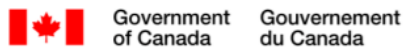




# **Village of Nakusp**

## **Asset Management Overview**

*Version 0.1 Sept 2023*



© 2023 Village of Nakusp, All Rights Reserved.

*The preparation of this project was carried out with assistance from the Government of Canada and the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.*

*LandInfo Technologies Inc grants the Village of Nakusp an irrevocable, perpetual, non-exclusive, worldwide, royalty-free license, with the right to sublicense, to use, reproduce, distribute, modify, adapt, change formats, prepare summaries, display, make improvements to and translate this report, which license includes a complete waiver of all non-assignable rights, including moral rights, that may exist.*



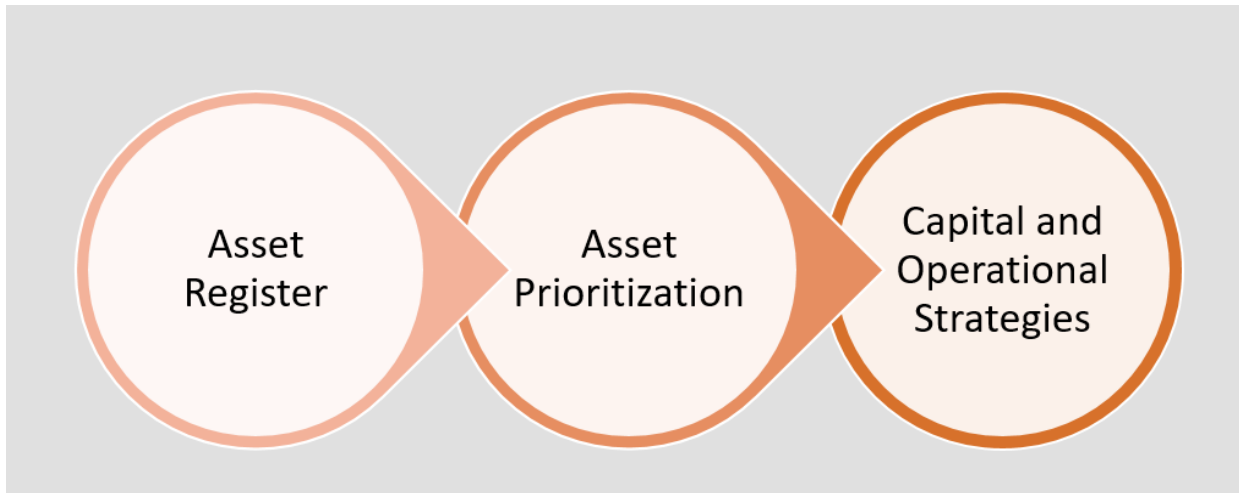
<b>Executive Summary</b>	<b>3</b>
<b>1. Asset Register</b>	<b>4</b>
<b>2. Policy and Governance</b>	<b>7</b>
<b>3. Revenue Sources</b>	<b>8</b>
I. Rate Payments	8
II. General Taxation	8
III. Debt Strategy	8
IV. Funding Potential	8
<b>4. Regulatory Environment</b>	<b>9</b>
I. Wastewater System Effluent	9
II. Drinking Water	9
III. Stormwater Regulations	9
IV. Facilities Regulations	9
V. Climate Change	9
<b>5. Short-Term Capital Investment Strategy</b>	<b>10</b>
I. Defining Risk	10
II. Priority of Capital Projects	12
III. Continuous Risk Management	12
IV. Level of Service	12
<b>6. Risk Profile</b>	<b>13</b>
<b>7. Capital Demand Projections</b>	<b>16</b>
I. Replacement cost estimates	16
II. Annual Average Infrastructure Demand	20
<b>8. Capital Works Recommendations</b>	<b>22</b>
I. Water Treatment and Distribution	22
II. Wastewater Collection and Treatment	23
III. Stormwater Collection	23
IV. Fleet	23
<b>9. Data Maintenance Recommendations</b>	<b>24</b>
<b>10. Financial Programs and Pro-Forma Budgets</b>	<b>25</b>
I. Five-Year Capital Plan	26
II. Operations and Maintenance	30
<b>Continuous Improvement Program</b>	<b>31</b>



## Executive Summary

Since infrastructure deteriorates due to age, it is very important to have access to information regarding the condition, cost of renewal, and the priority of infrastructure to ensure informed operational and management decision-making by staff and Council.

The Village followed a three-step approach in the development of its asset management plan. First, an asset inventory of all Village infrastructure was compiled. This was followed by a process of prioritizing assets. Lastly, focusing on high priority assets, capital and operational strategies were developed.



This document provides an overview of the process followed in the development of an asset management plan as well as proposals to support effective operational and strategic planning moving forward. This is meant to be a live document to be reviewed and updated by staff on a regular basis.

A detailed breakdown of service areas, location of infrastructure, and risk values can be found in the maps attached to this report and at [mycivitas.ca](http://mycivitas.ca), the Village's asset management website.



## 1. Asset Register

The Village of Nakusp has a GIS-based asset register and can be viewed at [mycivitas.ca](http://mycivitas.ca). It is maintained using QGIS, an open-source application. The Village manages infrastructure in the following infrastructure systems:

### Water Treatment and Distribution

The Village's water network is sourced from surface water intakes and two deep wells. Surface water is treated with a Level II water treatment system that employs membrane filtration, UV disinfection, and chlorine sanitization. Two wells draw water up from an aquifer where water is treated with chlorine before entering the distribution network. There are almost 40 kilometres of water piping captured in the Village's asset inventory. The Village also owns and operates a micro hydro generation station to extract energy from the surface water source pipeline before it enters the water treatment system.

### Wastewater Collection and Treatment

The Village provides wastewater collection and treatment services to residents. Wastewater is collected along the waterfront and the lift station in the Japanese Gardens pumps wastewater up to Highway 23 where it enters the wastewater treatment system. The wastewater treatment system includes a macerator, aeration tank, two lagoons that utilize hexa-covers, and a dissolved air floatation system. Treated water is discharged into the lake.

### Stormwater Collection

The Village owns stormwater infrastructure including culverts, pipes, catch basins, dry wells, and more. The majority of the stormwater infrastructure is near the downtown Village core along the main roads. There are 5.7 kilometres of stormwater pipes and culverts captured in the Village's asset inventory.

### Transportation

The Village owns pedestrian walkways, trails, and roads. The asset inventory has around 21 km of roads and 20 km of pedestrian walkway captured.

### Fleet and Equipment

The Village owns and operates a fleet as well as large equipment. At this point in time, the asset inventory does not include an exhaustive list of fleet vehicles and equipment.

### Buildings, Parks, and Recreation

The Village owns several facilities including the Nakusp Hot Springs, Nakusp and District Sports Complex, Emergency Services building, Seniors Centre, Centennial Building, Kinsman Building, marina, public works yard and Village office.

### Natural Capital Assets

Natural capital assets are defined as the stock of natural resources or ecosystems that are managed or could be managed or relied upon by a Village for the provision of one or more services to a community.

Natural capital assets included in the asset inventory were assets that:

- Support municipal service delivery - i.e. will have an impact on current services provided and



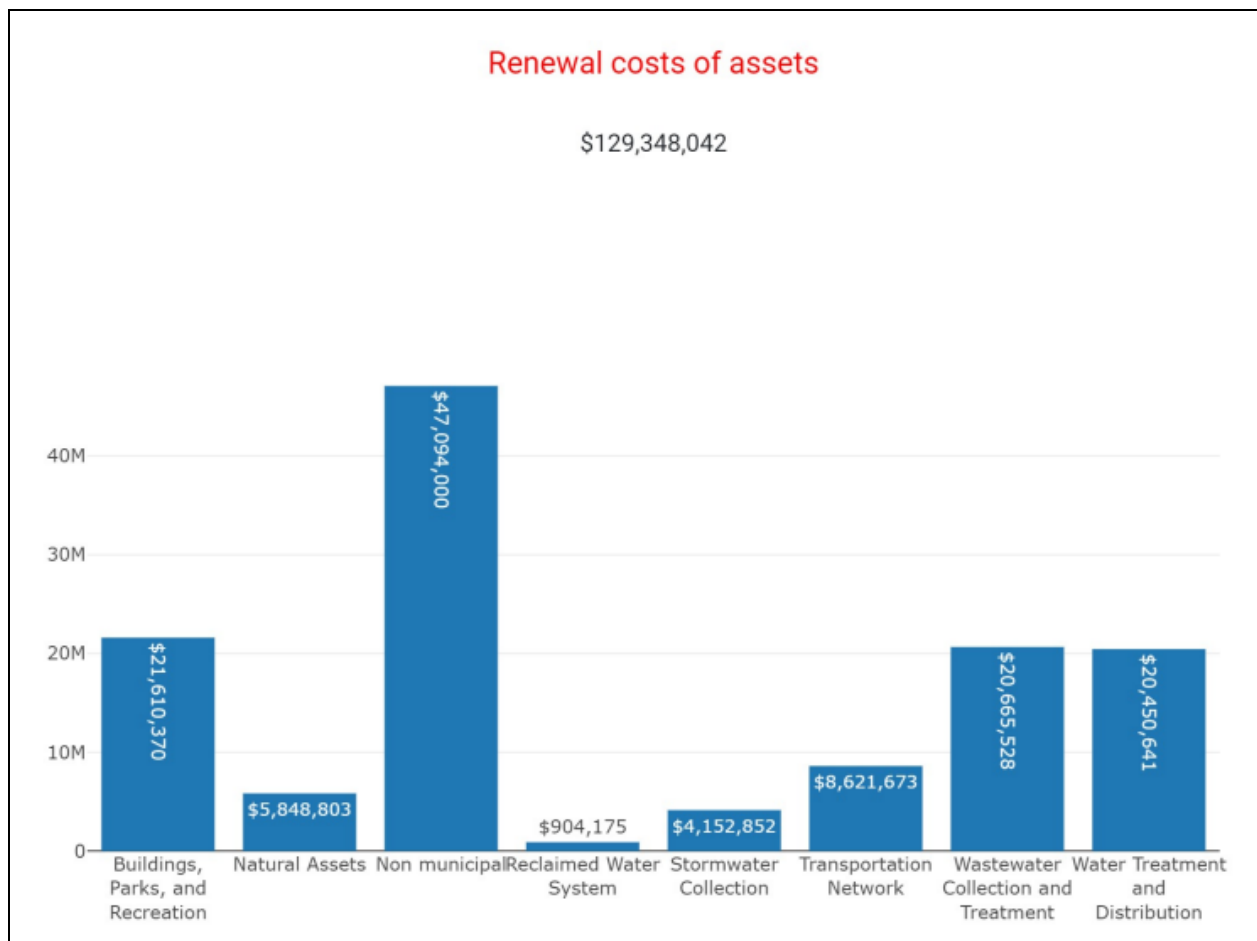
- are owned, managed or relied upon by the Village to support service delivery.

