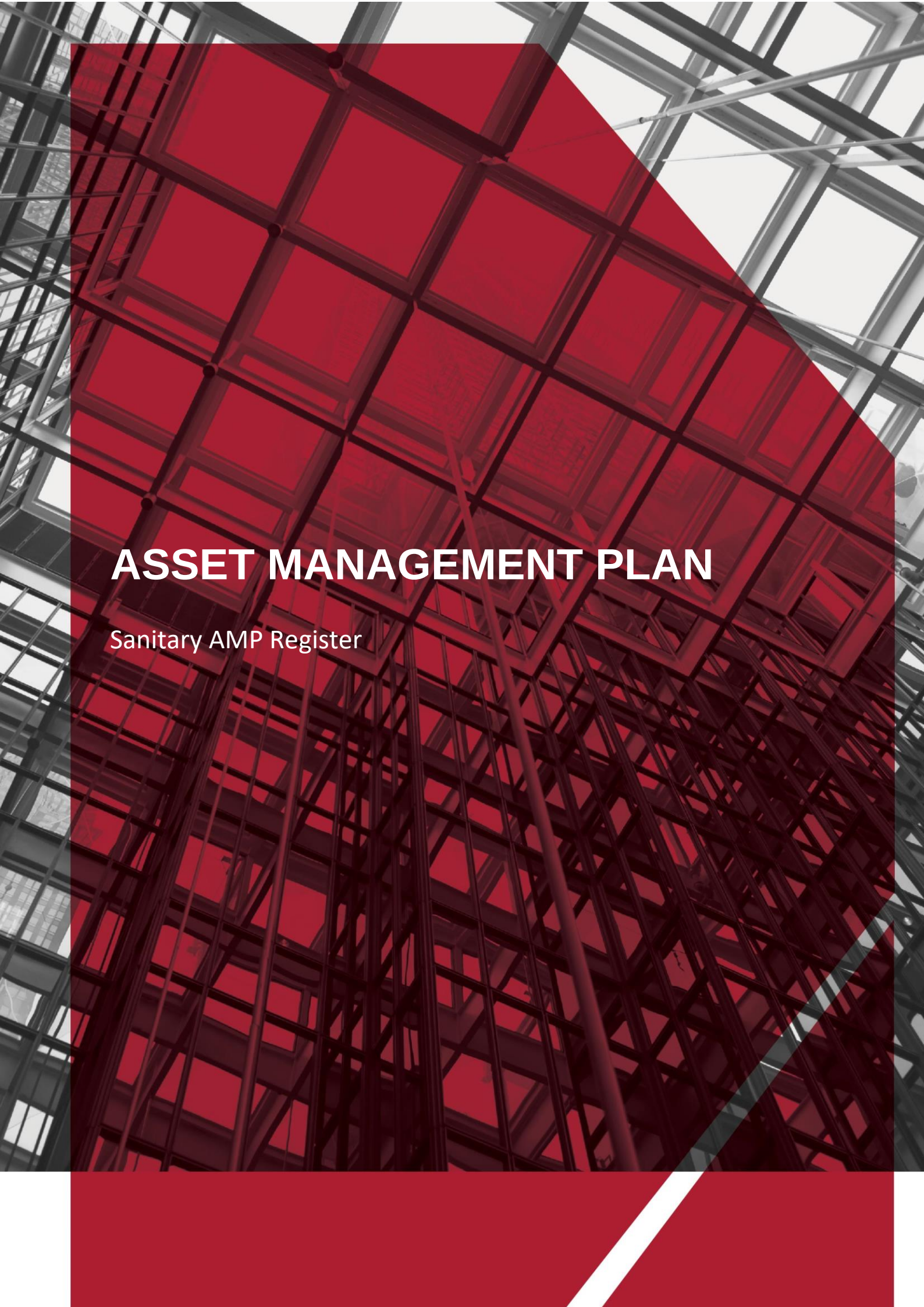

ASSET MANAGEMENT PLAN

Sanitary AMP Register

Document Control	Asset Management Plan				
Document ID :					
Rev No	**Date**	**Revision Details**	**Author**	**Reviewer**	**Approver**
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The preparation of this project was carried out with assistance from the Government of Canada and the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them."

Contents

1.0 EXECUTIVE SUMMARY

1.1 The Purpose of the Plan

This Asset Management Plan (AM Plan) details information about infrastructure assets with actions required to provide an agreed level of service in the most cost-effective manner while outlining associated risks. The plan provides a overview of the City's waste water assets, the customer values; the levels of services provided to the customer, what funds are required to provide over the ten (10) year planning period to maintain these service; the risks associated and plans for improvement. The AM Plan will link to a Long-Term Financial Plan which typically considers a 10 year planning period.

1.2 Asset Description

This plan covers the infrastructure assets that provide Sanitary Wastewater Collection Services. The total length of the sanitary collection system network is **87.5** km of gravity main and **6 km** force main and includes **1109** manholes.

- The plan currently does not include the three (3) Major Lift Stations and pumps (Building 1, Building 3 and Building 8) and three (3) Minor Lift Stations and pumps (Building 049, Building 413 and Building 414)
- The plan also does not include the Regional Utility Services Commission (RUSC) owned assets. The City only operates those assets on behalf of RUSC

The above infrastructure assets NOT including the lift stations or RUSC owned assets have replacement value estimated at $48,882,654.

The Sanitary Wastewater Collection Services network comprises:

Type of System (Gravity or Force main)	Diameter (mm)	Length (m)
Gravity	150	353
Gravity	200	62,976
Gravity	250	3,152
Gravity	300	6,084
Gravity	350	174
Gravity	375	5,478
Gravity	400	1,260
Gravity	450	3,322
Gravity	500	559
Gravity	525	273
Gravity	600	2,237
Gravity	675	1,425
Gravity	750	12
Gravity	900	224
Gravity	Unknown	299

Type of System (Gravity or Force main)	Diameter (mm)	Length (m)
Force main	38	136
Force main	50	372
Force main	75	1,363
Force main	100	490
Force main	150	136
Force main	200	1,353
Force main	300	1,547
Force main	350	856
Force main	Unknown	0

Asset Management Data Gravity System Material Composition Summary:

Type of System	Material	Length (m)	% of material in that Type of System
Gravity	AC/CL2400	8,141	9%
Gravity	PVC	34,851	40%
Gravity	Concrete	214	0.2%
Gravity	Unknown*	44,248	51%

**Note: Determining the unknown material is part of the improvement plan*

Asset Management Data Useful Life (50 years) Gravity Sanitary Summary:

Type of System	Useful Life Age Range (years)	% of system within that Useful Life Range	Condition Rating- based on age
Gravity	0-20	36%	Very Good
Gravity	21-30	12%	Good
Gravity	31-40	19%	Fair
Gravity	41-50	10%	Poor
Gravity	50 plus	23%	Very Poor

The average age of the gravity system network is 32 years giving the system an overall <u>fair</u> condition rating for the gravity system.

Asset Management Data Force Main System Material Composition Summary:

Type of System	Material	Length (m)	% of material in that Type of System
Force main	PE DR11	976	16%
Force main	PVC	3043	51%
Force main	Unknown*	1979	33%

**Note: Determining the unknown material is part of the improvement plan*

Asset Management Data Useful Life (50 years) Force Main Summary:

Type of System	Useful Life Age Range (years)	% of system within that Useful Life Range	Condition Rating
Force main	0-20	31%	Very Good
Force main	21-30	18%	Good
Force main	31-40	21%	Fair
Force main	41-50	30%	Poor
Force main	50 plus	0%	Very Poor

The average age of the force main system network is also 32 years giving the system an overall fair condition rating for the gravity system.

1.3 Levels of Service

The allocation in the financial modelling is insufficient for the renewals of the aging infrastructure which may affect our ability to continue to operate and maintain assets at their current level of service.

The main service consequences of the Planned Budget are:

- Service disruptions as a result of main breaks on aging infrastructure
- Property damage due to back ups as a result of main breaks or lack of maintenance
- Increased risk and cost of reactive maintenance

1.4 Future Demand

The factors influencing future demand and the impacts they have on service delivery are created by:

- Population Growth Increased- demands on system
- Increased development both- Commercial and Residential
- Land Use Changes- intensification of density and mixed uses
- Asset deterioration and breaks based on age and longevity of the asset
- Globally, COVID 19 has affected both the supply chain and costs for services since February 2020. The pandemic increased both the scarcity of materials and the financial costs to operate maintain and review assets and these levels are anticipated to continue.
- Provincial Standard Changes for licensing requirements

These demands will be approached using a combination of managing existing assets, upgrading existing assets and providing new assets to meet demand. Demand management practices may also include a combination of non-asset solutions, insuring against risks and managing failures.

- Adding additional assets to accommodate increased growth provided by developer contributions and offsite levy contributions
- Renewals when road rehabilitation opportunities arise and funding is available
- Staged and sectional work on improvements to minimize extent and effect of disruption
- Capacity upgrades to existing infrastructure due to growth increases based on recommendations in the Master Plans
- Regular updates to Master Plans
- Pipe repairs as needed
- Flushing and Cleaning
- Regular testing of the Back Up Systems in the Standard Operating Procedures
- Provide public education to promote customer's/ public awareness about the waste water network and facilities and issues of the waste water network and facilities that impact the services provided to the customers.

1.5 Lifecycle Management Plan

1.5.1 What does it Cost?

The forecast lifecycle costs necessary to provide the services covered by this AM Plan includes operation, maintenance, renewal, acquisition, and disposal of assets. Although the AM Plan may be prepared for a range of time periods, it typically informs a Long-Term Financial Planning period of 10 years. Therefore, a summary output from the AM Plan is the forecast of 10 year total outlays, which for the Sanitary Wastewater Collection is estimated as $52,607,432 or $5,260,743 on average per year.

1.6 Financial Summary

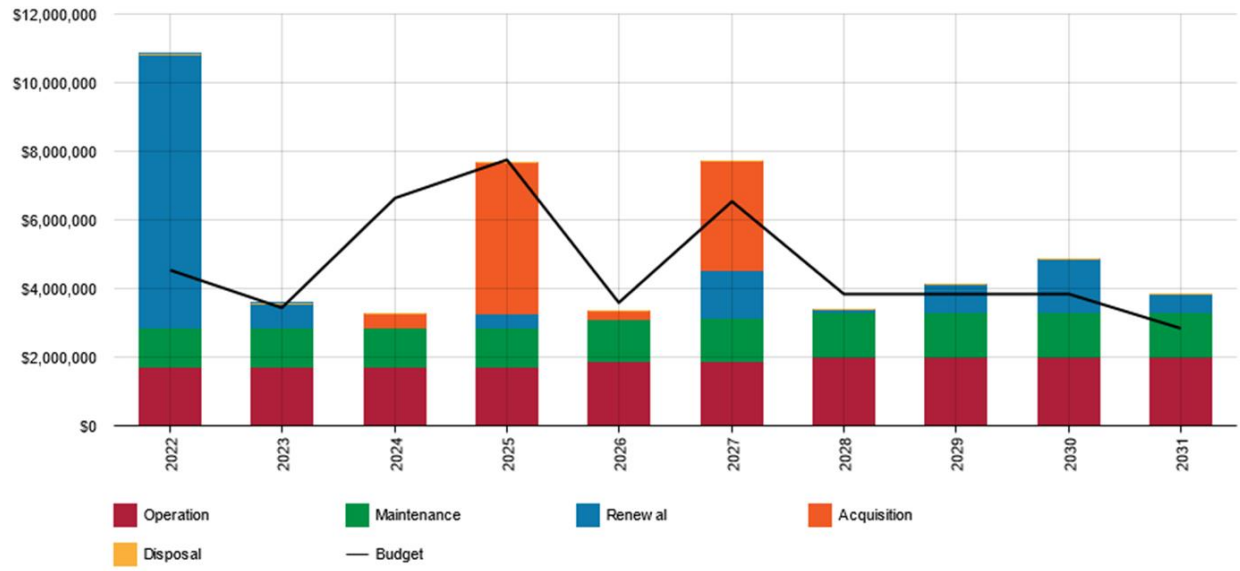
1.6.1 What we will do

Estimated available funding for the 10 year period is $46,835,000 or $4,683,500 on average per year as per the Long-Term Financial plan or Planned Budget. This is 89% of the cost to sustain the current level of service at the lowest lifecycle cost.

The infrastructure reality is that only what is funded in the long-term financial plan can be provided. The informed decision making depends on the AM Plan emphasising the consequences of Planned Budgets on the service levels provided and risks.

The anticipated Planned Budget for Sanitary Wastewater Collection leaves a shortfall of $-577,243 on average per year of the forecast lifecycle costs required to provide services in the AM Plan compared with the Planned Budget currently included in the Long-Term Financial Plan. This is shown in the figure below.

