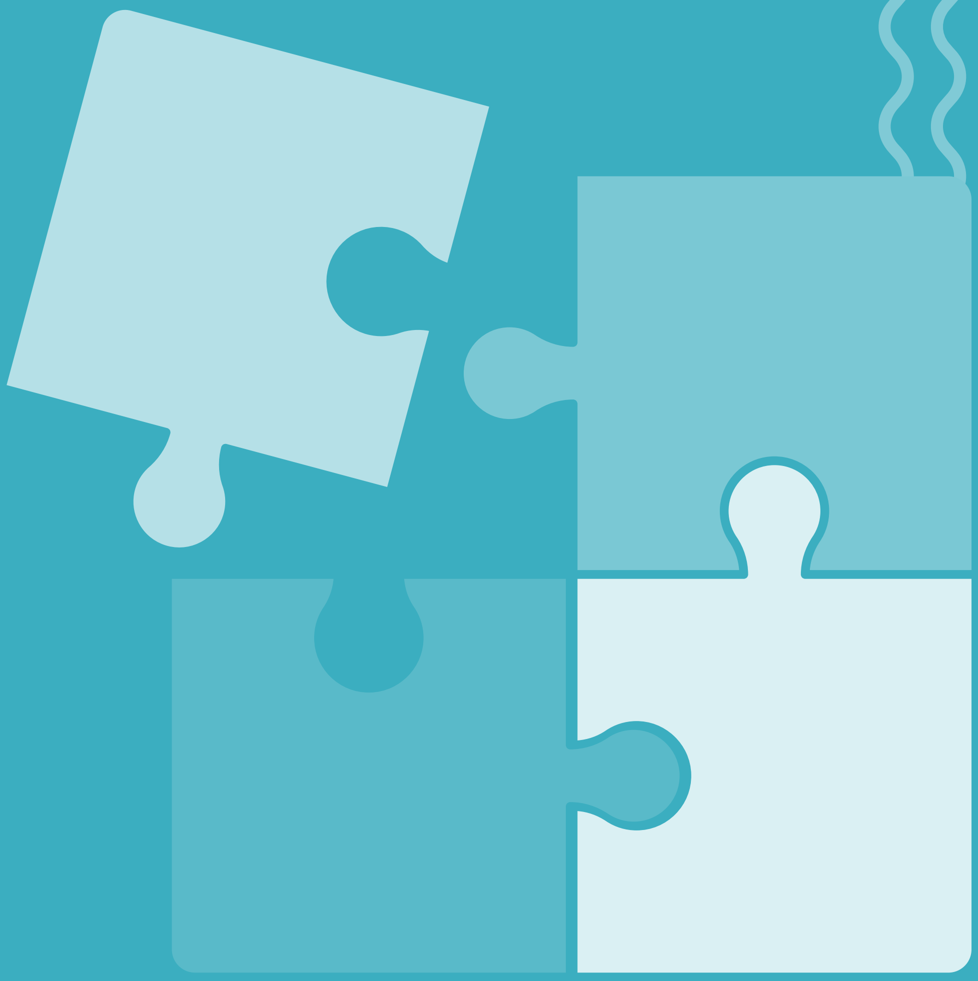
RMA
RURAL MUNICIPALITIES of ALBERTA

ASSET DEFICIT SUMMARY REPORT

UTILITIES



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Introduction

Overview

Rural municipalities in Alberta can be characterized by large geographic areas and low populations, where industrial activities play a significant role in shaping the local economy. Rural Alberta manages a significant amount of infrastructure in the province, providing maintenance and repairs as needed to support communities and industries including the forestry and energy sector. These sectors contribute to a significant amount of wear and tear on municipal infrastructure and as a result, the maintenance and repair of core infrastructure pose substantial challenges to municipalities.

The Rural Municipalities of Alberta (RMA) has identified a pressing need for up-to-date data to accurately quantify the infrastructure deficit across various asset types. Most critically, this assessment is required for the ‘core’ infrastructure of bridges and culverts, roads, water and wastewater distribution and treatment utility infrastructure, and engineered stormwater infrastructure.

Past work from the RMA has shown infrastructure deficits for these core assets. An infrastructure deficit refers to a state of deterioration of these assets below their ‘optimal’ levels of condition, which can vary depending on the asset type. As infrastructure naturally deteriorates over its expected lifecycle, only significant maintenance and re-investment can keep the asset at its optimal levels. Given the growing financial pressures on RMA member municipal districts and counties means this has likely grown over time. The lack of current and detailed data has made analysis like this nearly impossible, hence RMA’s desire to codify this deficit through a series of asset type studies.