Natural resources not only contribute to essential local government services but also offer a wide range of additional benefits. In addition to fundamental municipal services, nature also plays a crucial role in providing recreational opportunities, regulating the climate, ensuring clean air, offering habitats, and supporting biodiversity. These significantly contribute to the overall health and prosperity of a community - however, these assets were not included in the asset inventory.

### Summary Graphs and Tables

Items in the Village’s asset register have estimated renewal values that are summarized in the following graph and table.

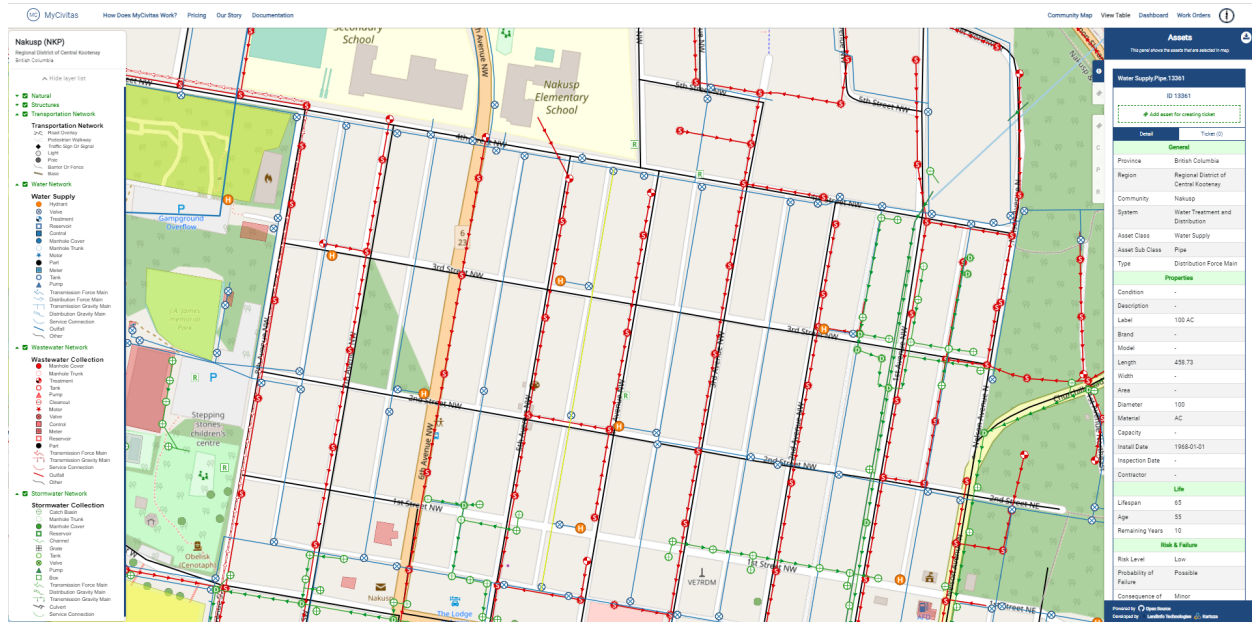
Figure 1.1: Asset Register Value



**Table 1.1: Renewal Cost by Asset Group (System)**

System Name	Total Sum	Total Percentage
Buildings, Parks, and Recreation	\$21,610,370	16.7%
Natural Assets	\$5,848,803	4.5%
Non municipal	\$47,094,000	36.4%
Reclaimed Water System	\$904,175	0.7%
Stormwater Collection	\$4,152,852	3.2%
Transportation Network	\$8,621,673	6.7%
Wastewater Collection and Treatment	\$20,665,528	16.0%
Water Treatment and Distribution	\$20,450,641	15.8%
<b>Total</b>	<b>\$129,348,042</b>	<b>100.0%</b>

Detailed information as well as summary graphs and tables are available on the Village’s [mycivitas.ca](http://mycivitas.ca) website.



## **2. Policy and Governance**

This capital program has been developed in accordance with applicable municipal plans and asset management principles with reference to the following guidance documents:

- OCP
- Water Master Plan
- Wastewater Master Plan
- Asset Management Policy





### 3. Revenue Sources

Nakusp generates revenue for capital maintenance, renewal and upgrades through general revenue from rate payments and taxes, borrowing, and grant funding.

#### I. Rate Payments

Water and sewer payments are set using flat rates depending on the category of property. An exhaustive list of specific rates and property categories can be found on the [Village's utility webpage](#). Water meters have been installed since 1996; however, are not currently used for payment calculations.

#### II. General Taxation

The Village's other services are supported by general tax revenue. Tax rates are set based on yearly budgets and projections of sustainable infrastructure investment. Tax rates can be found on the [Village's Tax Rate Bylaw](#).

#### III. Debt Strategy

Debt strategies will consider the long term life-cycle cost of infrastructure which will include initial capital requirements less funding, debt servicing requirements, allowance for maintenance cost over the life of the infrastructure, annual operations cost required to provide the service desired from the infrastructure and decommissioning or replacement cost at end of life. Debt spending will be used to maintain infrastructure services if:

- a) A level of service assessment has been completed for the existing or proposed infrastructure,
- b) the service has been deemed essential for the community,
- c) the community, via the council, is aware of the lifecycle cost of infrastructure, and
- d) the analysis has considered impacts on other essential service areas.

#### IV. Funding Potential

Capital infrastructure works funding is supplemented by applications to provincial and federal levels of government, as well as governmental agencies and nonprofits that direct funding to the municipal government to support capital works projects. Funding from these sources is not typically released according to long-term plans, so the availability of funding used in this planning document is, by necessity, speculative and based on historical availability. There are several online resources including [CivicInfo](#) that keep updated lists of municipal grants. Many grant providers realize the importance of climate resilience and the Village may benefit from studying how local climate change affects infrastructure systems.

##### Unconditional Grants

###### Small Communities Grant

Small community grants are unconditional grants for municipalities up to populations of around 19,000 to assist in providing basic services. This grant is guaranteed annually with no stipulations. It is used to support Nakusp's general operations and reduce taxes.

##### Other Funding Sources

Columbia Basin Trust

Investing in Canada Infrastructure Program

Union of BC Municipalities Funding

Gas Tax Agreements

FCM's Green Municipal Fund



## 4. Regulatory Environment

The Village's regulatory environment relates to wastewater, drinking water and facility regulations. A placeholder for climate change regulations exists to record their expected introduction in the upcoming years.

### I. Wastewater System Effluent

The Village samples effluent six days per week and performs monthly reporting with weekly third-party samples. The ministry of environment licenses the wastewater treatment facility. Currently, the Village appears to exceed discharge limits for phosphorus most days of the year. It has been noted that third-party testing results are being used temporarily while the treatment system is remediated by operations staff.

### II. Drinking Water

The Village operates a Level II water treatment and distribution system. Currently, no regulatory service gaps for water treatment, distribution and supply have been identified in the Region's Level of Service assessment. Interior Health licenses drinking water and relies on the Village's samples tested at a third-party laboratory.

### III. Stormwater Regulations

Stormwater will be managed in accordance with the provincial publication *Stormwater Planning: A Guidebook For British Columbia* and Nakusp policies, planning documents and guidelines.

### IV. Facilities Regulations

Municipal owned and operated facilities are to, at a minimum, be maintained in compliance with the BC Building Code at the time that they were constructed in compliance with BC legislation. Continuous updates to the BC Building Code related to safety and accessibility occur over time and may require significant funding to achieve upgrades to existing buildings. Nakusp's hierarchy of performance for facilities is as follows:

- Facilities will be upgraded for code compliance issues that pose an imminent risk to life and safety as soon as possible.
- All new construction will comply with the latest version of the BC Building Code.
- Existing facilities will be maintained such that performance meets at a minimum the code requirements at the time they were built.
- Existing facilities or parts of facilities that require renovation to continue providing services will incorporate the latest BC Building Code requirements.

