

Asset Management Plan:

January 31, 2024

Village of Tahsis

Submitted to: Village of Tahsis Prepared by McElhanney, Ltd.

Contact

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Our file: 2221-49140-00 Task 2042, 2043, 2044

Your Challenge. Our Passion.

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Our File: 2221-49140-00 Task 2042,2043,2044

January 31, 2024

Village of Tahsis 977 South Maquinna Dr. Tahsis, BC, V0P 1X0

Attention: Mark Tatchell

Village of Tahsis Asset Management Plan

McElhanney Ltd. (ML) is pleased to present the following Asset Management Plan to the Village of Tahsis.

The Asset Management Plan has been developed with data gathered through our GIS asset inventory and field verification program, a comprehensive review of relavent engineering and financial documents, and with valuable input and guidance from Tahsis Staff. This plan is a living document and is intended to be updated over time as assets are improved or replaced, and community priorities shift.

We trust that the information provided in this document is of value to the Village. Please don't hesitate to contact the undersigned if you have any questions or comments regarding any of the material presented herein.

Sincerely,

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EXECUTIVE SUMMARY

THE PURPOSE OF THE PLAN

Asset management planning is a comprehensive process to ensure services are being delivered by an organization's infrastructure assets in a financially sustainable manner.

The purpose of this Asset Management Plan (AMP) is to highlight current infrastructure asset management practices that the Village of Tahsis (Tahsis) implements to ensure assets are maintained and developed in a cost-effective, sustainable manner, while delivering agreed upon levels of service and minimizing risk. This AMP defines the services to be provided, how the services are provided, and how much it will cost to provide the services over a 5-year planning period.

The infrastructure assets covered by this AMP includes water infrastructure, wastewater infrastructure, storm drain infrastructure, roads, and community buildings.

ASSET DESCRIPTION

The asset classes included in this asset management program are comprised of:

- Water Infrastructure Sources, storage, and distribution of potable water and fire suppression services.
 - o Estimated value: \$7,782,500
- Sanitary Infrastructure Collection and treatment of wastewater.
 - Estimated value: \$12,407,000
- Storm Drainage Infrastructure Collection, storage, and conveyance of storm water.
 - o Estimated value: \$3,125,000
- **Roads** Roads, bridges, and streetlighting to provide transportation access for vehicles and pedestrians.
 - o Estimated value: \$17,398,000
- **Community Buildings** Commercial and institutional facilities, as well as facilities for public use and enjoyment.
 - Estimated value: \$37,770,000
- TOTAL ESTIMATED VALUE \$78,482,500



Most of the Village's infrastructure was constructed during the same time period by the Tahsis Company prior to the Village's incorporation in 1970; therefore, most of the Village's infrastructure is aging out at the same time. With a majority of assets concurrently reaching the end of their useful lives, this creates an unbalanced asset renewal forecast, making replacement funding extremely challenging.

Asset Class	Average Expected Life at Acquisition	Current Average Estimated Remaining Life	% of Life Remaining
Water	47	26	56%
Sanitary	53	26	49%
Storm Drainage	55	28	51%
Roads	37	10	28%
Community Buildings	48	5	10%

LEVELS OF SERVICE

Present funding levels are insufficient for some asset types to continue to provide existing services at current levels in the short term. The main consequences to service delivery based on funding are:

• Decreased road conditions

LIFECYCLE MANAGEMENT PLAN

What does it cost?

The forecasted lifecycle costs necessary to provide the services covered by this AMP includes operation, maintenance, renewal, and upgrade costs. The forecasted funding required to provide the services covered in this AMP over the 5-year planning period is \$28,926,569 or \$5,785,314 on average per year. The operating and capital costs are summarized in the table below.

Year	Operations	Maintenance	Projected Capital Renewal	Capital Upgrade / New	Disposals	TOTAL
2024	\$1,265,894	\$211,261	\$2,368,052	\$2,917,480	\$0	\$6,762,687
2025	\$1,274,452	\$219,819	\$4,145,804	\$1,711,558	\$0	\$7,351,632
2026	\$1,283,852	\$229,219	\$3,640,600	\$1,880,009	\$0	\$7,033,680
2027	\$1,283,852	\$229,219	\$2,414,462	\$0	\$0	\$3,927,532
2028	\$1,283,852	\$229,219	\$2,337,967	\$0	\$0	\$3,851,038



FINANCIAL SUMMARY

What we will do

Estimated available funding for this planning period is \$18,257,418 or \$3,651,484 on average per year as per the long-term forecast or budget forecast. This is 63% of the cost to sustain the total estimated operations, maintenance, renewal, and upgrade costs at current levels of service at the lowest lifecycle cost.

A key objective of this AMP is to communicate the consequences to service delivery and risks based on what is funded in the short-term financial plan so that decision-making is informed.

The allocated funding leaves a shortfall of \$2,133,830 on average per year of the estimated expenditure required to provide current levels of service for the asset classes in this AMP compared with planned expenditure currently included in the short-term financial plan; this is shown in the figure below.



Figure values are in current (real) dollars.



What we cannot do

The Village has been very successful in securing capital project grants over the past five years which has assisted in replacing or upgrading roads, wastewater systems, docks, the firehall, flood protection infrastructure, and community buildings; however, grants are not considered to be a sustainable method of financing asset renewal.

Tahsis currently does **not** allocate enough funding to provide services at the desired standard or add new services as desired. Works and services that cannot be provided under current funding levels are:

- Replace every asset at the end of its expected useful life in the next 5 years
- Repair every road surface defect

Managing the Risks

A major risk contributor to linear and above-ground infrastructure is the breadth and depth of the buried waste material from the former mills (hog fuel) throughout the municipality, causing shifting and subsidence of the infrastructure bedding.

Present funding levels are insufficient to continue to manage risks in the short term.

The main risk consequences due to insufficient funding are as follows:

- Reduced road safety due to poor road maintenance
- Potential for water main breaks, emergency repairs, and temporarily reduced service
- Environmental impacts and temporarily reduced service due to failed sanitary sewer infrastructure
- Reduction in useability of community buildings, leading to reduced level of service and potential economic downturn

Tahsis will seek to manage and mitigate these risks within available funding by:

- Allocating appropriate funding to operations, maintenance, and renewal activites
- Conducting regular inspections of its critical infrastructure
- Implementing a defined Operations & Maintenance plan

ASSET MANAGEMENT PLANNING PRACTICES

Tahsis uses the following systems to manage its assets:

- Asset registries
- Excel spreadsheets of annual capital and operating budget reports
- GIS data of infrastructure



Assets requiring renewal / replacement are identified using capital renewal expenditure projections from a combination of asset register data (useful life and acquisition year) and condition assessments.

MONITORING AND IMPROVEMENT PLAN

Asset management is a continuous improvement process. The next steps resulting from this asset management plan to improve asset management practices:

- 1. Survey residents for customer levels of service satisfaction.
- 2. Implement enhanced tracking of annual work completed with operating expenses linked to technical level of services.
- 3. Continue ongoing asset condition assessments including CCTV inspection.
- 4. Improve accuracy of asset register by verifying current replacement values, completeness, and install dates.

The Asset Management Plan has a maximum life of 4 years and is due for complete revision and updating within that time period.





1. INTRODUCTION

This Asset Management Plan outlines how the Village of Tahsis (Tahsis) can deliver sustainable, longterm services through the effective management of its infrastructure assets within the constraints of available funding. The purpose of this section is to provide a high-level overview of how Asset Management oversight is provided within Tahsis as well as describing core elements of its organisational structure with regards to governance and service delivery.

1.1. BACKGROUND

This Asset Management Plan is a part of a suite of core Village planning documents including:

- 2020 Village of Tahsis Official Community Plan
- Annual budgets and operating plans
- Village of Tahsis 2022 Annual Report
- 2023 Strategic Economic Development Plan

The infrastructure assets covered by this Asset Management Plan includes water infrastructure, wastewater infrastructure, storm drain infrastructure, roads, and public facilities and replacement costs are summarized in **Table 1**. These assets are used to provide safe, clean water for drinking and fire protection; wastewater collection and treatment; storm water conveyance and attenuation to prevent flooding; safe and efficient travel; and safe spaces for community members and the general public to conduct business and enjoy recreation.

Asset Group	Asset Subtype	Replacement Value
Water	Air Valves	\$5,000
	Curbstops	\$10,500
	Chambers	\$60,000
	Fire Hydrants	\$620,000
	Water Mains	\$4,683,000
	Meters	\$70,000
	Storage Tanks	\$1,400,000
	Line Valves	\$724,000
	Supply Well	\$150,000
	Monitoring Wells	\$60,000
Wastewater	Cleanouts	\$128,000
	Lift Station	\$2,800,000
	Sewer Pipes	\$5,301,000

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Table 1. Summa	ary of Assets Included	in this Asset Managemen	t Plan and their Repla	cement Value



Asset Group	Asset Subtype	Replacement Value
	Manholes	\$1,178,000
	Sanitary Treatment Systems	\$3,000,000
Storm	Catch Basins	\$615,000
	Cleanouts	\$4,000
	Culverts	\$421,000
	Headwalls	\$54,000
	Drainage Pipes	\$1,735,000
	Manholes	\$144,000
	Outfalls	\$22,000
	Pumps	\$80,000
	Storage	\$50,000
Roads	Bridge	\$6,000,000
	Roads	\$11,248,000
	Streetlights	\$150,000
Community Buildings	Community Buildings	\$34,270,000
	Utility Buildings	\$3,500,000
	Marine Dock*	\$2,000,000
	Parks / Greenspace*	\$2,453,000
	Parks / Trails*	\$870,000
	TOTAL	\$83,805,500

*Not included as part of this asset management plan

Note: Costs for water and sanitary mains do not include service connection costs.

Interested parties in the preparation and implementation of this Asset Management Plan are shown in **Table 2** below.

Table 2. Interested par	ties with a role in the	preparation of this	Asset Management Plan
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Interested Party	Role in Asset Management Plan
Community Residents	Users of services supported by infrastructure
Mayor and Council	Trustees with a fiduciary duty to act in the best interests of the Community. Overall responsibility for the assets of the community. Provides buy in and support to the AM process. Recognized at "Top Management" within the meaning of the Asset Management Framework.
Chief Administrative Officer	Oversees resource allocation and personnel management across the Village. Ensures compliance with existing policies and processes. Recommends new policies and procedures to Council.
Finance Department	Aggregates financial information regarding operations / maintenance and capital outlays. Leads department-level budgeting processes. Responsible for generating financial statements in accordance with PSAB.





Figure 1. Village of Tahsis Organizational Chart (source: Village of Tahsis 2022 Annual Report)

1.2. GOALS AND OBJECTIVES OF ASSET OWNERSHIP

The goal in managing infrastructure assets is to meet the defined level of service in the most costeffective manner for present and future users. The key elements of infrastructure asset management are

- Providing a defined level of service and monitoring performance;
- Managing the impact of growth and contraction, regulatory changes, and climate change 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 managing 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,
- 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, and
- Asset management improvement plan how we increase asset management maturity.

