

Village of Marengo

Asset Management Plan

- Final

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Executive Summary

In compliance with the Canada-Saskatchewan administrative agreement and gas tax fund agreement, the Village of Marengo is developing its asset management program that will determine the asset's current level of service, target (desired) level of service, and financial gap needed to attain this level of service. Asset Level of Service (LOS) is illustrated according to the following performance measures:

- Condition State – Very Good, Good, Fair, Poor, Very Poor
- Monetary Performance – Difference between the asset replacement cost (RC) and the write down value (WDV)
- Remaining Service Life (RSL)

Based on a condition assessment of each asset within each asset group, the following table summarizes the current (2021) level of service for each asset group.

Existing (2021) Level of Service

Asset Group	Condition State					Monetary Performance		RSL
	V. Good	Good	Fair	Poor	V. Poor	RC	WDV	
Water Intake	0%	0%	100%	0%	0%	\$ 31,600	\$ 15,800	50%
Water Treat	0%	0%	100%	0%	0%	\$ 500,000	\$ 250,000	50%
Water Reservoir	100%	0%	0%	0%	0%	\$ 7,000	\$ -	100%
Water Main	11%	0%	86%	3%	0%	\$ 975,292	\$ 439,924	55%
Sanitary Main	62%	0%	38%	0%	0%	\$ 919,767	\$ 175,719	81%
Sanitary Treat	0%	0%	0%	100%	0%	\$ 80,500	\$ 60,375	25%
Roads-Gravel	0%	6%	0%	71%	23%	\$ 527,297	\$ 403,938	23%
Roads-Paved	0%	12%	60%	28%	0%	\$ 705,816	\$ 381,172	46%
Sidewalks	0%	35%	14%	29%	21%	\$ 375,907	\$ 219,215	42%
Buildings	0%	100%	0%	0%	0%	\$ 24,000	\$ 6,000	75%
Machinery	46%	0%	54%	0%	0%	\$ 185,370	\$ 50,000	73%
Totals						\$ 4,332,549	\$ 2,002,143	54%

Overall, the current state of the infrastructure is in fair condition with an average Remaining Service Life (RSL) of 54 percent.

While all asset groups are vital to the community's well-being, the community cannot function without water. These asset groups are a critical priority, which cannot be placed at risk of being compromised. Water Security Agency standards state that "*The objectives of a public water supply system are to provide safe and aesthetically appealing water to the customers without interruption and at a reasonable cost*".

There are issues related to water supply, including water quality and transmission capacity to the water treatment plant. While the water treatment plant appears to be operating adequately today, given the issues from the water supply, upgrades should consider the integrated operation between water supply and treatment. Given the current combined state of the infrastructure, upgrades are expected within the long-range (20-year) horizon. One alternative could be a regional system approach where the treatment plant evolves to being a distribution pumping station, receiving potable water from another source. This may include supply from Alsask, pending its water treatment upgrades within a similar time horizon. This alternative may be considered in the future upgrades of Marengo's water supply and treatment systems.

The water distribution system (i.e. piping), appears to be working, and should have a long remaining service life with the pipe materials used. However, the water distribution system does not provide fire flow. One of the safety risks is with the school. The decision to provide fire flow rests with Council, which is

recognized by the Water Security Agency. Upgrading to fire flow would require significant expenditures. The piping capacity issue, relating to not providing fire flow, is a noted issue within the level of service (LOS) assessment for the water distribution system. However, no upgrades are recommended within the study's planning horizon.

The sanitary collection system has some similar issues. The issue would be the force mains leading from the households to the gravity main system. While it appears to be working, there could be risk of backflow to the residences. This study flags this as something the Village should be aware of. This is noted as an issue within the level of service (LOS) assessment for the sanitary collection system. However, no upgrades are recommended within the study's planning horizon.

The sanitary treatment (lagoon) appears to have a breach in containment. While this may not pose immediate risk. In this report we scheduled it for upgrade within the long-range (20-year) horizon.

For the paved roads and sidewalks, given the current varying level of service, there are varying capital renewal alternatives. This study includes a variety of capital renewal treatments, given the condition assessment of each asset segment. For the paved roads, this includes mid-life, mid-cost, preservation enhancing micro-surfacing on lighter deteriorated roads. For the heavier deteriorated roads, which are at the end of their service life, this includes the more expensive conventional resurfacing. Sidewalks are similar. This includes mid-life, mid-cost, bonded overlay, or diamond grinding with thin bituminous surface treatments on the lighter deteriorated sidewalks. For the heavier deteriorated sidewalks, which are at the end of their service life, this includes the more conventional higher cost replacement.

The main issue with the gravel roads is lack of defined drainage, which would typically include an urban style ditch to convey the drainage away from the village boundary. This we include as an item for the long-range (20-year) horizon to address.

The recommended target level of service (LOS) over the long-range (20-year) horizon, would improve overall asset LOS by 11 percent with a projected funding gap of \$373,000. The water system upgrade, including provision of a regional supply line, is a major contributor. However, it is the most critical asset group. There is potential to lower the funding gap, including deferring road work (i.e. gravel roads ditch grading). There is also the potential for external grant funding for water system upgrades.

The study's condition assessments, level of service analysis, and program strategy are housed in an Asset Management Database. The Village now has the tools and data in place to sustain, manage, and adjust its asset management program. However, sustaining an asset management program will require additional time and resource by the Administrator and associated staff. Moving forward, the following are expected new commitments the Village will need to allocate time and financial resources to:

- Conduct on-going condition assessments and infrastructure lifecycle analysis
- Train and develop staff on condition assessments and computing the current level of service
- Routinely update the asset management database based on reassessed condition assessments, completion of work, and adjusting the works program based on budget levels and level of service targets.
- Periodically outsource the lifecycle analysis to update the recommended maintenance and capital program strategy in line with on-going level of service targets set by the Village.

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Appendix A – Policy and Strategy

1. Introduction

As part of the Canada-Saskatchewan Administrative Agreement and the Municipal Gas Tax Fund Agreement, municipalities are required to:

- Make progress towards developing and/or implementing an asset management plan; and
- Report on progress made.

In accordance with this plan, administered by the Government of Saskatchewan, Gas Tax Program and Financial Management, municipalities are to attain the following asset management targets:

- June 30, 2018 – Completed an asset management policy and strategy
- June 30, 2019 – Determined the current level of service (assets condition) and target level of service moving forward
- June 30, 2020 – Determined the financial gap needed to attain the target level of service
- June 30, 2022 – Report back to the Provincial Government on initiatives to monitor and improve the asset management program moving forward

In March 2021, the Federation of Canadian Municipalities (FCM) approved grant funding for the given study under the Municipal Asset Management Program (MAMP). The study is to be complete by March 2022.

The objectives of the asset management study are as follows:

- Compile an asset listing for the various asset groups
- Complete a condition assessment of the assets and determine the current level of service
- Complete a lifecycle analysis and determine the targeted level of service
- Develop the infrastructure renewal plan/strategy and financial gap needed to attain the target level of service
- Implement an asset management database, housed with the data and results of this analysis, to help the municipality manage its asset management program moving forward.