### V. Climate Change

Currently, there are no known regulations for municipalities that regulate climate change adaptation or mitigation. Climate change adaptation and mitigation will be managed in accordance with Nakusp's policies, planning documents and guidelines.



## 5. Short-Term Capital Investment Strategy

The focus of public commentary and complaints is often based on the condition of visible, above-ground infrastructure and, due to the political nature of local government, can have a large impact on capital investment. It is necessary to strategically allocate Nakusp's finite capital funds with respect to all infrastructure.

Nakusp has adopted a risk management approach in prioritizing infrastructure capital investment. This approach is based on the principle that risk cannot be eliminated but it can be managed to an acceptable level. This risk-based approach seeks to balance the continuation of high-priority services with a capital investment that is acceptable to residents and stakeholders. Capital investment will prioritize high-risk assets first.

### I. Defining Risk

Risk is defined by two factors: Probability of failure (PoF) and consequence of failure (CoF).

#### Probability of Failure

PoF is related to the estimated remaining life of an asset shown in this table:

**Table 1: Probability of Failure**

PoF Rating	PoF Description	Estimated Remaining Life
1	Rare	More than 30 years
2	Unlikely	Between 15 and 30 years
3	Possible	Between 5 and 15 years
4	Likely	Between 0 and 5 years
5	Almost Certain	Less than 0 years

The estimated remaining life is calculated using a combination of condition values, age values, and expected lifespan values. PoF values automatically update with each passing year, and as infrastructure renewal and condition values are updated in Nakusp's asset register.



### Consequence of Failure

CoF is based on potential environmental, legal, economic, and social impacts of an asset failing.

**Table 2: Consequence of Failure**

CoF Rating	CoF Description
1	Minor
2	Moderate
3	Significant
4	Major
5	Catastrophic

CoF values were defined by staff and approved by elected officials for all Nakusp’s assets. CoF values should be reviewed by staff and elected officials regularly.

### Risk Matrix

A risk value is obtained by combining probability of failure and consequence of failure values as per the following matrix. It is common asset management practice to shift the matrix in favour of the consequence of failure, as seen below.

**Table 3: Risk Table**

Probability of Failure	5 Almost Certain	11 Low	16 Medium	20 High	23 Extreme	25 Extreme
	4 Likely	7 Minimal	12 Low	17 Medium	21 High	24 Extreme
	3 Possible	4 Minimal	8 Low	13 Medium	18 Medium	22 High
	2 Unlikely	2 Minimal	5 Minimal	9 Low	14 Medium	19 High
	1 Rare	1 Minimal	3 Minimal	6 Minimal	10 Low	15 Medium
		1 Minor	2 Moderate	3 Significant	4 Major	5 Catastrophic
			Consequence of Failure			



## II. Priority of Capital Projects

Nakusp has assigned a risk value to each asset in its asset register. Five-year capital plans are created by aiming to address infrastructure in the following order:

1. **Extreme-risk**
2. **High-risk**
3. **Medium-risk**

*In the event that there is budget remaining and no more unallocated extreme-risk or high-risk assets, medium-risk projects may be accelerated to prevent unsustainable infrastructure deficits in the future.*

4. **Reserve contributions**

*In the event that there is budget remaining after all extreme, high, and accelerated medium-risk assets have been addressed, Nakusp may contribute to reserve targets.*

5. **New infrastructure**

*If all reserve and spending targets are met, there may be an opportunity to invest in new infrastructure. Nakusp will evaluate infrastructure investments from a life-cycle cost perspective to ensure that decisions are sustainable.*

## III. Continuous Risk Management

Capital investment is about managing the appropriate balance between risk, levels of service and the cost of replacing infrastructure. On one hand, overall infrastructure risk is reduced by completing infrastructure renewal on extreme, high and medium risk assets. On the other hand, overall infrastructure risk continually increases as infrastructure ages because the probability of failure increases. By targeting capital spending and reserve targets that match the level of infrastructure demand, Nakusp ensures that infrastructure deficits do not create unmanageable infrastructure risk levels for future generations.

## IV. Level of Service

Other than the wastewater effluent not currently meeting phosphorus levels, the levels of service currently provided by the Village are considered to be on an acceptable level. No required increase or decrease of service levels or level of service gaps related to regulatory requirements were identified. The Council and staff will reassess the level of service annually and take into account any changes when a risk assessment is done. Increasing levels of service beyond current levels will require an increase in capital spending and reserve funding beyond that identified in this report.

Service Area	Level of Service Statement
Water Treatment and Distribution	Levels of service have been informally defined in policies and bylaws. The Village will continue to evaluate and meet existing levels of service for all service areas.
Wastewater Collection and Treatment	
Stormwater Collection	
Fleet and Equipment	
Buildings, Parks, and Recreation	
Transportation	



## 6. Risk Profile

A risk value was calculated based on the Probability of Failure and Consequence of Failure allocated for each asset feature captured in the asset register

**Fig 6.1: Risk profile by Asset Group (System)**

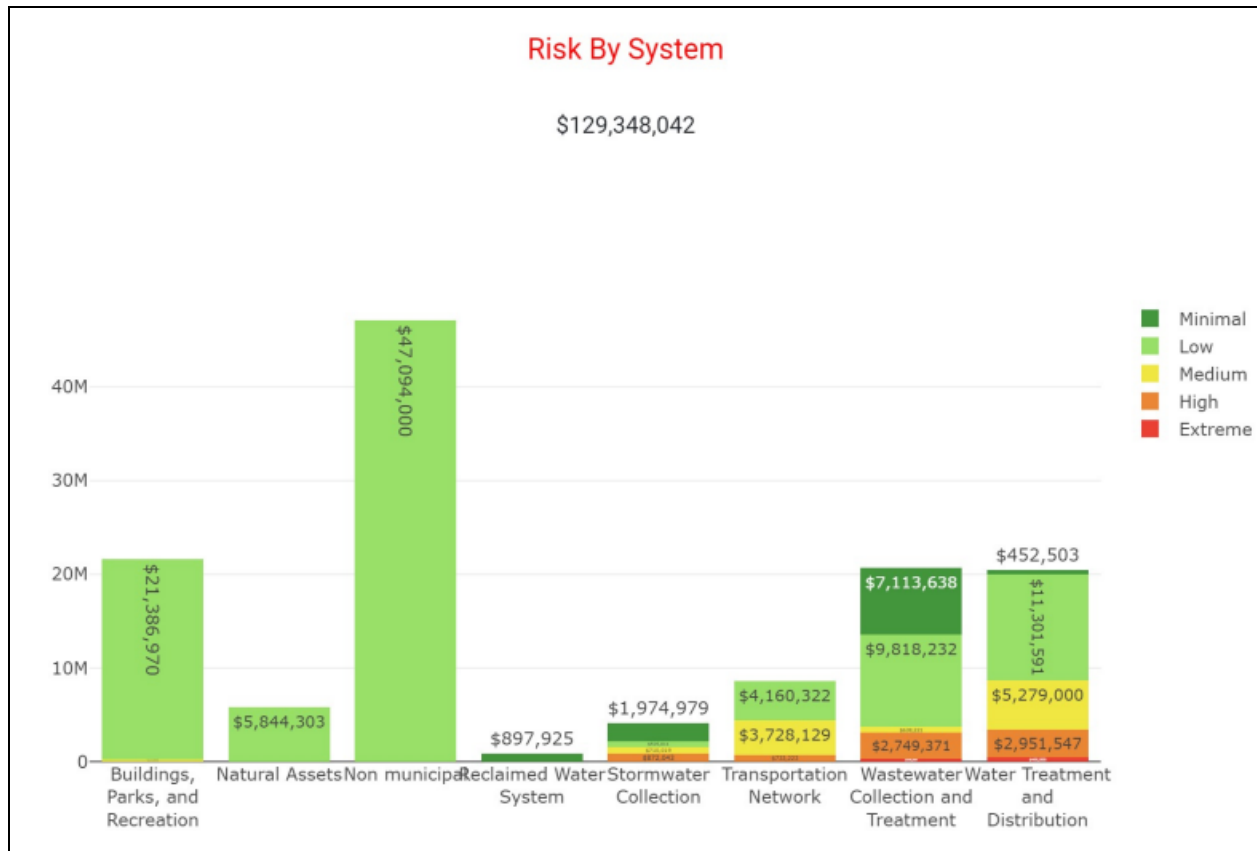


Fig 6.1 and Table 6.2 (below) shows extreme risk infrastructure was identified for wastewater collection and water distribution.while high risk assets were identified for water, wastewater, stormwater and roads.