1.3. ASSET MANAGEMENT MATURITY ASSESSMENT

As part of the Federation of Canadian Municipalities (FCM) Municipal Asset Management Program grant application, an Asset Management Readiness Review was conducted to identify current states within the Asset Management Program in place and to highlight key areas of practice development that would be appropriate for a community of this size. The review was completed using the FCM Asset Management Readiness Scale tool, which evaluates an organisations' current and anticipated asset management maturity along 15 outcome areas. A summary of the results of the assessment are shown graphically in **Figure 2**.



Asset Management Maturity Status

FCM Asset Management Readiness Competencies

Policy and Governance
People and Leadership
Data and Information
Planning and Decision-Making
Contribution to Asset Management Practice

Figure 2. AM Maturity Status

It is important to note that every organisation has a different "end maturity state" that is appropriate for its size, complexity, and service delivery requirements. Thus, achievement of the maximum maturity state in every category is not necessarily a relevant goal of an asset management plan.

For the Village of Tahsis, the largest anticipated increases in asset management maturity are in the areas of Budgets & Financial Planning, Asset Management Plans, Financial Information, and Asset Data.



1.4. SOURCES OF FINANCIAL AND ASSET MANAGEMENT DATA

The Village of Tahsis asset management program relies on financial and asset data to provide a basis of understanding asset inventories and valuations.

Overall, key sources of financial and asset management data include:

- Asset registries
- Excel spreadsheets of annual capital and operating budget reports
- GIS data of infrastructure
- 2019 Flood Risk Assessment report



This section provides an overview of how Tahsis establishes requirements regarding the services it provides. Included is a discussion of legislative and regulatory requirements affecting Tahsis' ability to deliver services, customer engagement and values, as well as how customer and technical levels of service are defined.

2.1. CUSTOMER ENGAGEMENT AND VALUES

The *primary* feedback mechanism with regards to service user satisfaction is ongoing informal discussions between Tahsis staff and community members. Occasionally, if there are issues with service delivery, community members will directly raise their complaints through the municipal administration. Given the small size of this community, this process generally allows for sufficient awareness by Tahsis staff if services are meeting the needs of end-users.

Future revisions of the Asset Management Plan will incorporate direct customer consultation on desired service levels. This will assist Tahsis and other interested parties in matching the level of service required, service risks, and consequences with the Village's ability to fund services and asset maintenance and development.

2.2. STRATEGIC AND CORPORATE GOALS

This Asset Management Plan aligns with the vision, mission, goals, and objectives of Tahsis.

Tahsis' vision is:

Tahsis is a healthy, thriving community that showcases its spectacular natural environment, recreation opportunities, and indigenous culture, where residents have pride in their community, access to safe, affordable housing, reliable health care, nutritious food, and facilities and services that support all stages of life.

Strategic goals that have emerged from the 2020 OCP include:

- Environment and Natural Areas Healthy protected watersheds and inlet that support future generations and sustain natural ecosystems.
- **Housing** Residents have access to appropriate, secure, and affordable housing that meets their needs throughout their lifespan.
- Economy and Employment An economic development strategy that supports and enhances the best of what Tahsis has to offer a high-quality natural environment, recreation opportunities, First Nations culture, and small-town rural atmosphere.



- Infrastructure and Transportation Infrastructure facilities deliver the right services to residents and business operators while utilizing best asset management practices; and Tahsis' healthy, high-quality drinking water is used prudently and maintained for future generations.
- Climate Action and Energy Tahsis is more resilient and prepared for climate change through implementation of adaptation measures that reduce impacts on public health, public safety, property, the local economy and the natural environment; and consistent with the Climate Change Accountability Act, Tahsis will strive to reduce GHG emissions by 40% from 2007 levels by 2030.
- **Parks and Recreation** Everyone enjoys convenient, affordable access to community parks, open spaces, recreation facilities, amenities, and programs.
- Learning Culture and Community Well-Being Residents are healthy and have access to facilities, services and programs that promote wellness and overall well-being; residents have diverse opportunities for social interaction, and access to high quality, affordable education and training; and residents have a deep sense of pride in their community and what it has to offer.

Based on these identified strategic goals, relevant goals and objectives relating to infrastructure service delivery and how these are addressed in this Asset Management Plan are summarised in **Table 3** below.

Goal	Objective	How Goals and Objectives are addressed by the Asset Management Plan
Infrastructure and Transportation	Reliable infrastructure	Residents and businesses rely on well- maintained infrastructure to live comfortably and safely, provide services, and enhance the local economy. This plan informs the condition, risk, and priority renewal and maintenance activities to avoid unexpected critical infrastructure failures.
Infrastructure and Transportation	Protection of the Village's high-quality drinking water	This plan will establish the right renewal and maintenance strategy for the Village's drinking water infrastructure to ensure it is protected for generations.
Climate Action and Energy	Adequate measures to protect public safety,	This plan addresses climate risk and resiliency from flooding events through

Table 3. Goals and how they are addressed in this Plan



Goal	Objective	How Goals and Objectives are addressed by the Asset Management Plan
	economy, and natural	recommended flood mitigation
	environment are in place	measures.
Learning Culture and	Residents have access to	This plan includes facility renewal costs
Community Well-Being	facilities that promote well-	in the lifecycle planning and 5-Year
	being	Financial Forecast.

2.3. SERVICE LEVEL DETERMINATION

The overall service delivery objective by Tahsis is to develop a sustainable infrastructure system, including a sustainable funding model for the ongoing maintenance and replacement of infrastructure to ensure community resiliency. Community resiliency includes adapting to the impacts of climate change.

As the primary end-users of the services that the Village provides, community residents and visitors are identified as 'Service Customers' within the meaning of the Asset Management framework. To ensure that the right services are being provided to the service customers at the right levels, the Village must define their 'Customer Values'.

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.

Service levels are defined in two ways: customer and technical level of service. Both levels of service are supplemented by fact-based organizational measures to balance the often subjective customer perception of service delivery. For example, documented number of service outages compared to the public's perception.

2.3.1. Customer Levels of Service

The **Customer Levels of Service** are an indication of what the end-users should expect in terms of receiving services. Generally, they are considered in terms of:

- Quality 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?

Table 4 to Table 5 summarize the performance measure being used with regards to the service measure type (quality, function, capacity / use) as well as the current performance and the expected performance based on the current funding level for each asset group included in this AMP.

Table 4. Customer Level of Service for Water Assets

LoS Category	Service Expectation	Performance Measure	Current Performance	Recommended Action	Expected State in 10 Years based on Current Budget		
Service Obje	Service Objective: To provide quality, safe drinking water to residents and businesses with adequate capacity for fire protection.						
Quality	Aesthetically pleasing drinking water	Complaints	Excellent - No Complaints in a year	Do Nothing	Expected to Stay the Same		
	Adequate water pressure	Pressure Testing	Good - Few complaints about water pressure (<5/year)	Do Nothing	Expected to Stay the Same		
Function	Minimal watermain breaks	Documented Events	Good - 1-2 watermain breaks per year (average over last 5 years)	Do Nothing	Expected to Stay the Same		
	Minimal boil water advisories	Documented Events	Excellent - No more than one boil water advisory over previous 10 years	Do Nothing	Expected to Stay the Same		
Capacity / Availability	Sufficient water supply for firefighting	Expert Assessment	Excellent - Water is piped and hydrants available for every building and the network is regularly maintained	Do Nothing	Expected to Stay the Same		
	Sufficient water for customer needs (drinking, washing and unrestricted irrigation)	Org. Policy; Expert Assessment	Good - Water for drinking, washing and restricted irrigation	Do Nothing	Expected to Stay the Same		
	Sufficient water for future needs (drinking, washing and unrestricted irrigation)	Expert Assessment	Good - Ability to increase capacity by 5-20%	Do Nothing	Expected to Stay the Same		
	Piped water to properties	Expert Assessment	Excellent - Every property has access to piped water	Do Nothing	Expected to Stay the Same		

Table 5. Customer Level of Service for Wastewater Assets

LoS	Service Expectation	Performance Measure	Current Performance	Recommended	Expected Trend in 10 Years
Category				Action	based on Current Budget
Service Objective: To provide adequate and reliable wastewater collection infrastructure that is available to all residents and businesses.					
Quality	Minimal system	Odour detection in	Good - Less than 5	Do Nothing	Expected to Stay the Same
	odours	condition assessments	complaints in a year		
		(confirm with client)			
Function	Minimal inflow and	System inspections	Good - Inflow and	Do Nothing	Expected to Stay the Same
	infiltration	completed	infiltration into sanitary		
			system does not		
			exceed 0.12 L/s per ha		
	Minimal service	Backup complaints	Fair - Complaints from	Do Nothing	Expected to Stay the Same
	connection back-ups	investigated	2% - 5% of connected		
			properties		
	Minimal sewer main	All reports of blockages	Fair - Less than 5	Do Nothing	Expected to Stay the Same
	blockages	are investigated	sewer main blockages		
			per year		
Capacity /	Access to piped	Review underground	Excellent - Every	Do Nothing	Expected to Stay the Same
Availability	sewerage collection	utilities	property has access to		
			piped sanitary system		
	System has capacity	Wastewater study	Good - Most of the	Do Nothing	Expected to Stay the Same
	to handle planned	completed	system capacity to		
	community growth		handle planned		
			community growth		

Table 6. Customer Level of Service for Storm Drainage Assets

LoS Category	Service Expectation	Performance Measure	Current Performance	Recommended Action	Expected Trend in 10 Years based on Current Budget
	Service Objective: T	o maintain effect	ive storm drainage infrastrue	cture to prevent fl	ooding.
Quality	Minimal service connection	Inspections of	Fair - 5-10 complaints in a	Do Nothing	Expected to Stay the Same
	back-ups	culverts	year		
Function	Minimal flooding/ponding	Catch basin	Good - Flooding at	Do Nothing	Expected to Stay the Same
	during intense wet weather	inspections	manholes or catch basins		
	events		during wet weather events		
			less than 5 times per year		
Capacity /	Access to stormwater	Utility maps	Poor - Less than half of	Do Nothing	Expected to Stay the Same
Availability	conveyance		properties do not have		
			access to adequate		
			stormwater conveyance		
	Existing stormwater system	Flood risk	Fair - Less than half of the	Do Nothing	Expected to Stay the Same
	capacity for large storm	assessment	storm system has capacity		
	events		to convey storm events up		
			to and including the 100-		
			year event without property		
			damage		
	Existing stormwater system	Flood risk	Fair - Less than half of the	Do Nothing	Expected to Stay the Same
	has capacity to handle	assessment	system has capacity to		
	planned community growth		handle planned community		
			growth		

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Table 7. Customer Level of Service for Roads Assets

LoS Category	Service Expectation	Performance Measure	Current Performance	Recommended Action	Expected Trend in 10 Years based on Current Budget
Servi	ice Objective: To ma	intain safe roadways	and roadsides enabling safe and	d efficient travel in	a cost-effective way.
Quality	Smooth roads with no defects	Asphalt survey report	Poor - More than 10 complaints in a year	Increase Annual Maintenance Activities	Expected to Stay the Same
Function	Active transportation methods are accommodated	Major roads measured for width	Good - No defined bike lanes exist but major routes are wide enough to safely accommodate cyclist and vehicle traffic, with some sidewalks; some local roads are too narrow to safely accommodate both vehicle and cyclist/pedestrian traffic	Do Nothing	Expected to Stay the Same
	Roads are open and accessible	Roads plowed on snow days by 2 PM (confirm this with client)	Good - No more than 1 unplanned road closures per year	Do Nothing	Expected to Stay the Same
Capacity / Availability	Adequate parking is available	Reports from parking enforcement	Good - Most major routes have on-street parking; some local roads have on-street parking	Do Nothing	Expected to Stay the Same

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Table 8. Customer Level of Service for Community Buildings.

