and re-approve documents. Make relevant documents available at points of use.
Retention	The procedures for the City to determine the duration of document/records retention to comply with authorities, standards and organizational objectives.
Disposition or Transfer	The procedures for the City to dispose of documents and records or transfer of these, with due consideration for matters of privacy and confidentiality. This also includes procedures to prevent obsolete documents from unintended use. • Documents - Their disposal occurs when the life cycle of the document has been complete and is no longer needed in the business process. • Records - Their destruction is generally regulated by law with strict procedures so that the information contained in them will not be disclosed.

It is recognized that the implementation of a document life cycle approach for the City's AM documents and records will take time and effort, especially since no approach has existed in the organization before. When developing its documents and records management plans, the City will need to consider the policy principles for creating and managing authentic, reliable and usable records that are capable of supporting its business functions and activities. The following table provides a brief description of these principles with corresponding procedures.

Table 78 – Principles of Document and Records Management

Principles	Description	Corresponding Procedures
Authenticity	An authentic record is one that is: i) what it claims to be; ii) created or sent by the person purported to have done so; and iii) created or sent at the time indicated.	To ensure the authenticity of records, the City should implement and document policies and procedures that control the creation, receipt, transmission, maintenance, and disposal of its records. Record management policies and procedures should ensure that record creators are identified and authorized. In addition, steps need to be put in place to protect records against unauthorized addition, deletion, alteration, use and concealment.
Reliability	A reliable record is one whose contents can be trusted as a full and accurate representation of transactions, activities or facts.	To ensure reliability, records need to be created: i) at the time of the related transaction/incident or soon after; ii) By individuals who have direct knowledge of the facts regarding the transaction and iii) By instruments routinely used within the business to conduct the transaction.
Integrity	The integrity of a record refers to its being complete and unaltered.	The City's records need to be protected against unauthorized changes. In the event a record needs to be altered, policies and procedures need to specify the additions or annotations that may be made to a record after it is created. To maintain integrity of records, the record system should include controls to enable access monitoring, user verification, authorized destruction and security to prevent unauthorized access, destruction, alteration, or removal of records.

Principles	Description	Corresponding Procedures
Usability	A usable record is one that can be located, retrieved, presented and interpreted quickly by the City and/or its stakeholders.	The City's record should be capable of being connected to the business activity or transaction that produced it.

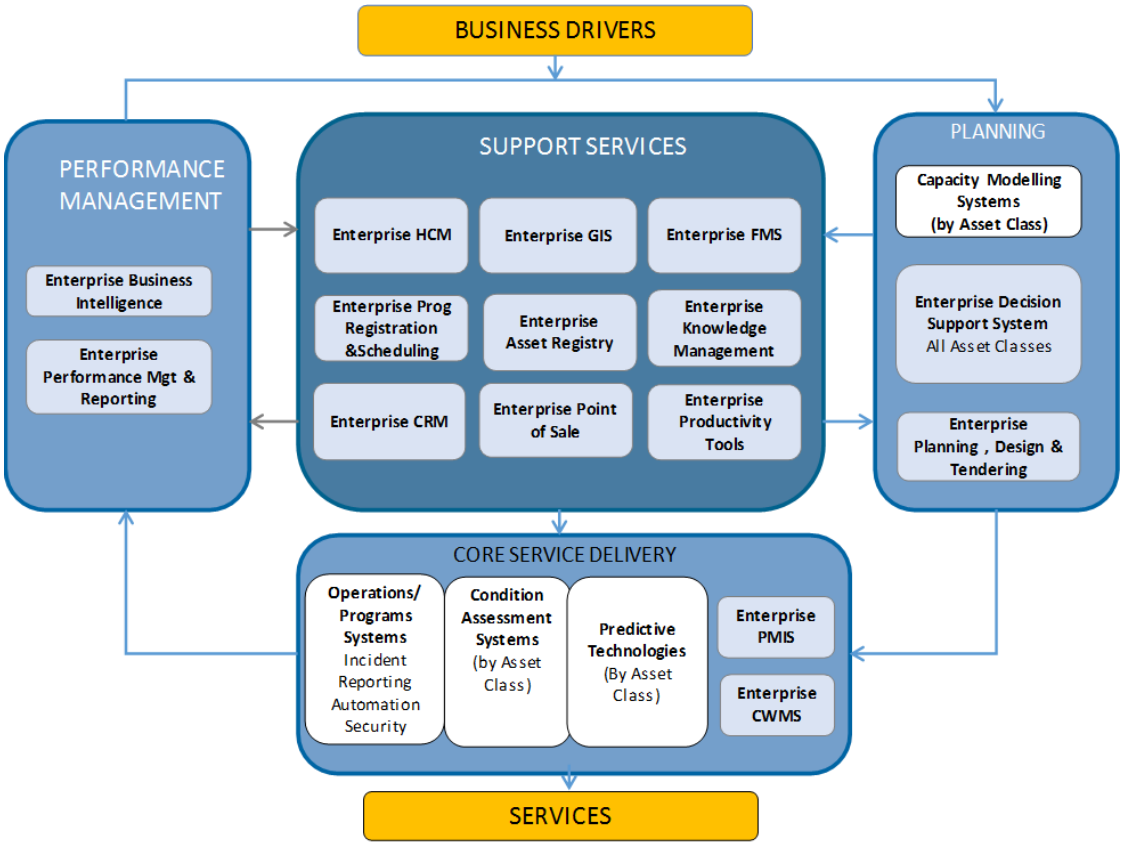


Figure 13 – Technology Systems Aligned to the AM Framework

3.4.4 Key Findings & Initiatives

The following table provides a summary of the key findings related to the City's asset management systems and data management as of late-2018.

Table 79 – General Findings related to AM Systems and Data

	Strengths	Weaknesses
Technology Architecture	• There is a high level of awareness and appreciation for technology and its role in supporting asset management • The City has a good GIS information data base	• The software ecosystem does not include a DSS – Decision Support System
Data Management	• The City is progressing its data management practices, by ensuring inventory is captured in GIS	• There are no Asset Management Plans to capture the data for each asset class • There is no data management strategy specific to asset information • Data accuracy and completeness varies across the asset inventory and has not been formally evaluated • Lack of data to support analysis of long-term LOS trends and quantify residual risks
Document management	• Recordkeeping is not optimized as staff are under resourced	• There is no records management strategy specific to asset management documentation

The preceding observations have been used to develop the following considerations for the continual improvement of the City's asset management practices.

Table 80 – Recommendations and Corresponding Initiatives

ID	Recommendations	Initiatives in Chapter 5
1	Develop a data management strategy	7
2	Develop a document and records management strategy	7
3	Assess the current IT technologies and identify gaps in meeting asset management needs	7

The systems and data improvement initiative developed from the above opportunities is provided in further detail in Section 6.

3.5 Finances (#5)

3.5.1 Valuation

The City has an extensive capital asset inventory with an estimated 2016 replacement value of $1.2 billion (excluding land), equivalent to approximately $36,000 per household. The figure below

shows the City's asset categories and the corresponding estimated replacement values (2016) as a percentage of the value of the total asset inventory.

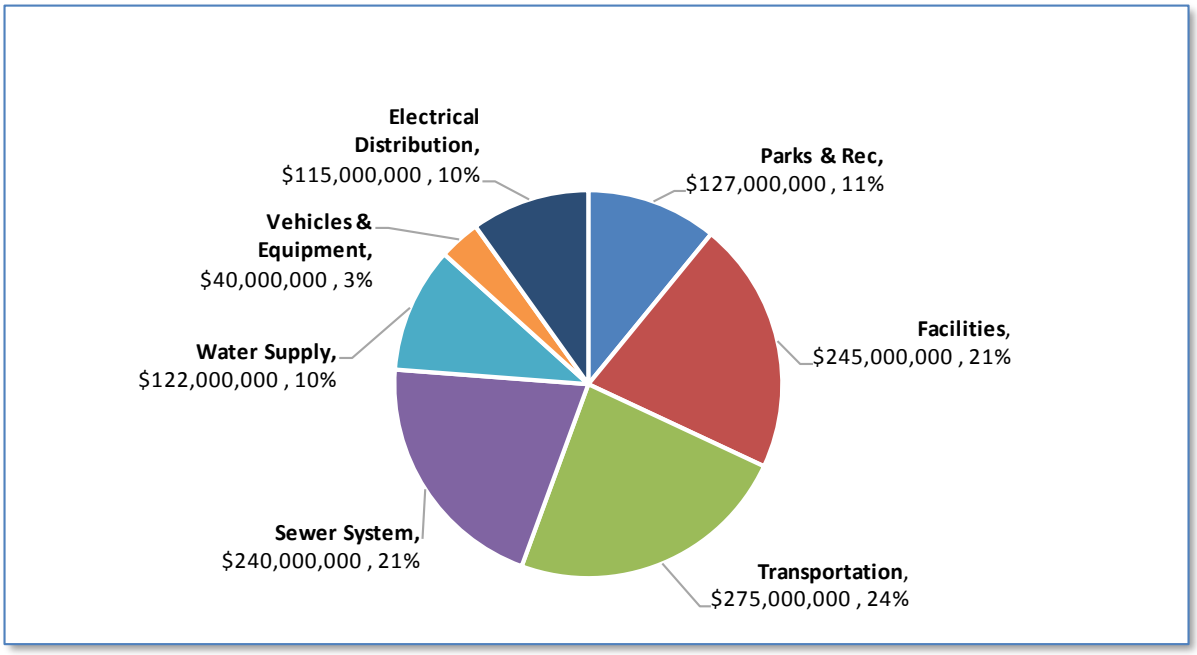


Figure 14 – Valuation of City Assets, 2016

The following table provides a summary of some of the City's financial policies.

Table 81 – Capitalization Thresholds

Departments	Asset Categories	Initial Valuation (2009)	New Betterments
Parks & Recreation	Parks Improvement	$20,000	$50,000
Finance & IT	IT Equipment	$20,000	$10,000
Engineering	Engineering Operations Equipment	--	$10,000
	Buildings	$50,000	$75,000
	Roads	All	All
	Other Transportation	--	$50,000
	Water System	All	All
	Sewer System	All	All
	Fleet	$10,000	$10,000
	Solid Waste Equipment	--	$10,000
Electrical	Electrical Distribution System	$10,000	$40,000

Typically, it is helpful to provide historic expenditure levels classified by expenditure type as outlined in the breakdown below, with two predominant categories; base-service provision or renewal (i.e., to

maintain the current service level), and enhancement (i.e., to provide some change or improvement from the current service level). The two predominant categories for expenditure classification are:

- **Base-Service Provision (or Renewal)** – This relates to capital expenditures that are required to maintain the current LOS to customers. Base maintenance expenditure is not just for assets that are beginning to fail, but can also be used where there is a demonstrable savings in OPEX arising from the project (that is, automation or replacing the asset with a modern equivalent). This form of funding is classified as "spend to save" but is still base maintenance.
- **Enhancement** – This relates to capital expenditures that cause a permanent increase in the current LOS to a new base level. Enhancement is further divided as follows.
  - **Legislative:** This relates to expenditures that are required for compliance with new legally enforceable obligations (e.g., new acts or regulations).
  - **Enhanced LOS:** This relates to expenditures that provide an identifiable, measurable, and permanent step change in overall LOS to existing customers above the standard previously provided (e.g., extending the hours of bus service).
  - **Supply/Demand Balance or Growth:** This relates to expenditures that provide services for new customers with no net deterioration from the current LOS provided to existing customers, as well as expenditure that accommodates the increased use of services by existing customers at the current LOS (e.g., providing additional capacity).

This type of analysis can provide an understanding of what proportion of the actual expenditure has been focused on maintaining the current asset base, as opposed to being used for purposes such as growth driven projects or projects focused on providing an enhanced LOS.

3.5.2 Replacement Backlog

The replacement backlog, sometimes referred to as the infrastructure deficit, is the current replacement cost of assets that are still in-service but have exceeded their designated lifespan. The annual funding gap is the difference between current funding level and recommended spending for asset renewal and replacement. The transportation, facilities and park & rec asset classes have a higher replacement backlog and will require the most attention. The electrical distribution, water and sewer systems are well funded with little or no funding gaps indicated at this time. Timely maintenance, replacement and upgrading of City capital assets are essential for the continued and effective provision of services. Funding sources are limited and include reserves, grants from higher levels of government and debt borrowing. Reserves are funded from the tax base and utility levies.

As of 2016, there was a replacement backlog of approximately $105 million and an annual funding gap in the range of $12.1 million. The following figure visually represents the 2016 replacement backlog distributed across the service areas.