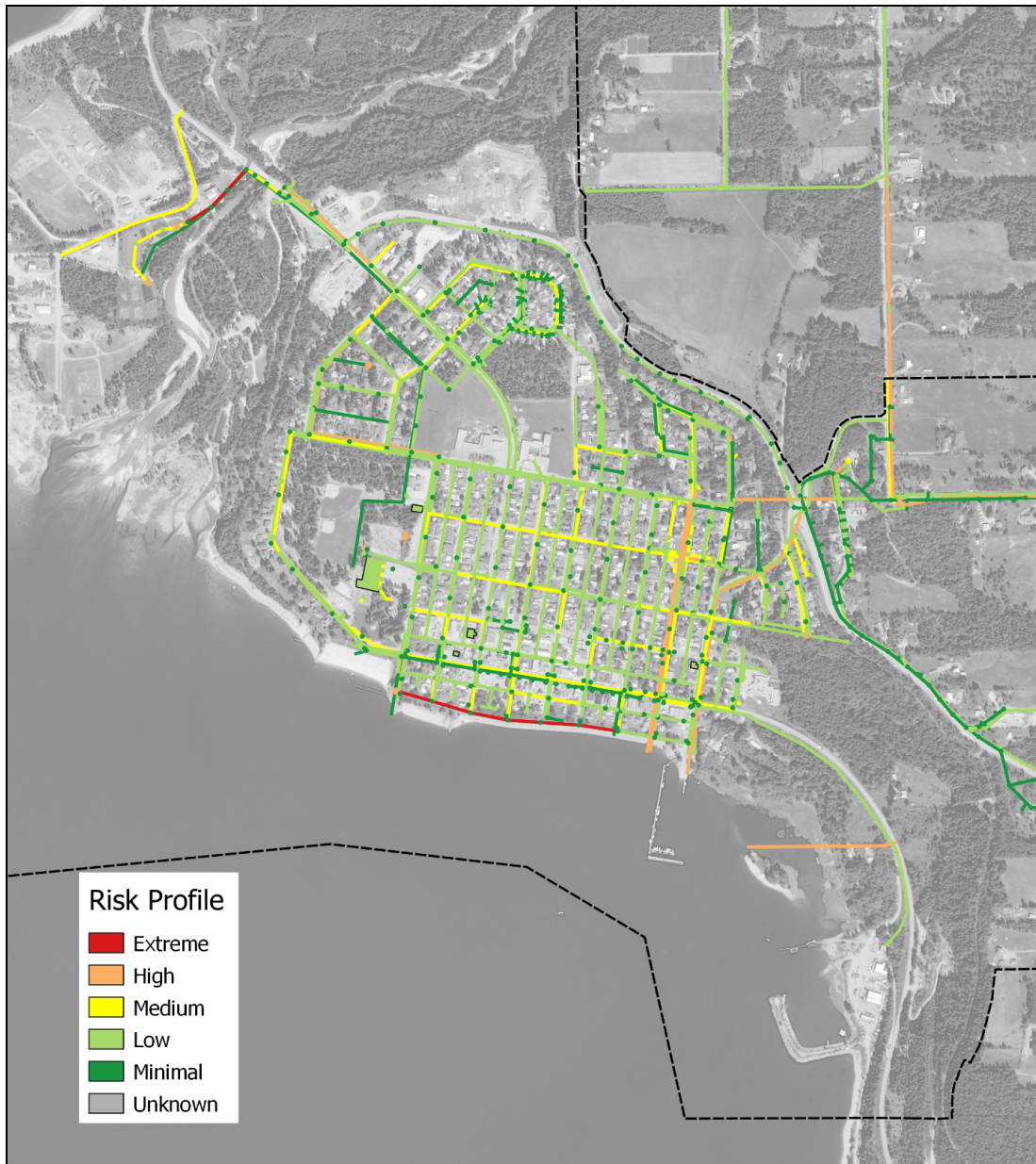


**Table 6.2: Risk value by Asset Group (System)**

System Name	Extreme	High	Medium	Low	Minimal	None	Total Sum	Total Percentage
Buildings, Parks, and Recreation	\$0	\$0	\$223,400	\$21,386,970	\$0	\$0	\$21,610,370	16.7%
Natural Assets	\$0	\$4,500	\$0	\$5,844,303	\$0	\$0	\$5,848,803	4.5%
Non municipal	\$0	\$0	\$0	\$47,094,000	\$0	\$0	\$47,094,000	36.4%
Reclaimed Water System	\$0	\$0	\$0	\$6,250	\$897,925	\$0	\$904,175	0.7%
Stormwater Collection	\$0	\$872,043	\$710,019	\$595,811	\$1,974,979	\$0	\$4,152,852	3.2%
Transportation Network	\$0	\$733,223	\$3,728,129	\$4,160,322	\$0	\$0	\$8,621,673	6.7%
Wastewater Collection and Treatment	\$346,067	\$2,749,371	\$638,221	\$9,818,232	\$7,113,638	\$0	\$20,665,528	16.0%
Water Treatment and Distribution	\$466,000	\$2,951,547	\$5,279,000	\$11,301,591	\$452,503	\$0	\$20,450,641	15.8%
<b>Total</b>	<b>\$812,067</b>	<b>\$7,310,683</b>	<b>\$10,578,768</b>	<b>\$100,207,479</b>	<b>\$10,439,045</b>	<b>\$0</b>	<b>\$129,348,042</b>	<b>100%</b>



Figure 6.3: Risk Map



The risk map above shows the current risk profile of all mapping layers of Nakusp's infrastructure. An interactive map is available at [mycivitas.ca](http://mycivitas.ca). An extreme-risk sewer main that runs along the waterfront walkway has been identified. A high-risk water main has been identified that runs from Glenacres to Nelson Avenue N along Churchill Road. A high-risk stormwater culvert has been identified that runs along 1st Avenue NW.





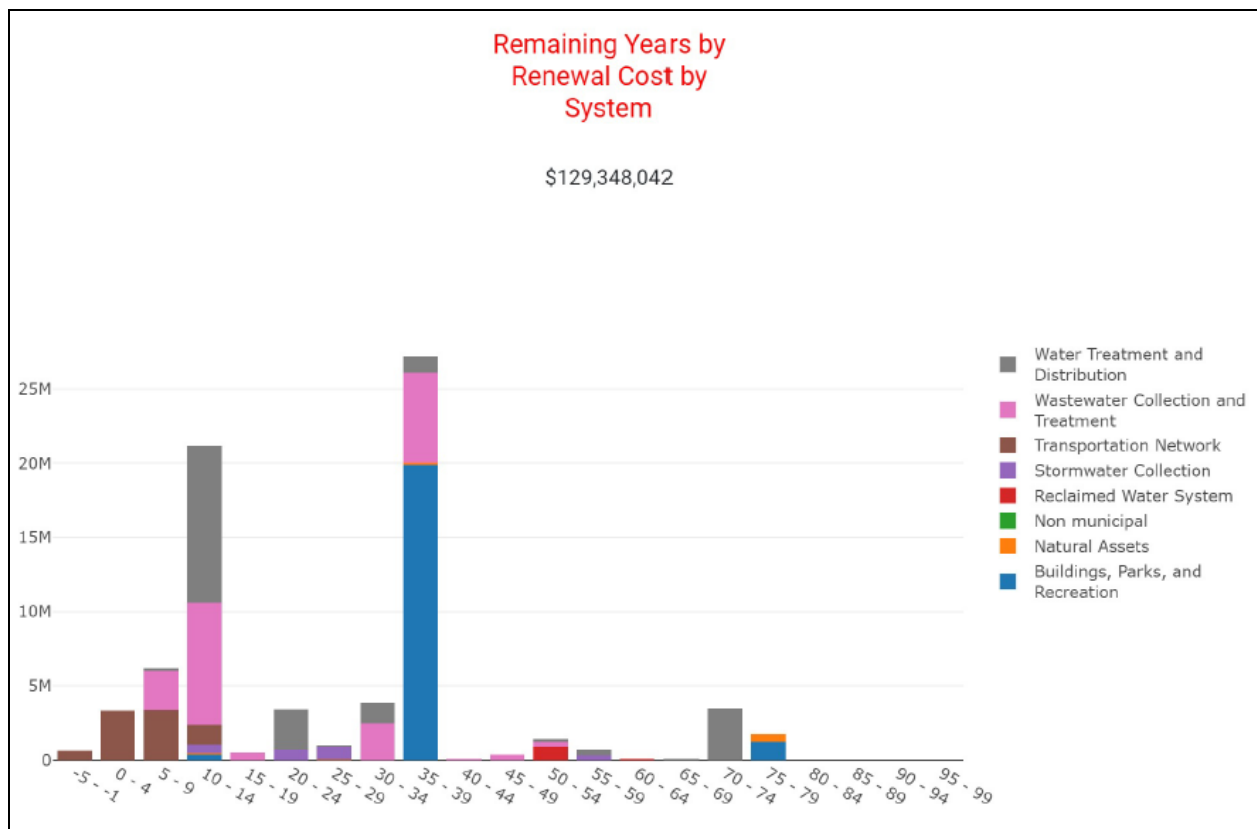
## 7. Capital Demand Projections

### I. Replacement cost estimates

As a starting point, we calculated an estimated replacement cost (valued at the current CAD rate) and projected the remaining lifespan for every asset recorded in the asset inventory. For the Village's capital demand projection, the assumption was made that assets would be replaced upon reaching the end of their design life. Nevertheless, it is important to note that in practice, assets can continue to function effectively beyond their designated design life. Achieving this longevity is possible through measures such as preventive maintenance and risk mitigation, among others.