The lack of data also poses a significant risk to municipalities as infrastructure owners and to industries that rely on this infrastructure. Without current and detailed data on the extent of this deficit, it becomes challenging to make informed decisions about the necessary investments to maintain and improve infrastructure.

The RMA developed this project to conduct a comprehensive analysis of various asset types to determine the infrastructure deficit faced by RMA members for each. The project relies on information provided by RMA members. The study's significance lies in its ability to offer evidence-based insights to measure the true level of infrastructure investment required.

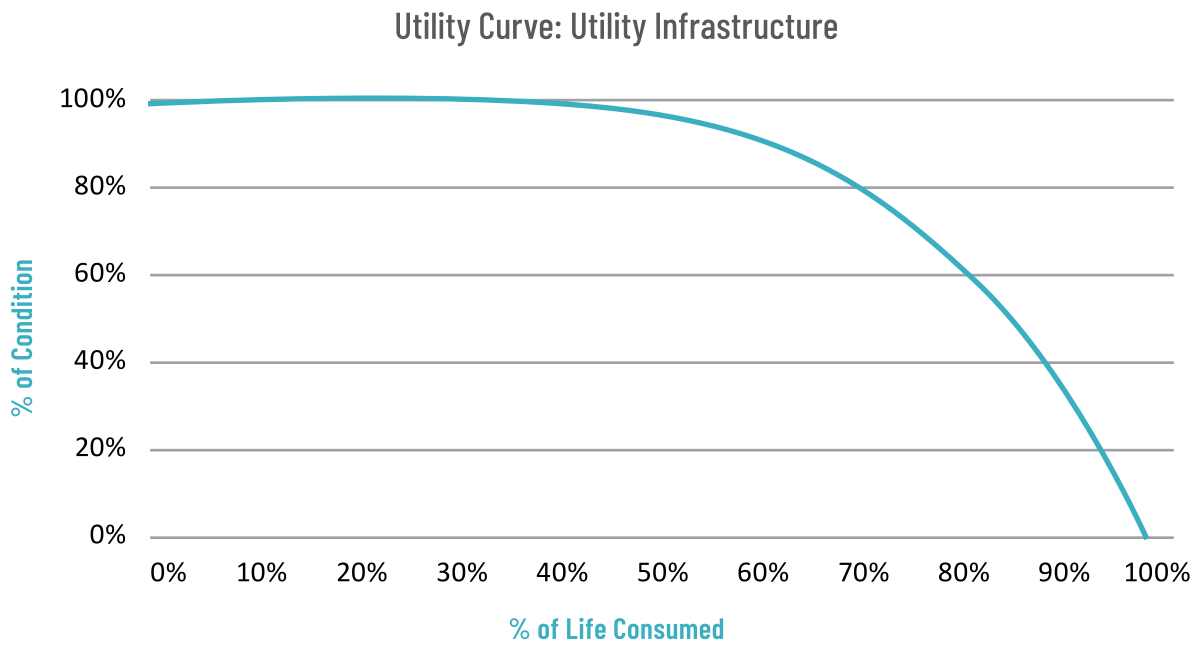
The project will produce separate reports for each asset type, with a final report summarizing and analyzing the overall rural municipal infrastructure deficit. The goal is to provide a robust data set and analyses of said data for future advocacy efforts, offering insights into the rural municipal infrastructure deficit and support overall asset management efforts for RMA members.

This report provides an overview of the analysis specifically for utility infrastructure managed by RMA members with an overview of the analysis process, key data sources, infrastructure deficit calculations, and identifies key findings for consideration by RMA members as well. As we explore additional asset types, the other reports will follow a similar format and include details specific to each asset.

Deterioration Curve Summary

This project is structured around a standardized deterioration curve model. The ability to derive the infrastructure deficit for RMA members relies on the ability to place the current state of member infrastructure portfolios within this model. The deterioration curve model has been used to inform analysis in several RMA reports, including 2013's *Apples to Apples: Rural Municipal Finance in Alberta*[1]. It was also used as key methodology informing RMA's input into the design of the Municipal Sustainability Initiative in 2007.

The deterioration curve model is based on the fundamental principle that **infrastructure does not deteriorate in a linear fashion**, and that strategically timing infrastructure investment can lead to greater value for money and reduced risk of rapid infrastructure deterioration or even failure. If infrastructure is not properly protected, there will be little initial change in its condition, but over time, deferred investment leads to dramatically increased loss of condition and value.



[1] Apples to Apples: Rural Municipal Finance in Alberta

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Deterioration Curve Key Definitions

This assessment uses a number of definitions for key terms related to the Deterioration Curves and other portions of the analysis:

Useful Life: Largely based on statistics from Infrastructure Canada. "Average expected useful life of new publicly owned [potable water/wastewater/stormwater] assets, Infrastructure Canada." This shows the average expected life of an asset without significant maintenance or reinvestment.