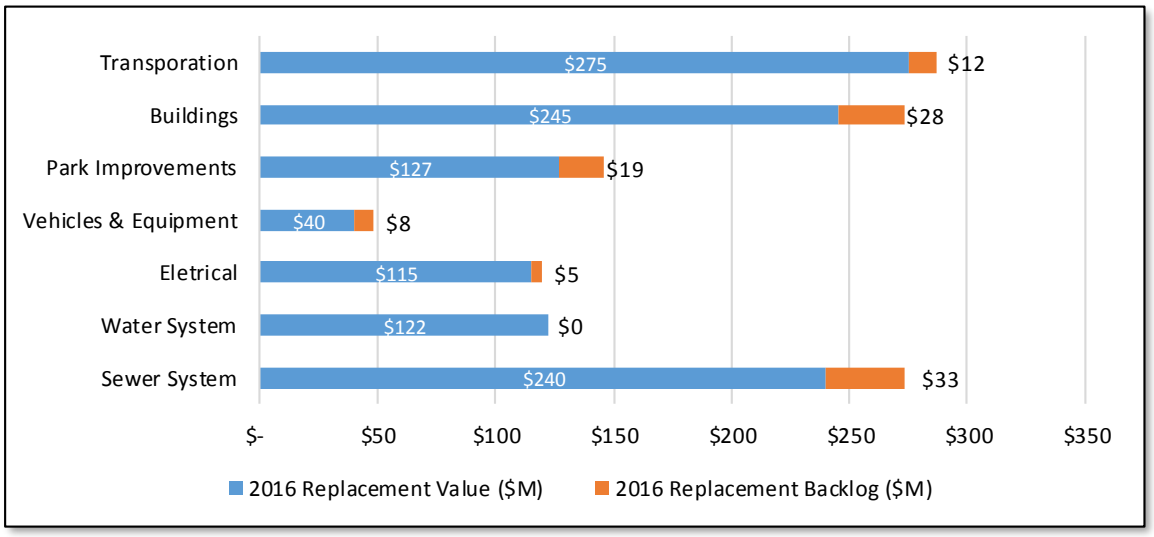


Figure 15 – City's Replacement Backlog, 2016

The following table is a high level summary of the City's capital assets based on analysis of information contained in the Tangible Capital Assets (TCA) database. The analysis has limitations given some of the assumptions and estimates around capital asset in-service dates, useful service life, and replacement value. It does however provide an indication of the magnitude of the asset deficit faced by the City. The figures in the table will require review and updating, as the City moves forward with its Asset Management journey.

Table 82 – Asset Replacement Value, Backlog, and Funding Gap for each Asset Class

Departments	Asset Classes		Replacement Value, 2016	Replacement Backlog, 2016	% of 2016 Replacement Value	Annual Funding Gap, 2016
Parks	1	Parks & Recreation	**$127 million**	**$19 million**	**15.0%**	**$2.7 million**
Finance & IT	2	IT	**Included in asset class #9**			
Engineering	3	Facilities	**$245 million**	**$28 million**	**11.4%**	**$6.0 million**
	4	Transportation	**$275 million** *(includes roads and other transportation)*	**$12 million** *(includes roads and other transportation)*	**7.8%** *(includes roads and other transportation)*	**$2.1 million**
	5	Storm Water	**Included in asset class #6**			
	6	Waste Water	**$240 million** *(combined sewer system)*	**$33 million** *(combined sewer system)*	**13.8%** *(combined sewer system)*	--
	7	Solid Waste	**Included in asset class #9**			
	8	Water Supply	**$122 million**	--	--	--

Departments	Asset Classes		Replacement Value, 2016	Replacement Backlog, 2016	% of 2016 Replacement Value	Annual Funding Gap, 2016
	9	Fleet	**$40 million** *(includes vehicles and equipment)*	**$8 million** *(includes vehicles and equipment)*	**20.0%** *(includes vehicles and equipment)*	**$1.3 million**
Electrical	10	Electrical Utility	**$115 million**	**$5 million**	**4.3%**	**--**
Total - Approx.			**$1.2 billion**	**$105 million**	**--**	**$12.1 million**

The City of New Westminster, like most other Canadian municipalities, faces the challenge of funding the replacement of aging infrastructure and buildings while at the same time financing new capital assets to meet the needs of its growing community. Asset Management has been identified in Corporate Strategic Plan as one of the priorities for 2016 to 2018.

While the total annual funding gap for the City is estimated as $12.1 million, it is recognized that complete elimination of the gap in a short timeframe is not financially practical. The focus of the asset management program is to develop a long term financial strategy that considers a series of options to address the funding gaps, including establishing a desired level of service and level of risk/deficit tolerance, identifying long term funding sources such as specified tax revenues, potential for third party funding, building and maintaining appropriate reserves and strategically use of debt financing when necessary.

As shown in the below table, progress has been made since 2010 to reduce the funding gaps identified at that time. However, as new assets are added to the inventory, setting aside funds for eventual rehabilitation/replacement of those assets also increases the demand of fiscal resources.

Table 83 – City's Funding of Asset Classes for 2010 and 2016

Departments	Asset Classes		Notes	Funding, in Millions	
				2010	2016
Parks	1	Parks & Recreation		$1.5	$2.5
Finance & IT	2	IT	Included in asset class #9	--	--
Engineering	3	Facilities		$2.3	$2.7
	4	Transportation	*Incl. roads and other trans.*	$3.3	$5.8
	5	Storm Water	Included in asset class #6	--	--
	6	Waste Water	combined sewer system)	$2.1	$4.0
	7	Solid Waste	Included in asset class #9	--	--
	8	Water Supply		$1.1	$3.0

Departments	Asset Classes		Notes	Funding, in Millions	
				2010	2016
	9	Fleet	Incl. vehicles & equipment	$3.1	$3.2
Electrical	10	Electrical Utility		$1.1	$2.4
			Total, Approx.	$14.5	$23.6

The City's proposed reinvestment rates are primarily in line with CIRC target reinvestment rates, except for its facility assets.

Table 84 – The **City's Annual Replacement Budget vs. National Average and** CIRC Targets

Dept.	Asset Classes		Current		Proposed			
			2016 Annual Replacement Budget	2016 Reinvestment Rate	Proposed Annual Replacement Budget	Proposed Reinvestment Rate	2016 National Reinvestment Rate	CIRC Target Reinvestment Rate
Parks	1	Parks & Recreation	$2.5 M	2.0%	$5.2 M	4.1%	1.3%	1.7-2.5%
Finance & IT	2	IT	Included in asset class #9					
Engineering	3	Facilities	$2.7 M	1.1%	$8.7 M	3.6%	1.7%	1.7-2.5%
	4	Transportation *(includes roads and other transportation)*	$5.8 M	4.1%	$7.9 M	5.5%	1.1%	2.0-3.0%
	5	Storm Water	Included in asset class #6					
	6	Waste Water *(combined sewer system)*	$4.0 M	1.7%	$4.0 M	1.7%	0.7% sanitary linear; 0.3% storm linear; 1.3% non-linear	1.0-1.5% linear; 1.7-2.5% non-linear
	7	Solid Waste	Included in asset class #9					
	8	Water Supply	$3.0 M	2.5%	$3.0 M	2.5%	0.9% linear; 1.1% non-linear	1.0-1.5% linear; 1.7-2.5% non-linear

Dept.	Asset Classes		Current		Proposed			
			2016 Annual Replacement Budget	2016 Reinvestment Rate	Proposed Annual Replacement Budget	Proposed Reinvestment Rate	2016 National Reinvestment Rate	CIRC Target Reinvestment Rate
	9	Fleet *(includes vehicles and equipment)*	$3.2 M	8.0%	$4.5	11.3%	n/a	n/a
Electrical	10	Electrical Utility	$2.4 M	2.1%	$2.4 M	2.1%	n/a	n/a

3.5.3 Whole Life Cost Analysis

A 50-year funding forecast was generated in 2016, which estimates spending requirements of approximately $23.6 Million annually for the rehabilitation and replacement of the City's assets across all asset classes. If the City continues to spend its existing reinvestment rate from 2016, it will be facing a cumulative backlog of over $500 M in the next 50 years.

3.5.4 Key Findings & Initiatives

The following table provides a summary of the key findings associated with the financial elements of the City's Asset Management System.

Table 85 – General Observations Regarding Finance

	City Strengths	City Weaknesses
Whole life Cost Analysis	• Annual budget process in place across all business units	• Financial management is currently task/project based rather than asset-based • Whole life costs are not known • Climate change costs are not currently considered in every stage of the asset's lifecycle • The link between cost of service, level of service and risk of service is not well defined
Unfunded liabilities	• There is a desire to secure dedicated funding for asset management • A Long-range capital planning model has been fully operationalized	• The City has been underfunded to meet its infrastructure needs. This will require the City to continue to make optimized trade-offs • Several asset classes have been underfunded for a number of consecutive years

	City Strengths	City Weaknesses
Optimized tradeoffs in TBL framework		• Lack of decision criteria to determine defensible financial tradeoffs.

The preceding observations have been used to develop the following considerations for the continual improvement of the City's asset management practices.

Table 86 – Recommendations and Corresponding Initiatives

ID	Recommendations	Initiatives in Chapter 5
1	Refine the financial charts of accounts to enable whole life cost analysis	8
2	Continue enhancing the long term investment planning process	8
3	Examine methods to increase the reinvestment rates to meet CIRC target reinvestment rates	8

A full suite of prioritized improvement initiatives have been included as a roadmap in Chapter 7.

3.6 Roadmap for Continual Improvement

Based on a review of existing artifacts there is anecdotal evidence that the City is in the early stages of its journey and is currently "establishing" its fully documented Asset Management System (AMS). The following figure provides a visual summary of the maturity spectrum.

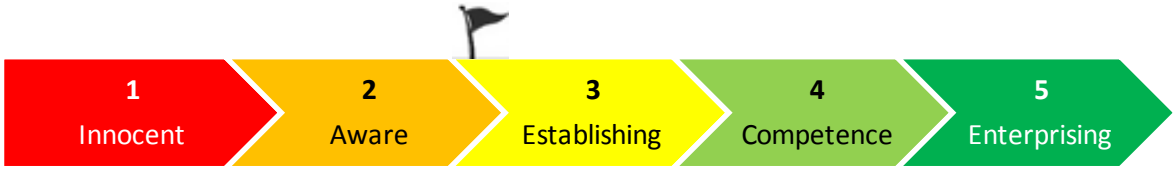


Figure 16 – Maturity Spectrum

A full suite of improvement initiatives from the preceding sections are included in Chapter 6.0 and the prioritization of initiatives in the form of a roadmap can be found in Chapter 7.0.

4. Approach to Asset Management Plans

Asset Management Plans (AMPs) are defined under ISO 55000 as "documented information that specifies the activities, resources and timescales required for an individual asset, or a grouping of assets, to achieve the organization's asset management objectives". An asset management plan is derived from the strategic asset management plan. An asset management plan may be contained in, or may be a subsidiary plan of, the strategic asset management plan.

AMPs document a framework for achieving the strategic goals within each Service Area, and ultimately the City's strategic goals, by focusing on levels of service, lifecycle AM planning, and the resulting long-term cash flow requirements. This Section of the SAMP provides information on the City's approach to developing the asset management plans (AMPs).

An important step in translating the objectives and goals of the City's AM system into specific tasks and actions is the creation of asset management plans (AMPs). Asset management plans will provide the greatest level of detail and description of the City's service areas. The City is working to complete individual and service area AMPs for all service areas. Once AMPs are completed, the review period for the AMPs will be a maximum of three years. In the future, the City may consider creating asset and service masterplans to improve long-term planning and integration of assets.

As of late 2018, the City does not have any AMPS except for the draft State of Infrastructure chapter completed for its transportation assets.

4.1 Suite of AMPs

The grouping of assets in the AMPs may be arranged by **asset type** (i.e. grouping of assets having common characteristics that distinguish those assets as a group) or **asset system** (i.e. set of assets that interact or are interrelated). In this regard, it is anticipated that the City will develop one AMP for each of its 10 major asset classes.

The following table includes the suite of anticipated AMPs that cover the City's asset portfolio and will need to be developed to support the asset management system.

Table 87 – Current State of AMPs as of late-2018

#	AMP	Asset types and Asset Systems	Status, 2017
1	**Parks & Recreation**	Park infrastructure; park amenity; sport amenity; etc.	Pending
2	**IT**	IT fibre; IT software; IT hardware; etc.	Pending
3	**Facilities**	Electrical; envelope; finishing; mechanical; structure; etc.	Pending
4	**Transportation**	Roads - base and surface layer; Other transportation - bridges, sidewalks, streetlights, traffic lights, tunnel, retaining walls; etc.	Partially complete
5	**Storm Water**	Outfall; sewer pump stations; sewer mains; etc.	Pending
6	**Waste Water**	Outfall; sewer pump stations; sewer mains; etc.	Pending
7	**Solid Waste**	Equipment, etc.	Pending
8	**Water**	PRV stations; water meters; water mains; etc.	Pending
9	**Electrical Utility**	Transformers; switches; poles; electrical meters; manholes; substations; etc.	Pending
10	**Fleet**	Vehicles, etc.	Pending

The specific scope of the assets within each AMP will be developed once the AMP process has commenced.

4.2 AMP Structure

While the specific content and scope of each AMP may vary depending on the asset class, the City proposes to utilize the following format for each of its AMPs. This common structure contemplates nine (9) key sections and its corresponding sub-sections to ensure consistency between the AMPs.

A sample table of contents is provided in the table below.