LoS Category	Service Expectation	Performance Measure	Current Performance	Recommended Action	Expected Trend in 10 Years based on Current Budget
Service Objectiv	ve: To maintain safe and	l dependable co	mmunity facilities enabling	g continued use a	nd a vibrant community.
Quality	Building users are comfortable	Heating system checked	Fair - 5-10 complaints in a year	Increase Annual Maintenance Activities	Expected to Improve
Function	Buildings are accessible to all users	Accessibility committee	Fair - More than half of community buildings meet BC Accessibility standards	Do Nothing	Expected to Stay the Same
	Buildings experience no unforeseen closures due to systems or component failures	Condition assessment reports	Fair - No more than 5 unplanned full or partial building closures per year	Do Nothing	Expected to Stay the Same
Capacity / Availability	Buildings can be occupied year-round	Condition assessment reports	Good - More than half of the buildings can be occupied year-round	Do Nothing	Expected to Stay the Same
	Buildings provide the right amount of space to meet current and future demand	Property Management Policy	Good - All Buildings provide sufficient space for current usage demands	Do Nothing	Expected to Stay the Same

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2.3.2. Technical Levels of Service

Technical Levels of Service are performance measures indicating what the organisation needs to do (and at what frequency) to provide services to customers. Whereas the Customer Levels of Service focus on the measures of what the customers *receive*, Technical Levels of Service measure what the organisation is *doing*.

Typically, Technical Levels of Service are segregated by activities required to operate and maintain the asset capacity, namely:

- **Operation** regular activities to provide services (e.g., fuel and electricity, overhead related to operating the organisation)
- **Maintenance** activities necessary to keep an asset in an appropriate condition to provide services for its planned life (e.g., regular equipment upkeep, vegetation control, minor road repairs, culvert, and bridge inspections)
- **Renewal** the activities that return the service capability of a degraded asset up to that which it had originally provided (e.g., repairing washouts, replacement of damaged pipe, purchasing replacement equipment)
- **Acquisition** the activities to provide a higher level of service (e.g., paving a road or purchasing additional equipment) or a new service that did not exist previously (e.g., building a new treatment facility)

Tables 9 to 13 summarize the activities expected to be provided under the current planned budget allocation and forecast activities being recommended in this AMP to maintain customer service levels. Current performance values are derived from budgets provided by the Village. Recommended performance budgets were developed through consultation with the Village's Operations Lead (see **Appendix E**) and the annualized asset renewals identified from lifecycle analysis (see **Appendix A**).



Table 9. Technical Level of Service for Water Assets

Service Attribute	Service Activity Objective	Activity Measure Process	Current Performance*	Recommended Performance**
Service Objective: 1	Γο provide quality, safe drinkir	ng water to residents and	businesses with adequate ca	pacity for fire protection.
Operations	Staff allocations	Hourly wages	Adequate	Adequate
		Budget	\$62,189	\$62,189
Maintenance	Aesthetically pleasing drinking water	Annual Operating Budget	Adequate	Adequate
	Safe drinking water	Annual Operating Budget	Adequate	Adequate
		Budget	\$28,500	\$28,500
Renewal	Replacement of infrastructure beyond its useful life	Renewal Reserves	Inadequate - Reactive asset replacement	Proactively replace assets at the end of their life - \$181,400 needed annually
		Budget	\$32,000	\$181,400
Upgrade / New	New supply and distribution infrastructure	Long-Term Capital Budget	Planned projects; adequate	Adequate
		Budget	\$0	\$0

*Current activities and costs that are currently funded



Table 10. Technical Level of Service for Wastewater Assets

Service Attribute	Service Activity Objective	Activity Measure Process	Current Performance*	Recommended Performance**
Service O	bjective: To provide adequate an	d reliable wastewater colle businesses.	ection infrastructure that is avai	lable to all residents and
Operations	Staff allocations	Hourly wages	Adequate	Adequate
		Budget	\$26,957	\$26,957
Maintenance	Sewers are free of blockages	Annual Operating Budget	Complaints from 2-5% of connected properties - Reactive system maintenance	Cleaning and CCTV Inspection of Sewer Mains - \$28,104 needed annually
	Treatment infrastructure is maintained	Annual Operating Budget	Adequate	Adequate
		Budget	\$28,500	\$56,605
Renewal	Renewal of high-risk sewer infrastructure that has reached its useful life	Renewal Reserves	Inadequate - Reactive asset replacement	Proactively replace assets at the end of their life - \$246,820 needed annually
		Budget	\$36,000	\$246,820
Upgrade / New	New collection and treatment infrastructure	Long-Term Capital Budget	Planned projects; Upgrades to Wastewater System	Adequate
		Budget	\$1,700,056	\$1,700,056

*Current activities and costs that are currently funded



Table 11. Technical Level of Service for Storm Drainage Assets

Service Attribute	Service Activity Objective	Activity Measure Process	Current Performance*	Recommended Performance**
	Service Objective: To maintai	n effective storm draina	ge infrastructure to prevent floo	ding.
Operations	Staff allocations	Hourly wages	Undetermined	Undetermined
		Budget	Unknown	Unknown
Maintenance	Storm runoff is adequately managed	Annual Operating Budget	Inadequate – Some service connection backup complaints per year	Annual culvert and system cleaning and inspection - \$13,052 needed annually
		Budget	Unknown	\$13,052
Renewal	Renewal of high-risk storm drain infrastructure that has reached its useful life	Renewal Reserves	Inadequate – No contribution to reserves	Proactively replace assets at the end of their life - \$54,140 needed annually
		Budget	\$0	\$54,140
Upgrade / New	New drainage and flood protection infrastructure	Long-Term Capital Budget	Planned projects; Flood protection infrastructure	Adequate
		Budget	\$3,282,152	\$3,282,152

*Current activities and costs that are currently funded



Table 12. Technical Level of Service for Road Assets

Service Attribute	Service Activity Objective	Activity Measure Process	Current Performance*	Recommended Performance**
Service Objec	tive: To maintain safe roadwa	ys and roadsides enabling	g safe and efficient travel in a	cost-effective way.
Operations	Staff allocations	Hourly wages	Adequate	Adequate
		Budget	\$50,286	\$50,286
Maintenance	Roads are clear	Annual Operating Budget	Annual snow plowing; \$2,500	Adequate
	Roads are smooth Annual Operating Budget		Inadequate - \$500 annual budget; >10 complaints per year	Crack sealing and patching – increase annual budget to \$5,000 (estimate)
		Budget	\$3,000	\$7,500
Renewal	Renewal of road surfaces	Renewal Reserves	Inadequate - No contribution to reserves	Proactively replace assets at the end of their life - \$281,200 needed annually
	Renewal of bridges	Renewal Reserves	Inadequate - No contribution to reserves	Proactively replace assets at the end of their life - \$120,000 needed annually
	Renewal of streetlights	Renewal Reserves	Inadequate - No contribution to reserves	Proactively replace assets at the end of their life - \$7,500 needed annually
		Budget	\$0	\$408,700
Upgrade / New	New roads, streetlights, and bridges	Long-Term Capital Budget	Planned projects; adequate	Adequate
		Budget	\$0	\$0

*Current activities and costs that are currently funded



Table 13. Technical Level of Service for Community Buildings

Service Attribute	Service Activity Objective	Activity Measure Process	Current Performance*	Recommended Performance**
Service Objective	e: To maintain safe and depen	dable community facilities	s enabling continued use and	l a vibrant community.
Operations	Facility Utilities and Staff Allocations	Utility Costs and Hourly Wages	Adequate	Adequate
		Budget	\$880,841	\$880,841
Maintenance	Buildings are comfortable and open	Annual Operating Budget	Adequate	Adequate
		Budget	\$27,000	\$27,000
Renewal	Renewal of facilities and components beyond useful life or capacity	Renewal Reserves	Inadequate - No contribution to reserves	Proactively replace assets at the end of their life - \$755,667 needed annually
		Budget	\$0	\$755,667
Upgrade / New	New facilities and upgrades to existing	Long-Term Capital Budget	Planned projects; New firehall	Adequate
		Budget	\$1,756,500	\$1,756,500

*Current activities and costs that are currently funded



3. ASSET INVENTORY, CONDITION, AND LIFECYCLE MANAGEMENT PLAN

A key aspect of sustainable service delivery is understanding what assets an organization is obliged to manage, what condition they are in, and what their estimated remaining lives are. Through this knowledge, the future financial obligations required to maintain assets at an acceptable level of service can be established.

The lifecycle management plan details the strategy around how the Village will manage and operate the assets at the agreed levels of service while managing lifecycle costs and minimizing risks to service delivery. Establishing the lifecycle management plan involves not only an understanding of the underlying asset base, but also an understanding of the basis for how new asset acquisition decisions will be made, when they will be disposed of, and at what level they will be operated, maintained, and renewed.

3.1. ASSET INFORMATION

The assets covered by this Asset Management Plan are shown in Table 14 and Table 15.