The most critical asset groups are those related to water systems. While this study did not complete a regulatory review, we reference one document by the Saskatchewan Water Security Agency, “Waterworks Design Standard – EPB 501”, November 15, 2012. Section 3.11, “Treatment Objectives”, states the following:

“The objectives of a public water supply system are to provide safe and aesthetically appealing water to the customers without interruption and at a reasonable cost, an adequate quantity of water at sufficient pressure for fire protection”

Further to this, Section 5.1 “Distribution – General”, states the following:

“Whether or not fire protection is provided via the communal drinking-water system is the decision of the municipality/owner of the system and can be subject to a cost/risk-benefit analysis, especially for smaller systems.”

These are key items in setting water system level of service targets to ensure a safe, reliable, and sustainable delivery of water within reasonable budget allocations. External grant funding opportunities may be of assistance in meeting the level of service targets and bridging the funding gap.

2. Policy and Strategy

The Village has an Asset Management Policy and an Asset Management Strategy approved January and May of 2019, with a review scheduled for January and May of 2020. We conducted a review of both the existing Policy and Strategy documents. Both were well written. The only revision included additions around the Asset Management Database, including monitoring and managing the asset management program moving forward. Both policy and strategy documents are contained in Appendix A. The following highlights the additional items to these documents:

Policy:

Objectives:

- Having the systems, processes, and resource allocations in place for continued monitoring and management of an asset management program.

Principles:

- a. An asset management database will be deployed and maintained with annual review of condition assessments, level of service assessment, and capital renewal treatment programming in line with delivering level of service targets.

Strategy:

MONITORING AND MANAGING THE ASSET MANAGEMENT PROGRAM

The asset inventory, condition assessment data, level of service results, and resulting 5-year maintenance and capital works program will be loaded into an MS Access Asset Management Database for the Village to continue to manage the asset management program moving forward. Based on the initial asset management assessments and analysis completed in 2021, the following are requirements for the Village Administrator to sustain and manage an asset management program moving forward:

- Continuously update the data within the Asset Management Database.
- Train and engage operations staff to provide condition assessments and updates to the Administrator to update the data and level of service results.
- On a periodic basis, seek the support of professional services to reanalyze the Long-Range Sustainability Plan and determine the corresponding Short-Range Maintenance and Capital Program in line with delivering the long-range level of service targets.

3. Asset Inventory

The asset inventory for the Village includes eleven asset groups:

Asset Group	Functional Classification	Quantity	Description
Roads-Gravel	Local	2672 m	
Roads Paved	Local	149 m	
Sidewalks	Local	1093 m	
Water Intake	N/A	1	Pumphouse with three raw water supply wells with two currently functioning (1982)
Water Treatment	N/A	1	Shared building with the shop (1983)
Water Reservoir	N/A	2	External to the WTP
Water Mains	Main	4455 m	<ul style="list-style-type: none"> Raw HDPE water supply – 50 mm x 1835 m Internal HDPE potable supply – 50 mm x 2620 m
Sanitary Mains	Main	2152 m	<ul style="list-style-type: none"> HDPE-Conventional Gravity Main – 150 mm x 754 m HDPE-Residential Force to Main – 50 mm x 1398 m
Sanitary Treatment	N/A	1	Facultative lagoon
Buildings	N/A	1 structure	Office is shared use with RM of Antelope Park and RM of Milton
Machinery	N/A	4 units	

4. Condition Assessment and Lifecycle Analysis Process

4.1 Condition Assessment Criteria

Condition rating criteria was developed for each asset (i.e. infrastructure) group. The condition rating criteria defined for the Village’s infrastructure groups is contained in a separate document. As appropriate for the asset group, the assessment of each component is based on one of three fundamental performance measures.

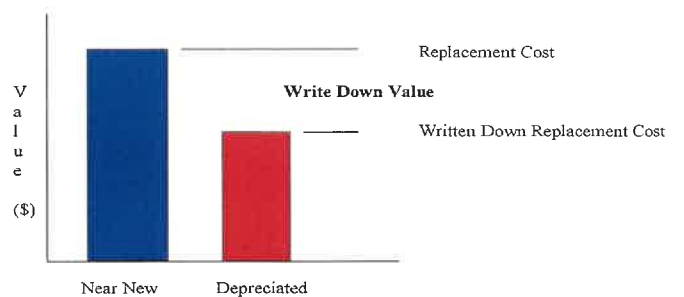
- Physical Condition – The level of deterioration
- Capacity – A measure of the size needed to meet the volume desired
- Functional Adequacy – A measure of the component doing what it should be doing, including design resiliency

The following table summarizes the condition types assessed for each asset group.

Asset Group	Condition Type	Comments
Roads (Gravel)	Surface Condition	
	Surface Gravel	
	Dust	
	Crown	
	Drainage	
	Width	
	Sight Distance	Sight triangle (horizontal) and stopping sight distance (vertical)
Roads (Paved)	Rutting	
	Fatigue Cracking	
	Surface Condition	
	Lineal Cracking	
	Grade	Not applicable for rural roads
	Sight Distance	
Sidewalks	Cracking	
	Spalling	
	Vertical Displacement	Heaving
Water Intake	Building	
	Instrumentation	
	Wet Well	
	Pumping	
	Backup Power	
	Auxiliary Items	
Water Treatment	Building	
	Instrumentation	
	Filtration	
	Disinfection	

	Wet Well	
	Pumping	
	Back-up Power	
	Auxiliary Items	
Water Reservoir	All Included	
Water Main	Pipe	
	Valves	
	Hydrants	
	Service Connections	
	Pipe Capacity	
Sanitary Mains	Pipe	
	Manholes	
	Service Connections	
	O&M	Roots and calcification
	Service Connections	
	Pipe Capacity	
Sanitary Treatment	All Included	Facultative lagoon
Buildings	Civil	
	Exterior Building	
	Interior Building	
	Plumbing	
	HVAC	
	Electrical	
Machinery	All Included	

The first level of service measure is condition state. The fundamental elements of deriving this in the condition assessment criteria for each asset group are severity and extent. Severity is a defined measure of the level of deterioration (i.e. minor, moderate, major, and severe). The extent is the proportion of the infrastructure segment within each of the defined severity levels. In relation to defined threshold levels, this determines the condition state, assessing the infrastructure to be very good, good, fair, poor, or very poor. Threshold levels are tolerance levels defined for each severity level; which in part determines how much risk can be endured. As example, the tolerance to minor (i.e. hairline) cracking can be rather high. However, major cracking cannot be tolerated to any significant amount, as it becomes the threshold to failure, expensive repair, disruption, and potential consequence to life and safety in some instances.



A second level of service measure is monetary performance. This is also derived through the condition assessment. It measures the amount of deterioration and depreciation of the infrastructure assets. This is

the asset Write-Down-Value (WDV). It is a very effective measure as it provides a dollar to dollar comparison between input expenditures (i.e. maintenance and capital costs) to the output benefit (i.e. asset valuation).

In addition, we use the WDV to measure risk. One major risk is that associated with collision injury or fatality. The combination of the collision severity with the probability of the event is added to the WDV. This triggers proactive infrastructure renewal practices that will address the consequence of risk.

A third measure of level of service is the asset Remaining Service Life (RSL). This can be computed as the ratio between the asset write-down-value and its replacement cost.

4.2 Lifecycle Analysis

Lifecycle analysis uses the collected condition data from each infrastructure asset. The objective of the analysis is as follows:

- Determine a long-range (20-year) infrastructure sustainability plan identifying the targeted (optimal) level of service and funding needs required to get there.
- Determine the detailed maintenance and capital program required to deliver that sustainability plan.