Forecast Lifecycle Costs and Planned Budgets



Forecast Lifecycle Costs and Planned Budgets

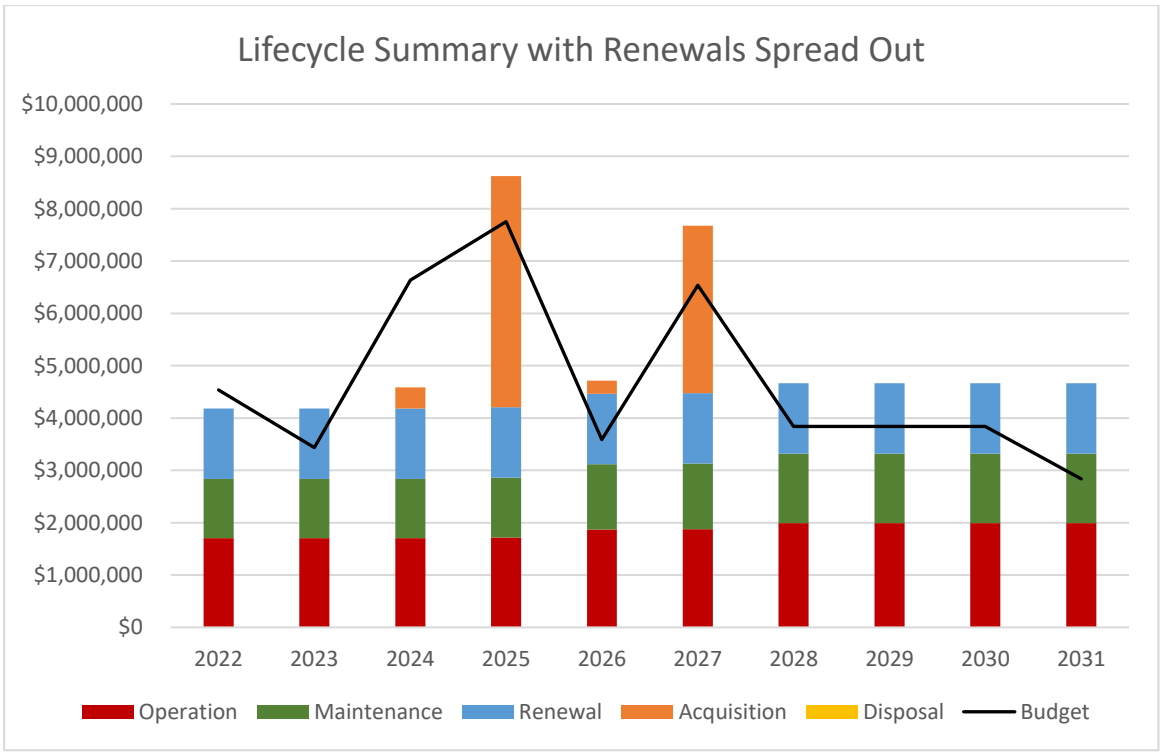


Figure Values are in current dollars.

The asset renewal spike is caused by the asset exceeding the useful life of 50 years as this is the current set age for useful life. Some of these renewal assets within the spike will be addressed during the 10 year planning period but have not been distributed within the graph as the asset is often selected in connection with road rehabilitation projects and CCTV inspections conducted prior to any road rehabilitation and experience, knowledge and professional opinion of administration. There will continue to be a spike in renewals as the budget does not provide for all renewals to be completed with the understanding some risk must be assumed and some assets have a longer useful life than 50 years.

We plan to provide Sanitary Waste Water Collection services for the following:

- Operation, maintenance, renewal and acquisition of gravity mains. manholes, personal drain systems and force mains to meet service levels set by City of Cold Lake in annual budgets.
- The following **acquisitions** within the 10 year planning period.
    - Forest Heights Sanitary Sewer Trunk Extension (Phase 2). 2024; $400,000 2025; $4,415,000. Total $4,815,000
    - Building 3 Force main Improvement Project. 2026; $250,000, 2027; $3,200,000. Total $3,450,000
    - Grand total on acquisition for the 10 year planning period = $8,265,000
- The following **renewals** within the 10 year planning period.
    - Shallow Sewer Replacement Program. 2022-2030 @$500,000/year = $4,500,000
    - 16 Avenue Sewer Replacement (7 Street to City Limits). 2022; $450,000
    - 11 St Underground Infrastructure Upgrades and Road Rehabilitation Project. 2022; $750,000
    - Building 8 Upstream Sewer Enhancements (Phase 2). 2023: $100,000 2024: $1,400,000. Total $1,500,000
- Some Inflow and Infiltration Upgrades: 2028; $500,000, 2029; $500,000, 2030; $500,000. Total $1,500,000 (Determine what these projects are)
- Lakeshore Drive- 2023-2024- $1,500,000
- Grand total on renewals for the 10 year planning period = $10,200,000
- The following **tasks** are to be completed annually to operate and monitor the system:
    - Inspect and document 10% of the sanitary manholes annually
    - Closed Caption Video Televised (CCTV) Inspection of 10% of the gravity sanitary system
    - Flush (25%) of the gravity wastewater mains annually on a rotational basis
    - Flush sewers prone to freezing
    - Flush high-risk areas 3 times per year

1.6.2 What we cannot do

We cannot allocate budget for every project that has been requested or recommended within the same year or within the current ten (10) year planning period to provide all new services being sought. All projects and services sought are considered and evaluated on a yearly basis. Based on the analysis and current ten (10) year planning the following projects and services that cannot be provided under present funding levels are:

- 375mm English Bay Road Sanitary Sewer Trunk Extension
- 675mm English Bay Road Sanitary Sewer Trunk Extension
- 525mm Sewer Trunk to undeveloped land East side of Hwy 28 between 69 Ave and 61 Ave
- Westlawn Lift station Improvements
- Operations activities such as removing debris from manholes, flushing all mains, CCTV inspections and repairing conveyance pipes may need to be altered to address reactive maintenance due to pipe deterioration and breaks based on age and longevity of asset.

1.6.3 Managing the Risks

Our present budget levels are insufficient to continue to manage risks in the medium term.

The main risk consequences are:

- Reactive maintenance spending will increase due to the age of the infrastructure and increased potential for failure and costs due to global circumstances and material costs and availability
- Reduce current level of service to customer
- Property Damage due to insufficient funding to ensure wastewater services can be maintained at current levels based on useful life or renewals
- Environmental Damage- Contaminants impacting the environment and the natural water course for future generations
- High cost reactive maintenance will increase financial shock and divert funds and labour from other services
- Capacity for resources- staffing and contractor availability

We will endeavour to manage these risks within available funding by:

- Preform any maintenance and operation that will be required to meet our licensing requirements and maintain current performance.
- Ensure future development is appropriately sized and financial risk mitigated
- Improve data confidence through inspection, condition assessment practices and donated acquisition process
- Ensure Council and the public are adequately informed to the risks and financial obligations and responsibilities of long lived assets
- Increasing wastewater rates in conformity to Bylaw 441-UT-12
- Offsite Levy accountability/ establishment/ collection for oversizing of lines to accommodate growth demands

1.7 Asset Management Planning Practices

Key assumptions made in this AM Plan are:

- The acquisitions are based on the Wastewater / Sanitary Master Plan and forecasted based on the City's growth plan as well as Developer Contributions
- Renewals are triggered by failure and road network renewals and replacement
- Age and condition information is based on historical drawings and Asset Management data
- Costs are based on historical Tangible Capital Asset data as well as the asset registry which required some estimations and replacement costs were determined by applying the Canadian inflation rate

Assets requiring renewal are identified from either the asset register or an alternative method.

- The timing of capital renewals based on the asset register which is applied by adding the useful life to the year of acquisition or year of last renewal.
- Assets may be prioritized differently due to either function failure or to align with other asset renewal opportunities.
- Alternatively, an estimate of renewal lifecycle costs is projected from external condition modelling systems and may be supplemented with, or based on, expert knowledge.

The Registry Method was used as the foundation to forecast the renewal lifecycle costs for this AM Plan in conjunction with the 10 year financial plan where assets may have been prioritized differently due to either function failure or to align with other asset renewal opportunities.

This AM Plan is based on a reliable level of confidence information.

1.8 Monitoring and Improvement Program

The next steps resulting from this AM Plan to improve asset management practices are:

- Establish actual customer value baseline through public engagement and or survey.
- Increased system operation practices that are digitally documented and integrated into Cityworks to better track information such as spending, resources, areas of concern, time frames for service initiation to completion (i.e.- flushing, manhole inspections, assets with service requests or outstanding work orders)
- Improve GIS data quality (i.e. identify the 51% unknown material, mapping for material and age condition)
- Develop waste water/ sanitary assets condition rating scale based on age first then CCTV
- Develop a method to project and incorporate developer contributions/ acquisitions
- Develop more accurate replacement costs based on current rates of recent projects within the City of Cold Lake and Master Plan requirements for future planning
- Incorporation of the Lift stations into the Asset Management Planning
- Incorporate the service connections into the Asset Management Planning
- Improve practices to provide resiliency of new assets to climate change

2.0 Introduction

2.1 Background

This AM Plan communicates the requirements for the sustainable delivery of services through management of assets, compliance with regulatory requirements, and required funding to provide the appropriate levels of service over the planning period.

The AM Plan is to be read with the Sanitary planning documents. This should include the Asset Management Policy and Asset Management Strategy, where developed, along with other key planning documents:

- Wastewater/ Sanitary Master Plan Update 2020
- City of Cold Lake Engineering Standards and Specifications 2020
- City of Cold Lake Asset Management Policy 206-AD-19
- Council's Strategic Plan 072-AD-01
- Council's Projected 10 year Capital Plan
- City of Cold Lake Economic Development Strategy -March 2019
- City of Cold Lake Business Plan 2015
- City of Cold Lake Levels of Service
- City of Cold Lake Strategic Plan
- Cityworks
- 2017 Growth Study
- Current Road System Analysis through pavement management software
- Area Structure Plans
- Asset Optimizer for the asset registry and financial background
- Offsite Levy Bylaw 281-AD-07
- Water, Sanitary and Storm Service Connection Policy 216-DA-21

Asset Management is currently a collective process. Yearly each department meets with staff and administration to review service levels, current assets and discuss budgets required to provide and maintain the services within our community and to acquire and maintain our current assets. Administration then presents the budgets from department staff to CAO/ Management. The CAO and all department Management deliberate financial requirements, service obligations and assets of all the departments to develop a proposed prioritized budget to present to Council. The proposed prioritized collaborative budget is then presented to Council by the CAO for review to get approval and budget allocation as required. This is the system that is currently followed with no formal AMP. The implementation of a formal Asset Management Plan will provide an overall picture of the asset to assist in the decision-making process for service levels, financial obligations and project prioritization while considering the current risks and the opportunities for improvement as the formal AMP is developed.

The infrastructure assets covered by this AM Plan includes conveyance pipes and manholes. The lift stations and RUSC assets have not been incorporated at this time. For a detailed summary of the assets covered in this AM Plan refer to Table in Section 5.

These assets are used to provide Wastewater/ Sanitary Collection services.

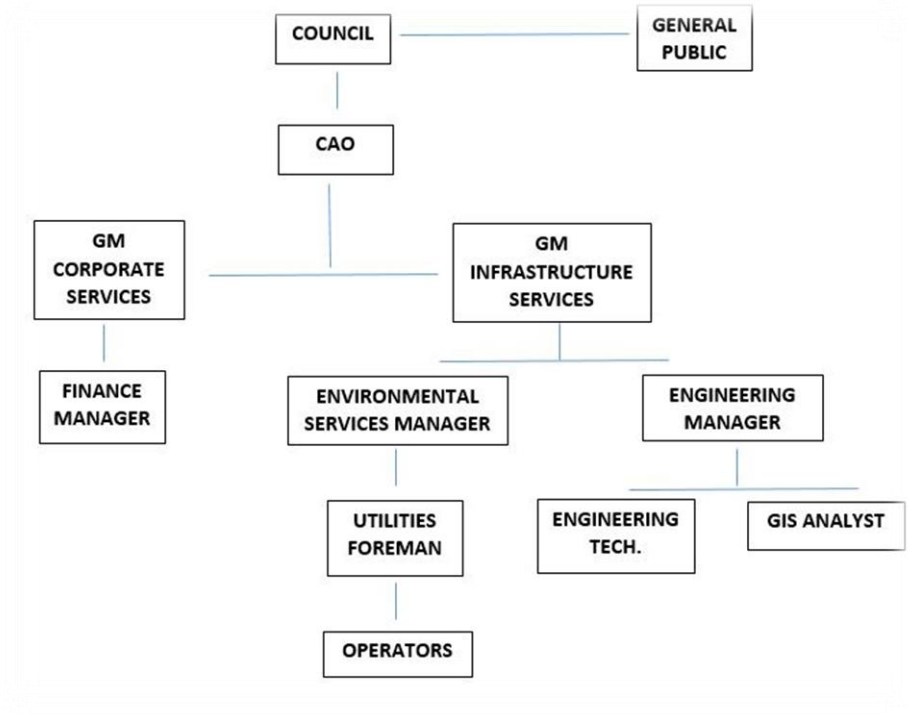
The infrastructure assets included in this plan have a total replacement value of $48,882,654.

Key stakeholders in the preparation and implementation of this AM Plan are shown in Table 2.1.

Table 2.1: Key Stakeholders in the AM Plan

Key Stakeholder	Role in Asset Management Plan
City Council	■ Represent needs of community/shareholders, ■ Allocate resources to meet planning objectives in providing services while managing risks, ■ Ensure service sustainable.
CAO/Management	■ Represent needs of the community/ shareholders/ administration, ■ Allocate resources to meet planning objectives in providing services while managing risks ■ Ensure the service is sustainable ■ Ensure that adequate resources are available to develop staff knowledge and skills to aid the implementation and continuous improvement of asset management practices ■ Set high level priorities for asset management development and raise awareness of this function to staff and outside contractors ■ Support the Asset Management Driven budget (10 year) and long-term financial plan (5 year)
Administration	■ Operate and maintain the Waste water/ Sanitary collection network ■ Verify location and condition of assets ■ Report to CAO and Management progress, deficiencies and effectiveness of operations and maintenance activities
Province of Alberta	■ Sets policy for Wastewater collection through legislation which outlines mandatory standards and practices
Customers	■ Participate in engagement with the City to understand the residents desired level of service ■ Use the waste water collection system to disposal of waste water

Our organisational structure for service delivery from infrastructure assets is detailed below,



2.2 Goals and Objectives of Asset Ownership

Our goal for managing infrastructure assets is to meet the defined level of service (as amended from time to time) in the most cost effective manner for present and future consumers. The key elements of infrastructure asset management are:

- Providing a defined level of service and monitoring performance,
- Managing the impact of growth through demand management and infrastructure investment,
- Taking a lifecycle approach to developing cost-effective management strategies for the long-term that meet the defined level of service,
- Identifying, assessing and appropriately controlling risks, and
- Linking to a Long-Term Financial Plan which identifies required, affordable forecast costs and how it will be allocated.