Table 88 – Structure of the AMPs

ID	Section	Questions Answered	Sub-section(s)
1	**Executive summary**	--	• Version number • Asset health summary (physical and financial) • Acronyms and Abbreviations • Definitions
2	**Introduction**	--	• Alignment with corporate documents • Key Stakeholder interests • Data confidence
3	**State of Infrastructure**	Where are we now? *(Current State)*	• Asset inventory and statistics • Asset valuation • Asset age • Asset condition
4	**Levels of Service**	Where do we want to be? *(Future State)*	• Stakeholder analysis • Strategic alignment • Investment drivers • Performance measures and targets • Analysis and trends
5	**Asset Lifecycle Strategies**	What will it take to get there? *(Transition State)*	• Demand management • Asset acquisition • Asset operations and maintenance • Asset renewal • Asset decommissioning and disposal
6	**Risks & Uncertainties**	What might change?	• Risk context • Risk identification • Risk evaluation • Risk treatment and control • Risk monitoring and review
7	**Financing strategies**	What will it cost and how will we pay for it?	• Financial policies and rules • Historical capex and opex • Asset valuation • Sources of funding • Project funding requirements • The infrastructure gap • Reinvestment scenarios • Strategies to address the infrastructure gap

ID	Section	Questions Answered	Sub-section(s)
8	**Implementation & Continuous Improvement**	How will we ensure we are delivering to the plan?	• Governance model • Process model • Data & information management • Decision-making, business case template, etc. • Implementation roadmap • Change management and communication plan
9	**Appendices**	--	• Source data, references • Supporting tables and charts

This first version of the AMPs will covers a 10-year timeframe. As the full life cycle for some of the assets can be in excess of 50 years, future versions of this AMP will consider the full life cycle of all of the assets.

4.3 The Process

It is anticipated that the City's AMPs will be led by an AMP team, consisting of asset class subject matter experts (SMEs) within each of the corresponding service areas. Typically a team consists of 2 to 4 people selected by the department and may include, but is not limited to, engineers, technicians, supervisors and analysts (if applicable). Each AMP team member's role will vary from the collection and evaluation of data to the writing and compiling of the report. The cross-Section of staff on each AMP team is at the discretion of the City.

It is estimated that the City's AMPs will require approximately 2-6 months to complete, depending on various factors, including the quality of data and available resources. The outline process for preparation of each AMP is summarized in the following table, along with sample roles to carry out the different steps.

Table 89 – AMP Development Process & Responsibilities

Steps		Description	Typical duration	Resources	
				Primary	Secondary
Pre-AMP	1.1	Identify AMP class to be developed	4 weeks	Asset Manager	Senior management AM Steering Committee
	1.2	Identify the team – departments and resources (internal and external)	1 week	Asset Manager	Senior management AM Steering Committee
	1.3	Establish the budget	4 weeks	Asset Manager	Finance dept. Senior management
	1.4	Hold a team kick-off meeting	1 week	Asset Manager	AM steering committee AMP team
AMP	2.1	Collect asset data	4 weeks	Asset Manager	AMP team
	2.2	Evaluate data quality	2 weeks	Asset Manager	AMP team

Steps		Description	Typical duration	Resources	
				Primary	Secondary
	2.3	Compile draft AMP	12 weeks	Asset Manager	AMP team
	2.4	Revise and update	8 weeks	Asset Manager	AMP team Finance Department Other
	2.5	Prepare council-ready copy	4 weeks	Asset Manager	AM Steering Committee AMP team
Post AMP	3.1	Prepare a brochure summary of the AMP for public consumption	2 weeks		AM Steering Committee AMP team
	3.2	Publish AMP on the City's website	1 week		IT Dept.
	3.3	Roll-out	--		AM Steering Committee
		Total	**24 weeks**		

It is anticipated that the simpler AMPs, such as solid waste (which includes few asset categories) will be completed in a shorter time period.

4.4 Resources, Roles & Responsibilities

It is anticipated that an average AMP requires approximately 500 hours of staff time to complete, which translates into approximately 2 FTEs to complete the full suite of AMPs over a five year period. The following table provide a matrix of roles associated with the development of the AMPs.

Table 90 – Matrix of Roles for AMP Development

ID	AMP requirements		Sub-section	Roles (and Depts.)					
				Senior Management	Finance Dept.	Planning Dept.	Asset Manger	Engineers	Staff
1	**Lead the overall process**	--	--	●			●		
2	**Collect data**	--	--					●	●
3	**State of Infrastructure**	3.1	Asset age					●	
		3.2	Asset condition					●	
4	**Level of Service**	4.1	Complaints analysis						●
		4.2	Stakeholder analysis			●			●
		4.3	Demand analysis			●			●
5	**Risk Management**	5.1	Risk identification				●	●	
		5.2	Risk analysis				●	●	
		5.3	Risk treatment				●	●	

ID	AMP requirements		Sub-section	Roles (and Depts.)					
				Senior Management	Finance Dept.	Planning Dept.	Asset Manger	Engineers	Staff
6	**Lifecycle Strategies**	6.1	Maintenance					●	●
		6.2	Renewals					●	●
7	**Financial Strategies**	7.1	Historical opex		●				
		7.2	Historical capex		●				
		7.3	Forecast capex		●	●			
		7.4	Revenue sources		●				
8	**Implementation**	–	–	●			●		

4.5 Implementation

Based om current resourcing, it is anticipated that City will require approximately two years to complete the full suite of ten AMPs, with support from external consultants. Sequencing of the AMPs is determined by the following:

- Data quality
- Asset criticality

The following table provides a preliminary timetable for preparation and roll-out of each AMP:

Table 91 – AMP Prioritization

Asset Class		Rationale for prioritization	2019				2020				2021				2022				2023			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Transportation	Process has already begun	■																			
2	Storm Water			■	■																	
3	Waste Water				■	■																
4	Water						■	■														
5	Solid Waste							■	■													
6	IT	High data quality							■	■												
7	Fleet										■	■										
8	Facilities												■	■								
9	Electrical														■	■						
10	Parks & Recreation																		■	■		

It is noted that AMPs are typically updated every 3-years. By the time the full suite of AMPs is completed, the first few AMPs will be due for their first update.

Table 92 – Recommendations and Corresponding Initiatives

ID	Recommendations	Initiatives in Chapter 5
1	Establish documented procedures for preparation of the Departmental AMPs	All

5. Improvement Initiatives

This section of the SAMP focuses on continuous improvements for the City on its asset management journey.

Ten (10) improvement initiatives have been identified and proposed for the City to take advantage of and to improve its Asset Management maturity.

With appropriate resources and commitment from senior management, the City can potentially look forward to achieving "competence" (level 3 of the maturity framework) in approximately 48 months. To this end, the recommended initiatives have been distributed over a 4 year implementation window which provides a high level prioritization and sequencing for ongoing development in the form of a roadmap.

Each initiative is presented as a solution to a problem that will guide the City through its transition from current state to desired future state, as shown in the diagram below. The City will require the implementation of each initiative to reach its optimal future state; thus the future state cannot be obtained by implementing only one initiative.

5.1 Stakeholder Framework (#1)

The background and drivers for this initiative are addressed in Section 3.2 (People) and Section 3.3 (Processes) of the SAMP. The following table provides a summary of the change model expressed in the form of the "problem", the "solution" and the "outcome".

Table 93 – Case Study and Change Model for Initiative #1

Case Study	Change Model	Description
The "Problem"	Current State	• There is no formal documented stakeholder registers • There are no documented stakeholder engagement plans in the many of the service areas
The "Solution"	Transition State	• Pilot testing of stakeholder framework
	Future State	• Fully developed stakeholder engagement plan utilized across service areas
The "Outcome"	Benefits	• Effective communication with City stakeholders • Improved customer satisfaction

Provided below is a conceptual model of the states of change related to the stakeholder framework initiative which provides a visual representation of the preceding table.

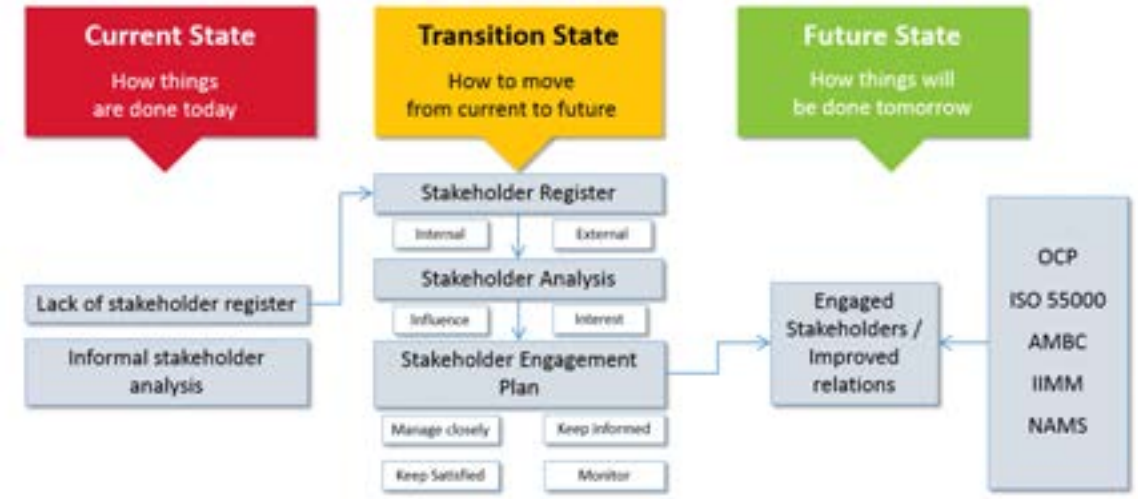


Figure 17 – States of Change for Initiative #1

The following table provides an outline of the "journey" in the form of a scope of work and key steps involved in advancing from the current state to the desired future state.

Table 94 – Scope of Work for Initiative #1

ID	Tasks	Estimated Duration	City's Level of Effort	Output/ Deliverable
1	Conduct stakeholder workshop	1 week	Low	Workshop notes
2	Develop stakeholder framework	3 weeks	Med	Stakeholder framework
3	Prepare stakeholder register	2 week	Low	Stakeholder register
4	Conduct stakeholder analysis	2 weeks	Med	--
5	Prepare stakeholder engagement plan	4 week	Med	Stakeholder engagement plan
6	Review and update stakeholder register, as required	Ongoing	Low	--
	Overall Net Effect	**12 weeks**	**Low Effort**	**High Benefit**

The prioritization of this initiative relative to the other ten initiatives, and sequencing in an overall time-bound roadmap, is included in Section 7.7.2.

5.2 Level of Service (LOS) Framework (#2)

The background and drivers for this initiative were addressed in Section 3.3 (Processes) of the SAMP. The following table provides a summary of the change model expressed in the form of the "problem", the "solution" and the "outcome".

Table 95 – Case Study and Change Model for Initiative #2

Case Study	Change Model	Description
The "Problem"	Current State	• Currently there is no consistent framework for communicating how level of service is being impacted by funding decisions • Service areas do not have an efficient way of knowing when expectations are being met • LOS measures and targets are developed intuitively and qualitatively
The "Solution"	Transition State	• Pilot testing of the framework within one of the service areas
	Future State	• Consistent LOS framework adopted by all service areas with corresponding LOS registers
The "Outcome"	Benefits	• Will help decision makers and the public understand the tradeoffs between funding decisions and the LOS provided • Improved customer satisfaction • Benchmarking of performance metrics

Provided below is a conceptual model of the states of change related to the LOS framework initiative which provides a visual representation of the preceding table.

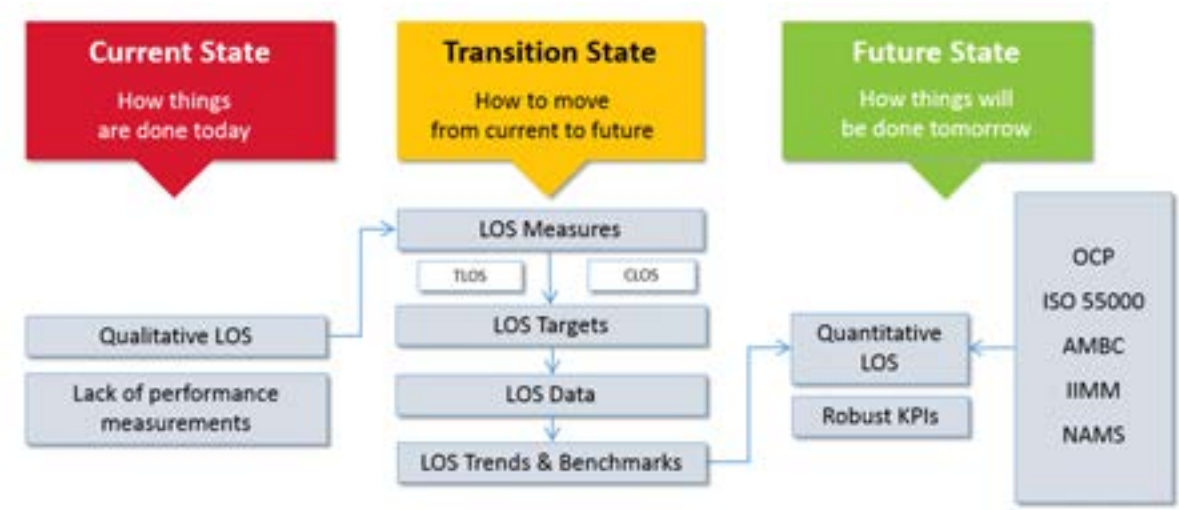


Figure 18 – States of Change for Initiative #2

The following table provides an outline of the "journey" in the form of a scope of work and key steps involved in advancing from the current state to the desired future state.