The type of analysis varies between the asset groups. Regardless of the analysis approach between the varying asset groups, the analysis reporting is seamless. This enables the Village to view all asset groups together in a single table and graph, providing effective decision management in the overall asset management program strategy. The analysis results are summarized into two horizons. The first is the short-range (5-year) horizon. This identifies immediate needs to be considered in the maintenance and capital budget programs. The second is the long-range (20-year) horizon. This illustrates the program strategy to deliver the targeted infrastructure sustainability plan.

Throughout the lifecycle analysis, multiple treatment options are tested given the current and forecast condition state. The sequence of treatment options that minimizes annualized costs over the lifecycle are selected. The following summarizes treatment options considered for each asset group.

- Gravel Roads
 - Routine Maintenance
 - Summer grader operations
 - Partial repair of problematic or failed road areas
 - Correction of shallow road crown (i.e. cross slope)
 - Sight Improvements - Sight corrections, including intersection signage, sight triangle clearing, and grading to address intersection/approach stopping sight distance deficiencies.
 - Spot Dust Suppression – Calcium Chloride dust suppression where house or other sensitive location (i.e. church or cemetery) is within close proximity.
 - Surface Gravel Replacement
 - Ditch Improvements
 - Additional minor grader maintenance of ridges at the shoulder.
 - Moderate shoulder pulling of slumping side-slopes.
 - Correcting major drainage deficiencies within the ditch and culverts.
 - Extensive construction to develop a ditch geometry.
 - Shoulder Widening
 - To address the more severe road width deficiencies.
 - Spot Strengthening

- Excavate problematic areas of weak soil locations, and back fill with pit-run and/or other subgrade strengthening materials.
 - Road (Subgrade) Stabilization
 - A relatively new practice and evolution/hybrid between conventional clay capping and surfacing. The existing surface is chemically stabilized, gravel is incorporated and locked into place, and the resulting surface is dust-free. The roadway surface strength is improved by approximately three times; annual maintenance needs are significantly reduced; gravel replacement needs are significantly reduced; traffic safety is improved; and driver comfort is improved.
 - Road Regrading (i.e. Reconstruction)
 - Full depth roadway reconstruction to address strength deficiencies and geometric deficiencies (i.e. lack of ditch grade)
- Paved Roads
 - Patching
 - Potholes and other major deficiencies impacting traffic safety.
 - Crack Filling
 - Micro Sealing
 - Specialized cost-effective treatment where the deficiency is open surface texture (i.e. raveling).
 - Resurfacing
 - Could involve reconstructing the entire granular substructure if it is unsuitable for the heavy haul traffic using the roadway.
- Sidewalks
 - Grinding
 - Leveling off trip edges and addressing the vertical displacement
 - Bonded Overlay
 - Epoxy overlay patch. Most effective on spalling, but some effect on cracking
 - Grinding with a thin bituminous surface
 - Major grinding to develop a constant surface profile. A micro-surface is applied to the entire sidewalk segment.
 - Replacement
 - Remove and replace entire sidewalk
- Water Intake
 - Repair
 - Upgrade
 - Replace
- Water Treatment
 - Repair
 - Upgrade
 - Replacement
- Water Reservoir
 - Repair
 - Upgrade
 - Replacement
- Water Main

- Pipe Repair
- Valve Replacement
- Hydrant Replacement
- Full Distribution Line Replacement – Pipe, valves, hydrants, and service connections
- Sanitary Main
 - Pipe Maintenance
 - Typically root cutting and jetting for calcium build-up and other debris
 - Pipe Repair
 - Dig and replace collapsed pipe sections
 - Manhole Replacement
 - Service Connection Replacement
 - Full Collection Lining – Pipe, manholes, and service connections
 - Full Collection Line Replacement - Pipe, manholes, and service connections
- Sanitary Treatment
 - Repair
 - Upgrade
 - Replace
- Buildings
 - Routine Maintenance
 - Special Identified Maintenance
 - Noted deficiencies
 - Can be above average expenditures requiring budget allocation
 - Replacement
- Machinery
 - Routine Maintenance
 - Special Identified Maintenance
 - Noted deficiencies
 - Can be above average expenditures requiring budget allocation
 - Replacement

The lifecycle analysis results for each infrastructure asset within each asset group are contained in the Asset Management Database for review, reporting, adjustment, and financial/operations management moving forward.

5. Current and Targeted Level of Service

The infrastructure level of service is based on compilation of lifecycle analysis completed for each infrastructure asset. The results are compiled for all the assets within each asset group.

Level of service is presented in the following three measures, which present a unique understanding of the state of the infrastructure. However, each of the three level of service measures were derived from the same base condition data.

- Condition State (Very Good, Good, Fair, Poor, and Very Poor)
- Monetary Performance (\$WDV)
- Remaining Service Life (%)

The level of service first illustrates the current state of the infrastructure. Then it is illustrated to show the targeted short-range (5-year) and long-range (20-year) level of service resulting from the recommended (optimal) program strategy expected to minimize costs and maximize infrastructure performance over the asset lifecycle.

5.1 Current Level of Service

The following table and graphs summarize the current state of the infrastructure for all asset groups.

Overall, the current level of service (LOS) is in fair condition with a Remaining Service Life (RSL) of 54 percent. The Replacement Cost (RC) of all asset groups is \$4,333,000.

While all asset groups are vital to the community's well-being, the community cannot function without water. The water asset groups are a priority. There are issues related to water supply, including water quality and transmission capacity to the water treatment plant. While the water treatment plant appears to be operating adequately today, given the issues from the water supply, upgrade needs should consider the combined functionality of the water supply and treatment plant. One alternative may include a regional water system approach.

The water distribution system (i.e. piping), appears to be working and should have a long remaining service life with the pipe materials used. However, it is deficient in providing fire flow. One of the safety risks is with the school.

The sanitary collection system has some similar issues. This would be the force mains leading from the households to the main gravity system. While it appears to be working, there could be risk of backflow to the residences.

The sanitary treatment (lagoon) appears to have a breach in containment. While this may not pose immediate risk, upgrading may be required within the short-range (5-year) or long-range (20-year) horizons.