Key elements of the planning framework are

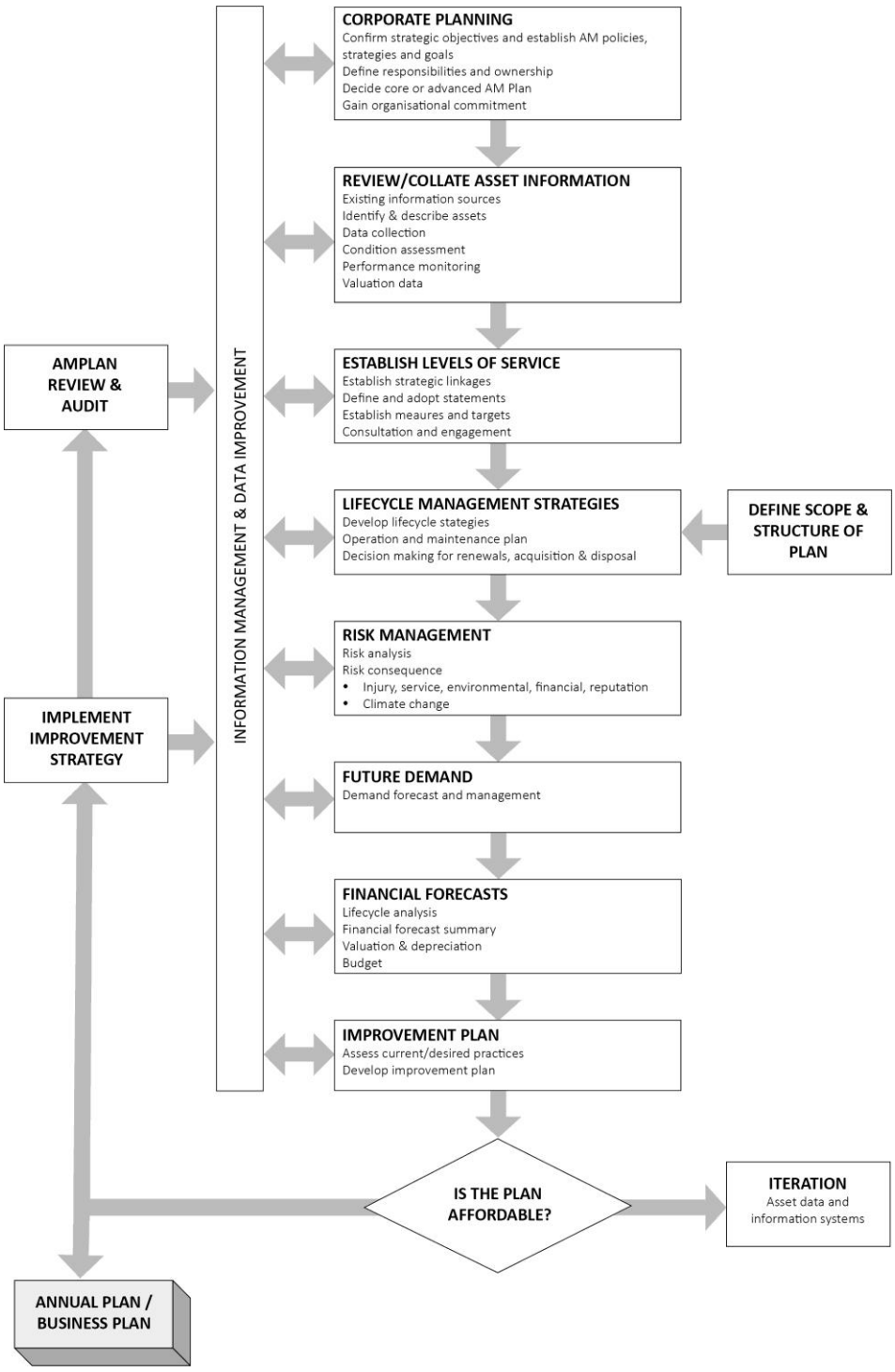
- Levels of service – specifies the services and levels of service to be provided,
- Risk Management,
- Future demand – how this will impact on future service delivery and how this is to be met,
- Lifecycle management – how to manage its existing and future assets to provide defined levels of service,
- Financial summary – what funds are required to provide the defined services,
- Asset management practices – how we manage provision of the services,
- Monitoring – how the plan will be monitored to ensure objectives are met,
- Asset management improvement plan – how we increase asset management maturity.

Other references to the benefits, fundamentals principles and objectives of asset management are:

- International Infrastructure Management Manual 2015 [1]
- ISO 55000[2]

A road map for preparing an AM Plan is shown below.

Road Map for preparing an Asset Management Plan
Source: IPWEA, 2006, IIMM, Fig 1.5.1, p 1.11



[1] Based on IPWEA 2015 IIMM, Sec 2.1.3, p 2| 13
[2] ISO 55000 Overview, principles and terminology

3.0 LEVELS OF SERVICE

3.1 Customer Research and Expectations

This AM Plan is prepared to facilitate consultation prior to adoption of levels of service by the City of Cold Lake Future revisions of the AM Plan will incorporate customer consultation on service levels and costs of providing the service. This will assist the City of Cold Lake and stakeholders in matching the level of service required, service risks and consequences with the customer's ability and willingness to pay for the service.

We currently have no research on customer expectations. This will be investigated for future updates of the AM Plan.

3.2 Strategic and Corporate Goals

This AM Plan is prepared under the direction of the Sanitary vision, mission, goals and objectives.

Our vision is:

To make Cold Lake a sustainable, diverse and vibrant community"

Our mission is:

"To maintain a strong balance between expanding and modernizing old infrastructure to provide excellent municipal services while delivering expanded updated economic development strategies, infrastructure maintenance programs and capital projects for new and renewed infrastructure to accommodate growth and diversity."

Strategic goals have been set by the Sanitary. The relevant goals and objectives and how these are addressed in this AM Plan are summarised in Table 3.2.

Table 3.2: Goals and how these are addressed in this Plan

Goal	Objective	How Goal and Objectives are addressed in the AM Plan
Sustainability	Maintain and renew existing while adding the new infrastructure within budget	Maintenance will continue as per service levels and budgets, work to provide projected renewal 10 year asset plans, provide implementation plans, report to Council on funding required for renewal
Excellent Services	Ensure the waste water flows into the pipe network and lift stations as expected and intended	Maintain Service Levels, prepare emergency response plans, education the public on the wastewater system
Growth and Diversity	Provide new or modernized services	Work to provide projected new and upgrade 10 year asset plans, report to Council on funding requirements

3.3 Legislative Requirements

There are many legislative requirements relating to the management of assets. Legislative requirements that impact the delivery of the Wastewater/ Sanitary Collection service are outlined in Table 3.3.

Table 3.3: Legislative Requirements

Legislation	Requirement
Municipal Government Act	Preparation of annual financial statements for immediately preceding year
Public Sector Accounting Board	Standards on how to account for and report on tangible capital assets in governmental financial statements

Canada- Alberta Gas Tax Fund Agreement	Alberta and Canada agreement to "Work in collaboration to develop the approach to Asset management based on where Alberta is today." Alberta to provide a "Outcomes Report"
Alberta Environment and Parks	Code of Practice
Alberta Environment and Parks	Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems

3.4 Customer Values

Service levels are defined in three ways, customer values, customer levels of service and technical levels of service.

Customer Values indicate:

- what aspects of the service is important to the customer,
- whether they see value in what is currently provided and
- the likely trend over time based on the current budget provision

Table 3.4: Customer Values

Service Objective:

Customer Values	Customer Satisfaction Measure	Current Feedback	Expected Trend Based on Planned Budget
Condition, Service is reliable and responsive to customer.	# of unplanned service interruptions of service connection breaks/ year Frozen Service Connections	10-15 service connection (breaks annually) 15-20 frozen service line (calls annually)	Remain the same
Function. Service meets needs within limited impact to health, safety and property	Ability to protect life and property # of claims/ year	5 properties impacted by waste water events on average annually	Remain the same
Capacity/ Use Service has enough capacity and is accessible to everyone	Property has access to the service immediately adjacent to the property	5102 of properties immediately adjacent to service or 99.7% of the community.	Remain the same until triggered by growth or development.

3.5 Customer Levels of Service

The Customer Levels of Service are considered in terms of:

Condition How good is the service … what is the condition or quality of the service?

Function Is it suitable for its intended purpose …. Is it the right service?

Capacity/Use Is the service over or under used … do we need more or less of these assets?

In Table 3.5 under each of the service measures types (Condition, Function, Capacity/Use) there is a summary of the performance measure being used, the current performance, and the expected performance based on the current budget allocation.

These are measures of fact related to the service delivery outcome (e.g. number of occasions when service is not available or proportion of replacement value by condition %'s) to provide a balance in comparison to the customer perception that may be more subjective.

Table 3.5: Customer Level of Service Measures

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Condition	Wastewater mains intact	# of main break repairs per year # of service disruptions more than 12 hours	10-15 waste water main breaks per year 2 repairs are more than 12 hours	Remain the same
	Wastewater assets are kept in good repair	% with a condition rating of good to very good	67% of gravity assets & 70% of force main assets are in fair or better condition	Remain the same
	Confidence levels		Medium (Professional judgement supported by data sampling)	Medium (Professional judgement supported by data sampling)
Function	Wastewater Sizing Adequate	l.m. of mains that require upgrades	Only 3% (2,370 lm) of mains require upgrade in the existing system if Forest Trunk included 6% (5,840 lm)	Remain the same
	Confidence levels		Medium (Professional judgement supported by data sampling)	Medium (Professional judgement supported by data sampling)
Capacity	Wastewater Surcharge	# of manholes experiencing surcharge	0.8% (9) have the potential to experience surcharge with I-I rate of 0.60L/s during storm event	Remain the same
	Confidence levels		Medium (Professional judgement supported by data sampling	Medium (Professional judgement supported by data sampling

3.6 Technical Levels of Service

Technical Levels of Service – To deliver the customer values, and impact the achieved Customer Levels of Service, are operational or technical measures of performance. These technical measures relate to the activities and allocation of resources to best achieve the desired customer outcomes and demonstrate effective performance.

Technical service measures are linked to the activities and annual budgets covering:

- **Acquisition** – the activities to provide a higher level of service (e.g. widening a road, sealing an unsealed road, replacing a pipeline with a larger size) or a new service that did not exist previously (e.g. a new library).
- **Operation** – the regular activities to provide services (e.g. opening hours, cleansing, 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 (e.g. 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 provided (e.g. road resurfacing and pavement reconstruction, pipeline replacement and building component replacement),

Service and asset managers plan, implement and control technical service levels to influence the service outcomes.[3]

Table 3.6 shows the activities expected to be provided under the current 10 year Planned Budget allocation, and the Forecast activity requirements being recommended in this AM Plan.

Table 3.6: Technical Levels of Service

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
TECHNICAL LEVELS OF SERVICE				
Acquisition	Ensure assets are sustainable and fit for purpose	Inspection to ensure the assets constructed or acquired conform to expected standards for condition, quality, resiliency and function	100%	100%
	Provide collection systems to existing urban road networks previously not serviced	Installation of wastewater collection system for road renewal in urban areas	On road renewal basis	On road renewal basis
		Budget	$8,265,000	$8,265,000

[3] IPWEA, 2015, IIMM, p 2|28.

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
Operation	**Regulatory Compliance** Requirement for AEP certification and license to operate distribution system	Level 2- Collection required	Meeting approval requirements	Remain the same
	Locates. To make sure water assets are not struck and cause disruptions or need for repair and	All locates are completed within 14 days of request and 0 incidents have occurred do to wrong locates.	100% located within 14 days and 0 incidents	Remain the same
	Inspection to evaluate condition and ensure operable	Annual condition survey 10% of manholes and conveyance pipe	Ad hoc	10% manholes and CCTV inspection conveyance pipe of total network per year
	Flushing of conveyance pipes to remove debris and ensure pipe is operational	25% of gravity mains flushed per year on a rotational basis	City split into 4 quadrants. Random rotation of the four (4) quadrants done yearly	25% flushing of collection system
		Budget	$1,702,000/yr	$1,852,823/yr
Maintenance	# of flushing points of shallow services to mitigate risk of freeze	18 points are flushed every 24-48 hours except weekends and holidays from January to May	100% completed	Remain the same
	# of high risk areas flushed to mitigate risk of back up	2 locations (54 Avenue south and near senior's lodge in the north)	100% completed	Remain the same
		Budget	$1,135,000/yr	$1,235,549/yr
Renewal	Rehabilitate the entire asset	Critical assets are identified with condition rating based on age	23% of our system is over 50 years old with a very poor condition rating due to age	As required or in conjunction with road renewal
		Budget	$1,020,000	$1,345,871
Disposal	N/A	N/A	N/A	N/A
		Budget	$0	$0

Note: * Current activities related to Planned Budget.

** Expected performance related to forecast lifecycle costs.

It is important to monitor the service levels regularly as circumstances can and do change. Current performance is based on existing resource provision and work efficiencies. It is acknowledged changing circumstances such as technology and customer priorities will change over time.

4.0 FUTURE DEMAND

4.1 Demand Drivers

Drivers affecting demand include things such as population change, regulations, changes in demographics, seasonal factors, vehicle ownership rates, consumer preferences and expectations, technological changes, economic factors, agricultural practices, environmental awareness, etc.

4.2 Demand Forecasts

The present position and projections for demand drivers that may impact future service delivery and use of assets have been identified and documented.

4.3 Demand Impact and Demand Management Plan

The impact of demand drivers that may affect future service delivery and use of assets are shown in Table 4.3.

Demand for new services will be managed through a combination of managing existing assets, upgrading of existing assets and providing new assets to meet demand and demand management. Demand management practices can include non-asset solutions, insuring against risks and managing failures.