Table 96 – Scope of Work for Initiative #2

ID	Tasks	Estimated Duration	City's Level of Effort	Output/ Deliverable
1	Conduct LOS workshop	1 week	Low	Workshop notes
2	Prepare LOS framework	4 weeks	High	LOS framework

ID	Tasks	Estimated Duration	City's Level of Effort	Output/ Deliverable
3	Establish LOS measures	2 weeks	Med	LOS measures
4	Establish LOS targets	2 weeks	Low	LOS targets
6	Collect/analyze performance data	Ongoing	High	--
7	Pilot testing of LOS framework	4-6 weeks	High	Pilot framework
8	Review and monitor performance metrics as required	Ongoing	Med	--
	Overall Net Effect	**12 weeks**	**Med. Effort**	**High Benefit**

The prioritization of this initiative relative to the other eleven initiatives, and sequencing in an overall time-bound roadmap, is included in Section 7.7.2.

5.3 Climate Change Committee / Working Group (#3)

The background and drivers for this initiative were addressed in Section 3.2 (People) of the SAMP. The following table provides a summary of the change model expressed in the form of the "problem", the "solution" and the "outcome".

Table 97 – Change Model for Initiative #3

Case Study	Change Model	Description
The "Problem"	Current State	• There is one identified person who is collecting energy consumption data from the City's assets in regards to the provincial Climate Action Charter. Annual reports outline the GHGs that are being emitted from the City's assets (based on the energy consumption data) and are issued as per provincial requirements. This role has low awareness in the City (observed that some people are unaware of the mandate of the role). • There is a corporate Energy Management Committee (EMC) and two sub-committees within the fleet and facilities departments. Currently, the EMC only manages corporate assets. An overarching point of contact committee for managing climate change initiatives across all service areas appears to be an existing gap.
The "Solution"	Transition State	• Acquiring resources for a successful committee.
	Future State	• Effective management of climate change initiatives on a city-wide level in order to align climate change initiatives to the City's goals and assist the prioritization, documentation, and progress assessment of the initiatives.

Case Study	Change Model	Description
The "Outcome"	Benefits	• One group that is responsible for the overall management of the climate change initiatives (whether being completed under the working group or through sub-committees). • This working group acts as a connector to ensure that different initiatives are working together to minimize risk, increase effectiveness, and ensure streamlined execution and reporting. • One group that is accountable for the City's agreements and regulations (i.e., FCM). • Reports and reviews that document the City's overall progress in achieving climate change initiatives.

The use of the term committee or working group is for the City to determine which is most appropriate (or a third option) and resonates well with the determined function of the group.

Provided below is a conceptual model of the states of change regarding the Climate Change Committee / Working Group initiative which provides a visual representation of the preceding table.

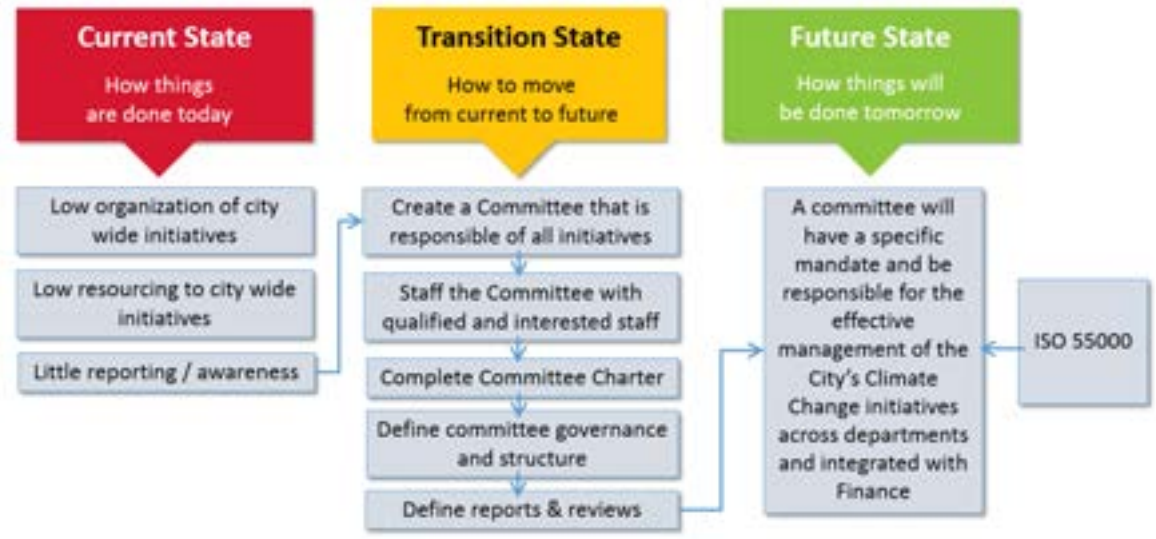


Figure 19 – States of Change for Initiative #3

The following table provides an outline of the "journey" in the form of a scope of work and key steps involved in advancing from the current state to the desired future state.

Table 98 – Scope of Work for Initiative #3

ID		Estimated Duration	City's Level of Effort	Output/ Deliverable
1	Identification and definition of roles & responsibilities	3 week	High	List of roles & responsibilities
2	Selection process of people (including consideration of departmental representation, interviews)	4 weeks	High	--
3	Set-up committee charter (with selected members)	1 week	High	Committee charter
4	Complete plan outlining committee governance model and structure	4 week	High	Governance plan
5	Set-up reporting requirements, review frequency, and review requirements	2 week	Low	Reporting requirements
	Overall Net Effect	**16 weeks**	**High effort**	**High benefit**

The prioritization of this initiative relative to the other eleven initiatives, and sequencing in an overall time-bound roadmap, is included in Section 7.7.2.

5.4 Risk Framework (#4)

The background and drivers for this initiative were addressed in Section 3.3 (Processes) of the SAMP. The following table provides a summary of the change model expressed in the form of the "problem", the "solution" and the "outcome".

Table 99 – Case Study and Change Model for Initiative #4

Case Study	Change Model	Description
The "Problem"	Current State	• Individual departments do not currently document asset specific risks • Asset risks are addressed intuitively/subjectively by each department • There is no formal risk treatment plan • Residual risk has not been quantified
The "Solution"	Transition State	• Pilot testing of the risk framework within one of the service areas
	Future State	• A fully developed and operationalized risk framework consistent across service areas that is used to make risk-based decisions • Criticality scores are assigned to all assets and consistently recorded in GIS
The "Outcome"	Benefits	• To mitigate risk • To improve operational efficiencies • To treat/control and monitor risk

Provided below is a conceptual model of the states of change regarding the risk framework initiative which provides a visual representation of the preceding table.

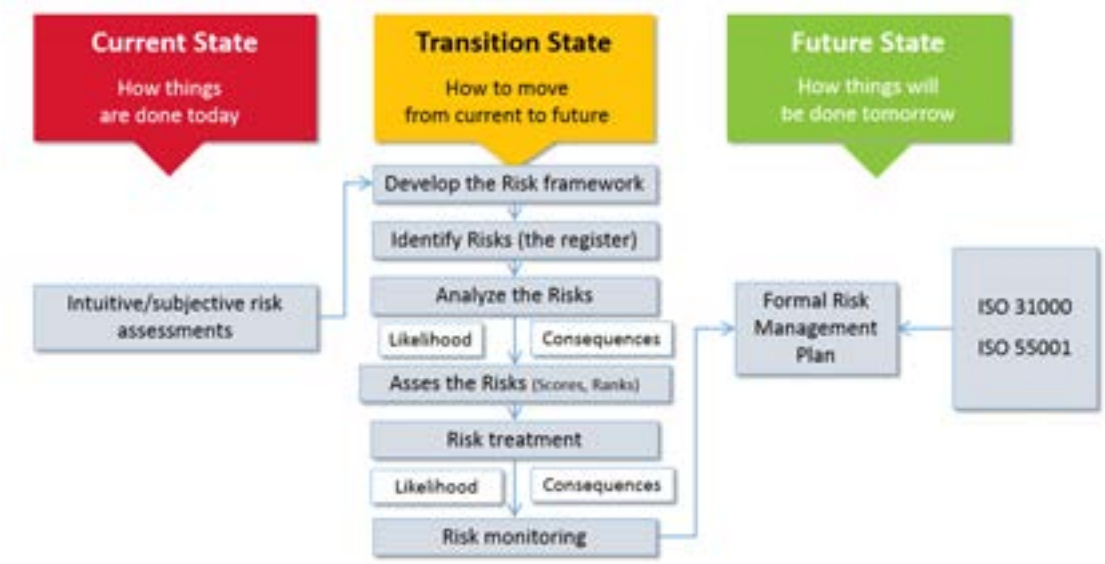


Figure 20 – States of Change for Initiative #4

The following table provides an outline of the "journey" in the form of a scope of work and key steps involved in advancing from the current state to the desired future state.

Table 100 – Scope of Work for Initiative #4

ID	Tasks	Estimated Duration	City's Level of Effort	Output/ Deliverable
1	Conduct a risk workshop(s)	2 weeks	Low	Workshop notes
2	Prepare a fully developed Risk Framework	4 weeks	Med	Risk framework
3	Prepare a risk register	2 week	Med	Risk register
4	Analyze risks (likelihood/consequence)	2 weeks	High	--
5	Rank risk scores and embed into GIS	1 week	Med	Data fields in GIS
6	Prepare risk treatment plan	2 weeks	Med	Treatment plan
	Pilot testing of risk framework	4-6 weeks	High	Pilot framework
	Track and monitor the risk program with periodic cycles of continual improvement	Ongoing	Med	--
	Overall Net Effect	**18 weeks**	**Med Effort**	**High Benefit**

The prioritization of this initiative relative to the other eleven initiatives, and sequencing in an overall time-bound roadmap, is included in Section 7.7.2.

5.5 Climate Change Adaptation Strategy (#5)

The background and drivers for this initiative are identified in Section 3.3.4 of the SAMP. The following table provides a summary of the change model expressed in the form of the "problem", the "solution" and the "outcome".

Table 101 – Change Model for Initiative #5

Case Study	Change Model	Description
The "Problem"	Current State	• A level of risk exposure target has not been quantified • Climate Change (incl. extreme weather) is observed and noted in the general community as a risk that municipalities should review and plan for
The "Solution"	Transition State	• Engage an experienced consultant to complete a vulnerability assessment (including the identification of next steps), compile required information, and review findings from consultant.
	Future State	• A completed vulnerability assessment that is reviewed by the City Council and Senior Management Team and available for incorporation with risk management
The "Outcome"	Benefits	• The level of risk that the City is exposed to is defined under varying scenarios / probability • A suite of initiatives will be included in the vulnerability assessment for the city to consider as next steps to reduce the level of risk exposure

Provided below is a conceptual model of the states of change regarding the climate change framework initiative which provides a visual representation of the preceding table.

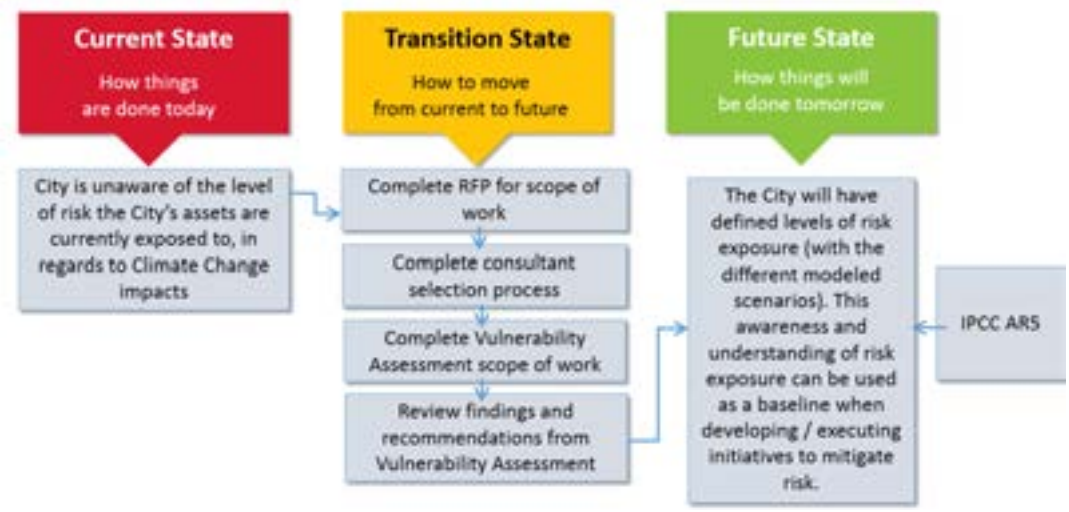


Figure 21 – States of Change for Initiative #5

The following table provides an outline of the "journey" in the form of a scope of work and key steps involved in advancing from the current state to the desired future state.