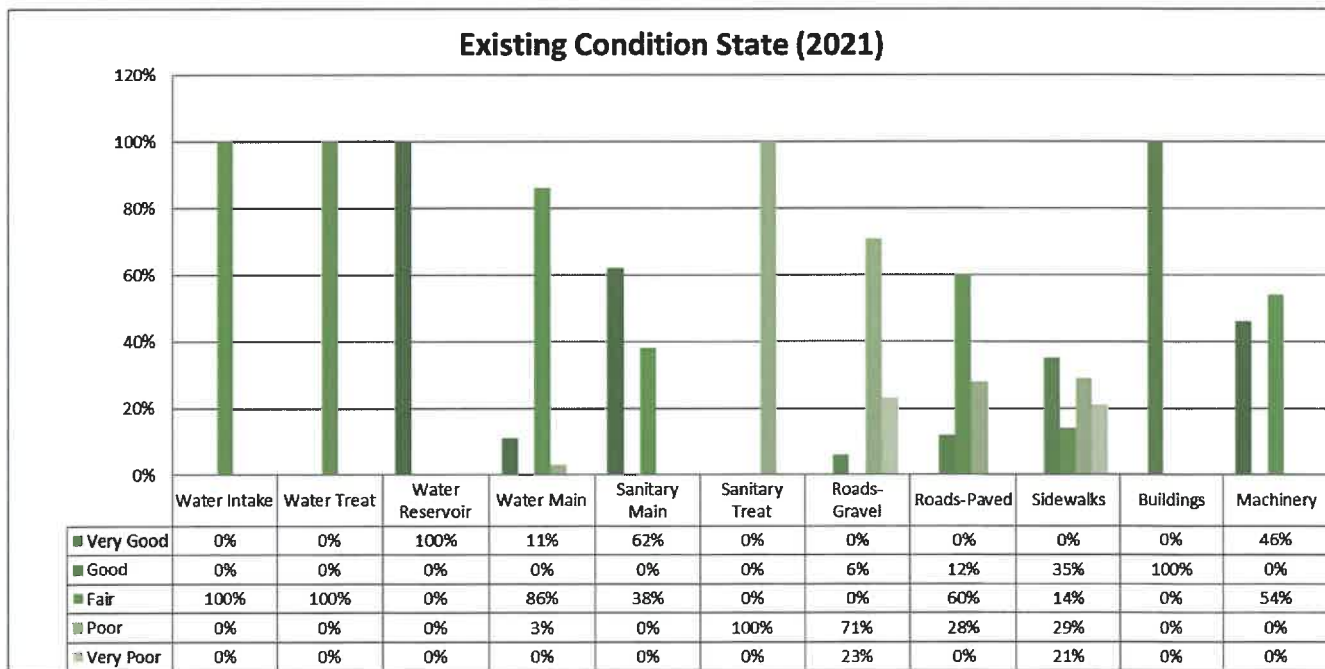
For the paved roads and sidewalks, they vary in condition state from some that may be renewed employing preservation maintenance practices, to some that are at the end of their service life and will require more extensive and costly renewal/replacement.

The main issue with the gravel roads is lack of defined drainage, which would typically include an urban style ditch to convey the drainage away from the village boundary.

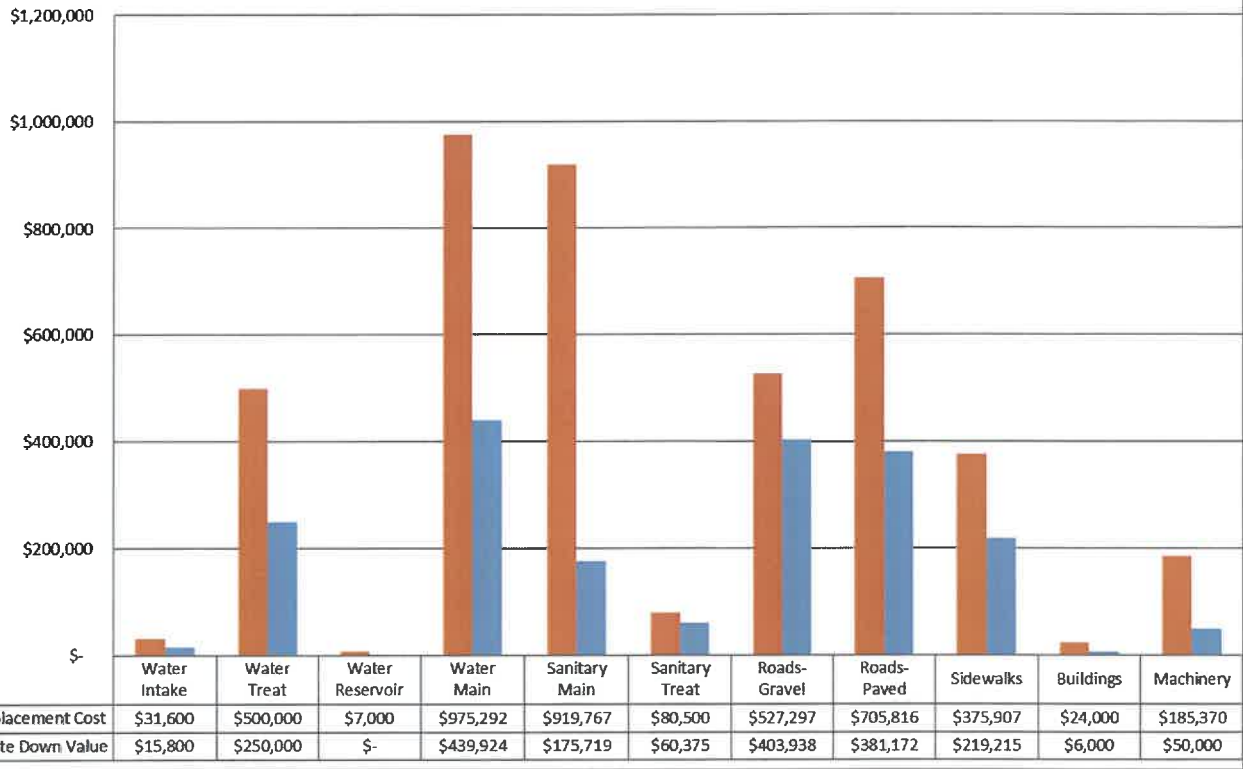
Existing (2021) Level of Service

Asset Group	Condition State					Monetary Performance		RSL
	V. Good	Good	Fair	Poor	V. Poor	RC	WDV	
Water Intake	0%	0%	100%	0%	0%	\$ 31,600	\$ 15,800	50%
Water Treat	0%	0%	100%	0%	0%	\$ 500,000	\$ 250,000	50%
Water Reservoir	100%	0%	0%	0%	0%	\$ 7,000	\$ -	100%
Water Main	11%	0%	86%	3%	0%	\$ 975,292	\$ 439,924	55%
Sanitary Main	62%	0%	38%	0%	0%	\$ 919,767	\$ 175,719	81%
Sanitary Treat	0%	0%	0%	100%	0%	\$ 80,500	\$ 60,375	25%
Roads-Gravel	0%	6%	0%	71%	23%	\$ 527,297	\$ 403,938	23%
Roads-Paved	0%	12%	60%	28%	0%	\$ 705,816	\$ 381,172	46%
Sidewalks	0%	35%	14%	29%	21%	\$ 375,907	\$ 219,215	42%
Buildings	0%	100%	0%	0%	0%	\$ 24,000	\$ 6,000	75%
Machinery	46%	0%	54%	0%	0%	\$ 185,370	\$ 50,000	73%
Totals						\$ 4,332,549	\$ 2,002,143	54%