Opportunities identified to date for demand management are shown in Table 4.3. Further opportunities will be developed in future revisions of this AM Plan.

Table 4.3: Demand Management Plan

Demand driver	Current position	Projection	Impact on services	Demand Management Plan
Population Growth	15,661	2.5% growth rate	Increase demand for all services	Education will continue to the public through brochure development and during Public Works Day.
Land Use Changes	Increasing densities and rezoning	Downtown re-purposing to mixed uses and lower density areas transition to higher density	Increase volumes of flow, more maintenance and need for upgrades	Education will continue to the public through brochure development and during Public Works Day.

4.4 Asset Programs to meet Demand

The new assets required to meet demand may be acquired, donated or constructed. Additional assets are discussed in Section 5.4.

Acquiring new assets will commit the Sanitary to ongoing operations, maintenance and renewal costs for the period that the service provided from the assets is required. These future costs are identified and considered in developing forecasts of future operations, maintenance and renewal costs for inclusion in the long-term financial plan (Refer to Section 5).

4.5 Climate Change Adaptation

The impacts of climate change may have a significant impact on the assets we manage and the services they provide. In the context of the Asset Management Planning process climate change can be considered as both a future demand and a risk.

How climate change impacts on assets will vary depending on the location and the type of services provided, as will the way in which we respond and manage those impacts.[4]

[4] IPWEA Practice Note 12.1 Climate Change Impacts on the Useful Life of Infrastructure

The impact of climate change on assets is a new and complex discussion and further opportunities will be developed in future revisions of this AM Plan.

5.0 LIFECYCLE MANAGEMENT PLAN

The lifecycle management plan details how the Sanitary plans to manage and operate the assets at the agreed levels of service (Refer to Section 3) while managing life cycle costs.

5.1 Background Data

5.1.1 Physical parameters

The assets covered by this AM Plan are shown in Table 5.1.1.

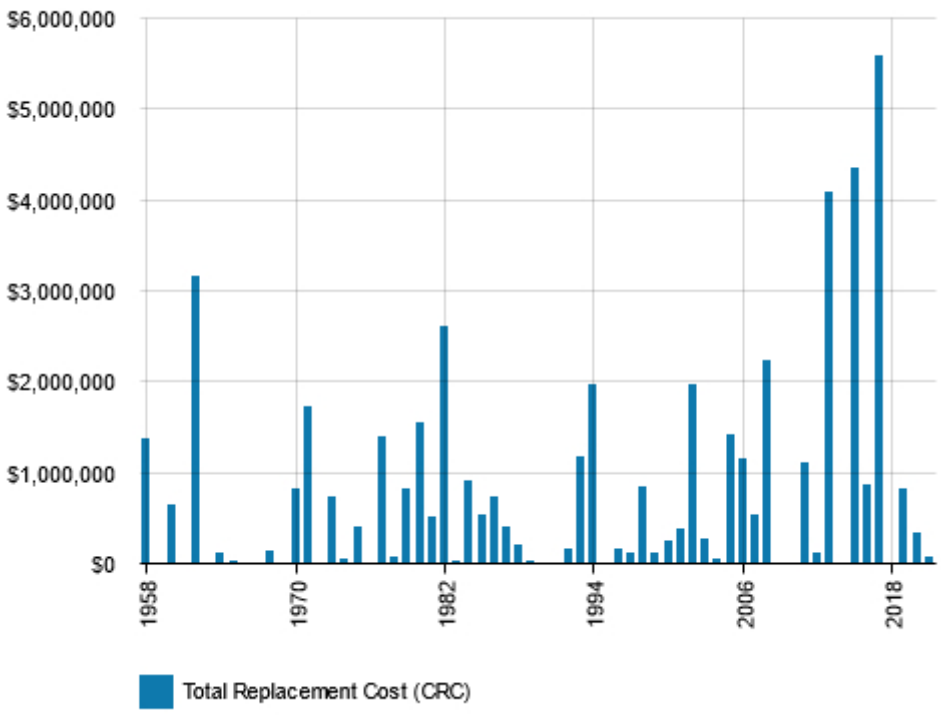
The assets included in this AM Plan are conveyance pipes, manholes and service connections.

The age profile of the assets included in this AM Plan are shown in Figure 5.1.1.

Table 5.1.1: Assets covered by this Plan

Asset Category	Dimension	Replacement Value
Conveyance Pipes	93,484 l.m. or 93.5km- (gravity and forcemain combined)	$48,882,654.
Manholes	1109	Value with the conveyance pipes
Service Connections	# of lots with water connections- only commercial or residential 4489 properties billed for utilities	Value with the conveyance pipes
TOTAL		$48,882,654.

5.1.1: Asset Age Profile



GRAPH: ASSET AGE PROFILE

Asset acquisition date is based on the registry. The assets have a 50 year projected useful life.

All figure values are shown in current day dollars based on applying the Canada Inflation Rate-CPI.

Due to sporadic population growth and development as a result of industry booms and busts in the area over the years there are large spikes and valleys for the acquisition of wastewater collection system. 23% of the gravity network and is beyond the 50 year useful life.

5.1.2 Asset capacity and performance

Assets are generally provided to meet design standards where these are available. However, there is insufficient resources to address all known deficiencies. Locations where deficiencies in service performance are known are detailed in Table 5.1.2.

Table 5.1.2: Known Service Performance Deficiencies

Location	Service Deficiency
16 Avenue between 6 St – 7 St	Poor pipe condition based on camera inspection
16 Avenue between 6 St- City Limits	Poor pipe condition based on camera inspection
16 Avenue between 10 St- 8 St	Poor pipe condition based on camera inspection
17 Avenue between 6 St – 7St	Poor pipe condition based on camera inspection
11 Avenue between 10 St -8 St	Poor pipe condition based on camera inspection
5 Street City Limits between 16 & 17 Ave	Poor pipe condition based on camera inspection
7 Street between 14 Ave – 16 Ave	Poor pipe condition based on camera inspection
5 Ave (Alley) between 16 St- 13 St	Shallow, Low Flow Conveyance Pipe
Fas Gas	Shallow Conveyance Pipe
47 Ave @ 48 St	Shallow Conveyance Pipe
5209- 51 St- pump out	Shallow Conveyance Pipe
51 Ave @ 49 St Pump out	Shallow Conveyance Pipe
Creekside Manufactured Home Park	Shallow Conveyance Pipe
End of 47 Avenue	Shallow Conveyance Pipe
57 Street	Shallow Conveyance Pipe
53 Avenue	Shallow Conveyance Pipe and unwanted materials
Forest Heights Trunk	Development Constraint installation of 900mm next phase
Building 3 to Building 4 Force main Extension	Capacity Constraint along 7 Ave from Grouse to 25 street
50 Avenue 45 St to 47 Street	Capacity Constraint upgrade to 300mm for capacity room
Building 3 Pumping / Storage	Capacity Constraints

The above service deficiencies were identified from Sanitary/ Wastewater Master Plan, Camera Inspections, Service Requests and professional experience.

5.1.3 Asset condition

Condition is currently monitored based on the install age and material. We have begun to camera the wastewater mains that are 50 years or older and apply a condition rating based on the visual inspection of the mains beyond their useful life.

Condition of the pipe is based the age of the pipe from the information in the asset registry of the waste water collection network.

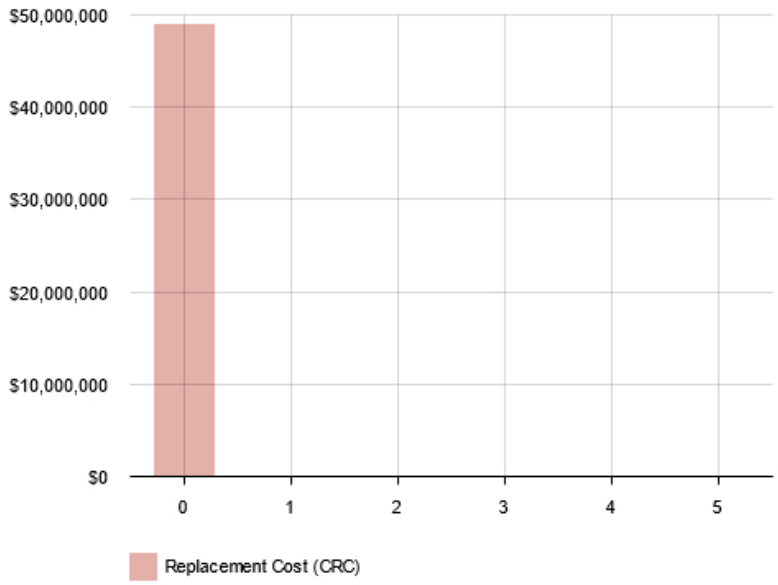
Condition is measured using a 1 – 5 grading system[5] as detailed in Table 5.1.3. It is important that a consistent approach is used in reporting asset performance enabling effective decision support. A finer grading system may be used at a more specific level, however, for reporting in the AM plan results are translated to a 1 – 5 grading scale for ease of communication.

Table 5.1.3: Condition Grading System

Condition Grading	Description of Condition
1	**Very Good**: free of defects, only planned and/or routine maintenance required
2	**Good**: minor defects, increasing maintenance required plus planned maintenance
3	**Fair**: defects requiring regular and/or significant maintenance to reinstate service
4	**Poor**: significant defects, higher order cost intervention likely
5	**Very Poor**: physically unsound and/or beyond rehabilitation, immediate action required

The condition profile of our assets is shown in Figure 5.1.3.

Figure 5.1.3: Asset Condition Profile



[5] IPWEA, 2015, IIMM, Sec 2.5.4, p 2|80.

($521,137.06/km based on CRC)

Asset Management Data Gravity System Material Composition Summary:

Type of System	Material	Length (m)	% of material in that Type of System
Gravity	AC/CL2400	8,141	9%
Gravity	PVC	34,851	40%
Gravity	Concrete	214	0.2%
Gravity	Unknown*	44,248	51%

**Note: Determining the unknown material is part of the improvement plan*

Asset Management Data Useful Life (50 years) Gravity Sanitary Summary:

Type of System	Useful Life Age Range (years)	% of system within that Useful Life Range	Condition Rating- based on age
Gravity	0-20	36%	Very Good
Gravity	21-30	12%	Good
Gravity	31-40	19%	Fair
Gravity	41-50	10%	Poor
Gravity	50 plus	23%	Very Poor

The average age of the gravity system network is 32 years giving the system an overall fair condition rating for the gravity system. ($10,526,967- CRC for 50+ year replacement of gravity mains)

Asset Management Data Force Main System Material Composition Summary:

Type of System	Material	Length (m)	% of material in that Type of System
Force main	PE DR11	976	16%
Force main	PVC	3043	51%
Force main	Unknown*	1979	33%

**Note: Determining the unknown material is part of the improvement plan*

Asset Management Data Useful Life (50 years) Force Main Summary:

Type of System	Useful Life Age Range (years)	% of system within that Useful Life Range	Condition Rating
Force main	0-20	31%	Very Good
Force main	21-30	18%	Good
Force main	31-40	21%	Fair
Force main	41-50	30%	Poor
Force main	50 plus	0%	Very Poor

The average age of the force main system network is also 32 years giving the system an overall fair condition rating for the gravity system. ($0.00- CRC for 50+ year replacement of force mains)

Condition is not currently monitored in a formal way but we have started to develop a system and criteria to provide a condition rating and utilizing information and resources as they become available.

All figure values are shown in current day dollars.

5.2 Operations and Maintenance Plan

Operations include regular activities to provide services. Examples of typical operational activities include cleaning, street sweeping, asset inspection, and utility costs.

Maintenance includes all actions necessary for retaining an asset as near as practicable to an appropriate service condition including regular ongoing day-to-day work necessary to keep assets operating. Examples of typical maintenance activities include pipe repairs, asphalt patching, and equipment repairs.

The trend in maintenance budgets are shown in Table 5.2.1.

Table 5.2.1: Maintenance Budget Trends

Year	Maintenance Budget $
2021	$1,135,000.00
2022	$1,135,000.00
2023	$1,135,000.00

Maintenance budget levels are considered to be adequate to meet projected service levels, which may be less than or equal to current service levels. Where maintenance budget allocations are such that they will result in a lesser level of service, the service consequences and service risks have been identified and are highlighted in this AM Plan and service risks considered in the Infrastructure Risk Management Plan.

Assessment and priority of planned and reactive maintenance is undertaken by staff using experience and judgement.

Asset hierarchy

An asset hierarchy provides a framework for structuring data in an information system to assist in collection of data, reporting information and making decisions. The hierarchy includes the asset class and component used for asset planning and financial reporting and service level hierarchy used for service planning and delivery.

The service hierarchy is shown is Table 5.2.2.

Table 5.2.2: Asset Service Hierarchy

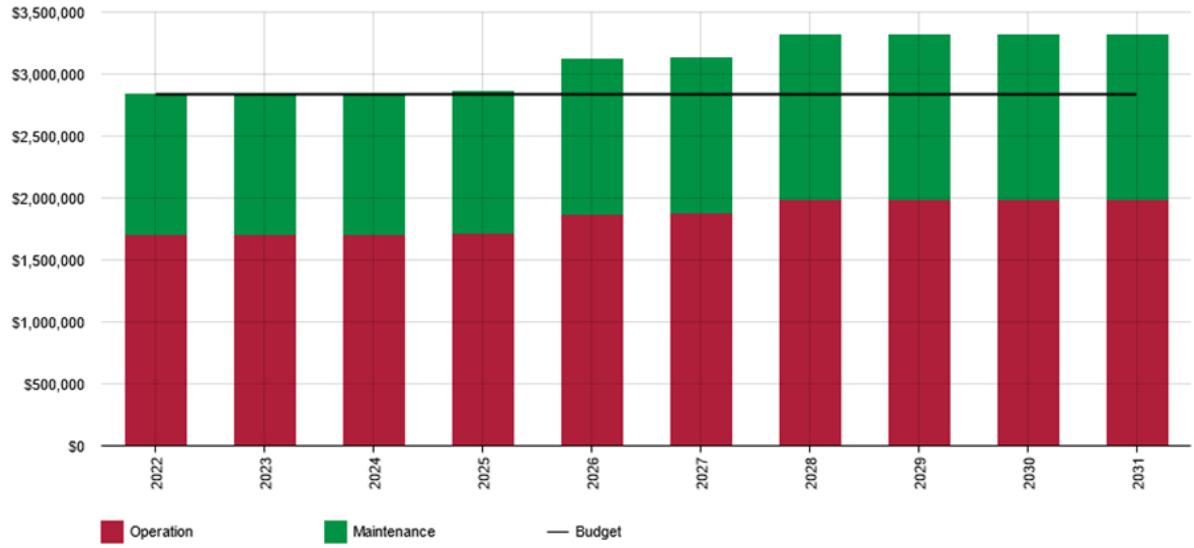
Service Hierarchy	Service Level Objective
Asset Class – wastewater network	Asset Network to provide waste water collection services to customers
Asset Sub Class Conveyance pipes, manholes, and service connections	Specific components of infrastructure that enables the asset class to deliver its service. These major components of the wastewater network to ensure the delivery of waste water collection services.