Asset Category	Description
Water	Sources, storage, and distribution of potable water and fire suppression services
Wastewater	Collection and treatment of wastewater
Drainage	Collection, storage, and conveyance of storm water
Roads	Roads, bridges, and streetlighting to provide transportation access for vehicles and pedestrians
Community Buildings	Commercial and institutional facilities, as well as facilities for public use and enjoyment

Table 14. Assets Covered by this Plan

Table 15. Asset Quantity by Category

Major Asset Group	Asset Sub-Group	Quantity
Water	Air Valves	1
	Chambers	3
	Meter	1
	Fire Hydrants	61
	Water Mains	15.6 km
	Storage Tanks	2
	Valves	172
	Monitoring wells	6
	Supply well	1



Major Asset Group	Asset Sub-Group	Quantity
Sanitary	Lift Station	6
	Forcemains	0.9 km
	Sanitary Mains	8.4 km
	Manholes	124
	Sanitary Treatment Systems	2
Drainage	Catch Basins and Lawn Basins	123
	Culverts	12
	Headwalls	12
	Drainage Pipes	2.2 km
	Manholes	18
	Outfalls	11
	Pumps	1
	Storage	1
Roads	Bridge	1
	Roads	16 km
	Streetlights	15
Community Buildings	Community Buildings	10
	Utility Buildings	4
	Marine Dock*	1
	Parks / Greenspace*	8
	Parks / Trails*	11
TOTAL		607 Features 27.1 km of pipe

*Not included as part of this asset management plan

Together, these asset groups provide safe drinking water and fire protection, collection and treatment of wastewater, rainwater drainage to prevent flooding, vehicular and pedestrian access to efficient transportation, and facilities for vital services and recreation. Tahsis is situated in a temperate coastal setting on the west coast of Vancouver Island and experiences heavy rainfall but is not exposed to extreme seasonal temperature variations; therefore, well-functioning storm drainage infrastructure is vital to the community's well-being and thermally related infrastructure defects are not typically encountered.

Figure 3 shows a graphical representation of the general arrangement of the assets.





Figure 3. Overview of Asset Locations

A breakdown of replacement values (in current dollars) by asset class is shown in Error! Reference source not found. below. Note that these are high-level estimates used to indicate the relative magnitudes of the asset classes under this current plan.





Figure 4. Asset Replacement Value by Major Asset Group

3.2. ASSET CONDITION

Condition for most assets is currently informally monitored by department personnel during their normal operations. However, a key strength of the Tahsis organisation is that Operations personnel are often users of the assets themselves – as a result, issues with service delivery are quickly identified by personnel in a position to promptly address it.

A condition assessment scheme for sanitary sewer mains was developed for this plan based on a 1 to 10 grading system as detailed in Table 16. This grading system was used only to quantify the structural condition of sanitary mains based on information from the CCTV analysis.

Baseline condition for all assets other than sanitary mains is not known at this time, and analysis for all other assets is based on age and material.

Table 16. Wastewater Physical Condition Grading Model

Condition Grading	Description of Condition
10	Excellent: as new
9	Very Good: only planned maintenance required
8	Good: minor maintenance required plus planned maintenance
6	Fair: significant maintenance required
4	Poor: significant renewal/rehabilitation required
1	Very Poor: physically unsound and/or beyond rehabilitation
0	Bad / Non-functioning: completely defunct and non-operational



Figure 5 below shows the sanitary sewer main count per physical condition grade based on CCTV inspection. The graph indicates the number of pipe segments as identified in the GIS asset register that fall within each condition profile. The Sanitary Condition Map provides visual interpretation of Figure 7 and can be found in **Appendix D**.



Figure 5. Sanitary Sewer Main Count Per Physical Condition Grade Based on CCTV Inspection

3.3. EXPECTED AND REMAINING LIFE

At the time of acquisition or construction, infrastructure assets have an expected length of time that they should perform before being replaced or significantly rehabilitated. This expected life is based on anticipated usage levels of the asset, environmental factors causing stress on the asset, and the nature of the designed maintenance regime for the asset.

Once the asset has been in use for some time, the remaining life of the asset is a function of the age of the asset, as well as the history of actual operations, maintenance, and environmental stress it has been subjected to. Inspection of the assets allows the re-evaluation of remaining life of the asset, so that the timing of renewal / replacement activities can be better estimated.

For a complex asset such as a building or treatment plant, individual components that make up the asset have varying expected lives of their own (such as internal finishes vs roofing). For the purposes of highlevel reporting in this AMP, an overall expected life is provided for when the complete asset would be replaced.

Figure 8 below shows the average percent of remaining life for each of the asset types under consideration in this AMP. Many assets do not have documented install years or condition assessments,


so the remaining useful lives of those assets is not fully understood. Ongoing monitoring and condition inspections should be completed to determine current condition and better estimate the remaining useful life. For modeling purposes, it is assumed that assets managed by Tahsis without documented install years are at the middle of their expected lives, which means that it should be expected that the need for increased maintenance and renewal activity will increase in the upcoming years.



Figure 6. Average % Remaining Useful Life

Most of the Village's infrastructure was constructed during the same time period by the Tahsis Company prior to the Village's incorporation in 1970; therefore, most of the Village's infrastructure is aging out at the same time. With a majority of assets concurrently reaching the end of their useful lives, this creates an unbalanced asset renewal forecast, making replacement funding extremely challenging.

3.4. OPERATIONS AND MAINTENANCE STRATEGY

Operations include regular activities to provide services such as public health, safety, and amenity, e.g. cleaning, street lighting, utility costs, and street sweeping. Within the scope of the Village of Tahsis, operations activities include general support services to maintain the organisation and direct costs associated with operating facilities such as treatment plants and buildings.



Maintenance includes all actions necessary for keeping an asset at a condition level that supports its ability to deliver services. This includes any regular ongoing day-to-day work necessary to keep assets operating. Examples of typical maintenance activities include inspection activities, vegetation and debris removal, road grading, and patching. Annual maintenance expenditure trends are summarized in **Table 17** showing the previous year's budget, current year budget, and next year's budget estimate.

Table 17. Maintenance Expenditure Trends

Year	Maintenance Budget				
2022	\$102,876				
2023	\$74,500				
2024	\$74,500				

Maintenance expenditure levels are considered to be adequate to meet projected service levels, which may be less than or equal to current service levels. Consequences and risks to the level of service have been identified and discussed in this AMP.

Future operations and maintenance (O&M) budgets are forecasted in line with the Village's asset portfolio as shown in **Figure 9**. Note that all costs are shown in 2023 dollars.



Figure 9. Projected Operating and Maintenance Expenditures for 5-Year Financial Forecast



In order to determine an appropriate O&M budget for the Village's existing infrastructure, we have developed through consultation with Village Operations staff an estimated annual O&M plan with recommended work tasks and cost estimates. The required O&M expenditures are projected to exceed that which is budgeted for over the next five years due to the updated O&M plan and future capital projects which will require additional O&M activities. The current operating and maintenance budgets will need to be increased in order to satisfy regular O&M needs. The projected O&M expenditures also includes an annual estimated savings of \$65,000 in 2025 from the planned decommissioning of the North Wastewater Treatment Plant as summarized in Section 3.8.

Maintenance is undertaken by staff using experience and judgement to address corrective and reactionary maintenance requirements on a priority basis. Operations staff implement several proactive maintenance schedules including hydrant, flood, and vehicle maintenance schedules, and are working towards preventative maintenance programs for all other infrastructure groups.

The challenges of preventative maintenance include limited staffing resources and time, resulting in an increasing amount of deferred maintenance (i.e., works identified as maintenance but unable to be completed due to available resources).

Deferred maintenance should be included in the infrastructure risk management plan. Additionally, note that if assets are added (such as the construction of additional roads or other community facilities), maintenance budgets will need to be increased accordingly.

3.5. RENEWAL STRATEGY

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. Examples of renewal work include significant road reconstruction, relining of water mains, culvert and bridge replacement, and the replacement of equipment with an equivalent replacement.

If expected renewals are deferred due to lack of budget, it will be expected that the overall condition of the assets will progressively deteriorate, resulting in loss of level-of-service.

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

- Have a high consequence of failure.
- Have a high likelihood of failure due to age or condition.
- Have high use and subsequent impact on users would be significant.
- Have a total value representing the greatest net value.
- Have higher than expected operational or maintenance costs.
- Have a potentially high negative impact to the environment due to failure.



 Have potential to reduce lifecycle costs by replacement with a modern equivalent asset that would provide the equivalent service.

Currently, renewals are determined on a "run to failure" basis with considerations for available funding. Prioritized renewals for water, sanitary, and storm linear infrastructure in this Asset Management Plan are based on the likelihood and consequence of failure. CCTV condition data, material, and installation years were used in conjunction with consequence criteria to determine a prioritization plan for linear infrastructure. The ranking criteria used to determine pipe renewal priority is detailed in **Table 18**.

Table 18. Ranking Criteria for Linear Infrastructure

Ranking Criteria	Weighting
Cost to Repair (Financial shock)	25%
Service Class (e.g., supply vs. distribution; trunk vs. collector; culvert vs. main)	25%
Looped System (water) Environmental Impact (sanitary) Flood Risk (storm)	25%
Reduction to Level of Service	25%
Total	100%

The ranking criteria used to determine priority renewals for other asset groups included in this AMP are detailed in **Table 19**.

Table 19. Ranking Criteria for Non-linear Infrastructure

Ranking Criteria	Weighting
Age	50%
Reduction to Level of Service	50%
Total	100%

Projected future renewal and replacement expenditures are expected to increase as the Village's asset inventory increases. The annual capital renewal expenditure for the Village's asset portfolio is shown in Figure #. All values are in current (2023) dollars.





Figure 10. Projected Capital Renewal Expenditures for 5-Year Financial Forecast

The projected capital renewal expenditure accounts for the annualized replacement cost of each component based on its assumed service life listed in Table 18 as well as any prioritized water, wastewater, or storm linear infrastructure replacement based on risk (likelihood of failure vs. consequence of failure) within the next five years and renewal projects that the Village has identified within their 5-year capital budget. With the exception of sanitary sewers, the projected capital renewal costs are best practice estimates for annual asset renewal based solely on expected service life and do not necessarily reflect actual future renewal requirements without completing physical condition assessments.

3.6. ACQUISITION & UPGRADE STRATEGY

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. Acquisition reflects new assets that did not previously exist or works which will upgrade or improve an existing asset beyond its existing capacity such as the paving of a gravel road. They may result from growth, demand, social, or environmental needs.

Proposed upgrades of existing assets, and new assets, are identified from various sources such as community requests, proposals identified by strategic plans, or partnerships with others. Generally, these upgrades are forecasted on a five-year period and approved on the basis of available funding. Potential



upgrades and new works should be reviewed to verify that they are essential to the needs of the Village. Verified proposals can then be ranked by priority and available funds and scheduled in future works programmes. An example priority ranking criterion for asset aquisition is detailed in Table 20. It is important that the approval of any new acquisitions should include the evaluation of resulting full lifecycle cost increases including the development of a preliminary renewal estimate to ensure that the services are sustainable over the longer term.

Table 20. Acquired Assets Priority Ranking Criteria

Criteria	Weighting
Direct Service Benefit	35%
Financial Benefit	35%
Risk of Failure	30%
Total	100%

Since 2019, the Village the Village has received grant funding for road improvements, wastewater treatment upgrade, dock replacement, flood protection, and museum upgrade projects. Projected upgrade and new asset expenditures for the 5-year forecast are shown in **Figure 11**. Details of the projected upgrade and new capital works to be completed in the 5-year plan are shown in **Appendix B**. All values are in current (2023) dollars.