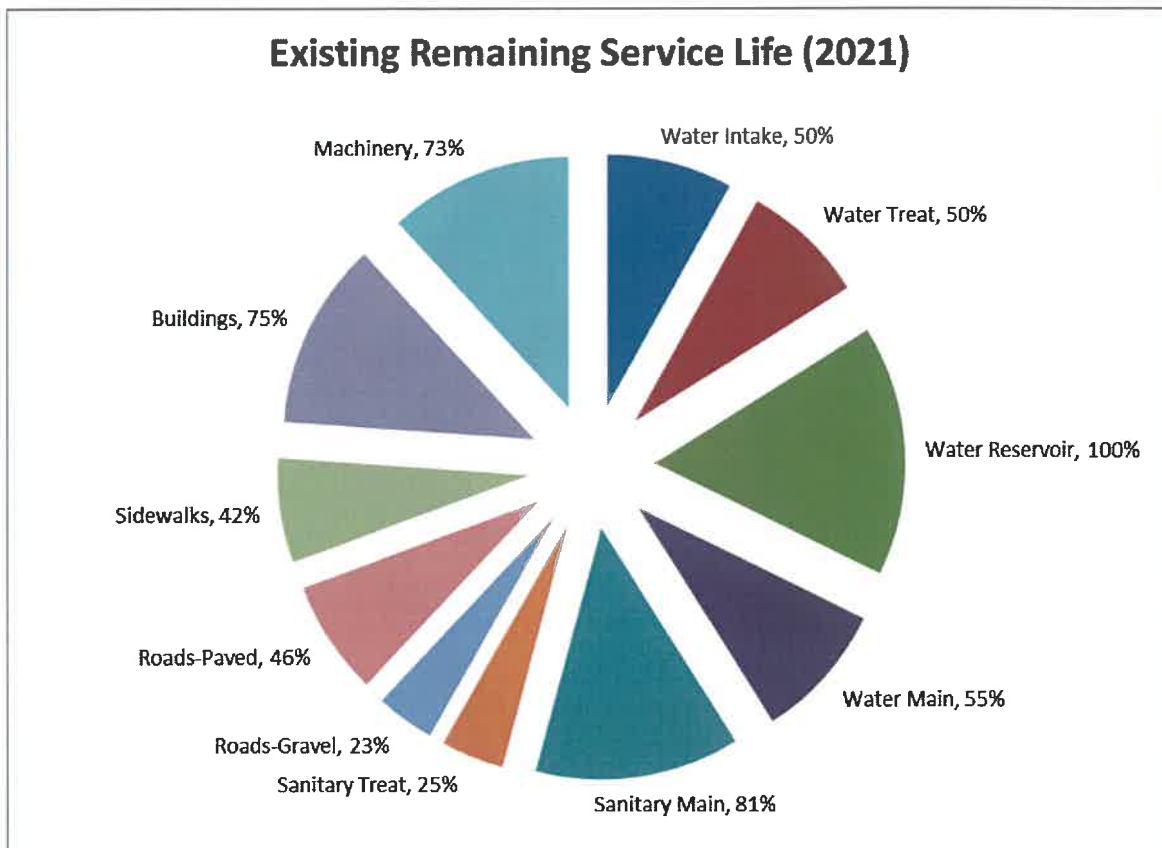
Existing Condition State (2021)



Existing Monetary Performance (2021)



Existing Remaining Service Life (2021)



5.2 Short-Range (5-Year) Level of Service Targets

The following table summarizes the expected level of service (LOS) at the end of the short-range horizon. Given the expenditure levels, and continued deterioration, the assets remaining service life (RSL) is expected to decline by 4 percent.

Five-Year Target (2026) Level of Service

Asset Group	Condition State					Monetary Performance		RSL
	V. Good	Good	Fair	Poor	V. Poor	RC	WDV	
Water Intake	0%	0%	0%	100%	0%	\$ 31,600	\$ 22,752	28%
Water Treat	0%	0%	0%	100%	0%	\$ 500,000	\$ 383,333	23%
Water Reservoir	100%	0%	0%	0%	0%	\$ 7,000	\$ 778	89%
Water Main	11%	0%	86%	3%	0%	\$ 975,292	\$ 441,982	55%
Sanitary Main	62%	0%	38%	0%	0%	\$ 919,767	\$ 216,314	76%
Sanitary Treat	0%	0%	0%	100%	0%	\$ 80,500	\$ 66,413	18%
Roads-Gravel	9%	8%	0%	66%	17%	\$ 527,297	\$ 458,015	13%
Roads-Paved	25%	31%	27%	17%	0%	\$ 705,816	\$ 291,643	59%
Sidewalks	22%	46%	8%	20%	1%	\$ 375,907	\$ 158,861	58%
Buildings	0%	0%	0%	100%	0%	\$ 24,000	\$ 19,200	20%
Machinery	0%	40%	6%	0%	54%	\$ 185,370	\$ 120,386	35%
Totals						\$ 4,332,549	\$ 2,179,677	50%

For the water systems, the focus in the short-range horizon is planning for upgrade of the water supply and treatment systems. This may include a regional systems approach, in part dependent on the RM of Milton's related planning for the water system upgrade in Alsask. As such, since no significant investment beyond engineering at this point, the LOS targets for the water systems at the end of this horizon remains relatively low.

For the surface works, the short-range horizon includes provision to initiate surface works renewal for both the sidewalks and paved roads. In addition to conventional resurfacing of the paved roads and replacement of the sidewalks, given the deterioration levels, the strategy includes provision for mid-life, mid-cost preservation enhancing treatments on some of the roads and sidewalks. These would include roadway micro-surfacing and sidewalk bonded overlay and diamond grinding with thin-bituminous surfacing. While the paved roads do not contain a surface (ditch) or subsurface (piping) drainage system, drainage is conveyed along the surface (i.e. curb line). During engineering design, the drainage functionality should be verified and corrected as required. As a result of the proposed surface works capital renewal strategy, the LOS of the paved roads and sidewalks are expected to improve by 13 percent and 16 percent respectively.

Micro-Surfacing - Roads



Bonded Overlay - Sidewalks



Diamond Grinding and Thin-Bituminous Surfacing - Sidewalks



Prior to completing the surface works renewal of roads and sidewalks, it would be prudent to plan the streetscape appeal and functionality. This will ensure the upgrading matches the vision of the community and budget allocations. The following is an example of a typical streetscape plan that would precede design engineering and construction.

Example – Streetscape Planning



To obtain the above LOS targets, the following tables summarizes the projected maintenance and capital expenditure needs for the short-term (5-year) horizon. More specific details, costing, and capital renewal strategy maps noting the locations of these works are contained in the Asset Management Database.

This phase is a planning period for the Water and Sanitary asset groups. As a result, no capital renewal expenditures anticipated for these asset groups.

Five-Year Projected (2022-2026) Expenditure Levels – Asset Group A

Asset Group	Treatment	Annualized Costs (\$/yr)
Water Intake	Maintenace-Specific	\$ -
	Upgrade	\$ -
	Replace	\$ -
		\$ -
Water Treat	Maintenace-Specific	\$ -
	Upgrade	\$ -
	Replace	\$ -
		\$ -
Water Reservoir	Maintenace-Specific	\$ -
	Upgrade	\$ -
	Replace	\$ -
		\$ -
Water Main	Pipe Repair	\$ -
	Valve Replacement	\$ -
	Hydrant Replacement	\$ -
	Service Connection Replacement	\$ -
	Full Replacement	\$ -
		\$ -
Sanitary Main	Pipe Repair	\$ -
	Line	\$ -
	Replace	\$ -
		\$ -
Sanitary Treat	Maintenace-Specific	\$ -
	Upgrade	\$ -
	Replace	\$ -
		\$ -

Note that in the lifecycle analysis for linear asset groups, the unit costs for each treatment option includes the full cost for equipment, labor, materials, and overhead. This includes “Buildings” and “Machinery” overhead costs. We back these costs out so they are not double counted. In this case these allocation adjustments are slight.