Summary of forecast operations and maintenance costs

Forecast operations and maintenance costs are expected to vary in relation to the total value of the asset stock. If additional assets are acquired, the future operations and maintenance costs are forecast to increase. If assets are disposed of the forecast operation and maintenance costs are expected to decrease. Figure 5.2

shows the forecast operations and maintenance costs relative to the proposed operations and maintenance Planned Budget.

Figure 5.2: Operations and Maintenance Summary



All figure values are shown in current day dollars.

At the current funding level there will be sufficient funding to maintain operations. Additional funds will be required as new assets are acquired to continue providing the current levels of service to all the roads. Deferrals in maintenance will directly impact the overall condition of the network which will rely upon higher cost reactive maintenance repairs. At the current funding level there will be sufficient funding to maintain operations, however, this may also be impacted by insufficient funding for the planned maintenance. Deferred maintenance (i.e. works that are identified for maintenance activities but unable to be completed due to available resources) should be included in the infrastructure risk management plan.

5.3 Renewal Plan

Renewal is major capital work which does not significantly alter the original service provided by the asset, but restores, rehabilitates, replaces or renews an existing asset to its original service potential. Work over and above restoring an asset to original service potential is considered to be an acquisition resulting in additional future operations and maintenance costs.

Assets requiring renewal are identified from one of two approaches in the Lifecycle Model.

- The first method uses Asset Register data to project the renewal costs (current replacement cost) and renewal timing (acquisition year plus updated useful life to determine the renewal year), or
- The second method uses an alternative approach to estimate the timing and cost of forecast renewal work (i.e. condition modelling system, staff judgement, average network renewals, or other).

The typical useful lives of assets used to develop projected asset renewal forecasts are shown in Table 5.3. Asset useful lives were last reviewed in 2021.

Table 5.3: Useful Lives of Assets

Asset (Sub)Category	Useful life
Wastewater Conveyance Mains	50 years

Manholes	50 years
Service Connections	50 years

The estimates for renewals in this AM Plan were based on the Registry Method

5.3.1 Renewal ranking criteria

Asset renewal is typically undertaken to either:

- Ensure the reliability of the existing infrastructure to deliver the service it was constructed to facilitate or
- To ensure the infrastructure is of sufficient quality to meet the service requirements

It is possible to prioritise renewals by identifying assets or asset groups that:

- Have a high consequence of failure,
- Have high use and subsequent impact on users would be significant,
- Have higher than expected operational or maintenance costs, and
- Have potential to reduce life cycle costs by replacement with a modern equivalent asset that would provide the equivalent service.[6]

The ranking criteria used to determine priority of identified renewal proposals is detailed in Table 5.3.1.

Table 5.3.1: Renewal Priority Ranking Criteria

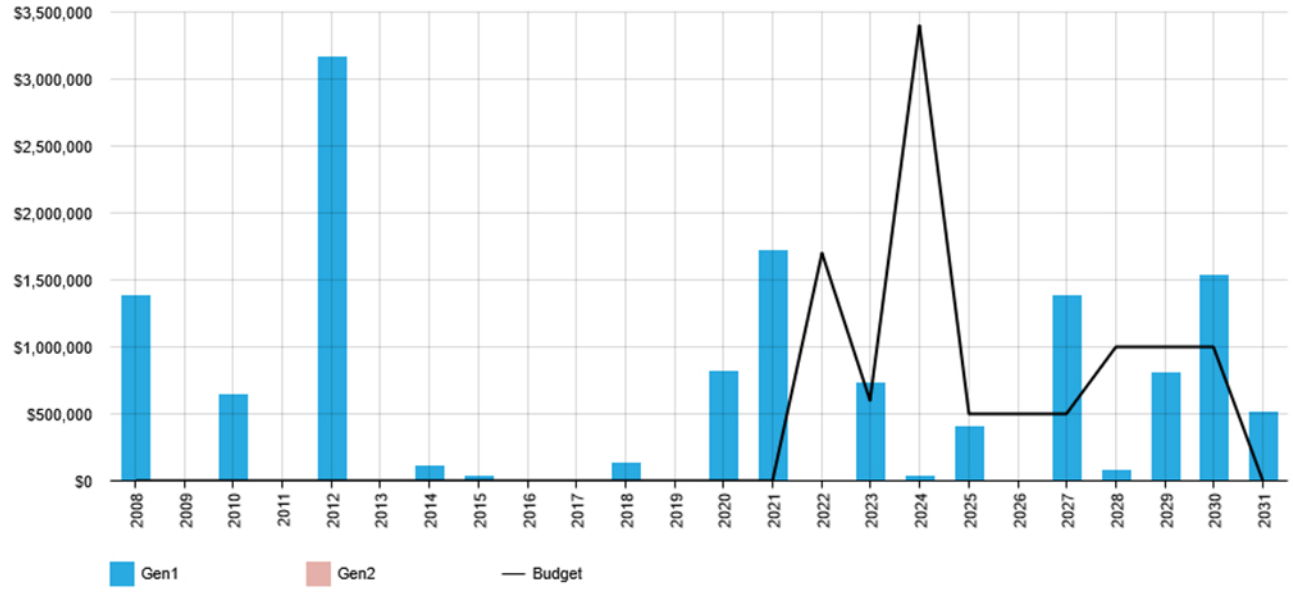
Criteria	Weighting
Asset Failure	10%
Capacity Improvements	10%
Coordinated with other asset replacement	40%
Condition 5 or less	40%
Total	**100%**

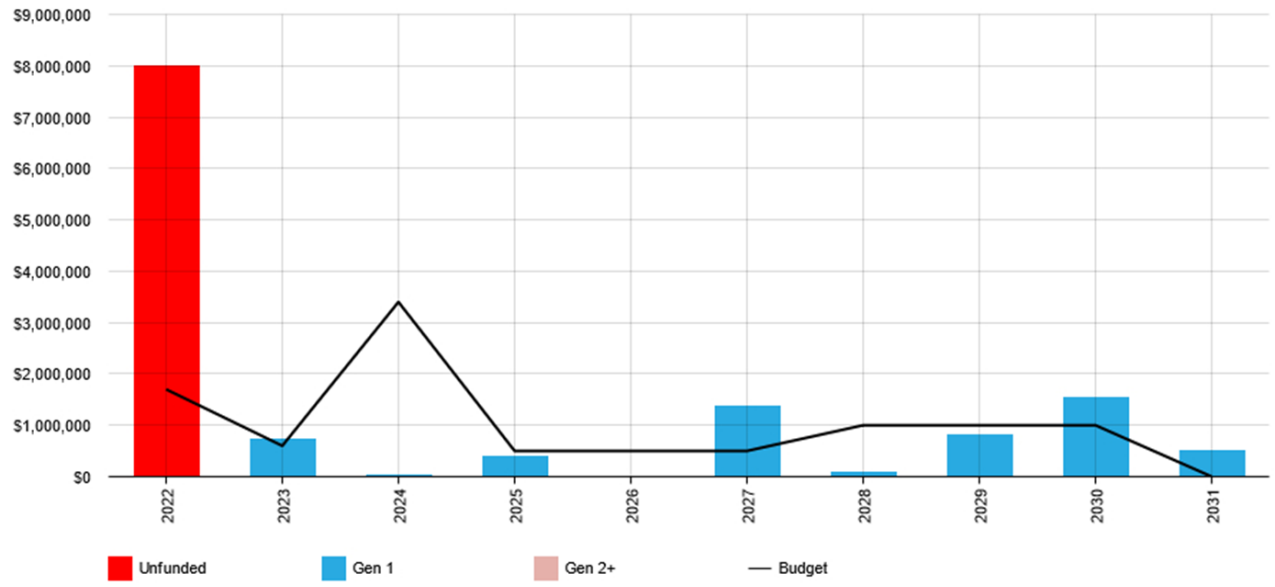
5.4 Summary of future renewal costs

Forecast renewal costs are projected to increase over time if the asset stock increases. The forecast costs associated with renewals are shown relative to the proposed renewal budget in Figure 5.4.1. A detailed summary of the forecast renewal costs is shown in Appendix D.

[6] Based on IPWEA, 2015, IIMM, Sec 3.4.5, p 3|97.

Figure 5.4.1: Forecast Renewal Costs





All figure values are shown in current day dollars.

The above graph shows the assets that require renewal based on their age reaching the 50 year useful life as per the registry. These costs are the estimated forecast renewal costs based on applying the Canada Inflation Rate-CPI to the original install costs. The budget allocated is based on the 10 year capital planning which the infrastructure may or may not be at the end of its useful life but completed in coordination with other asset replacements.

Within the next 10 years there are five (5) identified locations planned for renewal projects with additional funding allocated to be applied for renewals co-ordinated with other asset replacement or known failure areas. There is ($10,200,00) forecasted in the 10 year capital plan These forecasted renewal projects do not include the estimate renewals of any assets due to end of life and are triggered based on required capacity upgrades. In the future AM Plans the estimated renewals will increase annually.

5.5 Acquisition Plan

Acquisition reflects are new assets that did not previously exist or works which will upgrade or improve an existing asset beyond its existing capacity. They may result from growth, demand, social or environmental needs. Assets may also be donated to the Sanitary.

5.5.1 Selection criteria

Proposed acquisition of new assets, and upgrade of existing assets, are identified from various sources such as community requests, proposals identified by strategic plans or partnerships with others. Potential upgrade and new works should be reviewed to verify that they are essential to the Entities needs. Proposed upgrade and new work analysis should also include the development of a preliminary renewal estimate to ensure that the services are sustainable over the longer term. Verified proposals can then be ranked by priority and available funds and scheduled in future works programmes. The priority ranking criteria is detailed in Table 5.5.1.

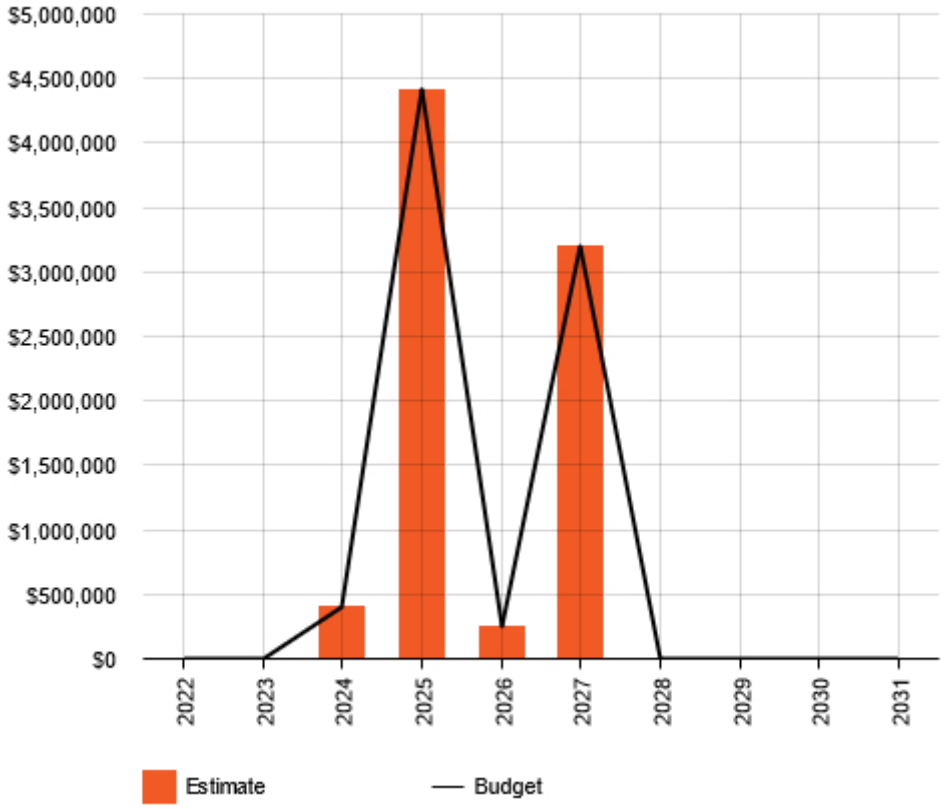
Table 5.5.1: Acquired Assets Priority Ranking Criteria

Criteria	Weighting
Growth Contributed Assets	90%
New Service Requests	10%
Total	**100%**

Summary of future asset acquisition costs

Forecast acquisition asset costs are summarised / summarized in Figure 5.5.1 and shown relative to the proposed acquisition budget. The forecast acquisition capital works program is shown in Appendix A.