The graphs and tables below show a projection of Nakusp's long-term infrastructure demand over the next 100 year

Figure 7.1: Replacement cost by System (100 years)

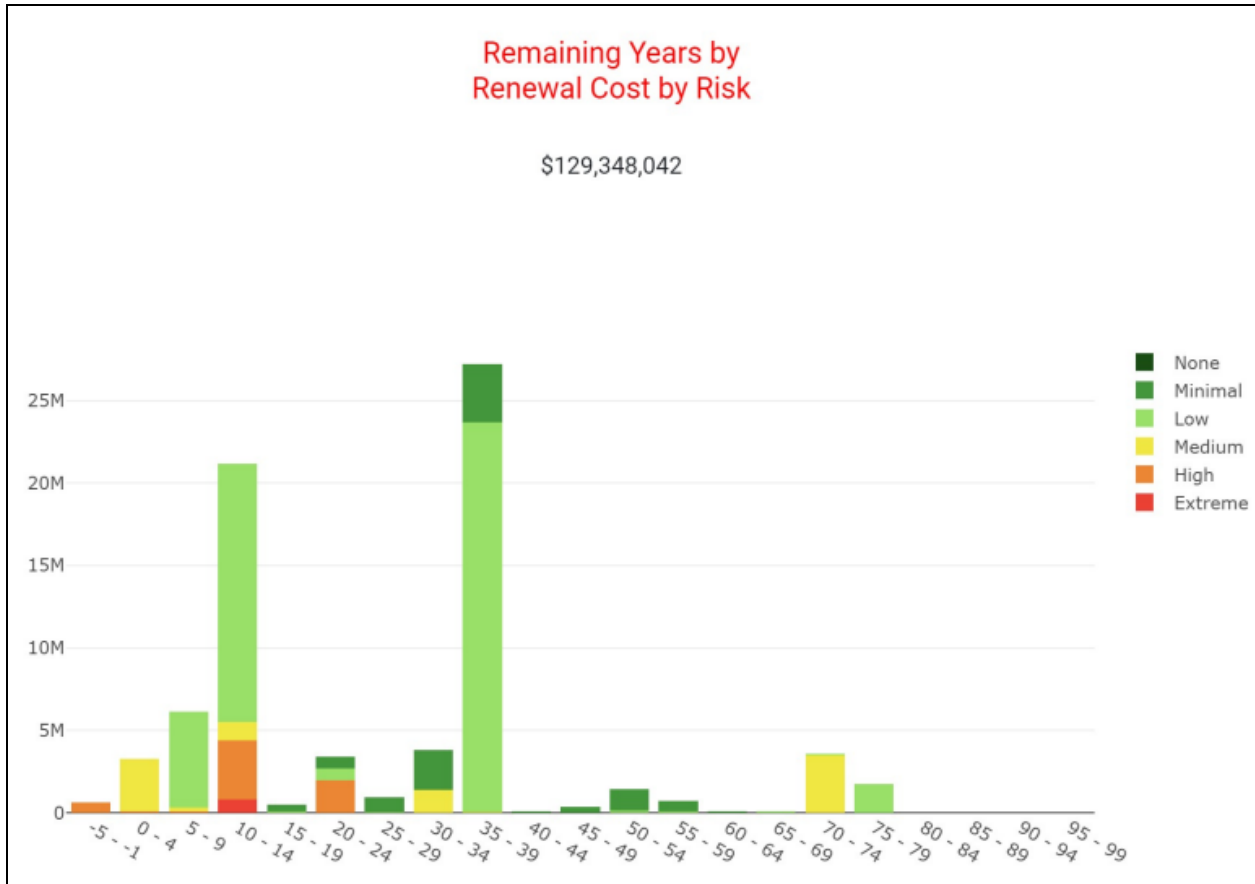


**Table 7.1: Replacement cost by System (100 years)**

Remaining Years	Buildings, Parks, and Recreation	Natural Assets	Non municipal	Reclaimed Water System	Stormwater Collection	Transportation Network	Wastewater Collection and Treatment	Water Treatment and Distribution	Total Result
-5 - -1	\$0	\$0	\$0	\$0	\$0	\$631,172	\$0	\$0	\$631,172
0 - 4	\$0	\$4,500	\$0	\$0	\$0	\$3,293,977	\$0	\$0	\$3,298,477
5 - 9	\$0	\$0	\$0	\$0	\$0	\$3,377,257	\$2,675,000	\$77,500	\$6,129,757
10 - 14	\$435,387	\$12,000	\$0	\$0	\$595,811	\$1,319,268	\$8,233,183	\$10,592,860	\$21,188,509
15 - 19	\$10,000	\$0	\$0	\$0	\$0	\$0	\$472,522	\$0	\$482,522
20 - 24	\$0	\$0	\$0	\$0	\$735,604	\$0	\$0	\$2,687,500	\$3,423,104
25 - 29	\$0	\$54,000	\$0	\$0	\$909,375	\$0	\$0	\$7,500	\$970,875
30 - 34	\$0	\$0	\$0	\$0	\$0	\$0	\$2,456,250	\$1,379,000	\$3,835,250
35 - 39	\$19,948,753	\$79,500	\$0	\$0	\$0	\$0	\$6,078,383	\$1,105,256	\$27,211,892
40 - 44	\$0	\$0	\$0	\$0	\$0	\$0	\$68,750	\$0	\$68,750
45 - 49	\$0	\$0	\$0	\$0	\$0	\$0	\$383,416	\$0	\$383,416
50 - 54	\$0	\$22,500	\$0	\$895,950	\$0	\$0	\$298,025	\$243,953	\$1,460,428
55 - 59	\$0	\$0	\$0	\$6,250	\$330,000	\$0	\$0	\$388,947	\$725,197
60 - 64	\$0	\$0	\$0	\$1,975	\$0	\$0	\$0	\$0	\$1,975
65 - 69	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$18,750	\$18,750
70 - 74	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,512,500	\$3,512,500
75 - 79	\$1,216,230	\$533,925	\$0	\$0	\$0	\$0	\$0	\$0	\$1,750,155
80 - 84	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
85 - 89	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
90 - 94	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
95 - 99	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>\$21,610,370</b>	<b>\$706,425</b>	<b>\$0</b>	<b>\$904,175</b>	<b>\$2,570,790</b>	<b>\$8,621,673</b>	<b>\$20,665,528</b>	<b>\$20,013,766</b>	<b>\$129,348,042</b>



Fig 7.2: Replacement cost by Risk (100 years)



**Table 7.2: Replacement cost by Risk (100 years)**

Remaining Years	Extreme	High	Medium	Low	Minimal	None	Total Result
-5 --1	\$0	\$631,172	\$0	\$0	\$0	\$0	\$631,172
0 - 4	\$0	\$106,551	\$3,191,926	\$0	\$0	\$0	\$1,772,571
5 - 9	\$0	\$77,500	\$246,807	\$5,805,450	\$0	\$0	\$6,129,757
10 - 14	\$812,067	\$3,565,293	\$1,130,105	\$15,681,044	\$0	\$0	\$21,188,509
15 - 19	\$0	\$0	\$0	\$90,531	\$391,991	\$0	\$482,522
20 - 24	\$0	\$2,000,000	\$0	\$687,500	\$735,604	\$0	\$3,423,104
25 - 29	\$0	\$0	\$0	\$55,250	\$915,625	\$0	\$970,875
30 - 34	\$0	\$0	\$1,375,250	\$0	\$2,460,000	\$0	\$3,835,250
35 - 39	\$0	\$0	\$45,911	\$23,650,775	\$3,515,206	\$0	\$27,211,892
40 - 44	\$0	\$0	\$0	\$0	\$68,750	\$0	\$68,750
45 - 49	\$0	\$0	\$0	\$0	\$383,416	\$0	\$383,416
50 - 54	\$0	\$0	\$0	\$124,472	\$1,335,956	\$0	\$1,460,428
55 - 59	\$0	\$0	\$0	\$94,675	\$630,522	\$0	\$725,197
60 - 64	\$0	\$0	\$0	\$0	\$1,975	\$0	\$1,975
65 - 69	\$0	\$0	\$0	\$18,750	\$0	\$0	\$18,750
70 - 74	\$0	\$0	\$3,500,000	\$12,500	\$0	\$0	\$3,512,500
75 - 79	\$0	\$0	\$0	\$1,750,155	\$0	\$0	\$1,750,155
80 - 84	\$0	\$0	\$0	\$0	\$0	\$0	\$0
85 - 89	\$0	\$0	\$0	\$0	\$0	\$0	\$0
90 - 94	\$0	\$0	\$0	\$0	\$0	\$0	\$0
95 - 99	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total</b>	\$812,067	\$6,380,515	\$9,489,999	\$47,971,101	\$10,439,045	\$0	\$129,348,042