Table 102 – Scope of Work for Initiative #5

ID	Tasks	Estimated Duration	City's Level of Effort	Output/ Deliverable
1	Complete RFP for scope of work	2 week	Med	RFP for Vulnerability Assessment
2	Complete consultant selection process	2 weeks	Low	Selected Consultant for work
3	Complete Vulnerability Assessment scope of work (and assist with providing documentation)	8 weeks	Low	Vulnerability Assessment Report and improvement initiatives.
4	Review findings and recommendations from Vulnerability Assessment	2 week	Low	Memorandum of group review and next steps
	Overall Net Effect	**14 weeks**	**Low Effort**	**High Benefit**

The prioritization of this initiative relative to the other ten initiatives, and sequencing in an overall time-bound roadmap, is included in Section 7.7.2.

5.6 Decision-Making Framework (#6)

The background and drivers for this initiative are identified in Section 3.3 (Processes) of the SAMP. The following table provides a summary of the change model expressed in the form of the "problem", the "solution" and the "outcome".

Table 103 – Change Model for initiative #6

Case Study	Change Model	Description
The "Problem"	Current State	• Decision criteria is inconsistent across service areas and not formally documented • Decision criteria is primarily based on experience • Using Parks & Rec as an example, decisions are typically based on free-flowing discussions and determined by reviewing a supervisor's "wish lists"
The "Solution"	Transition State	• Develop decision-criteria and assign weightings • Piot test of the DM Framework
	Future State	• A fully developed decision-making framework consistent across service areas and widely known/utilized amongst staff for prioritization of business decisions

Case Study	Change Model	Description
The "Outcome"	Benefits	• Support tool for presentation of business case(s); ability to easily justify decisions to stakeholders • Informed decision-making • Ability to compare decisions easier across different service areas due to uniform criteria

Provided below is a conceptual model of the states of change regarding the decision-making framework initiative which provides a visual representation of the preceding table.

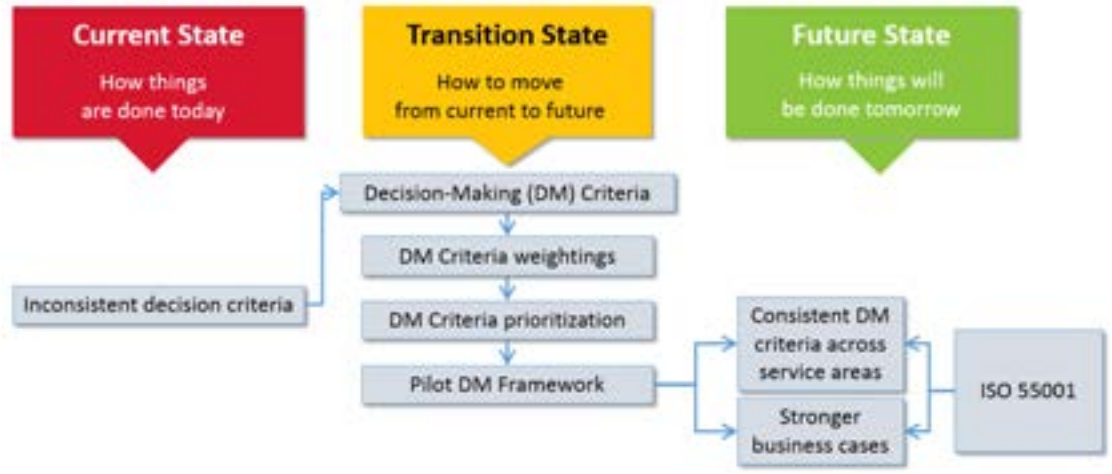


Figure 22 – States of Change for Initiative #6

The following table provides an outline of the "journey" in the form of a scope of work and key steps involved in advancing from the current state to the desired future state.

Table 104 – Scope of Work for Initiative #6

ID	Tasks	Estimated Duration	City's Level of Effort	Output/ Deliverable
1	Conduct decision-making workshop	2 weeks	Low	Workshop notes
2	Develop full Decision-Making Framework	6 weeks	High	Decision-Making Framework
3	Develop decision criteria	4 weeks	Med	Decision criteria
4	Assign weights and priority to decision criteria	2 weeks	Med	Weightings/prioritization
5	Pilot testing of DM Framework	4-6 weeks	High	DM Framework Pilot
6	Roll-out framework	--	Low	--
	Overall Net Effect	**20 weeks**	**Med Effort**	**High Benefit**

The prioritization of this initiative relative to the other eleven initiatives, and sequencing in an overall time-bound roadmap, is included in Section 7.7.2.

5.7 Condition & Data Framework (#7)

The background and drivers for this initiative are identified in Section 3.1 (Assets) and Section 3.4 (Systems and Data) of the SAMP. The following table provides a summary of the change model expressed in the form of the "problem", the "solution" and the "outcome".

Table 105 – Change Model for Initiative #7

Case Study	Change Model	Description
The "Problem"	Current State	• The City does not currently have an adequate method of assessing the state of infrastructure of its assets (e.g., asset age, condition, valuation).
The "Solution"	Transition State	• Collecting/analyzing asset condition and preparing to migrate data into GIS.
	Future State	• A fully developed asset inventory in GIS with the majority of data fields populated for each asset class - such as asset age, condition, and valuation.
The "Outcome"	Benefits	• Ability to produce an SOI report for any asset class. • Empowers informed decision-making. • Behaves as a business case tool to justify capital reinvestments.

Provided below is a conceptual model of the states of change regarding the condition & data framework which provides a visual representation of the preceding table.

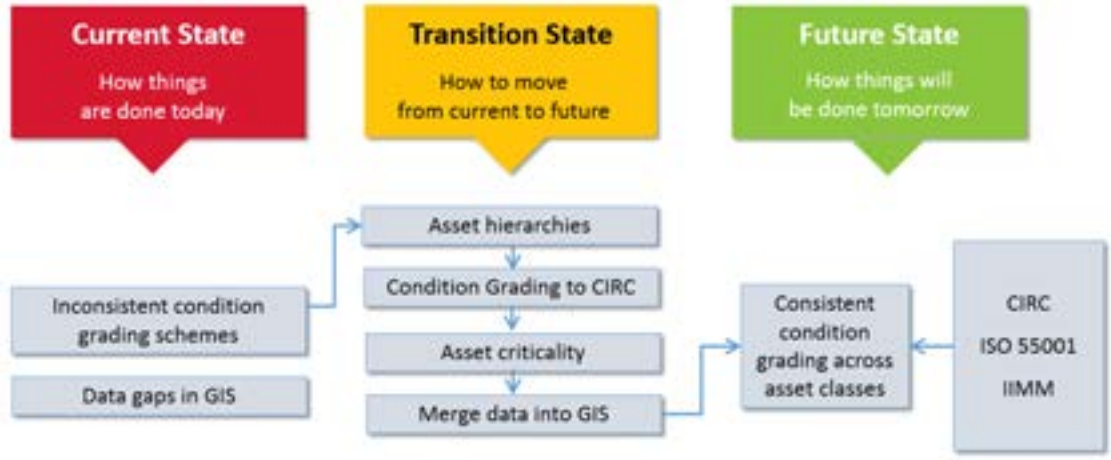


Figure 23 – States of Change for Initiative #7

The following table provides an outline of the "journey" in the form of a scope of work and key steps involved in advancing from the current state to the desired future state.

Table 106 – Scope of Work for Initiative #7

ID	Tasks	Estimated Duration	City's Level of Effort	Output/ Deliverable
1	Conduct SOI workshop	2 weeks	Low	Workshop notes
2	Further develop asset hierarchies & prepare an asset inventory register	4 weeks	High	Asset inventory register
3	Conduct asset condition analysis	4-8 weeks	High	--
4	Migrate asset data into GIS	2 weeks	High	--
5	Identify asset criticality	2 weeks	Med	Asset criticality rankings
	Overall Net Effect	**16 weeks**	**High Effort**	**High Benefit**

The prioritization of this initiative relative to the other eleven initiatives, and sequencing in an overall time-bound roadmap, is included in Section 7.7.2.

5.8 Financial Strategy (#8)

The background and drivers for this initiative are identified in Section 3.5 (Finances) of the SAMP. The following table provides a summary of the change model expressed in the form of the "problem", the "solution" and the "outcome".

Table 107 – Change Model for Initiative #8

Case Study	Change Model	Description
The "Problem"	Current State	• Assets funded through general taxation compete with many other priorities • Link between cost of service, level of service, and risk of service is not well defined • Financial management is currently task based rather than asset-based
The "Solution"	Transition State	
	Future State	• Restructured chart of accounts to enable asset-based trend analysis • Whole life cost analysis enable informed decision-making • Strategies to decrease or eliminate the infrastructure gap
The "Outcome"	Benefits	• Provides a long-term view of infrastructure needs • Prioritize and optimize infrastructure investments across the organization • Provides a strategy to stabilize rate increases • Leads to sustainable long-term financial planning • Complies with senior government grant policies

The following table provides an outline of the "journey" in the form of a scope of work and key steps involved in advancing from the current state to the desired future state.

Table 108 – Scope of Work for Initiative #8

ID	Tasks	Estimated Duration	City's Level of Effort	Output/ Deliverable
1	Restructure the chart of accounts to enable analysis by each asset class rather than a roll-up of several assets	4-6 weeks	High	Chart of Accounts (revised)
2	Review historical Opex and Capex and prepare trend analysis	3 weeks	Med	--
3	Confirm the annual reinvestment rate for 2018 to 2027	2 weeks	Med	--
4	Identify and develop strategies to address the infrastructure gap	4-6 weeks	High	Capital Needs Forecasting
5	Establish a replacement reserve fund	4 weeks	High	Reserve fund
	Overall Net Effect	**20 weeks**	**High effort**	**High Benefit**

The prioritization of this initiative relative to the other eleven initiatives, and sequencing in an overall time-bound roadmap, is included in Section 7.7.2.

5.9 Governance Model (#9)

The background and drivers for this initiative are identified in Section 3.2 (People) of the SAMP. The following table provides a summary of the change model expressed in the form of the "problem", the "solution" and the "outcome".

Table 109 – Change Model for Initiative #9

Case Study	Change Model	Description
The "Problem"	Current State	• There is currently some clarity required around roles and job descriptions, specifically when it comes to stewarding the change management initiative – see Recommendation #10 • Inadequate resources devoted to asset management practices and procedures. AM is being done as a "side of desk" activity.
The "Solution"	Transition State	• Not applicable
	Future State	• A formalized governance framework with delegation of authority
The "Outcome"	Benefits	• Clarity on roles, responsibilities, authorities and accountabilities

The following table provides an outline of the "journey" in the form of a scope of work and key steps involved in advancing from the current state to the desired future state.

Table 110 – Scope of Work for Initiative #9

ID	Tasks	Estimated Duration	City's Level of Effort	Output/ Deliverable
1	Conduct an R2-A2 workshop	1 week	Low	Workshop notes
2	Review individual job descriptions and prepare draft RACI charts	2 weeks	Low	Draft RACI chart
3	Refine and finalize RACI charts	4-6 weeks	Med	Final RACI chart
	Overall Net Effect	**6 weeks**	**Med. Effort**	**Med. Benefit**

The prioritization of this initiative relative to the other eleven initiatives, and sequencing in an overall time-bound roadmap, is included in Section 7.7.2.

5.10 Change Management & Communication Plan (#10)

The background and drivers for this initiative are identified in Section 2.2 (AM Objectives) of the SAMP and are further discussed in Chapter 9.0 (Roadmap). The following table provides a summary of the change model expressed in the form of the "problem", the "solution" and the "outcome".

Table 111 – Change Model for Initiative #10

Case Study	Change Model	Description
The "Problem"	Current State	• Limited awareness and understanding about the importance of asset management was identified as a key challenge. A communications strategy and plan will help build awareness and understanding with staff, council and the community. • As the City begins its roll-out of AMPs across service areas, a structured approach is required to minimize resistance to change and maximize its return on investment • The City does not currently have a documented communication plan to engage or notify stakeholders of upcoming changes to its business operations
The "Solution"	Transition State	• Form appropriate committees • Allocate a staff member to champion the change management initiative
	Future State	• Fully developed Change Management & Communication Plan; rolled-out across the City and adopted by staff at all levels

Case Study	Change Model	Description
The "Outcome"	Benefits	• Ensures all stakeholders, and particularly Council, understand the benefits of asset management and are kept up-to-date on asset management activities • Supports sound decision-making by Council • Promotes buy-in throughout the organization, and with the public • Understanding of who is impacted by asset management practices and how to communicate with stakeholders accordingly • Enhanced performance monitoring • Improved stakeholder relations

Provided below is a conceptual model of the states of change regarding the change management and communication plan initiative which provides a visual representation of the preceding table.