Five-Year Projected (2022-2026) Expenditure Levels – Asset Group B

Asset Group	Treatment	Annualized Costs (\$/yr)
Road-Gravel	Maintain	\$ 1,284
	Regravel	\$ 114
	Sight Improvement	\$ -
	Dust Control	\$ 213
	Drainage Improvement	\$ -
	Regrade/Reconstruct	\$ -
	Subgrade Stabilize	\$ -
		\$ 1,611
	Machinery & Building Adjustment	\$ 120
	Net \$ 1,491	
Road-Paved	Patch	\$ 734
	Crack Fill	\$ 1,741
	Sight Improvement	\$ 50
	Micro-Surface	\$ 13,700
	Resurface	\$ 11,616
		\$ 27,841
Sidewalk	Grinding	\$ -
	Bonded Overlay	\$ 883
	Grind & TBS	\$ 6,874
	Replace	\$ 12,780
		\$ 20,537

Five-Year Projected (2022-2026) Expenditure Levels – Asset Group C

Asset Group	Treatment	Annualized Costs (\$/yr)
Buildings	Maintenace-Specific	\$ 120
	Demolish	\$ -
	Upgrade	\$ -
	Replace	\$ -
		\$ 120
Machinery	Maintenace-Specific	\$ -
	Lease	\$ -
	Upgrade	\$ -
	Replace	\$ -
		\$ -

5.3 Long-Range (20-Year) Level of Service Target

The following table summarizes the expected level of service (LOS) at the end of the long-range horizon. Given the capital renewal initiatives proposed, the forecast is for a 11 percent remaining service life (RSL) improvement from the current LOS.

20-Year Target (2041) Level of Service

Asset Group	Condition State					Monetary Performance		RSL
	V. Good	Good	Fair	Poor	V. Poor	RC	WDV	
Water Intake	100%	0%	0%	0%	0%	\$ 31,600	\$ 632	98%
Water Treat	100%	0%	0%	0%	0%	\$ 500,000	\$ 8,333	98%
Water Reservoir	0%	0%	100%	0%	0%	\$ 7,000	\$ 3,111	56%
Water Main	14%	0%	86%	0%	0%	\$ 975,292	\$ 419,337	57%
Sanitary Main	0%	62%	38%	0%	0%	\$ 919,767	\$ 338,099	63%
Sanitary Treat	100%	0%	0%	0%	0%	\$ 80,500	\$ 1,006	99%
Roads-Gravel	29%	15%	57%	0%	0%	\$ 527,297	\$ 169,164	68%
Roads-Paved	0%	21%	72%	6%	0%	\$ 705,816	\$ 282,356	60%
Sidewalks	0%	20%	51%	28%	0%	\$ 375,907	\$ 191,009	49%
Buildings	0%	0%	0%	0%	100%	\$ 24,000	\$ 24,000	0%
Machinery	6%	40%	55%	0%	0%	\$ 185,370	\$ 65,126	65%
Totals						\$ 4,332,549	\$ 1,502,174	65%

The strategy includes a coordinated renewal of the water supply and treatment system. While the exact upgrade strategy has not yet been determined, it may include a regional system approach potentially including potable water supply from Alsask.

The strategy also includes continued renewal of the sidewalks and paved road network. In addition, it includes addressing the ditch/drainage deficiencies for the gravel-road network. The following is an example of a typical urban roadway ditch.

Example – Urban Roadway Ditch



At the end of this horizon, the “Buildings” asset group is projected to be at the end of its service life. This may be the focus following this horizon.

To obtain the above LOS targets, the following tables summarizes the projected maintenance and capital expenditure needs. More specific details, costing, and capital renewal strategy maps noting the locations of these works are contained in the Asset Management Database.

20-Year Projected (2027-2041) Expenditure Levels – Asset Group A

Asset Group	Treatment	Annualized Costs (\$/yr)
Water Intake	Maintenace-Specific	\$ -
	Upgrade	\$ 2,780
	Replace	\$ -
		\$ -
		\$ 2,780
Water Treat	Maintenace-Specific	\$ -
	Upgrade, including regional pipeline	\$ 97,316
	Replace	\$ -
		\$ 97,316
Water Reservoir	Maintenace-Specific	\$ -
	Upgrade	\$ -
	Replace	\$ -
		\$ -
Water Main	Pipe Repair	\$ -
	Valve Replacement	\$ -
	Hydrant Replacement	\$ -
	Service Connection Replacement	\$ -
	Full Replacement	\$ -
		\$ -
Sanitary Main	Pipe Repair	\$ -
	Line	\$ -
	Replace	\$ -
		\$ -
Sanitary Treat	Maintenace-Specific	\$ -
	Upgrade	\$ 7,081
	Replace	\$ -
		\$ 7,081

Note that in the lifecycle analysis for linear asset groups, the unit costs for each treatment option includes the full cost for equipment, labor, materials, and overhead. This includes “Buildings” and “Machinery” overhead costs. We back these costs out so they are not double counted.

20-Year Projected (2027-2041) Expenditure Levels – Asset Group B

Asset Group	Treatment	Annualized Costs (\$/yr)
Road-Gravel	Maintain	\$ 600
	Regravel	\$ 1,188
	Sight Improvement	\$ 160
	Dust Control	\$ 1,122
	Drainage Improvement	\$ 32,032
	Regrade/Reconstruct	\$ -
	Subgrade Stabilize	\$ -
		\$ 35,102
	Machinery & Building Adjustment	\$ 14,702
	Net \$ 20,400	
Road-Paved	Patch	\$ 4,521
	Crack Fill	\$ 600
	Sight Improvement	\$ -
	Micro-Surface	\$ -
	Resurface	\$ 5,557
		\$ 10,678
Sidewalk	Grinding	\$ -
	Bonded Overlay	\$ -
	Grind & TBS	\$ -
	Replace	\$ 4,200
		\$ 4,200

20-Year Projected (2027-2041) Expenditure Levels – Asset Group C

Asset Group	Treatment	Annualized Costs (\$/yr)
Buildings	Maintenance-Specific	\$ -
	Demolish	\$ -
	Upgrade	\$ -
	Replace	\$ -
		\$ -
Machinery	Maintenance-Specific	\$ -
	Lease	\$ -
	Upgrade	\$ -
	Replace	\$ 14,702
		\$ 14,702

5.4 Summary of Long-Range Financial Plan and Asset Performance

Based on the above short-range (5-year) and long-range (20-year) plans, the following table summarizes the financial needs in comparison to existing maintenance and capital renewal budget allocations.