Effective Age: The effective age of the portfolio based on life consumed.

Life Consumed: How much of the useful life the portfolio has consumed.

Condition: The condition of the portfolio. In this study we utilize a percent condition rating.

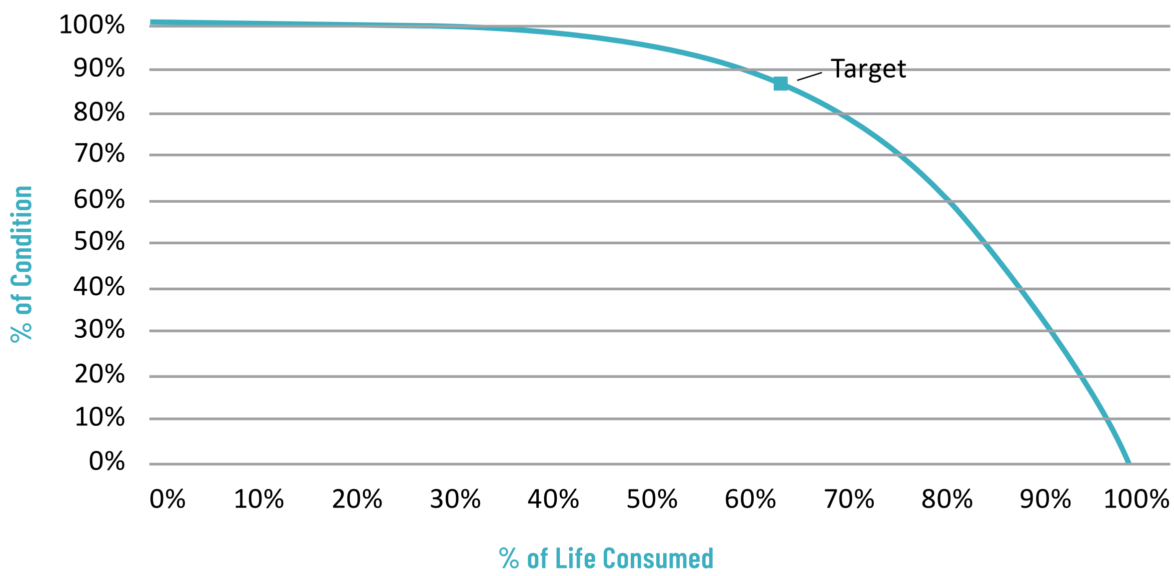
Value: The value of the portfolio based on estimated replacement cost and condition.

Holding Cost: How much it costs to keep the portfolio at the same level from year 0 to year 1.

Target: The optimal point on the deterioration curve to maintain the portfolio.

Cost to get to target: How much it would cost to bring the portfolio from its existing condition to the target condition.

Deterioration Curve Interpretation



The graph above shows the deterioration curve. The curve is a function of two factors: **the percentage of life consumed of the assets**, and **the percentage condition rating of the assets**. The horizontal axis represents the average age of the infrastructure as a percentage of its lifespan (e.g., infrastructure at the end of its life would be rated 100%). The vertical axis represents the average condition of the infrastructure as a percentage of its value. For example, a new asset, worth 100% of its value, would be rated at the 100% condition. Alternatively, a completely failed asset would be rated at a 0% condition.

For this asset study, this curve is used to model the deterioration of overall asset portfolios (all the assets of a particular type managed by rural municipalities), rather than individual assets. That means that investment can be made into individual assets, which will affect the effective condition of the portfolio. If one asset is completely rehabilitated, it will naturally 'pull' the portfolio back up the curve. If investment lags, the natural change in condition over asset age will occur, with an expectation that aging without intervention will follow the curve shape.

Benefits of the Curve

The deterioration curve used in this report provides a more accurate analysis of the infrastructure deficit than the standard straight-line deterioration method typically employed in Tangible Capital Asset (TCA) accounting. One of the primary advantages of this curve is its ability to account for varying rates of degradation over an asset's lifespan, unlike the straight-line approach which assumes a consistent level of annual degradation. This assumption in the straight-line method means there is no optimal point identified for maintaining assets. The straight-line approach also tends to underestimate an asset's condition early in its lifespan and overestimate it later when critical investments are needed. In contrast, the deterioration curve used in this analysis incorporates a more realistic view of how assets degrade over time. By considering factors such as the optimal condition to maintain assets and the varying rates of degradation, this curve offers a more precise assessment of the infrastructure deficit.