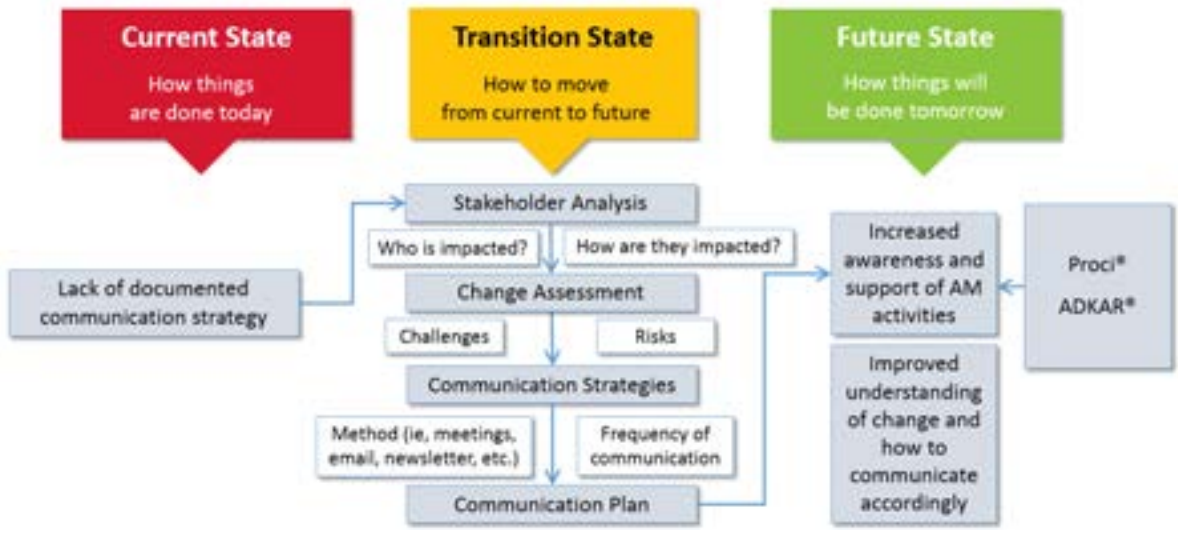


Figure 24 – States of Change for Initiative #10

The following table provides an outline of the "journey" in the form of a scope of work and key steps involved in advancing from the current state to the desired future state.

Table 112 – Scope of Work for Initiative #10

ID	Tasks	Estimated Duration	City's Level of Effort	Output/ Deliverable
1	Identify internal change management champion/stewards	2 weeks	Low	--
2	Conduct current assessment	4 weeks	Med	--
3	Develop and communicates the benefits of the change	8 weeks	High	Communication Plan

ID	Tasks	Estimated Duration	City's Level of Effort	Output/ Deliverable
4	Conduct AM awareness and training sessions	Ongoing	High	Staff training
	Overall Net Effect	**16 weeks**	**High effort**	**High benefit**

The prioritization of this initiative relative to the other eleven initiatives, and sequencing in an overall time-bound roadmap, is included in Section 7.7.2.

6. Roadmap

The roadmap for effective implementation of the ten improvement initiatives includes the following components:

- Prioritization Strategy
- Quantification – Internal FTE estimates and external fees
- Schedule/Timeline
- Implementation Strategy
- Master sheet

6.1 Prioritization of the Initiatives

Recognizing that the City operates in a constrained environment (i.e. limited budget, etc.), the improvement initiatives can be evaluated using the benefit-effort matrix to assist in establishing priorities and roll-out strategies. The methodology is captured in four key steps as follows:

- Step 1: Calculate benefit scores
- Step 2: Calculate effort scores
- Step 3: Correlate on the Benefit-Effort matrix
- Step 4: Bundle work on the Benefit-Effort outputs

6.1.1 Step 1: Benefit Criteria

A summary of the benefit criteria that may be applied to each of the improvement initiatives, is as follows:

1. Manage assets to best serve the City's mandate
2. Optimize asset value according to service outcomes, risk mitigation & lifecycle costs
3. Explicitly link investment prioritization decisions to corporate objectives
4. Improve decision-making accountability and transparency
5. Provide appropriate resources with necessary knowledge and skills to effectively manage assets

The following table illustrates how each of the initiatives are scored against one or more of the five benefit criteria.

Table 113 – Conceptual Illustration of how the Benefit Criteria are Scored

Improvement Initiatives	Benefit Criteria					Total
	1	2	3	4	5	
Initiative #1	●	●				2
Initiative #1		●			●	2
Initiative #3	●					1
Initiative #4			●	●	●	3
Totals	**2**	**2**	**1**	**1**	**2**	

6.1.2 Step 2: Effort Ratings

The following table provides a summary of the efforts ratings and corresponding descriptors that may be applied to each of the improvement initiatives identified in the report.

Table 114 – Effort Ratings for the Improvement Initiatives

Score	Effort	Description of the Effort
1	Low	Minimal resources and internal FTE hours are required to accomplish initiative.
2	Moderate	Moderate resources and internal FTE hours are required to accomplish initiative.
3	High	Significant resources and internal FTE hours are required to accomplish initiative.
4	Very High	Significant resources and internal FTE hours are required to accomplish initiative. Business operations may be impacted. It is advised to have a Change Management & Communication Plan established and communicated to staff before implementing the initiative.
5	Paradigm Shift	Significant resources and internal FTE hours required to accomplish initiative. Business operations will be impacted, and changes to the organization's structure/culture may occur. It is strongly advised to have a Change Management & Communication Plan established and communicated to staff before implementing the initiative.

6.1.3 Step 3: Benefit-Effort Matrix

After each of the initiatives have been scored, they can be plotted onto a benefit-effort matrix. The matrix is divided into four quadrants, as seen below.

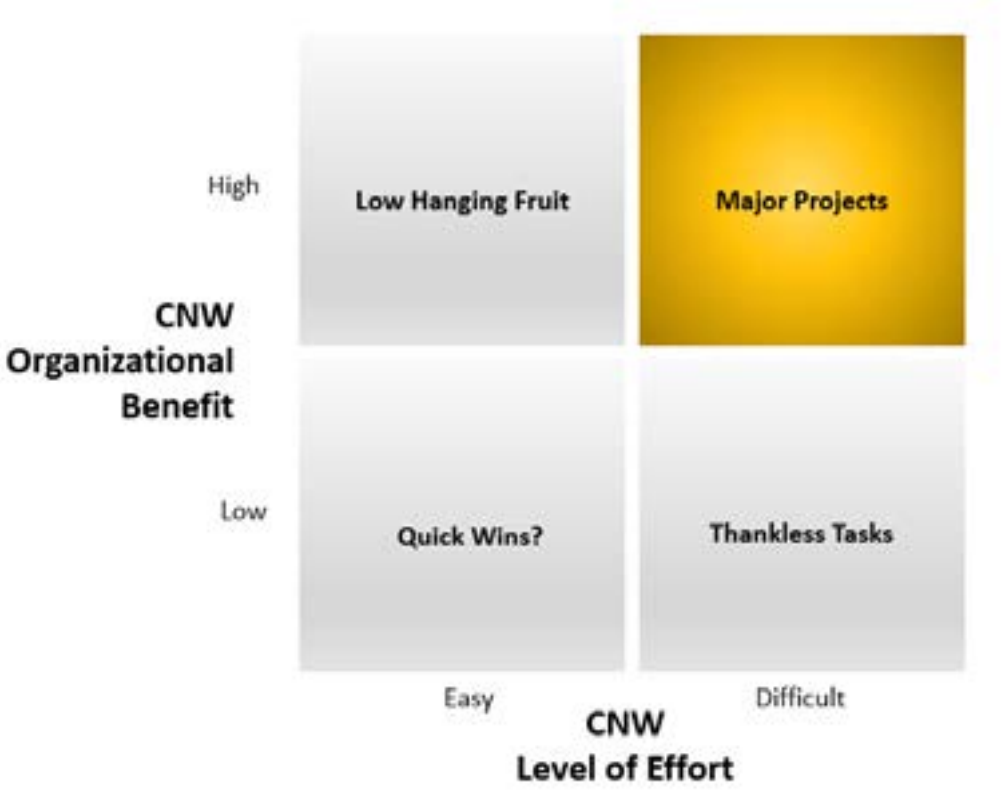


Figure 25 – Conceptual Benefit-Effort Matrix

For example, an initiative with high benefit and high effort will fall into Quadrant 2 and be deemed a "major project". The following table provides an outline of the benefit-effort classification and corresponding actions.

Table 115 – Initiatives Classification and Action Plan

Quadrants	Classification	Actions
1	Low Hanging Fruit	• Calculate material value of initiatives as a group • Develop group effort heat map
2	Major Projects	• Confirm dependencies on other initiatives • Obtain input from key stakeholders
3	Quick Wins	• Develop group effort heat map • Estimate cascading effect
4	Thankless Tasks	• Conduct cost-benefit analysis • Confirm the value of proposition

The following figure shows how the 10 improvement initiatives (identified in Section 6.2) score on the benefit-effort matrix, represented as a correlation of the relative effort and benefit required.

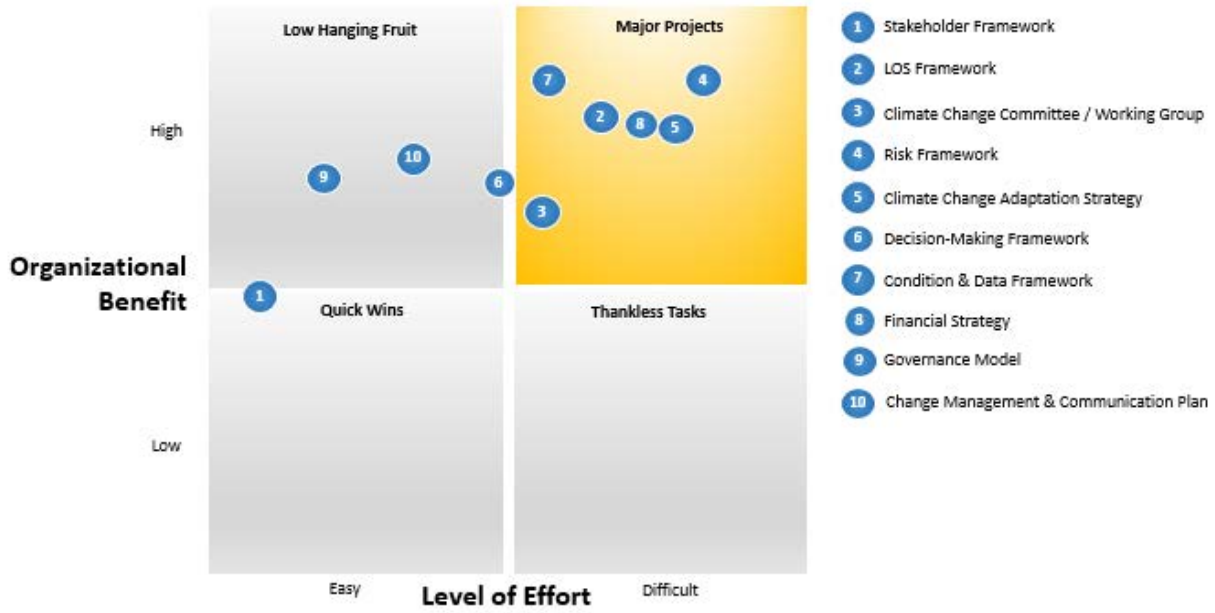


Figure 26 – Benefit Effort Matrix of the 10 Initiatives

More than half of the initiatives are considered to be "major projects" (approx. 70%), whereas the remaining three initiatives fall into the category of "low hanging fruit" (approx. 30%).

6.2 Quantification of the Initiatives

6.2.1 Internal Staff Hours

For each initiative an approximation of the internal staff hours have been calculated and visually represented in the following graph.

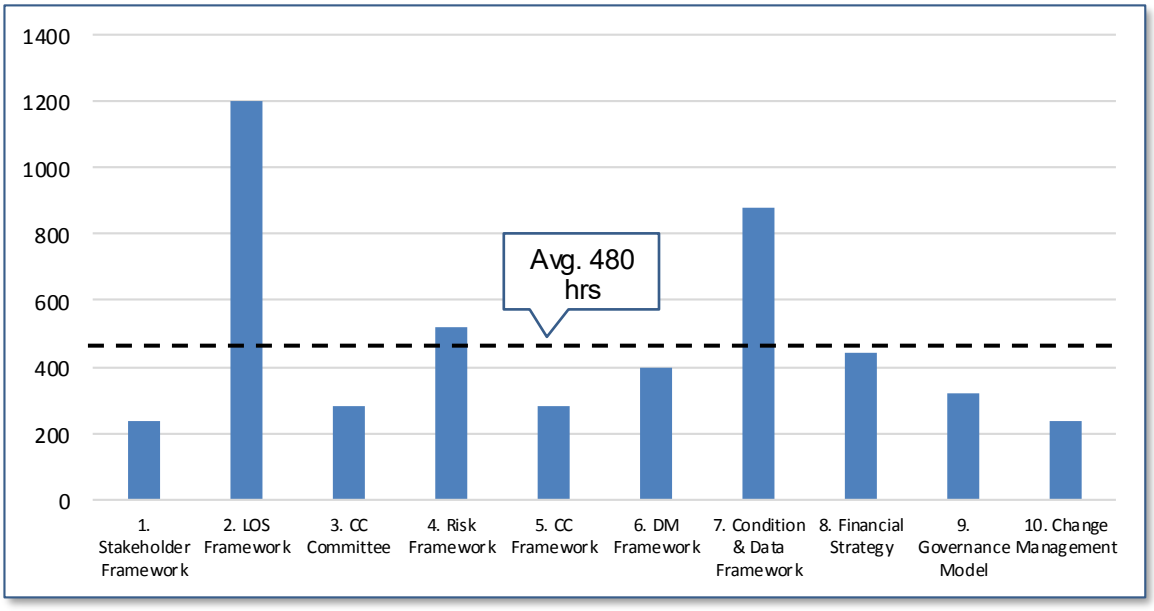


Figure 27 – Internal Staff Hours

The total internal hours for City staff across the ten initiatives is approximately 4,800, subject to additional external support. On average, each initiative requires 480 internal hours. Further details on the internal and external hours anticipated for each initiative is provided in Section 6.5.