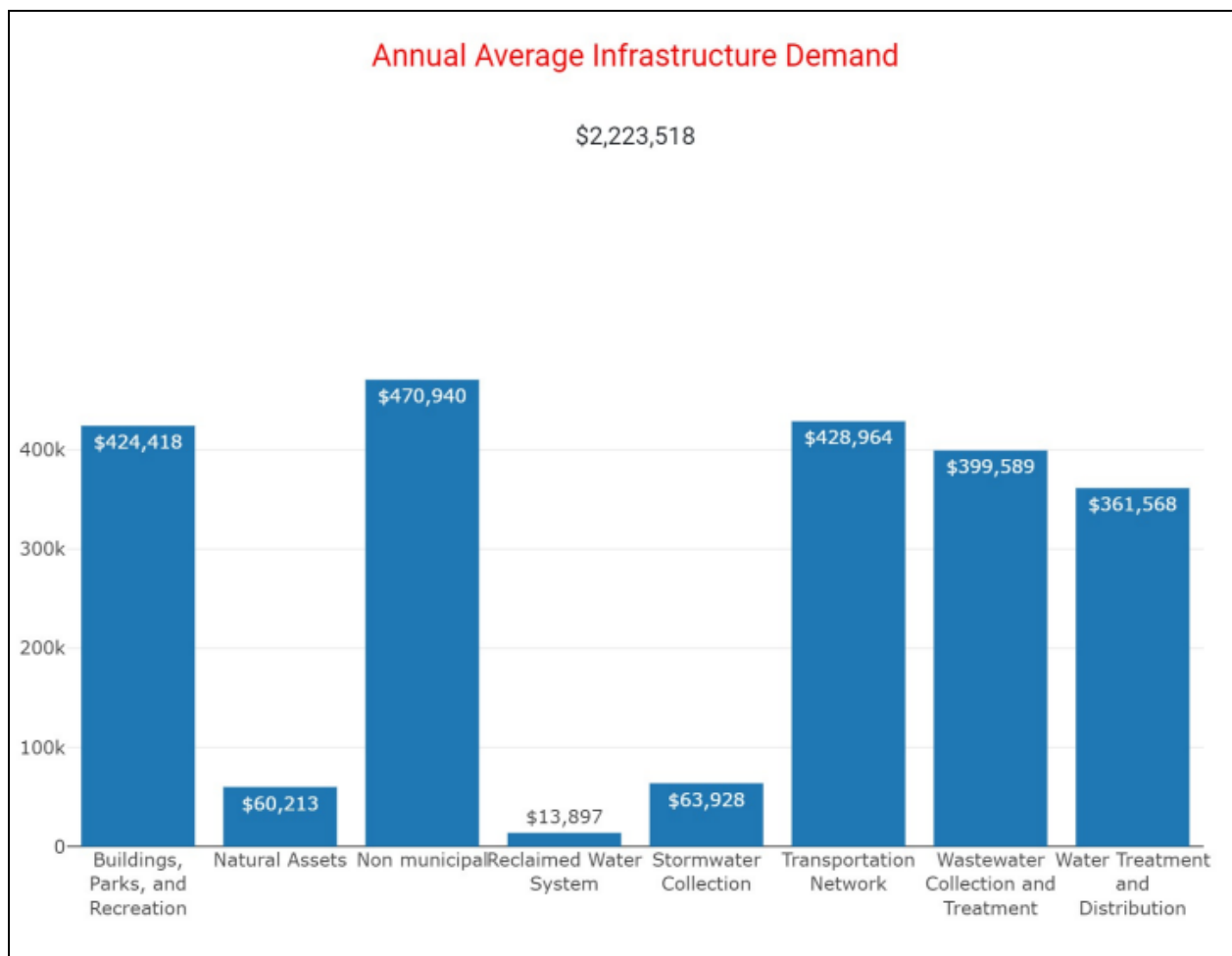


## II. Annual Average Infrastructure Demand

An Annual Average Infrastructure Demand is a theoretical calculation aimed at forecasting the expected future capital requirement necessary for upkeeping the Village's current infrastructure. To put it more simply, it offers an approximation of the funds the Village should allocate to ensure they possess adequate financing for replacing their assets when they reach their expected end of design life.

To calculate this annualized value, we divide the renewal cost of each asset in the database by its lifespan, and then we sum up these individual calculations. As we regularly update the data pertaining to lifespan and renewal costs, the annual infrastructure demand will adjust accordingly and could potentially be lowered by committing to operations and maintenance programs to extend lifespans, deciding to rehabilitate versus replace, and more. The total Annual Average Infrastructure Demand calculated for 2023 is approximately \$2.2 M. A more detailed summary is set out in the graphs and tables below.

Fig 7.3: Annual Average Infrastructure Demand per System



**Table 7.3 Annual Average Infrastructure Demand (per system)**

System Name	Total Sum	Total Percentage
Buildings, Parks, and Recreation	\$424,418	19.1%
Natural Assets	\$60,213	2.7%
Non municipal	\$470,940	21.2%
Reclaimed Water System	\$13,897	0.6%
Stormwater Collection	\$63,928	2.9%
Transportation Network	\$428,964	19.3%
Wastewater Collection and Treatment	\$399,589	18.0%
Water Treatment and Distribution	\$361,568	16.3%
<b>Total</b>	<b>\$2,223,517</b>	<b>100.0%</b>

Nakusp has a target funding threshold of, on average, 75% of capital project spending over the long-term. Based on the calculations above, a target average annual amount of \$550,000 (25% of \$2,2M) is estimated to be sufficient to cover the Village’s contribution.

If revenue for capital investment cannot meet the projected infrastructure deficits, the Village will be accepting a higher risk of service failure, where service failure is defined as *“not meeting the intended level of service”*. For example, the frequency and severity of water main breaks will increase with a longer duration of service outages of capital projects to replace water mains are delayed due to insufficient funding. Over the long term, the Village will experience a continued reduction in service levels such as poorer average road condition, increased incidences of stormwater backup and unexpected downtime or reduced programming at recreational facilities. This is not to be interpreted as a mandate to increase user fees and municipal tax rates. A well-thought-out plan to defer infrastructure renewal by reducing target levels of service can be a key strategy in managing asset performance when funding is limited.



## 8. Capital Works Recommendations

Capital projects are identified by analyzing risk values, communicating with staff, researching existing studies, and including existing capital projects. Opinions of possible cost estimates in **Section 9: Financial Programs and Pro-Forma Budgets**.

### I. Water Treatment and Distribution

#### Water Sources

There appears to be a significant risk related to meeting water demand attributed to the lack of redundancy of the Village's water sources. The 2021 Water Master Plan by 9dot Engineering states that the two wells have a maximum capacity of 47.5 L/s and the water treatment plant has a capacity of 25 L/s. The maximum day demand in 2020 was 53.7 L/s<sup>1</sup> and if any one of the water sources fails, then the system is unable to meet the maximum demand. Considering Nakusp's upward trend of water usage, this is a short-term risk that should be addressed. Two projects were recommended from the Village's water master plan to address this risk including designing and constructing a new well and reservoir which have been included in this capital plan.

#### Water Distribution Network

The Village's asset register has a total of 37 km of water pipe captured. About 26 km of the water pipes are asbestos cement (AC), 6 km are ductile or galvanized iron, and 4 km are PVC. Over 80% of the Village's water distribution network has estimated install years from the late 1960s. A commonly accepted lifespan for underground water pipes is 65 years, which indicates that these older pipes are expected to reach their theoretical end-of-life in the 2030s. Based on this information, the Village has a large upcoming infrastructure deficit and should begin planning on addressing these underground mains.

The current renewal estimate for water mains that reach their theoretical end-of-life in the 2030s is over \$10 million. In practice, AC pipes sometimes exhibit lifespans closer to 100 years. AC pipes are generally problematic when they begin requiring maintenance as health hazards arise when the existing pipe needs to be cut into. In the short term, the Village should closely monitor areas where AC pipe shows signs of failure and prepare to proactively replace these mains before operations and maintenance costs increase sharply. Stocking spare parts for these projects may be beneficial. It is also recommended that the Village begin to search for funding opportunities and contribute to a reserve fund specifically for underground water main replacement. The reserve fund will support the municipal contribution to the projects when advantageous funding programs become available.

The Village should consider creating and maintaining a hydraulic model for the water network. These models evaluate water supply and water demand to help identify areas that do not meet regulations for current water consumption and fire flows, and can evaluate scenarios based on consumption projections. This model will be crucial to servicing properties on the north-side expansions.

It has been noted that funding sources for replacing aging infrastructure mains is difficult to obtain. The Village should consider studying the potential effects of hotter and drier summers on the water infrastructure network. Climate resilience is a heavily discussed topic in higher levels of government and may allow the Village to access funding for distribution network improvements. Reducing unaccounted-for water by identifying and fixing leaks may be a viable project that targets climate

---

<sup>1</sup> 9dot Engineering, Village of Nakusp - 2021 Water Master Plan



resilience by improving water conservation by addressing potential lower levels of water supply.

## **II. Wastewater Collection and Treatment**

### **Wastewater Treatment**

The treatment plant is currently being upgraded as part of a multi-year project. It has been noted that the treatment plant exceeds regulated discharge limits for phosphorus levels.

### **Wastewater Collection**

Over 27 kilometres of the Village's underground wastewater infrastructure has an install year in the 1970s. Projecting a 65-year lifespan, these underground sewer mains reach their theoretical end-of-life in the late 2030s. These pipes present a large potential infrastructure in the future and the Village should begin planning to address this demand. Failures of wastewater lines are usually indicated by increases in infiltration and inflow (I&I) into the wastewater system. Monitoring flows at lift stations and treatment plants for increases during heavy rainfall and high groundwater table conditions can indicate areas of concern for wastewater pipe condition degradation.

Similar to the water distribution system, it has been noted that funding sources for replacing aging infrastructure mains are difficult to obtain. The Village should consider studying the potential effects of extreme rainfall events on the sewer infrastructure network. Climate resilience is a heavily discussed topic in higher levels of government and may allow the Village to access funding for sewer collection renewal. Infiltration and inflow are major challenges in aging wastewater collection systems and can over-burden the designed capacity of wastewater treatment plants. The extreme rainfall events observed in 2021 showed several instances of municipal treatment plants failing due to the increased capacity.

The Village should consider creating and maintaining a hydraulic model for the wastewater network. These models evaluate sewer demand and capacity of pipe networks, pump stations, and the treatment system to help identify problem areas. Scenarios can be created that demonstrate changes in capacity from inflow and infiltration.