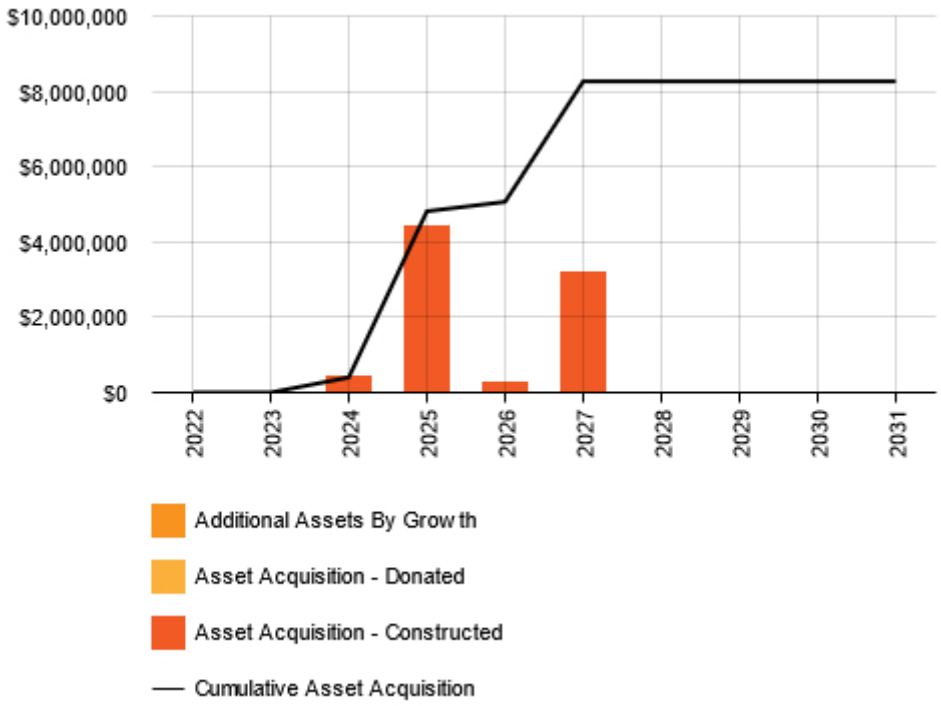
Figure 5.5.1: Acquisition (Constructed) Summary



All figure values are shown in current day dollars.

When an Entity commits to new assets, they must be prepared to fund future operations, maintenance and renewal costs. They must also account for future depreciation when reviewing long term sustainability. When reviewing the long-term impacts of asset acquisition, it is useful to consider the cumulative value of the acquired assets being taken on by the Entity. The cumulative value of all acquisition work, including assets that are constructed and contributed shown in Figure 5.5.2.

Figure 5.5.2: Acquisition Summary



All figure values are shown in current dollars.

Expenditure on new assets and services in the capital works program will be accommodated in the long-term financial plan, but only to the extent that there is available funding.

The constructed assets shown above are estimated at $8,265,000 and will require additional operational and maintenance resources to ensure the level of service can be maintained. Continued asset acquisition without sustainable funding allocation for operations and maintenance will require the City to lower its level of service and increase the likelihood of high cost reactive maintenance and the need for premature renewals.

The City of Cold Lake anticipates six (6) new subdivisions (Parkview, Lakewood, west of HSB- “Heights of English Bay”, Lefebvre Heights, Tri City, Colonial) in the near term that will add 1800 lm of wastewater collection network as donated assets. These contributed assets are estimated at $720,000 (rate of $400/l.m. based on master plan) and will require additional operational and maintenance resources to ensure level of service can be maintained. These estimated donated acquisitions are not included the graphs above as a firm timeline of acquisition to the City of Cold Lake cannot be given.

Continued asset acquisition without sustainable funding allocation for operations and maintenance will require the City to lover its level of service and increase the likelihood of high cost reactive maintenance and the need for premature renewals.

5.6 Disposal Plan

Disposal includes any activity associated with the disposal of a decommissioned asset including sale, demolition or relocation. Assets identified for possible decommissioning and disposal are shown in Table 5.6. A summary of the disposal costs and estimated reductions in annual operations and maintenance of disposing of the assets are also outlined in Table 5.6. Any costs or revenue gained from asset disposals is included in the long-term financial plan.

Table 5.6: Assets Identified for Disposal

Asset	Reason for Disposal	Timing	Disposal Costs	Operations & Maintenance Annual Savings
N/A	N/A	N/A	N/A	N/A

5.7 Summary of asset forecast costs

The financial projections from this asset plan are shown in Figure 5.7.1. These projections include forecast costs for acquisition, operation, maintenance, renewal, and disposal. These forecast costs are shown relative to the proposed budget.

The bars in the graphs represent the forecast costs needed to minimise the life cycle costs associated with the service provision. The proposed budget line indicates the estimate of available funding. The gap between the forecast work and the proposed budget is the basis of the discussion on achieving balance between costs, levels of service and risk to achieve the best value outcome.

Figure 5.7.1: Lifecycle Summary

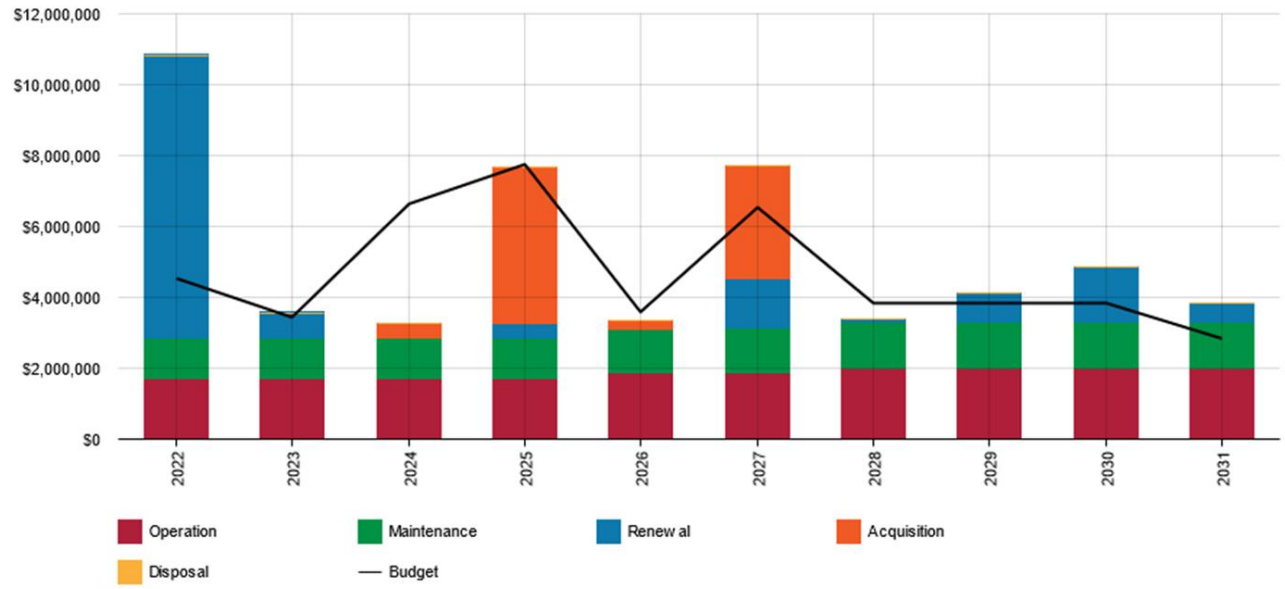
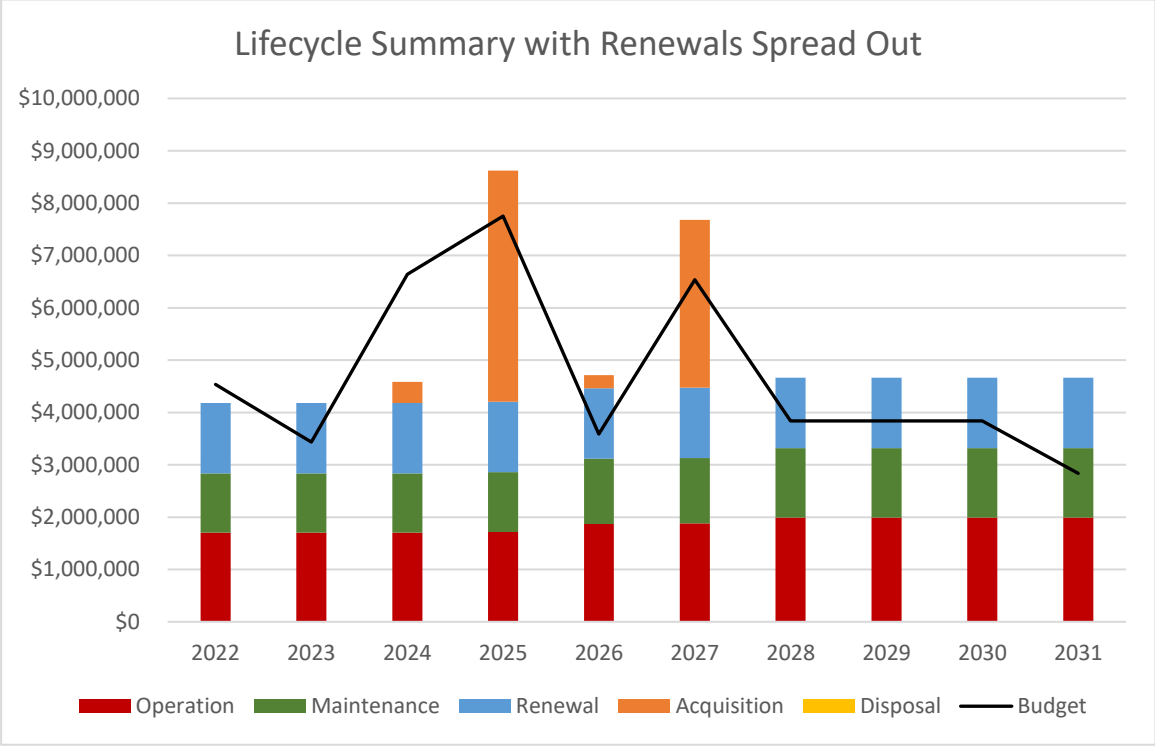


Figure 5.7.2: Lifecycle Summary with Renewals Spread Out



All figure values are shown in current day dollars.

The forecasted trend shows that the City of Cold Lake has insufficient funding for the renewals of the aging infrastructure which may affect our ability to continue to operate and maintain assets at their current level of service. The infrastructure acquisitions as a result of development will create an upward financial pressure for resources to enable the city to operate and maintain the assets at the current service level. Without increased funding, levels of service will be reviewed and adjusted as they cannot be maintained.

The proposed budget is insufficient which may increase:

- The likelihood of high cost reactive maintenance and premature renewals
- The risk of discharge of untreated sewage to the natural environment and into private property
- The financial and risk consequences of not complying with the legislative requirements

6.0 RISK MANAGEMENT PLANNING

The purpose of infrastructure risk management is to document the findings and recommendations resulting from the periodic identification, assessment and treatment of risks associated with providing services from infrastructure, using the fundamentals of International Standard ISO 31000:2018 Risk management – Principles and guidelines.

Risk Management is defined in ISO 31000:2018 as: 'coordinated activities to direct and control with regard to risk'[7].

An assessment of risks[8] associated with service delivery will identify risks that will result in loss or reduction in service, personal injury, environmental impacts, a 'financial shock', reputational impacts, or other consequences. The risk assessment process identifies credible risks, the likelihood of the risk event occurring, and the consequences should the event occur. The risk assessment should also include the development of a risk rating, evaluation of the risks and development of a risk treatment plan for those risks that are deemed to be non-acceptable.

6.1 Critical Assets

Critical assets are defined as those which have a high consequence of failure causing significant loss or reduction of service. Critical assets have been identified and along with their typical failure mode, and the impact on service delivery, are summarised in Table 6.1. Failure modes may include physical failure, collapse or essential service interruption.

Table 6.1 Critical Assets

Critical Asset(s)	Failure Mode	Impact
Force main/ Trunk Building 3- Building 4	Blockage/ Break	Sewage Back Ups/ environmental contamination
Building 1	Pump failure/ Break	Sewage Back Ups/ environmental contamination
Building 3	Pump failure/ Break	Sewage Back Ups/ environmental contamination
Building 8	Pump failure/ Break	Sewage Back Ups/ environmental contamination
Forest Heights Trunk	Blockage/ Break	Sewage Back Ups/ environmental contamination
Line to Hospital	Blockage/ Break	Sewage Back Ups/ environmental contamination
Assets near Water Bodies	Blockage/ Break	Sewage Back Ups/ environmental contamination

33% of our assets in this plan are currently in a condition of 4-5 if poorly or very poorly as they are over 40 years old in a lifecycle of 50 years. By identifying critical assets and failure modes an organisation can ensure

[7] ISO 31000:2009, p 2

[8] REPLACE with Reference to the Corporate or Infrastructure Risk Management Plan as the footnote

that investigative activities, condition inspection programs, maintenance and capital expenditure plans are targeted at critical assets.

6.2 Risk Assessment

The risk management process used is shown in Figure 6.2 below.

It is an analysis and problem-solving technique designed to provide a logical process for the selection of treatment plans and management actions to protect the community against unacceptable risks.

The process is based on the fundamentals of International Standard ISO 31000:2018.