Figure 11. Projected Capital Upgrade / New Asset Expenditures for 5-Year Financial Forecast

The addition of new assets such as flood protection, upgraded wastewater facilities, and new fire hall will increase the required committed operating and maintenance costs for the duration of their expected service life.

3.7. ASSET EXPENDITURE REQUIREMENTS

The financial projections from this AMP are shown in Figure 12 for estimated operations, maintenance, renewal, and upgrade costs. The bars in the graph represent the anticipated budget needs required to achieve the lowest lifecycle costs while the budget line indicates estimated available Village funding. The gap between lifecycle costs and available budget will determine how to balance service demands, costs, and risk to achieve the best value outcome. Figure values are in current (2023) dollars.





Figure 12. Projected Operating and Capital Expenditures for 5-Year Financial Forecast

The anticipated budget expenditure will not have sufficient funding to manage the expected levels of service related to capital renewal, operation, and maintenance requirements over the next five years. The Village may experience a decrease in customer levels of services and an increase to risk; however, the projected lack of funds may be satisfactory given a fresh renewal of asset conditions and replacement timelines during those years.

3.8. DISPOSAL STRATEGY

Disposal includes any activity associated with the disposal of a decommissioned asset including sale, demolition, or relocation As part of the wastewater treatment system upgrades, the Strange Rd Wastewater Treatment Plant is expected to be taken offline and decommissioned within the next one to two years. Flows will be diverted by way of proposed forcemain. Assets identified for decommissioning and disposal are shown in Table 21, together with estimated operations and maintenance savings.



Table 21. Assets Identified for Disposal

Asset	Reason for Disposal	Timing	Disposal Expenditure	O&M Annual Savings
Strange Rd	Part of the wastewater	1-2	Unknown at this	\$65,000
Wastewater	treatment system upgrades to	years	time	(est.)
Treatment Plant	improve efficiency			



4. RISK MANAGEMENT AND CLIMATE RESILIENCY

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' (ISO 31000:2009, p 2).

4.1. 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 along with their typical failure mode and the impact on service delivery and are summarised in **Table 22**. Failure modes may include physical failure, collapse, or essential service interruption. Regular maintenance and replacement of infrastructure can prevent critical failures from occurring.

Table 22.	Critical Assets
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Critical Asset(s)	Failure Mode	Impact
Potable Water Source Well	Equipment Failure	Section of Village cutoff from water supply
Water Tower	Corrosion / Collapse	Fire suppression water not available, and / or level of service reduced
Water Supply Infrastructure	Equipment Failure / Watermain Break	Flooding, reduced level of service, drinking water contamination
Wastewater Collection	Pipe Collapse / Equipment	Sewer backups, level of service
System and Lift Stations	Failure	reduced, and environmental concerns
Wastewater Treatment Plant	Equipment Failure	Sewer backups, level of service reduced, and environmental concerns
Bridges	Washout / Collapse	Village cutoff from access to vital goods and services

By identifying critical assets and failure modes, an organisation can ensure that investigative activities, condition inspection programs, maintenance, and capital expenditure plans are targeted at the right areas at the right time.

4.2. RISK ASSESSMENT

The risk management process used is based on the fundamentals of International Standard ISO 31000:2018. 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 risk assessment process is shown in Figure 7.



Figure 7. Risk Assessment and Management Process

Determination of risk criticality requires an assumption of relative levels of likelihood and severity. For the purposes of risk assessment, levels are defined on a 1-5 scale as shown in Table # and Table #. Risk severities are defined across the dimensions of financial, environmental, and safety impacts.

Risks with an assessed criticality of 'Very High' (requiring immediate corrective action) and 'High' (requiring corrective action) require mitigation, and an estimation of residual risk remaining after mitigation. The mapping of risk severities is shown in Table 25. An evaluation of the risks requiring mitigation stemming from a preliminary analysis are shown in Table 26

Table 23. Risk Probability Definition

Risk Probability	Frequency
1	Once every 20 years
2	Once every 10 years
3	Once every 5 years
4	Annually
5	Multiple Times a Year

Table 24. Risk Severity Definition

Risk	Financial	Environmental Consequence	Health and Safety
Severity	Consequence		Consequence
1	< \$ 10 000	Reversible impact within 1 week	No lost time
2	< \$ 50 000	Impact reversible w/i 1 yr. Prosecution likely.	Lost time. Minor Medical.
3	< \$ 100 000	Impact reversible w/i 3 mo. Possible	Lost time. Hospital.
		prosecution.	
4	< \$ 1 million	Impact reversible w/i 5 yr. Prosecution	Loss of life
		expected.	
5	> \$ 1 million	Impact not reversible. Long term studies	Multiple loss of life.
		required. Prosecution likely.	



Table 25. Risk Scoring Matrix

			Risk	Seve	erity	
	5	5	10	15	20	25
oility	4	4	8	12	16	20
bak	3	3	6	9	12	15
Prc	2	2	4	6	8	10
lisk	1	1	2	3	4	5
<u> </u>		1	2	3	4	5

Red denotes "Very high" risk, Orange denotes "High" risk.



Table	26	Potential	hiah	severit	v risks
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Potential Risk	Impact of Risk	What can lead to this	Risk	Risk Treatment Plan	Treatment Costs
Source		risk?	Rating		
			(VH, H)		
(AMS Management)	Loss of institutional	Retirement,	Н	Document policies related to	TBD – likely
Loss of	knowledge on AM system and	turn-over		asset management system	minor
Experienced	best-practices, resulting in			including training on	
Personnel	rework.			operation of the work order	
				tracking system.	
(All Asset Classes)	Loss of knowledge / expertise	Retirement,	VH	Document maintenance	TBC – likely
Loss of	on maintenance / operations	turn-over		management plans and	minor
Experienced	activities resulting in			establish standard operating	
Personnel	equipment wearing out or			procedures.	
	repairs not completed.				
Water Treatment	Inchility to ourply drinking	Lack of maintananaa	Ц	Dotormino required	Included in
Fauinment Failure	mability to supply drinking		п	increation intervals of	
Equipment Failure		failure			
	quanty	lailure		pumphouse equipment and	
D · · · D · ·				Inspect as required.	COSTS
Bridge Failure	Village cutoff from supplies	Road or bridge	Н	Ensure adequate bridge	IBD
	and food	impassibility due to		inspections are completed.	
		flooding, forest fire			
Collapsed Water	Reduced fire protection	Lack of maintenance	Н	Ensure adequate water	Included in
Tower		leading to structural		tower inspections are	proposed
		degradation		completed.	maintenance
					costs



Potential Risk Source	Impact of Risk	What can lead to this risk?	Risk Rating (VH, H)	Risk Treatment Plan	Treatment Costs
Wastewater	Sewer backups, reduced level	Lack of maintenance	Н	Determine required	Included in
Collection and	of service, and untreated	leading to equipment		inspection intervals of lift	proposed
Treatment	wastewater overflows into	failure		station and treatment	maintenance
Equipment Failure	waterbodies			equipment and inspect as	costs
				required.	
Watermain and	Inability to supply drinking	Settling and shifting of	VH	Proactively replace brittle AC	Included in
Sewer Main	water to residents; sewer	ground due to buried		pipes with resilient PVC.	proposed annual
Failures	backups; untreated	waste material below			renewal costs
	wastewater into waterbodies	infrastructure			

4.3. CLIMATE CHANGE AND ADAPTION

The impacts of climate change can have a significant impact on the assets managed and the services provided. In the context of the Asset Management process, climate change can be considered as both a future demand modifier and a risk.

How climate change will impact assets can vary significantly depending on the location and the type of services provided, as will the way in which impacts are managed and responded to.

As a minimum, management of existing assets given the potential climate change impacts must be considered, as well as how to create resilience to climate change in any new works or acquisitions.

Additionally, the way in which new assets are constructed should recognise that there is opportunity to build in resilience to climate change impacts. Building resilience will have benefits:

- Assets will withstand the impacts of climate change.
- Services can be sustained under varying conditions.
- Assets that can endure changes in climate with minimal additional interventions may potentially lower the lifecycle cost and reduce their carbon footprint.

Opportunities identified to-date for management of climate change impacts on existing assets are shown in Table 27. A flood risk assessment that was completed in 2019 identified three protection options for future flood issues:

- 1. Upgrade and extend the North Maquinna Drive floodwall to protect against an imminent 1:20-year magnitude flood, with minor improvements required for the Head Bay Road.
- 2. Raise all existing dykes, Head Bay Road, and Head Bay Road Bridge with improvements to all cross culverts along the Head Bay Road section to protect against a 1:200-year flood.
- 3. Further raising of flood protection infrastructure to protect against rising sea levels and climate change.

Climate Change	Projected	Potential Impact on	Management			
Description	Change	Assets and Services				
Change in flooding / severe precipitation events	Increase in extreme rainfall events	Washout of roads, bridges, and basement flooding	Budget for roadside ditch and storm drain system maintenance, capital upgrades to flood protection infrastructure, and potential increases in road repair work. Specify flood mitigation measures in			

Table 27. Managing the Impact of Climate Change on Assets



Climate Change Description	Projected Change	Potential Impact on Assets and Services	Management		
			OCP and Zoning Bylaws for new		
			developments.		
Change in	Increase in	Destruction of above-	Budget for increased vegetation		
wildfire events	wildfire events	ground infrastructure	control and implement design		
		such as community	elements that mitigate against		
		buildings and water /	wildfire damage (i.e., spacing,		
		wastewater facilities	materials)		
Change in	Increased	Damage to natural	Budget for maintaining natural		
summer weather	frequency of	assets, reduced access	assets with drought-resistant plants.		
patterns prolong		to drinking water, and	Specify / update water restriction		
drought		increased demand for	policies to minimize unnecessary		
	extreme heat	drinking water	usage.		

4.4. EFFECTS OF RESOURCE LIMITATION ON SERVICE AND RISK

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

4.4.1. Service Trade-Off

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

- Reduction in level of service
- Reduction in quality of service

4.4.2. Risk Trade-Off

Operations and maintenance activities and capital projects that cannot be undertaken may create risk consequences. These risk consequences include:

- Reduced road safety due to poor road maintenance
- Reduced nighttime pedestrian safety due to failed streetlighting
- Potential for water main breaks, emergency repairs, and temporarily reduced service
- Environmental impacts and temporarily reduced service due to failed sanitary sewer infrastructure
- Flooding during storm events due to debris accumulation around storm drain infrastructure-
- Reduction in useability of community buildings, leading to reduced level of service and potential economic downturn

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



4.4.3. Deferred Projects

There are some operations and maintenance activities and capital projects that are unable to be undertaken within the next 5 years. These include:

• Significant replacement of buried infrastructure



5. FINANCIAL SUMMARY

5.1. INVESTMENT REQUIREMENTS OVER TIME

Critical costs to consider with regards to management of the asset base includes ongoing operations and maintenance costs, as well as the costs of remedial investments required to return asset condition back to a "good" rating. These have been estimated from available tender information, discussions with operations staff, and general guidelines and are shown in Table 28 by year.