## **III. Stormwater Collection**

Two large areas of very poor condition stormwater culverts are indicated as extreme-risk to the Village. The first follows 1st Avenue NW from 4th Street to the waterfront. The second collects stormwater from the highway to Churchill Road to Nelson Avenue to the waterfront. These culverts and pipes are in very poor condition and are critical to transporting stormwater through the Village. It has been noted that several sections of the culverts and pipes are severely eroded. A project has been added to the capital program to remediate this area.

## **IV. Fleet**

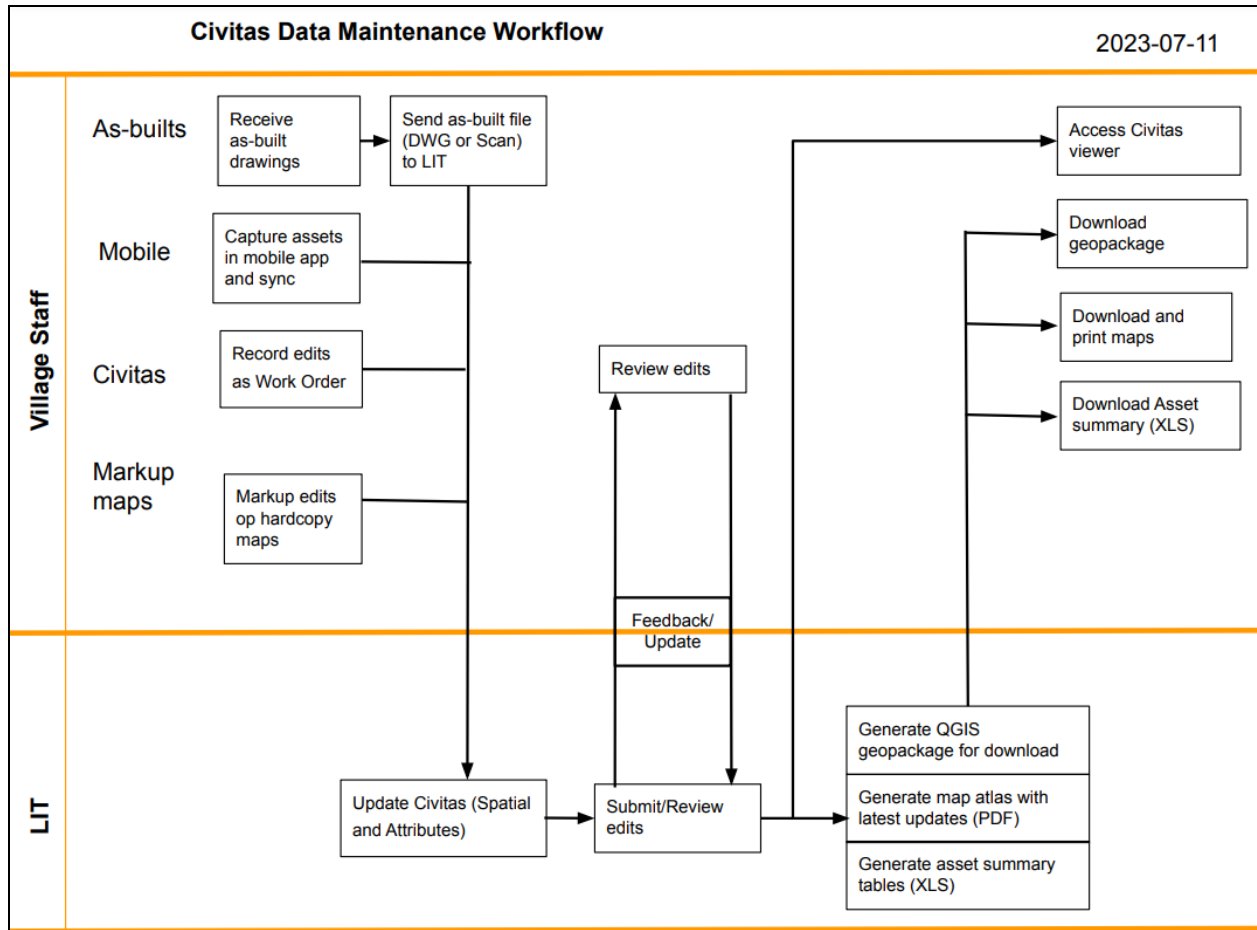
Nakusp's fleet is not discussed in this capital plan. The fleet is managed in accordance with the internal 20-year fleet management plan.





## 9. Data Maintenance Recommendations

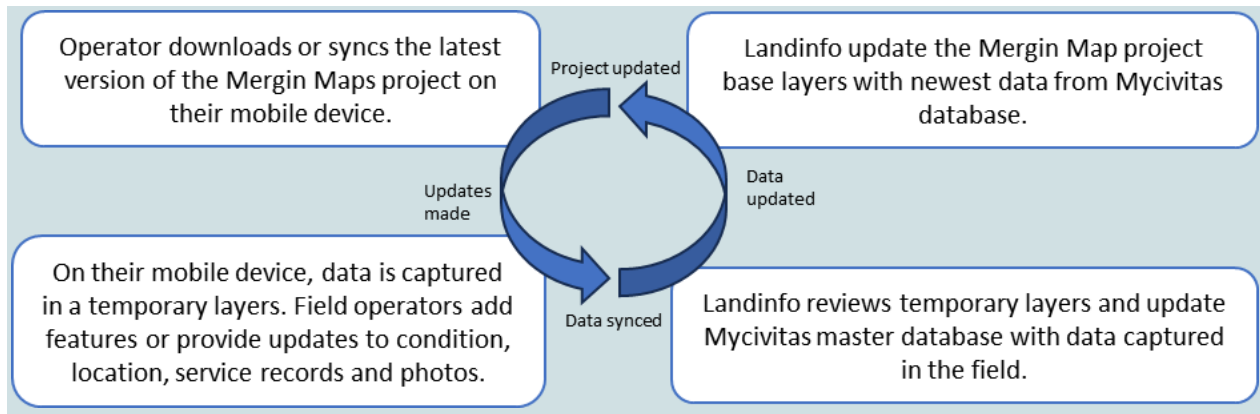
Data maintenance is very important to ensure informed decision making. Keeping your database up to date is essential for data accuracy, continuity and operational efficiency. Regular updates help, mitigate risks, and maximize the value of your data assets. A process to maintain data and keep it as up to date as possible is needed to ensure accuracy of your data sets, the diagram below provides an overview of the current workflow in place.



Using a mobile application (Mergin Maps) is the recommended and most effective option to update data. Frequent updates by staff members can be done and uploaded to the Landinfo’s Mergin Maps server. In turn Landinfo will review data to ensure accuracy then make the required changes to the master data set.



The Mergin Maps update work flow is described below



See Appendix A for Mergin Map Mobile Application user guide

## 10. Financial Programs and Pro-Forma Budgets

Where applicable, the cost basis of capital projects is based on estimations consisting of the following:

65%	Capital Costs
15%	Contingency
10%	Design
10%	Inspections and Removal

In some cases, where this general formula is not applicable, or a project requires significantly less or more effort in one of the above areas, a custom cost is applied to the project components in the capital program and in the inventory database.



## I. Five-Year Capital Plan

### Well #3 Design and Construction, 2022

*“The two existing groundwater wells (Well #1 and Well #2) currently have the capacity to supply a combined total of 60 L/s which is roughly four times less than the theoretical long-term capacity of the source aquifer (245 L/s). Therefore, a third well that sources water from the same aquifer can increase the water capacity and provide redundancy which is critical for long-term operation. Redundancy will allow for water demands to be continued to be met despite excessive demand or operational failure of either Well #1 or Well #2.”<sup>2</sup>*

This project is estimated to cost \$900,000 and is being funded entirely by the Village.

### New Reservoir Design and Construction, 2022

*“The Village has historically experienced water shortages during the summer months due to a combination of low creek flows and overcapacity demand on Well #1 and Well #2 as the run times of the wells are limited by the current storage capacity. In order to accommodate the peak water demand for domestic, fire protection and irrigation use, a new storage reservoir has been proposed. The newly proposed 200,000-gallon reservoir will allow the wells to increase their run time as the wells currently shut off when the reservoir is full. The storage reservoir will also provide redundancy in the event that low creek flows prevent the 1,000,000-gallon reservoir from operating at full capacity, or if Well #1 and Well #2 are rendered inoperable. As well, the additional reservoir will assist the Village in meeting all future needs.”<sup>2</sup>*

This project is estimated to cost \$800,000 and is expected to be funded entirely by the Village.

### Halfway Creek Intake Remediation, 2022

This project is scheduled for completion in 2022 with a total cost of \$40,000.

### DownVillage Revitalization - Phase 3, 2022

This project includes sidewalks, lighting, benches and other above-ground infrastructure in the Village’s downVillage core. The total project cost is estimated at \$700,000 and is expected to be entirely covered by grant funding. This project is scheduled for 2022.

### Rotary Playground Adventure Park, 2022

This project is expected to cost \$255,000 in total with a municipal contribution of \$50,000 and the remaining cost covered by grants.

### Wastewater Treatment Plant Upgrades, 2022 - 2024

This project includes upgrading the wastewater treatment plant’s headworks to eliminate the manual removal of solid garbage, upgrading the aeration in the lagoons, and other improvements to meet effluent regulations. The total cost is expected to be \$1.35 million and \$945,000 is covered by grant funding. This project will span three years from 2022 and be completed in 2024. The municipal contribution is expected to be approximately \$405,000.