Financial Summary

Asset Group	Annual Budget Allocation (\$/yr)	Short-Range (5 Year) Needs (\$/yr)	Long-Range (6-20 Year) Needs (\$/yr)	Financial Gap Needs to Budget Surplus (+) ; Deficit (-)	
				Short-Range (\$/yr)	Long-Range (\$/yr)
Water Intake	\$7,590	\$ -	\$ 2,780	\$ 7,590	\$ 4,810
Water Treat	\$12,650	\$ -	\$ 97,316	\$ 12,650	\$ (84,666)
Water Reservoir	\$100	\$ -	\$ -	\$ 100	\$ 100
Water Main	\$5,060	\$ -	\$ -	\$ 5,060	\$ 5,060
Sanitary Main	\$15,760	\$ -	\$ -	\$ 15,760	\$ 15,760
Sanitary Treat	\$3,940	\$ -	\$ 7,081	\$ 3,940	\$ (3,141)
Road-Gravel	\$9,800	\$ 1,491	\$ 20,400	\$ 8,309	\$ (10,600)
Road-Paved	\$9,800	\$ 27,841	\$ 10,678	\$ (18,041)	\$ (878)
Sidewalk	\$4,900	\$ 20,537	\$ 4,200	\$ (15,637)	\$ 700
Buildings	\$100	\$ 120	\$ -	\$ (20)	\$ 100
Machinery	\$42,022	\$ -	\$ 14,702	\$ 42,022	\$ 27,320
Total	\$111,722	\$ 49,989	\$ 157,157	\$ 61,733	\$ (45,435)

The historic budget allocations are estimated based on review of available budget drawing on expenditure allocations towards capital renewal. Currently the Village is spending approximately \$112,000/year for maintenance and capital renewal, which includes an allocation for amortization/depreciation within each of their asset groups.

The recommended program strategy includes a surplus of \$62,000/year in the short-range (5-year) horizon, which initiates capital renewal of the surface works asset groups. However, to address the LOS targets for the long-range horizon, which continues the surface works renewal, but addresses the water supply and treatment issues. This results in a projected funding gap of \$45,000/year for the long-range (20-year) horizon.

The following table summarizes the projected long-range (20-year) asset performance resulting from the recommended asset management strategy.

Asset Performance Summary

20-Year Performance (i.e. Level of Service) Targets					
Asset Group	Budget Allocation (\$)	Expenditure Needs (\$)	Expenditure Change (%)	WDV Change (Improve +) (\$)	RSL Change (Improve +) (%)
Water Intake	\$151,800	\$ 41,696	-73%	\$ 15,168	48%
Water Treat	\$253,000	\$ 1,459,739	477%	\$ 241,667	48%
Water Reservoir	\$2,000	\$ -	-100%	\$ (3,111)	-44%
Water Main	\$101,200	\$ -	-100%	\$ 20,587	2%
Sanitary Main	\$315,200	\$ -	-100%	\$ (162,380)	-18%
Sanitary Treat	\$78,800	\$ 106,218	35%	\$ 59,369	74%
Road-Gravel	\$196,000	\$ 313,455	60%	\$ 234,774	45%
Road-Paved	\$196,000	\$ 299,375	53%	\$ 98,816	14%
Sidewalk	\$98,000	\$ 165,685	69%	\$ 28,206	8%
Buildings	\$2,000	\$ 600	0%	\$ (18,000)	-75%
Machinery	\$840,440	\$ 220,530	-74%	\$ (15,126)	-8%
Total	\$ 2,234,440	\$ 2,607,298	17%	\$ 499,969	11%

Over the 20-year period, the total projected funding gap is \$373,000. However, the result is an overall projected level of service increase by 11 percent. This is a \$500,000 improvement in asset valuation. There is potential to reduce the funding gap in a couple of ways. By the nature of the proposed water supply and treatment upgrades, they are subject to partial compensation through external grant funding programs. Some of the surface works (i.e. ditch grading) can be deferred if necessary to manage the funding gap.

5.5 Grant Funding Programs

Considering the funding gap, the following lists some relevant grant funding programs for Saskatchewan municipalities. There may be other existing and/or new grant funding programs available as well. It is important for the municipal administrator to be aware of these revenue opportunities as these programs may be able to bridge the funding gap and deliver the capital renewal needs to attain infrastructure sustainability.

- i. Canada Community Building Fund (CCBF) – This is formerly the federal Gas Tax Fund (GTF). Funding allocation is based on a per capita basis. There is a requirement for municipalities to be making progress in asset management, which by this report, the Village is doing. The following are contacts to pursue further:
 - a. <https://www.saskatchewan.ca/government/municipal-administration/funding-finances-and-asset-management/funding/canada-community-building-fund>
 - b. Questions: 306-787-1262 or ccbfprogram@gov.sk.ca
- ii. Investing in Canada Infrastructure Program (ICIP) – This program provides eligibility for all types of Saskatchewan infrastructure projects. There are five streams of project funding. One stream is “Green Infrastructure”, which supports the needs for safe drinking water. That also has the greatest funding component to it. The following are contacts to pursue further.
 - a. <https://www.saskatchewan.ca/government/municipal-administration/funding-finances-and-asset-management/funding/investing-in-canada-infrastructure-program>
 - b. Questions: 306-787-1262 or infr@gov.sk.ca
- iii. Provincial Territorial Infrastructure Component Program (PTIC) – This program is a part of the “New Building Canada Fund (NBCF)”. There is a section of this program designed for Small Communities (< 100,000 residents). The program is designed for infrastructure programs resulting in economic growth, cleaner environment, developing sustainable communities, and other. These are relevant to asset management initiatives. The follow are contacts to pursue further:
 - a. <https://www.saskatchewan.ca/government/municipal-administration/funding-finances-and-asset-management/funding/nbcf>
 - b. Questions: 306-787-1262 or infr@gov.sk.ca
- iv. Clean Water and Wastewater Fund Program (CWWF) – This program is also part of the “New Building Canada Fund (NBCF)”. This program is targeted for projects that can be designed and constructed over a short-term including water and wastewater treatment systems, water distribution, and wastewater collection. The follow are contacts to pursue further:
 - a. <https://www.saskatchewan.ca/government/municipal-administration/funding-finances-and-asset-management/funding/nbcf>
 - b. Questions: 306-787-1262 or infr@gov.sk.ca

6. Implementation Plan

Based on the short-range (5-year) program strategy, the following table summarizes a step-by-step implementation plan the Village may use as a guide in delivering their asset management plan moving forward. Specific details of the individual assets and other related reporting is contained in the AM Database.

Action Item	Year	Comments
Asset Management Strategy	2022	Complete
LOS Targets and Corresponding Capital Renewal Strategy	2022	<p>Either adopt the LOS targets and corresponding capital renewal strategy as presented in this report; or use these as a guide to set Village generated LOS targets. The recommended targets include a 11% improvement in LOS over the 20-year horizon.</p> <p>Special LOS commitments may be given towards water systems which are critical asset groups.</p>
Initiate usage of the Asset Management Database	2022	Upon installation of the AM Database, which is loaded with LOS data and a recommended capital renewal program strategy, begin using the database to report on the current LOS and develop the detailed maintenance and capital works program for annual budget development.
Develop the Maintenance and Capital Renewal Annual Budget Program	2022-2026	<p>Initiate the program by developing the maintenance and capital renewal budget using the AM Database. Adjust as appropriate to do so. This should be an annual occurrence.</p> <p>Initiate design engineering and tender preparation as appropriate for the more significant and outsourced works. Refer to AM Database for program specific details of location, condition state, and preliminary cost estimates.</p>
Water Supply and Treatment Preliminary Engineering	2022	<p>Conduct upgrade planning in union with other regional water systems planning initiatives by the RM of Milton (i.e. Alsask)</p> <p>One concept to consider is receiving potable water from an upgraded Alsask system and Marengo providing distribution to the Village.</p>
Streetscape Planning	2022	Conduct some form of streetscape planning to confirm the functionality and appeal of streets and sidewalks throughout the village. In addition, confirm streets to remain, added, or removed as paved with sidewalks versus gravel surfaces. Confirm the drainage type for both paved and gravel roads.
Roads and Sidewalks Design Engineering	2023	Based on the concept of the streetscape planning, and consideration for any subsurface utility upgrades, complete design engineering and tender preparation for paved roads and sidewalk upgrades. The current strategy assumes the following activities within the short-range horizon. This may