This AMP identifies the forecasted operations, maintenance, and capital renewal budgets to provide an agreed-upon level of service to the community over a 5-year period. This will help inform the Village of its funding requirements to provide services in a sustainable manner. The forecasted expenditures can be compared to existing 5-year budgets to identify any funding shortfalls. In general, a funding shortfall identified from this AMP will likely be from the annualized capital renewal requirements due to aging infrastructure.

The projected operations, maintenance, and capital renewal expenditures is \$4,483,504 on average per year over the 5-year planning period (excludes upgrade / new assets).

Estimated operations, maintenance, and capital renewal funding is \$2,349,674 on average per year over the 5-year planning period, leaving a funding shortfall of \$2,133,830 on average per year. This indicates 52% of the forecasted expenditures to provide the services documented in this AMP are being funded (excludes upgrade / new assets).

In addition, it is important to consider that any assets acquired today will have to be replaced or rehabilitated in the future. A convenient measure of the latter is to amortize the replacement value of an asset over its expected life – this amount would be the annualized amount that would need to be saved into a reserve fund to be able to afford a full asset replacement in the future.

Year	Operations	Maintenance	Projected Capital Renewal	Capital Upgrade / New	Disposals	TOTAL
2024	\$1,265,894	\$211,261	\$2,368,052	\$2,917,480	\$0	\$6,762,687
2025	\$1,274,452	\$219,819	\$4,145,804	\$1,711,558	\$0	\$7,351,632
2026	\$1,283,852	\$229,219	\$3,640,600	\$1,880,009	\$0	\$7,033,680
2027	\$1,283,852	\$229,219	\$2,414,462	\$0	\$0	\$3,927,532
2028	\$1,283,852	\$229,219	\$2,337,967	\$0	\$0	\$3,851,038

Table 28. Overview of Annualized Operations, Maintenance, and Renewal Costs for 5-Year Financial Plan



5.2. FUNDING STRATEGY

Currently, asset acquisition, operations, maintenance, and renewal are funded through a mix of reserves, utility rate revenue, property taxes, and grant funding.

The Village has been very successful in securing capital project grants over the past five years which has assisted in replacing or upgrading roads, wastewater systems, docks, the firehall, flood protection infrastructure, and community buildings; however, grants are not considered to be a sustainable method of financing asset renewal.

The financial strategy outlines how the Village will fund the required infrastructure investments, whereas this AMP informs the Village of how and when asset expenditures should occur along with service risks and consequences of different approaches.

5.3. KEY ASSUMPTIONS MADE IN FINANCIAL FORECASTS

In compiling this Asset Management 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 Asset Management Plan are:

- All costs and budgets are in current day dollars, with no consideration for inflation.
- Replacement values for assets are based on best available comparable alternatives.
- Construction costs for various asset types are based on provided estimates and unit costs derived from available information and supplemented by other industrial estimates. A location factor of 1.8 has been applied to standard costs to account for the Village's remote location.
- Maintenance and operations budgets are very high level and are based on approximations and industry standards.

5.4. FORECAST RELIABILITY AND CONFIDENCE

The forecast costs, proposed budgets, and valuation projections in this Strategic Asset Management 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 in accordance with the table below (see Table 24) (IPWEA, 2015, IIMM, Table 2.4.6)



Table 29.	Data	Confidence	Grading	System
-----------	------	------------	---------	--------

Confidence Grade	Description
A. 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 $\pm 2\%$
B. 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 \pm 10%
C. Uncertain	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 $\pm 25\%$
D. 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 \pm 40%
E. Unknown	None or very little data held.

The estimated confidence level for and reliability of data used in this AM Plan is shown in Table 30. Overall, the estimated confidence level for and reliability of data used in this AM Plan is considered to be "C. Uncertain".

Table 30. Data Confidence Assessment for Data used in this Plan

Data	Confidence Assessment	Comment
Acquisition forecast	В	Based on known acquisitions with approved funding,
Operation forecast	В	Based on historical trends of available financials, and projections based on typical operations for similar infrastructure.



Data	Confidence Assessment	Comment
Maintenance forecast	В	Based on historical trends of available financials, and projections based on typical maintenance for similar infrastructure.
Renewal forecast	С	Renewal forecast based on anecdotal renewal projections and forecasted linear infrastructure renewal projects.
Disposal forecast	В	Disposal forecast based on actual forecasted disposal project information.
Asset values	С	Based on best available market information. Additional inventory confirmation required to ensure register is complete.
Asset useful lives	С	Based on market information and industrial expertise.
Condition modelling	C	Condition of wastewater assets based on CCTV data collection. Condition of all other assets based on age and material.

6. PLAN IMPROVEMENT & MONITORING

6.1. PLAN PERFORMANCE MEASURES

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

- The degree to which asset management practices improve the accuracy of forward-looking operations, maintenance, and renewal budgets as compared to actual expenditures.
- The degree to which demand forecasting supports accurate assessment of capital requirements for new asset construction.
- Improvements in maintaining agreed-upon levels of service for end-users.
- The degree to which information on asset operations, maintenance, and renewals is kept up-todate within the asset management information system.
- The degree to which the asset management information system is used by multiple operational departments to support service delivery and planning.



6.2. IMPROVEMENT PLAN

Table 31 below contains specific action items towards improving the Village's asset management program.

Table 31. Asset Management Program Improvement Plan

Task No.	Task Dscription	Responsibility	Resources Required	Timeline
1	Survey residents for customer levels of service satisfaction	Engineering	Staff time, customer feedback	1 year
2	Implement formal O&M plan and consistent work-tracking system across all departments relying on assets for service delivery. Develop expense accounts to capture O&M activity costs that align with technical level of services for monitoring of performance of service delivery.	Operations, Engineering, Finance	Staff time, Software	1 year
3	Ongoing asset condition assessments including CCTV inspection	Engineering	Third-party consultants, staff time	Annually
4	Improved accuracy of asset register by verifying current replacement values and install dates	Operations, Engineering	Staff time	6 months

6.3. PLAN MONITORING AND REVIEW PROCESS

This Asset Management 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.

During the annual review, the Asset Management Plan will be evaluated to ensure it represents the current service level, asset values, forecast operations, maintenance, renewals, upgrade/new, and asset disposal costs and proposed 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 Asset Management Plan has a maximum life of 4 years and is due for complete revision and updating within that time period.



7. REFERENCES

- Village of Tahsis Financial Statements
- GIS infrastructure data (collected through as-built drawing information)
- 2019 Flood Risk Assessment report
- IPWEA, 2020, 4td ed., 'International Infrastructure Management Manual', Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/IIMM
- IPWEA, 2012 LTFP Practice Note 6 PN Long-Term Financial Plan, Institute of Public Works Engineering Australasia, Sydney
- ISO, 2018, ISO 31000:2018, Risk management Guidelines



APPENDIX A

Projected 5-Year Capital Renewal and Replacement Works

Prioritized Watermain Renewals Based on Risk

Year	Asset	Asset Type	Subtype	Material	Diameter (mm)	Length (m)	Year Installed	Likelihood of Failure	Consequence of Failure	Risk	Current Replacement Cost (2023 dollars)
2024	WAT_MAIN_0073	Water	Supply	PVC	150	204.7	1960	4	4	16	\$90,272
2024	WAT_MAIN_0077	Water	Distribution	Unk	Unk	37.0	1960	5	3	15	\$18,044
2025	WAT_MAIN_0010	Water	Supply	Unk	Unk	1248.9	1970	4	3	12	\$499,236
	WAT_MAIN_0007	Water	Distribution	Unk	Unk	178.9	1970	4	3	12	\$78,474
	WAT_MAIN_0008	Water	Distribution	Unk	Unk	19.0	1970	4	3	12	\$9,242
	WAT_MAIN_0020	Water	Distribution	AC	300	224.9	1970	4	3	12	\$178,518
	WAT_MAIN_0021	Water	Distribution	AC	150	239.0	1970	4	3	12	\$125,451
	WAT_MAIN_0023	Water	Distribution	AC	200	817.6	1970	4	3	12	\$485,423
	WAT_MAIN_0075	Water	Distribution	PVC	150	129.0	1960	4	3	12	\$67,706
2026 /	WAT_MAIN_0079	Water	Distribution	PVC	150	325.3	1960	4	3	12	\$160,529
2027 /	WAT_MAIN_0104	Water	Distribution	AC	200	160.1	1970	4	3	12	\$95,047
2028	WAT_MAIN_0105	Water	Distribution	AC	200	18.3	1970	4	3	12	\$10,842
	WAT_MAIN_0118	Water	Distribution	HDPE	50	75.2	1960	4	3	12	\$38,714
	WAT_MAIN_0124	Water	Distribution	Steel	75	79.4	1960	4	3	12	\$38,345
	WAT_MAIN_0135	Water	Distribution	PVC	150	182.2	1960	4	3	12	\$95,669
	WAT_MAIN_0136	Water	Distribution	AC	300	73.4	1970	4	3	12	\$58,289
	WAT_MAIN_0172	Water	Distribution	DI	150	89.6	1960	4	3	12	\$39,507
	WAT_MAIN_0174	Water	Distribution	Unk	150	71.4	1970	4	3	12	\$37,510

Prioritized Sanitary Sewer Main Renewals Based on Physical Condition

Year	Asset	Asset Type	Subtype	Material	Diameter (mm)	Length (m)	Year Installed	Condition	Likelihood of Failure	Consequence of Failure	Risk	Current Replacement Cost (2023 dollars)
2024	SAN_MAIN_0042	Sewer	Collector	AC	200	245.2	1970	6	4	3	12	\$247,650
2025	SAN_MAIN_0158	Sewer	Collector	AC	200	62.1	1970	4	5	2	10	\$37,556
2026	SAN_MAIN_0155	Sewer	Collector	AC	200	75.7	1970	8	3	3	9	\$61,300
2027	SAN_MAIN_0106	Sewer	Collector	AC	200	115.0	1970	8	3	2	6	\$76,494