6.2.2 Internal FTE Counts

For each initiative an approximation of the internal FTE counts have been calculated and visually represented in the following graph.

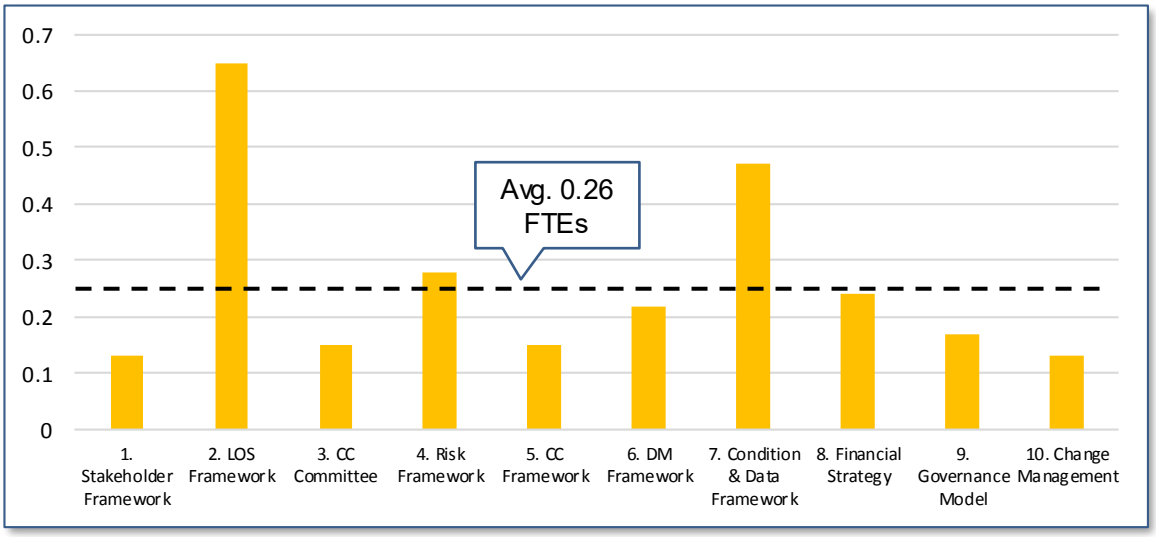


Figure 28 – FTE Counts

The total internal hours for City staff across the ten initiatives is equivalent to approximately 2.6 FTEs, subject to additional external support. On average, each initiative requires 0.26 FTEs. Further details on the internal and external FTEs anticipated for each initiative is provided in Section 6.5.

6.2.3 External Fees

For each initiative an approximation of the external consultant fees have been calculated and visually represented in the following graph.

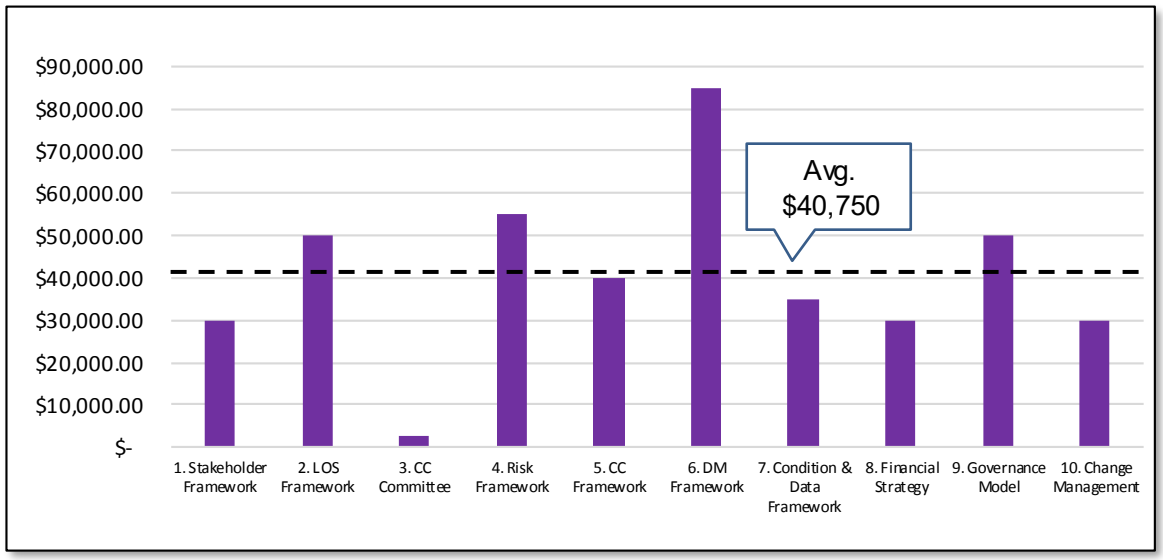


Figure 29 – External Fees

On average, each initiative requires $40,750 in external fees. Further details on the external fees anticipated for each initiative is provided in Section 6.5.

6.3 Implementation Timeline

The figure below includes a high level schedule for prioritized and sequenced roll-out of the ten (10) initiatives over an approximate 5-year period. Some of the initiatives have a finish-to-start or a start-to-start interdependency with one another.

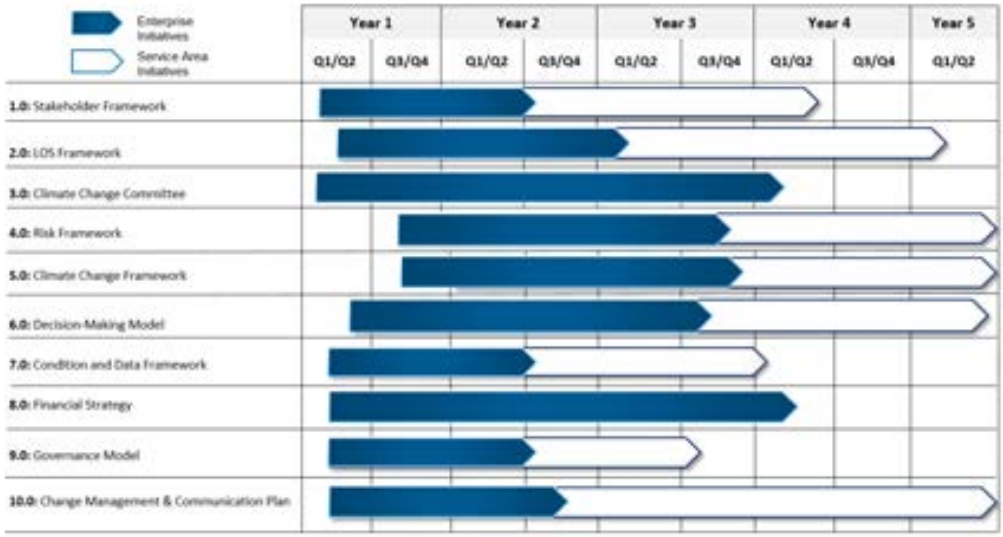


Figure 30 – Roll-out Timeline of Initiatives

6.4 Implementation Strategies

The table below provides a summary of three alternative strategies for implementation of the roadmap initiatives together with their respective advantages and disadvantages.

Table 116 – Alternative Implementation Strategies

Implementation Strategy	Description	Advantages	Disadvantages
Option 1: Practice Based Implementation	Implementation of improvement initiatives across asset groups/service areas City-wide, simultaneously.	A focused effort can create early successes City-wide. This approach would get all service areas involved and maintain the interest in AM practices.	There can be limitations on how far practices can be implemented without data and technology solutions in place. Internal resources could be spread too thin.
Option 2: Service Area Implementation	Focus on one asset group/service area and implement most of the initiatives before moving to another asset group/service area. Work can be done concurrently in all service areas.	A focused effort on one asset group can create early successes and demonstrate the return on investment across all asset groups. This approach would make fewer demands on internal resources.	There can be limitations on how far practices can be implemented without data and technology solutions in place. Other areas may have to wait too long for implementation and could lose interest.
Option 3: Hybrid Implementation	Focus is on one asset group but teams are established in all other areas that can start some of the preparatory work while major implementation is occurring. This can be data collection, documentation, etc.	A focused effort on one asset group can create early successes and demonstrate the return on investment in asset management.	This approach would require more internal resources than Option 1.

6.5 Improvement Initiatives Matrix

Included below is an itemized summary of the 42 key recommendations associated with this SAMP report, which have been arranged into sections corresponding with the different tasks of the SAMP. Included with each recommendation is information on the benefit-effort rating, primary roles, and estimated hours (internal and external).

Table 117 – Roadmap of Improvement Initiatives

What?		Why?				Who?			How Much?	When?																			
Description	Category	Benefit Rating	Effort Rating	City Wide	Asset Class Specific	Primary Roles	Internal FTE Formula	Internal Est. hours	External consultant Support	Year 1				Year 2				Year 3				Year 4				Year 5			
										Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.0 Stakeholder Framework	**Tactical**	**High**	**Low**	✓		**Director, Manager, Engineer**		**240**	**$30,000**	■	■	■	■	■	■														
1.1 Develop a stakeholder register	Tactical	High	Low		✓	Director, Manager	2 staff x 4hrs	8	$1,000	■	■	■																	
1.2 Develop a stakeholder engagement plan	Strategic	High	Low		✓	Director, Manager	2 staff x 8hrs	16	$2,000			■	■	■	■														
Sub-Total, Approx. (per Asset Class)								**24**	**$3,000**																				
x 10 Asset Classes																													
Total, Approx. (City-Wide)								**240**	**$30,000**																				
Total Number of FTEs (@ 1860 hrs/yr)								**0.13**																					
2.0 Level of Service Framework	**Tactical**	**High**	**Med**	✓		**Director, Manager, Engineer**		**1,200**	**$50,000**		■	■	■	■	■	■	■												
2.1 Develop a formal register of customer LOS measures	Tactical	High	Med		✓	Manager, Engineer	4 staff x 4hrs	16	$1,000		■	■																
2.2 Develop a formal register of technical LOS measures	Tactical	High	Med		✓	Manager, Engineer	4 staff x 4hrs	16	$2,000	■	■																		
2.3 Establish targets for the LOS measures	Tactical	High	Low		✓	Manager, Engineer	2 staff x 4hrs	8	$2,000				■	■														
2.4 Collect data for the LOS performance metrics	Tactical	High	High		✓	Data Analyst	4 staff x 8hrs	32	--				■	■	■	■	■											
2.5 Analyze demand data and conduct trend analysis	Tactical	High	High		✓	Data Analyst	4 staff x 8hrs	32	--						■	■	■											
2.6 Collect complaints/feedback for benchmarking and enhanced customer satisfaction	Tactical	High	Med		✓	Customer Service, Data Analyst	4 staff x 4hrs	16	--						■	■	■											
Sub-Total, Approx. (per Asset Class)								**120**	**$5,000**																				
x 10 Asset Classes																													
Total, Approx. (City-Wide)								**1,200**	**$50,000**																				
Total Number of FTEs (@ 1860 hrs/yr)								**0.65**																					
3.0 Climate Change Committee / Working Group	**Strategic**	**High**	**High**	✓		**Director, Manager**		**280**	**$2,500**			■	■	■	■	■	■												
3.1 Identification and definition of roles & responsibilities	Strategic	High	Med	✓		**Director, Manager**	--	--	--				■	■														
3.2 Prepare committee charter	Strategic	High	Med	✓		**Director, Manager**	--	--	--					■	■													
3.3 Develop committee governance model	Strategic	High	Low	✓		**Director, Manager**	--	--	$1,500						■	■												
3.4 Set-up reporting requirements, review frequency, and review requirements	Strategic	High	High	✓		**Director, Manager**	--	--	$1,000							■	■											
Total, Approx. (City-Wide)								**280**	**$2,500**																				
Total Number of FTEs (@ 1860 hrs/yr)								**0.15**																					