---

<sup>2</sup> 9dot Engineering, Village of Nakusp - 2021 Water Master Plan



**Rail Trail Washover Repairs, 2022**

This project addresses a washover on the rail trail. This project is 100% funded by grants and has a total cost of \$218,000.

**Breakwater, 2022**

This project is scheduled for 2022 with a cost of \$73,000.

**ESB Storage Building, 2022**

This project is scheduled for 2022 with a cost of \$150,000.

**Hotsprings, 2022 - 2024**

This item covers a \$130,000 transfer to the hot springs in 2022, followed by a \$15,000 transfer in 2023 and 2024.

**Fleet, 2022 - 2026**

This project item covers fleet upgrades and maintenance.

**Fire Equipment, 2022, 2024, 2026**

This project item supports fire equipment upgrades and maintenance.

**Computer Hardware, 2023, 2026**

This project item includes hardware for office computers and information technology.

**Sidewalk Replacement, 2022 - 2026**

This project item includes annual projects to renew sections of sidewalks.

**1st Avenue Stormwater Improvement, 2023**

This project addresses a critical stormwater channel that flows along 1st Avenue. The current estimate for this project is \$1.5 million and the Village is applying for a grant that covers 73.3% of the cost. The grant has not been approved at this time and the full project cost is reflected in the capital plan in 2023. The Village's contribution to the project will be funded through debt.

**Biomass Plant, 2023**

This project item relates to installing an alternative-energy system near the arena to burn local wood waste for heat generation.

**CBT Broadband, 2023**

This project item relates to expanding the regional broadband network and is scheduled for 2023.

**Underground Infrastructure Renewal, 2025 - 2026**

This project item is a placeholder for anticipated underground infrastructure renewal work that will target service areas that are identified from the Village's hydraulic analysis.



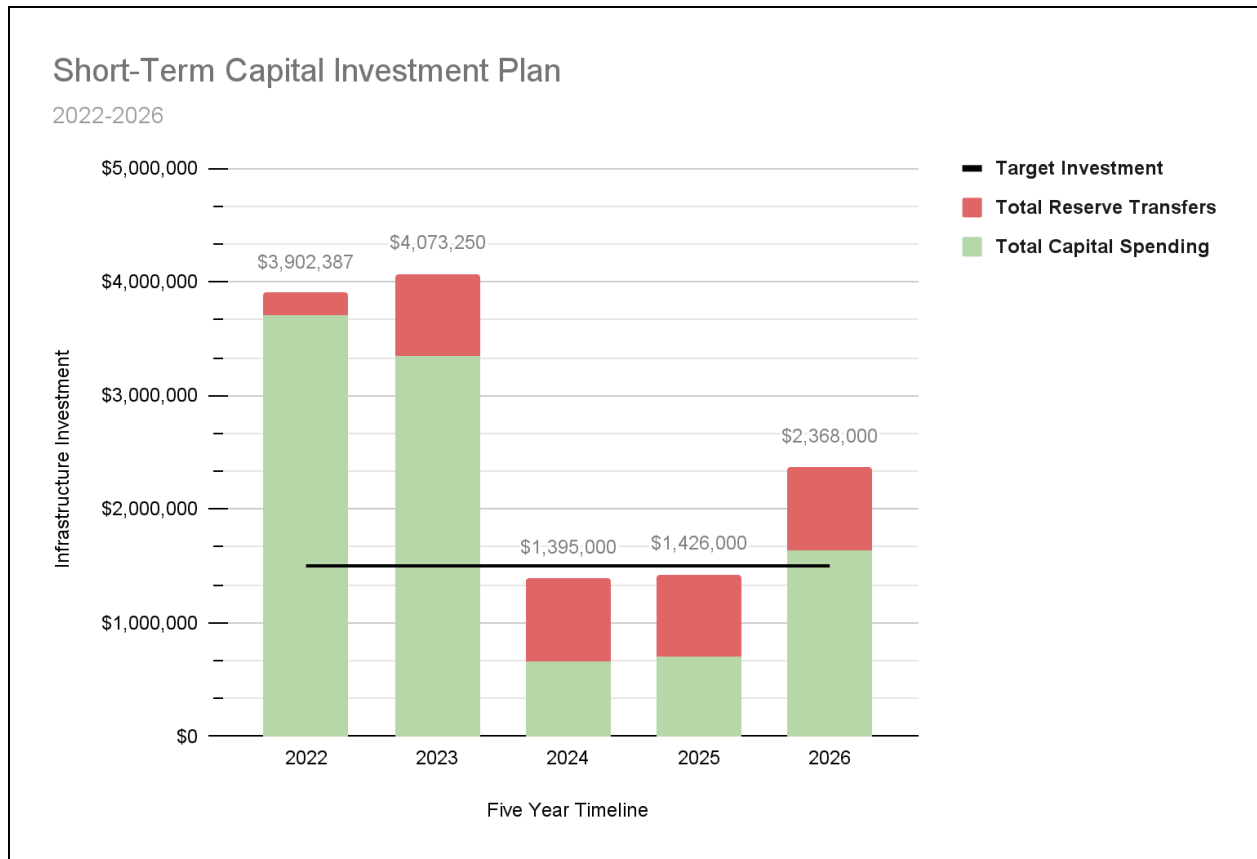
**Table 4: Short-Term Capital Plan**

	Year	2022	2023	2024	2025	2026
<b>Capital Projects</b>	Well #3 Design and Construction	\$725,000				
	New Reservoir Design and Construction	\$707,250				
	1st Avenue Stormwater Improvement		\$1,500,000			
	Government Road Stormwater Improvement					\$1,000,000
	Halfway Creek Intake Remediation	\$40,000				
	DownVillage Revitalization - Phase 3	\$750,000				
	Rotary Playground Adventure Park	\$255,000				
	Wastewater Treatment Upgrades	\$250,000	\$800,000	\$300,000		
	Rail Trail Washover Repairs	\$218,000				
	Breakwater	\$73,000				
	ESB Storage Building	\$150,000				
	Biomass Plant		\$851,000			
	CBT Broadband		\$42,250			
	Hotsprings	\$130,000	\$15,000	\$15,000		
	Fleet	\$366,000	\$85,000	\$305,000	\$161,000	\$66,000
	Fire Equipment	\$10,000		\$10,000		\$12,000
	Computer Hardware		\$15,000			\$25,000
	Sidewalk Replacement	\$32,000	\$35,000	\$35,000	\$35,000	\$35,000
	Underground Infrastructure Renewal				\$500,000	\$500,000
	<b>Total Capital Spending</b>		<b>\$3,706,250</b>	<b>\$3,343,250</b>	<b>\$665,000</b>	<b>\$696,000</b>
<b>Reserve Transfers</b>	Water Treatment and Distribution Reserve	\$33,246	\$380,000	\$380,000	\$380,000	\$380,000
	Sewer Collection Network Reserve	\$162,891	\$350,000	\$350,000	\$350,000	\$350,000



<b>Total Reserve Transfers</b>	\$196,137	\$730,000	\$730,000	\$730,000	\$730,000
<b>Total Capital Investment</b>	<b>\$3,902,387</b>	<b>\$4,073,250</b>	<b>\$1,395,000</b>	<b>\$1,426,000</b>	<b>\$2,368,000</b>
<b>Target Investment</b>	<b>\$1,500,000</b>	<b>\$1,500,000</b>	<b>\$1,500,000</b>	<b>\$1,500,000</b>	<b>\$1,500,000</b>

Figure 8: Short-Term Capital Plan



The proposed capital plan meets the Village’s short-term infrastructure renewal needs and addresses the level of service targets that were identified in developing this plan. The average annual investment level meets long-term targets and there are no anticipated increases in ongoing infrastructure deficits if this plan is followed.



## **II. Operations and Maintenance**

The following additional operational and maintenance activities are recommended:

### **Water Valve Maintenance Program**

The risk associated with older valves is that they may not open or close when maintenance is required on a main or certain areas need to be isolated. Public works should retain spare valves for common pipe sizes to minimize downtime and allow valves to only be replaced when main lines are replaced. In the meantime, valves should be exercised and their status should be recorded. The Village has powerful mapping tools available that can aid staff in recording and organizing this information.

### **Annual Fire Flow Testing**

In addition to the fire flow analysis and hydraulic analysis, it is recommended that the Village complete annual flow testing of each hydrant to ensure the hydrants meet the minimum flow requirements. The results of the flow testing should be recorded along with the hydrant maintenance records. These activities can support grant applications that allow for underground infrastructure upgrades where required flows are not met.



## Continuous Improvement Program

The following tasks will be completed annually and are certified completed in support of this Short-Term Capital Program:

<b>Update Asset Register</b>	An asset database has been created and updated by LandInfo with support from Nakusp staff. Visit <a href="http://mycivitas.ca">mycivitas.ca</a> for the latest data.
<b>Review Risk Assessment and Level of Service</b>	Risk assessment was performed by LandInfo with support from Nakusp staff.
<b>Update Capital Plan</b>	An asset management capital plan was created by LandInfo with support from Nakusp staff.

Last completed on:	Sept 2023
Person responsible:	Mark Tennant
Signature of completion:	
Next asset management update due	Sept 2024