Prioritized Storm Renewals Based on Risk

Year	Asset	Asset Type	Subtype	Material	Diameter (mm)	Length (m)	Year Installed	Likelihood of Failure	Consequence of Failure	Risk	Current Replacement Cost (2023 dollars)
2024	STM_MAIN_0051	Storm	Main	CSP	900	8.8	1960	5	4	20	\$10,955
2024	STM_MAIN_0070	Storm	Main	CSP	550	79.7	1950	5	4	20	\$57,404
2025	STM_MAIN_0021	Storm	Main	PVC	600	137.8	1950	4	4	16	\$135,010
2026	STM_CULV_0002	Storm	Culvert	CSP	1100 x 730	47.0	1950	5	3	15	\$35,243
2020	STM_CULV_0006	Storm	Culvert	CSP	800	60.8	1960	5	3	15	\$68,429
	STM_MAIN_0002	Storm	Main	Unk	Unk	25.8	1950	5	3	15	\$11,609
	STM_MAIN_0007	Storm	Main	Unk	Unk	8.2	1950	5	3	15	\$4,604
	STM_MAIN_0008	Storm	Main	Unk	Unk	4.7	1950	5	3	15	\$2,378
	STM_MAIN_0009	Storm	Main	Unk	Unk	13.9	1950	5	3	15	\$7,846
0007 /	STM_MAIN_0016	Storm	Main	CSP	200	86.2	1955	5	3	15	\$35,370
20277	STM_MAIN_0017	Storm	Main	Unk	Unk	26.0	1955	5	3	15	\$14,065
	STM_MAIN_0018	Storm	Main	RPVC	525	54.3	1955	5	3	15	\$44,813
	STM_MAIN_0022	Storm	Main	Unk	Unk	47.9	1950	5	3	15	\$26,968
	STM_MAIN_0023	Storm	Main	Unk	Unk	82.9	1950	5	3	15	\$46,612
	STM_MAIN_0025	Storm	Main	Unk	Unk	14.4	1955	5	3	15	\$8,128
	STM_MAIN_0027	Storm	Main	Unk	Unk	21.9	1955	5	3	15	\$10,329



Year	Asset	Asset Type	Subtype	Material	Diameter (mm)	Length (m)	Year Installed	Likelihood of Failure	Consequence of Failure	Risk	Current Replacement Cost (2023 dollars)
	STM_MAIN_0031	Storm	Main	Unk	Unk	9.3	1950	5	3	15	\$5,259
	STM_MAIN_0045	Storm	Main	Unk	Unk	14.8	1960	5	3	15	\$8,325
	STM_MAIN_0050	Storm	Main	CSP	1200	21.1	1960	5	3	15	\$23,691
	STM_MAIN_0052	Storm	Main	CSP	600	49.9	1960	5	3	15	\$48,903
	STM_MAIN_0053	Storm	Main	CSP	1220	13.1	1960	5	3	15	\$13,113
	STM_MAIN_0054	Storm	Main	CSP	800	24.8	1960	5	3	15	\$31,030
	STM_MAIN_0068	Storm	Main	Unk	Unk	18.5	1950	5	3	15	\$9,371
	STM_MAIN_0071	Storm	Main	RPVC	525	21.7	1955	5	3	15	\$17,222

Identified Capital Renewal Projects from 2024 Capital Budget

Year	Project	Project Cost
2024	Replace Little Bridge to the Dump	\$190,000
2024	Replace Electric Boiler	\$17,000
2024	Replace Village Office Heat Pumps	\$30,000
2024	Museum/Info Centre Building Upgrades and Repairs	\$250,000
2025	Tahsis Rec Centre Energy System Renewal	\$1,602,275
2025	Village Office Foyer Replacement	\$50,000
2025	Museum/Info Centre Building Upgrades and Repairs	\$175,000
2026	Tahsis Rec Centre Energy System Renewal	\$1,250,000
2026	Museum/Info Centre Building Upgrades and Repairs	\$72,479
2027	Future Road Renewal	\$150,000
2028	Future Road Renewal	\$150,000

5-Year Forecasted Capital Renewal Expenditures for Water Infrastructure

Water		2024	2025	2026	2027	2028
Annualized Network Renewals	Air Valves	\$100	\$100	\$100	\$100	\$100
Reliewals	Curbstops	\$420	\$420	\$420	\$420	\$420
	Chambers	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200
	Fire Hydrants	\$12,400	\$12,400	\$12,400	\$12,400	\$12,400
	Ріре	\$117,100	\$117,100	\$117,100	\$117,100	\$117,100
	Meters	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500
	Storage	\$28,000	\$28,000	\$28,000	\$28,000	\$28,000
	Valves	\$14,480	\$14,480	\$14,480	\$14,480	\$14,480
	Wells	\$4,200	\$4,200	\$4,200	\$4,200	\$4,200
Defect Repairs	Pipe Replacement (from prioritized renewal assessment)	\$108,315	\$499,236	\$506,422	\$506,422	\$506,422
TOTAL		\$289,715	\$680,636	\$687,822	\$687,822	\$687,822

5-Year Forecasted Capital Renewal Expenditures for Wastewater Infrastructure

Sanitary		2024	2025	2026	2027	2028
Annualized Network	Cleanouts	\$2,560	\$2,560	\$2,560	\$2,560	\$2,560
Reliewais	Lift Station	\$56,000	\$56,000	\$56,000	\$56,000	\$56,000
	Pipes	\$64,700	\$64,700	\$64,700	\$64,700	\$64,700
	Manholes	\$23,560	\$23,560	\$23,560	\$23,560	\$23,560



Sanitary		2024	2025	2026	2027	2028
	Sanitary Treatment System	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000
Defect Repairs	Pipe Replacement (from prioritized renewal assessment)	\$247,650	\$37,556	\$61,300	\$76,494	\$0
TOTAL		\$494,470	\$284,376	\$308,120	\$323,314	\$246,820

5-Year Forecasted Capital Renewal Expenditures for Storm Drainage Infrastructure

Drainage		2024	2025	2026	2027	2028
Annualized Network	Catchbasins	\$12,300	\$12,300	\$12,300	\$12,300	\$12,300
Renewals	Cleanouts	\$53	\$53	\$53	\$53	\$53
	Culverts	\$9,700	\$9,700	\$9,700	\$9,700	\$9,700
	Headwalls	\$1,080	\$1,080	\$1,080	\$1,080	\$1,080
	Pipes	\$21,500	\$21,500	\$21,500	\$21,500	\$21,500
	Manholes	\$2,880	\$2,880	\$2,880	\$2,880	\$2,880
	Outfalls	\$293	\$293	\$293	\$293	\$293
	Pumps	\$5,333	\$5,333	\$5,333	\$5,333	\$5,333
	Storage	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Defect Repairs	Pipe Replacement (from prioritized renewal assessment)	\$68,359	\$135,010	\$103,672	\$184,819	\$184,819
TOTAL		\$122,499	\$189,150	\$157,812	\$238,959	\$238,959

5-Year Forecasted Capital Renewal Expenditures for Roads Infrastructure

Roads		2024	2025	2026	2027	2028
Annualized Network	Roads	\$281,200	\$281,200	\$281,200	\$281,200	\$281,200
Reliewais	Bridges	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000
	Streelights	\$7,500	\$7,500	\$7,500	\$7,500	\$7,500
Renewal Projects	From 2024 Updated Capital Budget	\$190,000	\$0	\$0	\$150,000	\$150,000
TOTAL		\$408,700	\$408,700	\$408,700	\$408,700	\$408,700

5-Year Forecasted Capital Renewal Expenditures for Community Buildings

Community Buildings		2024	2025	2026	2027	2028
Annualized Network	Community Buildings	\$685,667	\$685,667	\$685,667	\$685,667	\$685,667
Reliewais	Utility Buildings	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000
Renewal Projects	From 2024 Updated Capital Budget	\$297,000	\$1,827,275	\$1,322,479	\$0	\$0
TOTAL		\$1,052,667	\$2,582,942	\$2,078,146	\$755,667	\$755,667

APPENDIX B

Projected 5-Year Upgrade / New Capital Works

New Capital Projects from 2024 Capital Budget

Year	Project	Budgeted Project Cost
2024	Wastewater System Upgrades - South Plant Upgrades - Forcemain - Lift Station Upgrades	\$1,010,000
2024	Flood Protection Measures	\$489,980
2024	New Fire Hall	\$1,414,500
2025	Wastewater System Upgrades - South Plant Upgrades - Forcemain - Lift Station Upgrades	\$460,395
2025	Flood Protection Measures	\$912,163
2025	New Fire Hall	\$339,000
2026	Flood Protection Measures	\$1,880,009



APPENDIX C

5-Year Budgeted Expenditures

Year	2023	2024	2025	2026	2027	2028				
	Budgets									
Operations										
Operations Budget	\$1,135,273	\$1,135,273	\$1,135,273	\$1,135,273	\$1,135,273	\$1,135,273				
Ancillary Ops Budget	\$118,550	\$118,550	\$118,550	\$118,550	\$118,550	\$118,550				
Total Operations	\$1,253,823	\$1,253,823	\$1,253,823	\$1,253,823	\$1,253,823	\$1,253,823				
Maintenance										
Planned Maintenance Budget	\$74,500	\$74,500	\$74,500	\$74,500	\$74,500	\$74,500				
Total Current O&M Budget	\$1,328,323	\$1,328,323	\$1,328,323	\$1,328,323	\$1,328,323	\$1,328,323				
Capital										
Planned Renewal Budget	\$15,000	\$487,000	\$2,047,275	\$1,822,479	\$450,000	\$300,000				
Planned Upgrade/New Budget	\$2,327,082	\$2,917,480	\$1,711,558	\$1,880,009	\$0	\$0				
Total O&M, Capital Budget	\$3,670,405	\$4,732,803	\$5,087,156	\$5,030,812	\$1,778,323	\$1,628,323				
		Additional Ex	kpenditures							
Capital Upgrade	\$2,327,082	\$2,917,480	\$1,711,558	\$1,880,009	\$0	\$0				
Acquisition O&M (assumed at 1% of capital costs)	\$23,271	\$29,175	\$17,116	\$18,800	\$0	\$0				
	Ee	recent Conite	l Expondituro							
	FC	orecast Capita	i Expenditures	5						
Water	-	\$319,519	\$680,636	\$695,772	\$695,772	\$695,772				
Sanitary	-	\$494,470	\$284,376	\$308,120	\$323,314	\$246,820				
Drainage	-	\$122,499	\$189,150	\$157,812	\$238,959	\$238,959				
Roads	-	\$408,700	\$408,700	\$408,700	\$408,700	\$408,700				
	-	\$1,052,667	\$2,582,942	\$2,078,146	\$755,667	\$755,667				
Total Capital Renewal	-	\$2,397,855	\$4,145,804	\$3,648,550	\$2,422,412	\$2,345,917				
Forecast Operations	-	\$1,265,894	\$1,274,452	\$1,283,852	\$1,283,852	\$1,283,852				
Forecast Maintenance	-	\$211,261	\$219,819	\$229,219	\$229,219	\$229,219				
TOTAL FORECASTED ANNUAL COSTS (Capital Renewal, O&M, Upgrades)		\$6,792,490	\$5,640,074	\$5,161,621	\$3,935,482	\$3,858,988				



APPENDIX D

Condition, Priority, and Risk Maps: Sanitary, Water, Storm






Storm Infrastructure



H2

• Storm Manhole

Storm Culvert

Priority

- --- Critical
- --- High
- --- Medium/High
- --- Medium/Low
- --- Low

Storm Main

Priority

- ----- Critical
- High
- Medium/High
- Medium/Low
- Low
- Parcels









	1 - 4
_	5 - 8
	9 - 12
	13 - 1
—	16 - 2
	Parcel

















Water Main

Risk

- **—** 1 3
- 4 6
- 7 9
- _____ 10 12
- 13 16
- ----- Not Inspected

Parcels

400 100 200 0 Meters SCALE: 1:6,500 McElhanney NAD 1983 UTM Zone 10N November 2023 Water Risk Rating







Water Main

- 4 6
- 7 9
- 10 12
- **—** 13 16
- Not Inspected

Parcels



H2





Wastewater Infrastructure



Sanitary Manhole

Sanitary Main

Condition

- ----- Poor

- Good/Fair
- Good
- Excellent
- Not Inspected

Parcels













Wastewater Infrastructure



Sanitary Manhole

Sanitary Main

Priority

- ----- Critical
- **—** High
- ----- Medium/High
- Medium/Low
- Low
- ----- Not Inspected

Parcels



















N

APPENDIX E

Calculated Operations and Maintenance Budget

Instructions:

Enter desired work order(s) in the "Task Code" column. All remaining columns will populate with information from the "ii. WO Data Masterlist" tab.