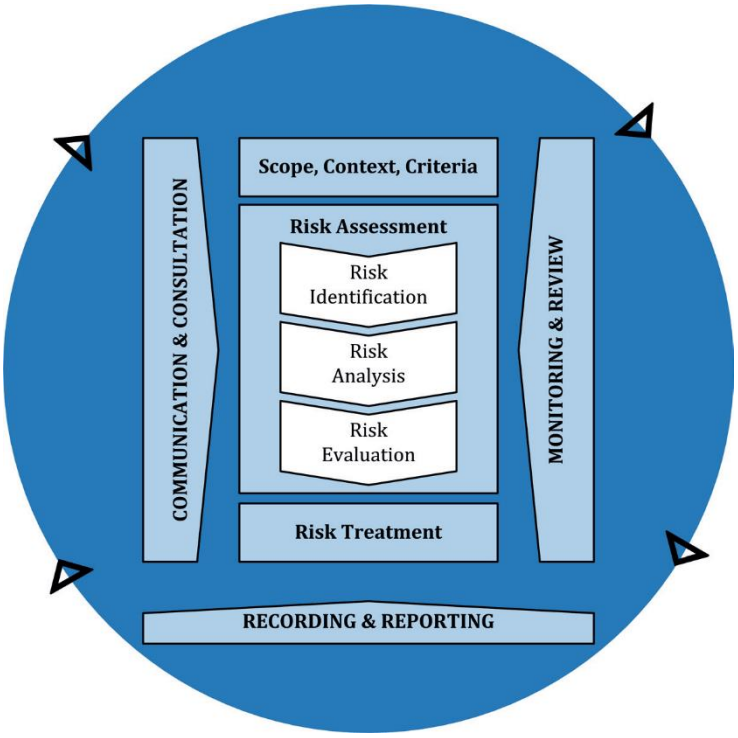


Fig 6.2 Risk Management Process – Abridged
Source: ISO 31000:2018, Figure 1, p9

The risk assessment process identifies credible risks, the likelihood of the risk event occurring, the consequences should the event occur, development of a risk rating, evaluation of the risk and development of a risk treatment plan for non-acceptable risks.

An assessment of risks[9] associated with service delivery will identify risks that will result in loss or reduction in service, personal injury, environmental impacts, a 'financial shock', reputational impacts, or other consequences.

Critical risks are those assessed with 'Very High' (requiring immediate corrective action) and 'High' (requiring corrective action) risk ratings identified in the Infrastructure Risk Management Plan. The residual risk and treatment costs of implementing the selected treatment plan is shown in Table 6.2. It is essential that these critical risks and costs are reported to management and the City of Cold Lake CAO, Administration and Council.

[9] REPLACE with Reference to the Corporate or Infrastructure Risk Management Plan as the footnote

Table 6.2: Risks and Treatment Plans

Service or Asset at Risk	What can Happen	Risk Rating (VH, H)	Risk Treatment Plan	Residual Risk *	Treatment Costs
	[[WhatCanHappen]]	[[RiskRating]]	[[TreatmentOptions]]	[[ResidualRisk]]	[[RiskCost]]
Conveyance Pipes	Blockage/ Break	High	Pipe flushing & flushing every 24-48 hours January to May for shallow sewers Develop an action plan in case of failure or break	Medium High	Staff Time
Manholes	Blockage	High	Yearly sump cleaning and inspection	Low	Staff Time
Lift Stations	Pump failure/ Power failure/ Break	High	Regular maintenance and daily inspection	medium	Staff Time
Conveyance Pipes	Decade old assets with unknown operational and maintenance records	VH	Staff will determine material and condition based on inspection and record and or data review	Medium	Staff time

Note * The residual risk is the risk remaining after the selected risk treatment plan is implemented.

6.3 Infrastructure Resilience Approach

The resilience of our critical infrastructure is vital to the ongoing provision of services to customers. To adapt to changing conditions we need to understand our capacity to 'withstand a given level of stress or demand', and to respond to possible disruptions to ensure continuity of service.

Resilience recovery planning, financial capacity, climate change risk assessment and crisis leadership.

We do not currently measure our resilience in service delivery. This will be included in future iterations of the AM Plan.

6.4 Service and Risk Trade-Offs

The decisions made in adopting this AM Plan are based on the objective to achieve the optimum benefits from the available resources.

6.4.1 What we cannot do

There are some operations and maintenance activities and capital projects that are unable to be undertaken within the next 10 years. These include:

- Flush all 25% of the wastewater mains proactively
- CCTV the full 10% of the waste water gravity mains proactively
- Remove debris from all 1109 manholes proactively

- Improve data on historical acquisitions
- Renewal of all assets currently beyond their useful life

6.4.2 Service trade-off

If there is forecast work (operations, maintenance, renewal, acquisition or disposal) that cannot be undertaken due to available resources, then this will result in service consequences for users. These service consequences include:

- Risk of service interruptions
- Reputation
- Customer complaints increase

6.4.3 Risk trade-off

The operations and maintenance activities and capital projects that cannot be undertaken may sustain or create risk consequences. These risk consequences include:

- Risk of surcharging and backing up causing property damage
- Financial shock due to increased reactive maintenance due to asset failure
- Contaminants discharged onto surface and into a natural watercourse/ receiving stream, with long term impact costs
- Insurance – identifying area of risk

These actions and expenditures are considered and included in the forecast costs, and where developed, the Risk Management Plan.

7.0 FINANCIAL SUMMARY

This section contains the financial requirements resulting from the information presented in the previous sections of this AM Plan. The financial projections will be improved as the discussion on desired levels of service and asset performance matures.

7.1 Financial Sustainability and Projections

7.1.1 Sustainability of service delivery

There are two key indicators of sustainable service delivery that are considered in the AM Plan for this service area. The two indicators are the:

- asset renewal funding ratio (proposed renewal budget for the next 10 years / forecast renewal costs for next 10 years), and
- medium term forecast costs/proposed budget (over 10 years of the planning period).

Asset Renewal Funding Ratio

Asset Renewal Funding Ratio[10] 75.8%

The Asset Renewal Funding Ratio is an important indicator and illustrates that over the next 10 years we expect to have 75.8% of the funds required for the optimal renewal of assets.

The forecast renewal work along with the proposed renewal budget, and the cumulative shortfall, is illustrated in Appendix D.

Medium term – 10 year financial planning period

This AM Plan identifies the forecast operations, maintenance and renewal costs required to provide an agreed level of service to the community over a 10 year period. This provides input into 10 year financial and funding plans aimed at providing the required services in a sustainable manner.

This forecast work can be compared to the proposed budget over the first 10 years of the planning period to identify any funding shortfall.

The forecast operations, maintenance and renewal costs over the 10 year planning period is $4,434,243average per year.

The proposed (budget) operations, maintenance and renewal funding is $3,857,000 on average per year giving a 10 year funding shortfall of $-577,243 per year. This indicates that 86.9% of the forecast costs needed to provide the services documented in this AM Plan are accommodated in the proposed budget. Note, these calculations exclude acquired assets.

Providing sustainable services from infrastructure requires the management of service levels, risks, forecast outlays and financing to achieve a financial indicator of approximately 1.0 for the first years of the AM Plan and ideally over the 10 year life of the Long-Term Financial Plan.

7.1.2 Forecast Costs (outlays) for the long-term financial plan

Table 7.1.3 shows the forecast costs (outlays) required for consideration in the 10 year long-term financial plan.

Providing services in a financially sustainable manner requires a balance between the forecast outlays required to deliver the agreed service levels with the planned budget allocations in the long-term financial plan.

A gap between the forecast outlays and the amounts allocated in the financial plan indicates further work is required on reviewing service levels in the AM Plan (including possibly revising the long-term financial plan).

[10] AIFMM, 2015, Version 1.0, Financial Sustainability Indicator 3, Sec 2.6, p 9.

We will manage the 'gap' by developing this AM Plan to provide guidance on future service levels and resources required to provide these services in consultation with the community.

Forecast costs are shown in 2022 dollar values.

Table 7.1.2: Forecast Costs (Outlays) for the Long-Term Financial Plan

Year	Acquisition	Operation	Maintenance	Renewal	Disposal
2022	0	$1,702,000	$1,135,000	$7,985,416	0
2023	0	$1,702,000	$1,135,000	$726,963	0
2024	$400,000	$1,702,000	$1,135,000	$35,010	0
2025	$4,415,000	$1,715,920	$1,144,280	$403,029	0
2026	$250,000	$1,869,562	$1,246,708	$0	0
2027	$3,200,000	$1,878,262	$1,252,508	$1,383,227	0
2028	0	$1,989,622	$1,326,748	$73,674	0
2029	0	$1,989,622	$1,326,748	$809,353	0
2030	0	$1,989,622	$1,326,748	$1,534,454	0
2031	0	$1,989,622	$1,326,748	$507,585	0

7.2 Funding Strategy

The proposed funding for assets is outlined in the Entity's budget and Long-Term financial plan.

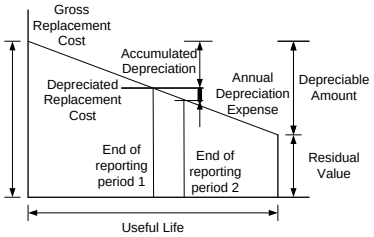
The financial strategy of the entity determines how funding will be provided, whereas the AM Plan communicates how and when this will be spent, along with the service and risk consequences of various service alternatives.

7.3 Valuation Forecasts

7.3.1 Asset valuations

The best available estimate of the value of assets included in this AM Plan are shown below. The assets are valued at fair value at cost to replace the service capacity based on our installation costs and Canada's inflation rate applied to the initial construction costs.

Replacement Cost (Current/Gross)	$48,882,654
Depreciable Amount	$48,882,654
Depreciated Replacement Cost[11]	$24,348,434
Depreciation	$977,653



7.3.2 Valuation forecast

Asset values are forecast to increase as additional assets are added to service.

Additional assets will generally add to the operations and maintenance needs in the longer term. Additional assets will also require additional costs due to future renewals. Any additional assets will also add to future depreciation forecasts.

[11] Also reported as Written Down Value, Carrying or Net Book Value.

7.4 Key Assumptions Made in Financial Forecasts

In compiling this AM Plan, it was necessary to make some assumptions. This section details the key assumptions made in the development of this AM plan and should provide readers with an understanding of the level of confidence in the data behind the financial forecasts.

Key assumptions made in this AM Plan are:

- Budgets will continue to be provided on the 10 year plan
- Original Asset values recorded are from the install date
- Some unit prices were not available and estimates were based on comparison of materials installed at that same timeframe.
- Asset data is derived from the Asset Registry and 51% of the asset data was incomplete data within the Asset Registry

7.5 Forecast Reliability and Confidence

The forecast costs, proposed budgets, and valuation projections in this AM Plan are based on the best available data. For effective asset and financial management, it is critical that the information is current and accurate. Data confidence is classified on a A - E level scale[12] in accordance with Table 7.5.1.

Table 7.5.1: Data Confidence Grading System

Confidence Grade	Description
A. Very High	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%
B. High	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%
C. Medium	Data based on sound records, procedures, investigations and analysis which is incomplete or unsupported, or extrapolated from a limited sample for which grade A or B data are available. Dataset is substantially complete but up to 50% is extrapolated data and accuracy estimated ± 25%
D. Low	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%
E. Very Low	None or very little data held.

The estimated confidence level for and reliability of data used in this AM Plan is shown in Table 7.5.2.

Table 7.5.2: Data Confidence Assessment for Data used in AM Plan

Data	Confidence Assessment	Comment
Demand drivers	medium	Based population growth and development statics and recent studies

[12] IPWEA, 2015, IIMM, Table 2.4.6, p 2|71.

Growth projections	high	Population based growth data is very high, other drivers require further development
Acquisition forecast	low	Acquisitions forecast is rated as low due to the uncertainty when developers will develop in Cold Lake
Operation forecast	medium	Medium as operation and maintenance forecasts are able to meet current service levels but as the asset ages and more acquisitions are acquired operation budget may not be sufficient
Maintenance forecast	medium	Medium as operation and maintenance forecasts are able to meet current service levels but as the asset ages and more acquisitions are acquired operation budget may not be sufficient
Renewal forecast - Asset values	low	Asset values are rated low based on plans, the records in asset optimizer and the application of the Canada – inflation rate in comparison with recently constructed projects (This method is $521/lm and the basic rate for a 250 in WWMP- $400 as comparable but recent 16 Ave cost for renewal was $1102/lm~~)~~
- Asset useful lives	medium	Subject matter opinion based on Tangible Capital Assets
- Condition modelling	low	Condition modelling is rated low due to the limited amount of camera inspections being completed and only age being considered
Disposal forecast	high	Disposal forecast is rated high as we do not expect any of the assets to be disposed of within the planning period.

The estimated confidence level for and reliability of data used in this AM Plan is considered to be medium

8.0 PLAN IMPROVEMENT AND MONITORING

8.1 Status of Asset Management Practices[13]

8.1.1 Accounting and financial data sources

This AM Plan utilises accounting and financial data. The source of the data is the 2022-10 year capital budget, the 2022 operations and maintenance budget, the canadian inflation index, the asset optimizer program, the Sanitary master plan.

8.1.2 Asset management data sources

This AM Plan also utilises asset management data. The source of the data is Asset Optimizer program, the Sanitary Master Plan, the GIS database and 2022 levels of service.

8.2 Improvement Plan

It is important that an entity recognise areas of their AM Plan and planning process that require future improvements to ensure effective asset management and informed decision making. The improvement plan generated from this AM Plan is shown in Table 8.2.

Table 8.2: Improvement Plan

Task	Task	Responsibility	Resources Required	Capital Required	Timeline
1	Develop a condition rating and mapping system based on age/ useful life and material for baseline	City staff	GIS database	Staff Time	2024
2	Establish Actual Customer Value Baseline	Management and Council	Public engagement and survey	Staff Time	2023
3	Develop a resiliency plan for adapting to changing conditions-back up plans to respond for continuity of service	Management and Council		Staff Time	2032
4	Increase reliability of data sets- Update/ Confirm asset inventory. Continue monitoring the progress of CCTV inspections over the next three (3) years to determine if third party required.	City Staff	Camera inspection for material, condition and size conformation	Staff Time	2029
5	Determine a 2% of wastewater infrastructure that on average would donated/ contributed by the developers to incorporate to project increase operation/ maintenance requirements	City staff	Analysis of past subdivision development and acquisition in the registry in comparison with growth rate to establish an average	Staff Time	2025
6	Inclusion of lift station facilities within the AMP	City staff and Administration	GIS database, maintenance records, historical drawings	Staff Time	2026
7	Manhole assessment	City Staff	inspection for material,	Staff Time	2028

[13] ISO 55000 Refers to this as the Asset Management System

			condition and size conformation		
8	Service Connection Data inclusion to data base	City Staff	Locates and provide coordinates to incorporate in GIS	Staff Time	
9	Develop more accurate actual replacement & acquisition costs database	City staff	Review of recent tenders, operation/ maintenance invoicing	Staff Time	2025
10	Update projects required for capital budget planning to reflect recent Water Master Plan Updates for acquisitions & renewals based on, age condition rating and road matrix triggers	City staff	Water Master Plans, Road Matrix projected road renewals/ replacement, age condition/ valve exercise results	Staff Time	2025
11	Research options based on assessments for cost effectiveness ie) lining, pipe bursting, removal and replacement	City Staff	Camera inspection and Contractor/ Consultant recommended renewal option report	Staff Time	2032

8.3 Monitoring and Review Procedures

This AM Plan will be reviewed during the annual budget planning process and revised to show any material changes in service levels, risks, forecast costs and proposed budgets as a result of budget decisions.