		<p>be adjusted based on the streetscape planning and practical engineering judgement:</p> <ul style="list-style-type: none"> • Paved Roads: <ul style="list-style-type: none"> ○ Patching and Crack Filling – 7 segments - \$12,000 ○ Micro-Surface – 4 segments - \$69,000 ○ Resurface – 2 segments - \$58,000 • Sidewalks: <ul style="list-style-type: none"> ○ Bonded Overlay – 1 segment - \$5,000 ○ Diamond Grinding and Bituminous Overlay – 5 segments - \$34,000 ○ Replace – 2 segments - \$64,000
Roads and Sidewalks Construction	2024-2026	Based on the design engineering, implement the upgrade/renewal of the paved roads and sidewalks
Buildings Renewal	2022-2024	<p>One item expected during this horizon</p> <ul style="list-style-type: none"> • Municipal office roof and siding repair - \$600 (Village share)
Equipment and Machinery Replacement	2022-2026	Nothing expected during this horizon
Infrastructure Condition Reassessment and Training	2026	<p>Conduct a reassessment of all infrastructure groups involving operations staff that would be trained during the process of conducting future condition assessments.</p> <p>The trained staff would enter the collected data into the AM Database and recompute the updated level of service and assess the changes from the base year 2021. A module exists in the AM Database for conducting field entry.</p> <p>Alternatively, reassessments could be completed by trained summer staff.</p>
Infrastructure Lifecycle Analysis - Update	2026	Consult an asset management specialist to utilize condition assessments by the Village to re-compute the lifecycle optimization maintenance & capital renewal strategy and update these planned works within the AM Database.

7. Conclusions and Recommendations

The following summarizes key conclusions and recommendations for implementation moving forward so the Village may sustain and maintain a viable asset management program as part of its on-going administration and operations.

7.1 Conclusions

- In accordance with the Government of Saskatchewan Gas Tax Program, this asset management plan attains the following:
 - Completes the Asset Management Policy and Strategy
 - Determines the current level of service (assets condition) and target level of service moving forward
 - Determines the financial gap needed to attain the target level of service
 - Develops an Asset Management Database, loaded with data analysis and results, so the Village can monitor and improve its asset management program moving forward
- The Asset Management Policy and Strategy was amended to include the Asset Management Database as a means for the Village to manage its asset management program moving forward.
- The Village's asset groups include rural and urban assets including, "Roads-Gravel", "Roads-Paved", Sidewalks, "Water Intake (raw water supply)", "Water Treatment", "Water Mains", "Sanitary Mains", "Sanitary Treatment (lagoon)", "Buildings", and "Machinery".
- The current replacement cost (RC) value of all infrastructure assets is estimated at \$4,333,000.
- The current LOS, considering all asset groups, is in fair shape with an overall remaining service life (RSL) of 54 percent.
- The asset groups with the lowest tolerance to risk of failure and consequence are those related to the water systems. The Village currently has some raw water supply issues. Addressing this may be done in union with the water treatment plant and even consideration of regional water system alternatives and coordination with similar initiatives within the RM of Milton.
- The water distribution system is functional and should have a long RSL with the pipe materials used. It does not meet fire flow. However, Water Security Agency standards provides the municipality the choice to provide fire flow or not, where costs are a decision factor. The costs to upgrade to meet fire flow capacity is significant. As a result, there is no water distribution upgrading included within the planning horizon of this study.
- The sanitary collection system is functional and should have a long RSL with the pipe materials used. However, the force main serving the residential dwellings to the gravity main, may be problematic to risk of backflow into the residences. As the risk may be manageable, there is no sanitary collection upgrading included within the planning horizon of this study.
- The sanitary treatment (i.e. facultative lagoon), appears to be losing containment. While it does not appear to be an immediate health risk, upgrading the lagoon is planned within the long-range (20-year) horizon.
- For the roads and sidewalks, the short-range horizon initiates renewal of the paved roads and sidewalks through a variety of mid-life and mid-cost preservation enhancing treatments to higher cost replacement/rehabilitation for those assets at the end of their service life. For the gravel roads, the greatest deficiency is a lack of ditch drainage. However, for paved roads, which rely on surface drainage to curb, the drainage functionality should be confirmed during the engineering

stage. However, in advance of any roads and sidewalks capital renewal initiatives, it would be prudent for the Village to complete some form of streetscape planning to verify the type of surface the Village visions (i.e. paved or gravel), the functionality (i.e. geometry, etc.) and visual appeal.

- The LOS target over the long-range (20-year) horizon would improve the assets overall remaining service life (RSL) by 11 percent, which brings the RSL total to 65 percent, which is a relatively good overall level of service. This results in a \$500,000 improvement in asset valuation. Much of this is driven towards surface works renewal and water supply and treatment upgrades. This also assumes the water mains remain unchanged including living with the fire flow capacity deficiencies. At the end of this horizon, the focus is forecast to be “Buildings” renewal.
- To get to the targeted LOS improvement, there is a projected funding gap of \$373,000 over the 20-year horizon. The funding gap can be reduced through a couple of options. For the water system upgrades, this has the potential for external grant funding for partial cost recovery. Some of the surface works renewal (i.e. gravel road ditch grading) could be deferred.
- The study's condition assessments, level of service analysis, and program strategy are housed in an Asset Management (AM) Database. The Village now has the tools and data in place to sustain and maintain its asset management program. Sustaining an asset management program will require additional time and resources by the Administrator and staff. Moving forward, the following are expected new activities the Village will need to allocate time and financial resources to:
 - Routinely update the AM Database based on reassessed condition assessments, completion of work, and adjusting the works program based on budget levels and level of service targets.
 - Train and develop staff on condition assessments and computing the current level of service
 - Potentially outsourcing the lifecycle analysis to update the recommended maintenance and capital program strategy in line with on-going level of service targets set by the Village.

7.2 Recommendations

- i. That the Village uses the findings of this report to set its asset level of service (LOS) targets for the short-range and long-range horizons; including consideration for the recommended LOS targets which would improve the overall asset remaining service life (RSL) by 11 percent over the 20-year horizon.
- ii. That the Village recognize the funding gap but research and leverage the various municipal infrastructure funding programs to deliver the infrastructure renewal needs and LOS targets.
- iii. That the Village recognizes the water systems asset groups as high priority with low tolerance to risk of failure due to the consequence of risk to the community. That the Village consider joint initiatives with the RM of Milton in a regional water system approach.
- iv. That the Village reviews the short-range capital renewal works program within this report and the Asset Management Database, conducts a field reality check, and deploys the program subject to changes as appropriate to do so.
- v. That the Village allocates the resources and incorporates the on-going activities of asset management within its administration and operations personnel.
- vi. That the Village invests as appropriate continued asset management training, including field level condition assessments by its operations staff.
- vii. That the Village use the data and analysis results of this study, housed within an Asset Management Database, as the foundation to manage its asset management program moving forward.