Notes and Assumptions:

This Budget calculates the total annual cost based on quantity of each system component inventoried, as noted in the "Community Infrastructure Summary" on the Table of Contents.

Asset Group	
ROADS	
SANITARY	
STORM	
WATER	



Return to Table of	Labour Rates	
Contents	Labour	\$
	Truck	\$
	TOTAL ANNUAL BUDGET (Water, Sanitary, Roads) - Tahsis	
	Operator	\$
	Truck	\$
	Contractor	\$
	Equipment	\$
	Parts & Materials	\$
	Utilities	\$
	TOTAL 0&M	\$

Village of Tahsis ANNUAL MAINTENANCE BUDGET

Main	tenance Task				Crew Hours per Year		Costs per Task			
Task	Code Asset Group	Asset Component	Task Description	Frequency	Operator	Truck	Contractor	Equipment	Parts & Materials	Annual Utility/Energy Cost An
W01	WATER	Main	Distribution System Inspection	Monthly	245	245	\$ - \$	50.00	\$ 1,000.00	\$-\$
W02	WATER	Main	Annual Valve Inspection and Maintenance	Annual	71	71	\$ - \$	50.00	\$ 150.00	\$-\$
W03	WATER	Main	Watermain/Hydrant Flushing	Monthly	522	522	\$ - \$	5 100.00	\$ 50.00	\$-\$
W04	WATER	Main	Hydrant Inspection and maintenance	Bi-Annual	85	85	\$-\$	5 100.00 S	\$ 50.00	\$-\$
W08	WATER	Main	Watermain Spot Repairs	As Required	0	0	\$ - \$	5 - 9	\$ 5,000.00	\$ - \$
W09	WATER	Main	Curb Box and Curb Stop Repairs	As Required	0	0	\$-\$	5 - 5	\$ 5,000.00	\$-\$
W11	WATER	Main	Valve Repair	As Required	0	0	\$ - \$	5 - 5	\$ 25.00	\$-\$
W12	WATER	Main	Hydrant Repair (General)	As Required	0	0	\$ - \$	5 - 5	\$ 5,000.00	\$ - \$
W14	WATER	Main	Hydrant Painting	As Required	0	0	\$ - \$	5 10.00 \$	\$ 25.00	\$ - \$
W16	WATER	Main	As Required Water System Repairs	As Required	60	60	\$ - \$	500.00	\$ 10,000.00	\$-\$
WS01	1 WATER	Reservoir	Daily Inspection of Water Storage Facility	Daily	156	312	\$ - \$	5 - 5	\$-	\$ - \$
WS02	2 WATER	Reservoir	Post-incident Inspection and Maintenance of Storage Facility	As Required	16	8	\$ - \$	5 10.00 \$	\$ 50.00	\$ - \$
WS03	3 WATER	Reservoir	Quarterly inspection and Maintenance of Storage Facility	Quarterly	12	3	\$ - \$	5 10.00 \$	\$ 50.00	\$ - \$
WS04	4 WATER	Reservoir	Annual Inspection and Maintenance of Water Storage Facility	Annual	4	1	\$ - \$	10.00	\$ 100.00	\$ - \$
WS05	5 WATER	Reservoir	Three to Five year inspection and Maintenance of Storage Facility	Every 3 Years	3	0	\$ - \$	50.00	\$ 200.00	\$ - \$
WWC	01 WATER	Well	Daily Groundwater Well Inspection	Daily	234	312	\$ - \$	5 - 5	\$-	\$ - \$
WWC	02 WATER	Well	Monthly groundwater well inspection and Maintenance	Monthly	22	11	\$ - \$	5 - 9	\$ 25.00	\$ - \$
WWC	03 WATER	Well	Annual groundwater well inspection and Maintenance	Annual	3	1	\$ - \$	50.00	\$ 50.00	\$ 900.00 \$
WWC	04 WATER	Well	Periodic (Every 3 years) well assessment	Every 3 Years	1	0	\$ - \$	5 - 5	\$ 50.00	\$ - \$
WT0:	1 WATER	Chlorine Disinfection	Daily Inspection of Chlorine Disinfection Treatment System	Daily	234	156	\$ - \$	1.00	\$ 5.00	\$ 26,000.00 \$
WT02	2 WATER	Chlorine Disinfection	Quarterly inspection and Maintenance of Chlorine System	Quarterly	6	3	\$ - \$	25.00	\$ 2,800.00	\$ - \$
WT03	3 WATER	Chlorine Disinfection	Annual Inspection and Maintenance of Chlorine System	Annual	4	1	\$ - \$	50.00	\$ 2,000.00	\$ - \$
D01	STORM	Storm Main	Annual Storm Main Inspection	Annual	107	107	\$ - \$	50.00	\$ 200.00	\$ - \$
D02	STORM	Storm Main	Main Flushing and Cleaning	Every 5 years	34	34	\$ - \$	5 75.00	\$-	\$ - \$
D03	STORM	Storm Main	CCTV Inspection	Every 10 years	3	3	\$ 14,532.62	5 - 5	\$-	\$ - \$
D04	STORM	Storm Main	Vac Truck	As Required	0	0	\$ 1,500.00	5 - 9	\$-	\$ - \$
D05	STORM	Storm Main	Semi-Annual Inlet/Outlet Inspection and Maintenance	Semi-Annual	6	6	\$ - \$	50.00	\$-	\$ - \$
D06	STORM	Culvert	Culvert inspection and clearing	Bi-Annual	3	3	\$-\$	5 75.00	\$-	\$ - \$
D08	STORM	Main	As Required Storm System Repairs	As Required	32	32	\$ - \$	500.00	\$ 3,000.00	\$ - \$
LS01	SANITARY	Lift Station	Lift Station Weekly Inspection	Weekly	182	364	\$-\$	5 - 9	\$ 50.00	\$ - \$
LS05	SANITARY	Lift Station	Annual Lift Station Inspection and Maintenance	Annual	56	7	\$-\$	600.00	\$ 900.00	\$ 9,100.00 \$
LS06	SANITARY	Lift Station	Pump out and flush wet well - vac truck	Quarterly	28	28	\$ 1,500.00 \$	5 - 5	\$-	\$ - \$
S01	SANITARY	Main	Annual Sanitary Main Inspection	Annual	104	104	\$ - \$	50.00	\$ -	\$ - \$
S02	SANITARY	Main	Main Flushing and Cleaning	Every 3 Years	57	57	\$ - \$	5 75.00	\$ -	\$ - \$
S03	SANITARY	Main	CCTV Inspection	Every 10 Years	2	2	\$ 66,656.09	5 - 5	\$-	\$ - \$
S04	SANITARY	Main	Vac Truck	As Required	0	0	\$ 1,500.00 \$	5 - 5	\$-	\$ - \$
S05	SANITARY	Forcemain	Annual Forcemain Inspection	Annual	2	2	\$ - \$	5 100.00 \$	\$ 50.00	\$-\$
S08	SANITARY	Main	As Required Sanitary System Repairs	As Required	60	60	\$ - \$	500.00	\$ 10,000.00	\$ - \$
ST06	SANITARY	Sewage Treatment Plant	Sewage Treatment Plant Inspection	Daily	624	78	\$ - \$	5 - 5	\$ -	\$ 40,000.00 \$
ST15	SANITARY	Sewage Treatment Plant	Outfall Inspection	Every 3 years	1	0	\$ 5,000.00 \$	5 - 5	\$ -	\$ - \$
R02	ROADS	Paved Roads	Annual Asphalt Road Inspection	Annual	17	17	ş - ş	5 - 5	\$ 50.00	ş - \$
R03	ROADS	Paved Roads	Monthly Boulevard and Sidewalk Maintenance	Monthly	249	249	\$ - \$	5 - 5	\$ 100.00	\$ - \$
R04	ROADS	Paved Roads	Asphalt Street Cleaning	Semi-Annual	3	3	<u>\$</u> \$	2,100.00	<u> </u>	<u>\$</u> -\$
R05	ROADS	Paved Roads	Catch Basin Inspection and Cleaning	Semi-Annual	104	104	ş - ş	5 - 5	ş -	<u>\$</u> - \$
R06	ROADS	Paved Roads	Streetlight Inspection	Annual	2	2	\$ 6,000.00 \$	5 - 9	ş -	\$ 26,000.00 \$
R07	ROADS	Paved Roads	Snow Clearing	5 Times per year	40	40	\$ - \$	500.00	\$-	\$ - \$

nual Budget
23,194.94
3,551.14
26,277.58
4,344.16
-
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-
-
13,348.00
9,973.59
1,107.73
601.40
250.47
171.49
12,391.59
1,138.13
1,109.47
63.49
37,694.79
8,710.40
2,190.47
5,336.82
1,649.75
1,606.20
-
384.80
269.91
5,018.93
29,835.85
21,451.27
43,329.07
4,981.33
2,749.58
0,758.81
1,500.00
12 241.95
13,348.00 60 629 40
1 600 71
1,000./1
00.00
13,037.73
4,342.40
32 071 20
A 202 66
+,350.00

For reference - from Tahsis financial documents

PROPOSED 2023 BUDGET (Water, Sa	anitary, Roads) - Tahsis
Operator	\$	105,767.00
Truck	\$	44,300.00
Contractor	\$	19,700.00
Equipment	\$	4,000.00
Parts & Materials	\$	43,500.00
Utilities	\$	106,500.00
TOTAL O&M	\$	323,767.00



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