What?		Why?				Who?			How Much?	When?																			
Description	Category	Benefit Rating	Effort Rating	City Wide	Asset Class Specific	Primary Roles	Internal FTE Formula	Internal Est. hours	External consultant Support	Year 1				Year 2				Year 3				Year 4				Year 5			
										Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
4.0 Risk Framework	**Tactical**	**High**	**High**	✓		**Manager, Engineer**		**520**	**$55,000**					■	■	■	■	■	■										
4.1 Develop a formal risk register of asset risks	Tactical	High	High		✓	Manager, Engineer	4 staff x 2hrs	8	$1,000					■	■														
4.2 Conduct risk assessment (likelihood, consequences)	Tactical	High	High		✓	Manager, Engineer	4 staff x 4hrs	16	$2,500							■	■												
4.3 Rank all risks in the risk register based on their scores	Tactical	Med	Low		✓	Manager, Engineer	2 staff x 4hrs	8	$500								■												
4.4 Formalize the risk treatment plan	Strategic	High	High		✓	Manager, Engineer	3 staff x 4hrs	12	$1,000								■	■											
4.5 Formalize the risk monitoring program	Tactical	High	Med		✓	Manager, Engineer	2 staff x 4hrs	8	$500										■										
							Sub-Total, Approx. (per Asset Class)	**52**	**$5,500**																				
									x 10 Asset Classes																				
							Total, Approx. (City-Wide)	**520**	**$55,000**																				
							Total Number of FTEs (@ 1860 hrs/yr)	**0.28**																				
5.0 Climate Change Adaptation Strategy	**Tactical**	**High**	**High**	✓		**Director, Manager, Engineer**		**280**	**$40,000**							■	■	■	■										
5.1 Develop a formalized register for climate change impacts and affects	Tactical	Med	High		✓	Manager, Engineer	2 staff x 4hrs	8	$1,000							■	■												
5.2 Formalize climate change initiatives	Tactical	High	High		✓	Director, Manager, Engineer	2 staff x 4hrs	8	$1,000								■	■											
5.3 Collect and measure climate change data to track progress	Tactical	High	High		✓	Manager, Engineer	Ongoing	--	--									■	■	■	■								
5.4 Formalize method of reporting climate change performance measures and targets	Tactical	High	Med		✓	Manager, Engineer	2 staff x 4hrs	8	$1,000											■	■								
5.5 Formalize impact mitigation plan	Strategic	High	Med		✓	Director, Manager, Engineer	2 staff x 2hrs	4	$1,000													■	■						
							Sub-Total, Approx. (per Asset Class)	**28**	**$4,000**																				
									x 10 Asset Classes																				
							Total, Approx. (City-Wide)	**280**	**$40,000**																				
							Total Number of FTEs (@ 1860 hrs/yr)	**0.15**																				
6.0 Decision-Making Model	**Tactical**	**High**	**Med**	✓		**Director, Manager**		**400**	**$85,000**						■	■	■	■											
6.1 Formalize the decision-making criteria to be consistent across each service area	Tactical	High	Med		✓	Director, Manager	4 staff x 4hrs	16	--						■													
6.2 Formalize the decision-making framework	Tactical	High	High		✓	Director, Manager	4 staff x 4hrs	16	**$5,500**						■	■													
6.3 Develop decision trees for each of the key procedures	Tactical	Low	Low		✓	Director, Manager	2 staff x 4hrs	8	**$3,000**								■	■											
							Sub-Total, Approx. (per Asset Class)	**40**	**$8,500**																				
									x 10 Asset Classes																				
							Total, Approx. (City-Wide)	**400**	**$85,000**																				
							Total Number of FTEs (@ 1860 hrs/yr)	**0.22**																				

What?		Why?				Who?			How Much?	When?																			
Description	Category	Benefit Rating	Effort Rating	City Wide	Asset Class Specific	Primary Roles	Internal FTE Formula	Internal Est. hours	External consultant Support	Year 1				Year 2				Year 3				Year 4				Year 5			
										Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
7.0 Condition & Data Framework	**Operational**	**High**	**Med**	✓		**Data Analyst, Engineer**		**880**	**3,500**									■	■	■	■	■	■	■	■				
7.1 Further develop asset hierarchies	Operational	Med	Low		✓	Engineer	4 staff x 2hrs	8	--									■	■										
7.2 Prepare asset inventory register	Operational	High	Low		✓	Engineer	4 staff x 2hrs	8	--											■									
7.3 Conduct asset condition analysis	Operational	High	Med		✓	Data Analyst, Engineer	4 staff x 6hrs	24	--												■	■	■						
7.4 Migrate asset data and condition data into GIS	Operational	High	Med		✓	Data Analyst, Engineer	4 staff x 8hrs	32	--													■	■	■					
7.5 Identify criticality ranking of assets	Operational	Med	Med		✓	Data Analyst, Engineer	2 staff x 4hrs	8	--															■					
7.6 Prepare data framework	Tactical	High	Med			Data Analyst, Engineer	2 staff x 4hrs	8	$3,500															■	■				
							Sub-Total, Approx. (per Asset Class)	**88**	**3,500**																						
									x 10 Asset Classes																					
							Total, Approx. (City-Wide)	**880**	**$35,000**																						
							Total Number of FTEs (@ 1860 hrs/yr)	**0.47**																						
8.0 Financial Strategy	**Operational**	**High**	**Med**	✓		**Manager, Accountant**		**440**	**$30,000**									■	■	■	■	■							
8.1 Restructure the chart of accounts to enable analysis by each asset class rather than a roll-up of several assets (i.e. financial management is currently task based and instead should be asset-based)	Operational	High	High	✓		Accountant	2 staff x 8hrs	16	$10,000									■	■										
8.2 Review historical Opex and Capex and prepare trend analysis	Operational	Low	Low	✓		Accountant, Manager	2 staff x 2hrs	4	$10,000										■	■									
8.3 Confirm the annual reinvestment rate for 2018 to 2027	Operational	Med	Low	✓		Accountant	2 staff x 4hrs	8	--											■									
8.4 Identify and develop strategies to address the infrastructure gap	Operational	High	High	✓		Manager	2 staff x 8hrs	16	$10,000											■	■	■							
8.5 Establish a replacement reserve fund	Operational	High	High	✓		Manager, Accountant	4 staff x 11hrs	44	--											■	■	■							
							Total, Approx. (City-Wide)	**440**	**$30,000**																						
							Total Number of FTEs (@ 1860 hrs/yr)	**0.24**																						
9.0 Governance Model	**Tactical**	**Med**	**Low**	✓		**Director, Manager, HR**		**320**	**$50,000**									■	■	■									
9.1 Prepare a formalized organizational chart of staff hierarchies with clear reporting lines of communication	Tactical	Med	Low		✓	Director, Manager, HR	2 staff x 4hrs	8	--									■											
9.2 Review individual job descriptions and prepare an R2-A2 Framework	Tactical	Med	Med		✓	Director, Manager, HR	3 staff x 4hrs	12	$2,000										■										
9.3 Develop a master list of processes as a RACI chart	Tactical	Med	Med		✓	Director, Manager, HR	3 staff x 4hrs	12	$3,000											■									
							Sub-Total, Approx. (per Asset Class)	**32**	**$5,000**																						
									x 10 Asset Classes																					
							Total, Approx. (City-Wide)	**320**	**$50,000**																						
							Total Number of FTEs (@ 1860 hrs/yr)	**0.17**																						

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What?		Why?				Who?			How Much?	When?																			
Description	Category	Benefit Rating	Effort Rating	City Wide	Asset Class Specific	Primary Roles	Internal FTE Formula	Internal Est. hours	External consultant Support	Year 1				Year 2				Year 3				Year 4				Year 5			
										Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
10.0 Change Management & Communication Plan	**Strategic**	**High**	**Low**	✓		**Director, Manager**		**240**	**$3,000**									■	■	■	■	■	■	■	■	■	■	■	■
10.1 Identify change management champion(s)	Strategic	Med	Low		✓	Director, Manager, HR	2 staff x 4hrs	8	--									■											
10.2 Current assessment	Strategic	Med	Low		✓	Director, Manager	2 staff x 4hrs	8	$1,000										■	■									
10.3 Document and communicate the benefits of the change	Strategic	High	Med		✓	Director, Manager	2 staff x 4hrs	8	$2,000												■	■	■						
10.4 Develop and roll-out AM awareness training	Strategic	High	Med		✓	Director, Manager	Ongoing	--	--															■	■	■	■	■	■
							Sub-Total, Approx. (per Asset Class)	**24**	**$3,000**																				
									x 10 Asset Classes																				
							Total, Approx. (City-Wide)	**240**	**$3,000**																				
							Total Number of FTEs (@ 1860 hrs/yr)	**0.13**																					
							Grand Total Hours for all Recommendations, Approx.	**4,800**	**$407,500**																				
							Number of FTEs for all Recommendations	**2.6**																					

6.6 Change Management

Change management is a structured approach that could help the City transition from its current state to a desired future state with minimal resistance or business operational issues and to maximize the return on its investment. It is recommended this transformational roadmap be supported by a formal approach such as the Prosci® ADKAR® Change Management methodology or similar. The Prosci® Toolkit has a number of structured assessments that help identify strengths and concerns for the project. Having this understanding allows effort to be focused on addressing the challenges to ensure the project as a whole meets its objectives and results in sustainable business transformation.

Initially, the focus of the Change Management Plan will be to understand the City's readiness for change, and establish an internal stakeholder map and internal communications plan. These help with the understanding of who is impacted by the transformation and how to communicate with stakeholders accordingly.

Table 118 – Stages of Change (Based on the ADKAR Model)

Stages	Objectives	Description
Awareness	Of the need for change	The City asks itself what is and is not working in the organization
Desire	To support and participate in the change	The City communicates the benefits of the change and builds momentum
Knowledge	Of how to change	The City staff learn new technical skills regarding teamwork
Action	To implement the change	The City employs a suitable governance framework; staff training
Reinforcement	To sustain the change	The City identifies champions, continually engages with staff

To track effectiveness and ensure sustainability, change management should become an iterative process that integrates with regular project management activities. Resistance to change is a natural human reaction and it is to be expected; but having tracking and feedback mechanisms in place helps the project team identify these areas so they can work to address them.

A properly-structured and well-implemented approach to change management plan will facilitate meeting and/or exceeding the City's AM objectives, minimizing its risks and maximizing its Return on Investment (ROI).

7. Continual Improvement & Monitoring

A key aspect of good asset management practice is to continually evaluate, review and enhance its practices. This continual improvement approach will result in periodic updates to the SAMP as a better understanding of the asset base and its needs is obtained. Continual improvement is defined as “recurring activity to enhance performance” (ISO 55000).

- **Monitor** - to supervise and continually check and critically observe. Determine the current status and assess whether or not required or expected performance levels are being achieved.
- **Review** - review activities that are carried out in order to determine whether something is suitable, adequate and effective way of achieving objectives. E.g., Review of the Risk Management Framework and Process.

7.1 Update Cycles

The City’s various asset management documents are living documents that should continue to reflect the evolution of asset management practices within the City. The following table shows the intended update frequencies of the different asset management documents.

Table 119 – Update Frequencies for Different AM Artifacts

Alignment Documents	Update Frequency	Current Status, 2018
Official Community Plan (OCP)	Every 5 years	Updated (2017)
Asset Management Policy	Every 10 years	Developed (2017)
Strategic Asset Management Plan (SAMP)	Every 5 years	In development (2018)
Service Area AMPs	Every 5 years	Pending (2019-2024)
State of Infrastructure Reports (SOIR)	Every 2-3 years	Transportation assets only (2017)
Long-Term Financial Plan (LTFP)	Every 5 years	--
Operating & Capital Budget	Annually	--

7.2 Monitoring Process

The City is adopting a number of continual improvement activities and will promote a culture of continual improvement. The process shall include the monitoring of the following: a) the assets; b) the asset management system; and c) the asset management program. The following table includes a summary of the different means and methods for monitoring the asset management program.

Table 120 – SAMP Monitoring Process

Methods	Description	Responsibility
1	Assign staff to certain monitoring roles	Senior management
2	Hold periodic meetings to elicit feedback from staff on performance matters	AM team
3	Collect customer feedback on service levels	All staff
4	Conduct performance benchmarking - Use a Key Performance Indicator tracker at the AM program level to monitor the adoption and embedding of AM tools, techniques, and behaviors.	AM team
5	Use a Key Performance Indicator tracker at asset level to monitor and target poor performing assets and effects of maintenance/replacement strategies.	AM team
6	Establish protocols for project closure reporting.	AM team
7	Establish appropriate mechanisms for disseminating know ledge.	Senior management AM team
8	Establish procedure and responsibility for acting on good practice/lessons learned.	Senior management AM Team
9	Review improvement opportunities as part of annual updating of planning procedures.	Senior management AM team
10	Promote a culture of continual improvement	Senior management AM team

7.3 Review Process

Once the improvement activities are in place, an annual review of the performance of the AM program will be conducted. This review shall include consideration of the following:

- The achievement of the intended benefits of the objectives
- The asset performance requirements
- The resources
- Any other appropriate elements.

The following table includes a summary of the steps involved in the ongoing review of the City's SAMP.

Table 121 – SAMP Review Process

Steps	Description	Responsibility
1	Record the results of the monitoring program	All staff
2	Conduct Internal evaluation of the data from the monitoring program together w ith the results of benchmarking, audit results, and assessments of current and best practices,	Senior management AM Team

Steps	Description	Responsibility
3	Continually seek opportunities to improve and achieve delivery of the asset related aspects of the organizational strategic plan in a more efficient way.	AM team
4	Review the AM program to ensure its continuing suitability, adequacy, and effectiveness.	CAO

The following table includes a summary of the steps involved in the periodic updates to the City's SAMP.

Table 122 – SAMP Update Process

Steps	Description	Responsibility
1	Prepare updates to the SAMP, as identified through the monitoring and review program. Adjust objectives and targets, as required.	AM Steering Committee
2	Review the updated SAMP	Senior management
3	Endorse updates to ensure consistency with the City's strategic aims and stakeholder requirements.	CAO
4	Approve updated SAMP	CAO
5	Transmit updates to all relevant staff	AM team
6	Communicate updates to appropriate stakeholders.	AM team



about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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