The AM Plan will be reviewed and updated annually to ensure it represents the current service level, asset values, forecast operations, maintenance, renewals, acquisition and asset disposal costs and planned budgets. These forecast costs and proposed budget are incorporated into the Long-Term Financial Plan or will be incorporated into the Long-Term Financial Plan once completed.

The AM Plan has a maximum life of 4 years and is due for complete revision and updating within 1 year of each Cold Lake election.

8.4 Performance Measures

The effectiveness of this AM Plan can be measured in the following ways:

- The degree to which the required forecast costs identified in this AM Plan are incorporated into the long-term financial plan,
- The degree to which the 1-5 year detailed works programs, budgets, business plans and corporate structures consider the 'global' works program trends provided by the AM Plan,
- The degree to which the existing and projected service levels and service consequences, risks and residual risks are incorporated into the Strategic Planning documents and associated plans,
- The Asset Renewal Funding Ratio achieving the Organisational target (this target is often 90 – 100%).

9.0 REFERENCES

- IPWEA, 2006, 'International Infrastructure Management Manual', Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/IIMM
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- Economic Development Strategy 2019, City of Cold Lake, https://coldlake.com/en/city-hall/plans-reports-and-studies.aspx
- City of Cold Lake Business Plan 2015, City of Cold Lake, https://coldlake.com/en/city-hall/plans-reports-and-studies.aspx
- Municipal Development Plan 2021, City of Cold Lake, https://coldlake.com/en/city-hall/plans-reports-and-studies.aspx
- Intermunicipal Development Plan 2021, City of Cold Lake, https://coldlake.com/en/city-hall/plans-reports-and-studies.aspx
- 2022 City of Cold Lake Service Levels

10.0 APPENDICES

Appendix A Acquisition Forecast

A.1 – Acquisition Forecast Assumptions and Source

The City of Cold Lake anticipates six (6) new subdivisions (Parkview, Lakewood, west of HSB- "Heights of English Bay", Lefebvre Heights, Tri City, Colonial) in the near term that will add 1800 lm of wastewater collection network as donated assets. These contributed assets are estimated at $720,000 (rate of $400/l.m. based on master plan) and will require additional operational and maintenance resources to ensure level of service can be maintained. Development though is dictated by market demand and the developer's ability and desire to construct so these donated assets were not assumed to be donate to the City of Cold Lake through development in the planning period. All acquired assets within this plan are a result of the City of Cold Lake funding.

A.2 – Acquisition Project Summary

The project titles included in the lifecycle forecast are included here.

2024- Forest Heights Sanitary Sewer Trunk Extension (Phase 2) $400,000
2025- Forest Heights Sanitary Sewer Trunk Extension (Phase 2). $4,415,000
2026- Building 3 Force main Improvement Project. $250,000
2027- Building 3 Force main Improvement Project. $3,200,000

Total: $8,265,000

A.3 – Acquisition Forecast Summary

Recommend using NAMS+ Outputs Summary for Acquisition

Table A3 - Acquisition Forecast Summary

Year	Constructed	Donated	Growth
2022	0	0	0
2023	0	0	0
2024	$400,000	0	0
2025	$4,415,000	0	0
2026	$250,000	0	0
2027	$3,200,000	0	0
2028	0	0	0
2029	0	0	0
2030	0	0	0
2031	0	0	0

Appendix B Operation Forecast

B.1 – Operation Forecast Assumptions and Source

Assumed that no additional assets will be donated to the City of cold Lake through development. The operations forecast is based on the annual operations budget.

B.2 – Operation Forecast Summary

Recommend using NAMS+ Outputs Summary for Operation

Table B2 - Operation Forecast Summary

Year	Planned Operation Forecast	Additional Operation Forecast	Total Operation Forecast
2022	$1,702,000	0	$1,702,000
2023	$1,702,000	0	$1,702,000
2024	$1,702,000	$13,920	$1,702,000
2025	$1,702,000	$153,642	$1,715,920
2026	$1,702,000	$8,700	$1,869,562
2027	$1,702,000	$111,360	$1,878,262
2028	$1,702,000	0	$1,989,622
2029	$1,702,000	0	$1,989,622
2030	$1,702,000	0	$1,989,622
2031	$1,702,000	0	$1,989,622

Appendix C Maintenance Forecast

C.1 – Maintenance Forecast Assumptions and Source

Assumed that no additional assets will be donated to the City of cold Lake through development. The maintenance forecast is based on the annual operations budget.

C.2 – Maintenance Forecast Summary

Recommend using NAMS+ Outputs Summary for Maintenance

.

Table C2 - Maintenance Forecast Summary

Year	Planned Maintenance Forecast	Additional Maintenance Forecast	Total Maintenance Forecast
2022	$1,135,000	0	$1,135,000
2023	$1,135,000	0	$1,135,000
2024	$1,135,000	$9,280	$1,135,000
2025	$1,135,000	$102,428	$1,144,280
2026	$1,135,000	$5,800	$1,246,708
2027	$1,135,000	$74,240	$1,252,508
2028	$1,135,000	0	$1,326,748
2029	$1,135,000	0	$1,326,748
2030	$1,135,000	0	$1,326,748
2031	$1,135,000	0	$1,326,748

Appendix D Renewal Forecast Summary

D.1 – Renewal Forecast Assumptions and Source
The renewal forecast is assumed based on the registered method total amounts for 10 years being actual projects being funded.it is also assumed that the data provided with the asset register is correct.

D.2 – Renewal Project Summary
The project titles included in the lifecycle forecast are included here.

2022- Shallow Sewer Replacement Program. $500,000
2022- 16 Avenue Sewer Replacement (6 Street to City Limits). $450,000
2022- 11 St Underground Infrastructure Upgrades and Road Rehabilitation Project. $750,000
2023- Shallow Sewer Replacement Program. $500,000
2023- Building 8 Upstream Sewer Enhancements (Phase 2). $100,000
2023 or 2024- Lakeshore Drive $1,500,000.00
2024- Shallow Sewer Replacement Program. $500,000
2024- Building 8 Upstream Sewer Enhancements (Phase 2) $1,400,000
2025- Shallow Sewer Replacement Program. $500,000
2026- Shallow Sewer Replacement Program. $500,000
2027- Shallow Sewer Replacement Program. $500,000
2028- Shallow Sewer Replacement Program. $500,000
2028- Inflow and infiltration Upgrades $500,000
2029- Shallow Sewer Replacement Program. $500,000
2029- Inflow and infiltration Upgrades $500,000
2030- Shallow Sewer Replacement Program. $500,000
2030- Inflow and infiltration Upgrades $500,000

D.3 – Renewal Forecast Summary
Recommend using NAMS+ Outputs Summary for Renewal

Table D3 - Renewal Forecast Summary

Year	Renewal Forecast	Planned Renewal Budget
2022	$7,985,416	$1,700,000
2023	$726,963	$600,000
2024	$35,010	$3,400,000
2025	$403,029	$500,000
2026	0	$500,000
2027	$1,383,227	$500,000
2028	$73,674	$1,000,000
2029	$809,353	$1,000,000
2030	$1,534,454	$1,000,000
2031	$507,585	0.00

D.4 –Renewal Plan
Detail output from NAMS+ Report for the Register Method

Appendix 10 Year Report

Appendix E Disposal Summary

E.1 – Disposal Forecast Assumptions and Source
Assumed no assets will be disposed of in the planning period

E.2 – Disposal Project Summary
N/A

E.3 – Disposal Forecast Summary
Recommend using NAMS+ Outputs Summary for Disposal
.

Table E3 – Disposal Activity Summary

Year	Disposal Forecast	Disposal Budget
2022	0	0
2023	0	0
2024	0	0
2025	0	0
2026	0	0
2027	0	0
2028	0	0
2029	0	0
2030	0	0
2031	0	0

Appendix F Budget Summary by Lifecycle Activity

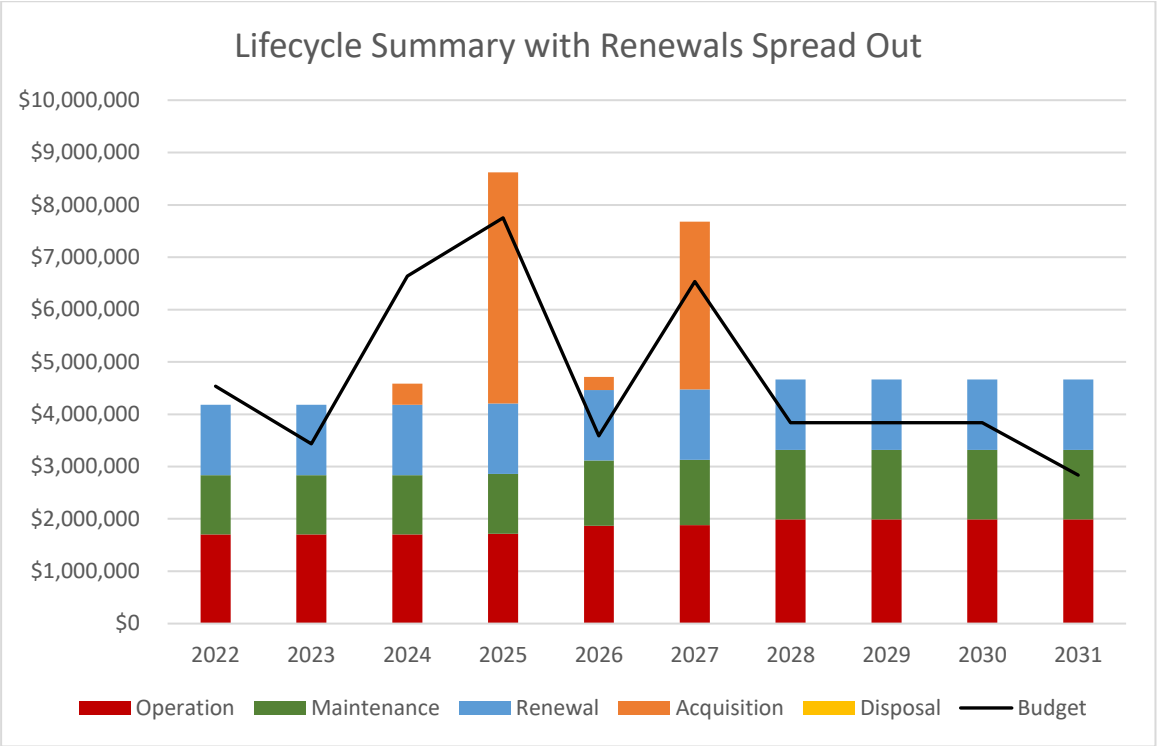
The assumption as noted in Appendix A-E remain for the total budget summary

Table F1 – Budget Summary by Lifecycle Activity

Year	Acquisition	Operation	Maintenance	Renewal	Disposal	Total
2022	0	$1,702,000	$1,135,000	$1,700,000	0	$4,537,000
2023	0	$1,702,000	$1,135,000	$600,000	0	$3,437,000
2024	$400,000	$1,702,000	$1,135,000	$3,400,000	0	$6,637,000
2025	$4,415,000	$1,702,000	$1,135,000	$500,000	0	$7,752,000
2026	$250,000	$1,702,000	$1,135,000	$500,000	0	$3,587,000
2027	$3,200,000	$1,702,000	$1,135,000	$500,000	0	$6,537,000
2028	0	$1,702,000	$1,135,000	$1,000,000	0	$3,837,000
2029	0	$1,702,000	$1,135,000	$1,000,000	0	$3,837,000
2030	0	$1,702,000	$1,135,000	$1,000,000	0	$3,837,000
2031	0	$1,702,000	$1,135,000	0	0	$2,837,000

Table F1 B – Budget Summary by Lifecycle Activity Spread Over 10 Years

Year	Acquisition	Operation	Maintenance	Renewal	Disposal	Budget
2022	0	$1,702,000	$1,135,000	$1,345,871	0	$4,537,000
2023	0	$1,702,000	$1,135,000	$1,345,871	0	$3,437,000
2024	$400,000	$1,702,000	$1,135,000	$1,345,871	0	$6,637,000
2025	$4,415,000	$1,715,920	$1,144,280	$1,345,871	0	$7,752,000
2026	$250,000	$1,869,562	$1,246,708	$1,345,871	0	$3,587,000
2027	$3,200,000	$1,878,262	$1,252,508	$1,345,871	0	$6,537,000
2028	0	$1,989,622	$1,326,748	$1,345,871	0	$3,837,000
2029	0	$1,989,622	$1,326,748	$1,345,871	0	$3,837,000
2030	0	$1,989,622	$1,326,748	$1,345,871	0	$3,837,000
2031	0	$1,989,622	$1,326,748	$1,345,871	0	$2,837,000


Lifecycle Summary with Renewals Spread Out
$10,000,000
$9,000,000
$8,000,000
$7,000,000
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
$0
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
Operation
Maintenance
Renewal
Acquisition
Disposal
Budget