The Optimal "Target" Point

The curve begins to steeply slope downward at an accelerated rate at approximately 64% of the infrastructure life span, with a corresponding condition rating of 87%. At this point, the investment required simply to hold the asset portfolio at its current condition begins to accelerate. Therefore, **the most economical option is to attempt to hold the portfolio right at this drop-off point.** This point is represented by the "Target State" label, and represents the most cost-effective point to maintain an asset portfolio on this curve.

Calculating an Infrastructure Deficit

This curve also shows the potential impact to municipalities if the infrastructure is left to deteriorate. Municipalities run a risk of having their infrastructure reach the steepest part of the curve, where repairing it becomes extremely expensive. This would put incredible pressure on municipalities to reallocate revenue from other areas to address their infrastructure issues. **Maintaining infrastructure**

at a higher condition level and lower percentage of lifespan is the most cost-effective way of preserving that infrastructure over time.

Of course, given the assessment of the curve above, it holds that it does not make sense to fully re-invest into assets to try to make the portfolio brand new. It is financially responsible to get the most age-life out of the assets, before hitting this accelerated drop-off point. Therefore, **the infrastructure deficit is the difference between the current condition of assets observed and the target state level of condition**, which is approximately 87% of new condition. The deficit calculation, therefore, is based on the one-time investment required to move the portfolio to its target state, and can be represented by:

$$\text{Infrastructure Deficit} = \text{Portfolio Target State Value (\$)} - \text{Portfolio Observed Condition Value (\$)}$$

Additional details on the technical nature of the deterioration curve can be found in Appendix A.

Utility Infrastructure Background

Many people may be surprised at the extent of utility infrastructure that is managed by RMA members. Utility infrastructure is typically thought of as an urban municipality focus area, but RMA members actually manage an extensive amount of water, wastewater and engineered stormwater infrastructure. RMA members are members of regional utility networks and maintain their own municipally-owned infrastructure, particularly in their urban nodes. In fact, according to 2022 MFIS data, RMA members are responsible for managing approximately 34% of municipally-owned water mains and 17% of municipally-owned wastewater mains in the province. When excluding cities, this number rises to 60% of municipally-owned water mains and 37% of municipally-owned wastewater mains.

This number may continue to rise in future years as viability reviews and dissolutions continue to increase the probability of additional utility infrastructure being absorbed. As shown by a recent RMA study on dissolution impacts, utility-related capital renewal costs can become a huge burden to the absorbing municipality[2].

The provincial government has made access to a "healthy, secure and sustainable water supply" a priority[3]. Considering not only the rising costs of providing utility services, but the criticality of such services to Alberta's population, it is imperative that governments must understand the importance of rural Alberta's utility infrastructure.

Reporting and Data Availability

Municipalities are not required to report on the condition of their utility assets but must report the length of all water, wastewater, and stormwater mains; this data is maintained through the Municipal Financial and Statistical Data mandatory reporting. To support this project's analysis, RMA members were asked to provide their internally collected utility infrastructure data. 25 of 69 RMA members contributed some amount of utility information, which was used to compile a dataset for the utility infrastructure analysis. While not specified in all cases, it is reasonable to assume that a large percentage of missing member information is due to a lack of structured asset data. In some cases, even members that did indicate the existence of and/or provided utility asset data noted that significant work was required to compile information, indicating that data may not be providing full 'asset management' value.

This project has illustrated that, despite RMA's efforts, asset management is not yet a common practice among many rural municipalities. The lack of widespread asset management practices reduces the visibility of infrastructure conditions and the ability to make informed decisions about maintenance and investments. Without a clear understanding of the current state of infrastructure, municipalities face significant challenges in planning and prioritizing their resources effectively. Ultimately, the robustness of this analysis was impacted by data availability, and a number of assumptions were required to derive a value for all RMA members.

Funding Programs

Local utility infrastructure has been historically funded primarily by municipalities themselves. The Municipal Sustainability Initiative (MSI) operated between 2007 and 2023 to provide funding to

[2] Post-Dissolution Impact Report
[3] Water and Wastewater – Laws, Regulations and Funding

municipalities for capital and operating projects. MSI distributed more than $15.2 billion while it was active. In 2024, the program is being replaced by the Local Government Funding Framework (LGFF). Among other things, the MSI program was well utilized by municipalities to care for their water, wastewater, and stormwater assets.

The LGFF provides a legislated infrastructure funding program for local governments in Alberta. Under LGFF, RMA members will receive approximately $149 million in capital funding for 2024. Similarly to MSI funding, eligible capital projects include:

- Roads and bridges
- Public transit vehicles or facilities
- Emergency services facilities or equipment
- Water and wastewater systems
- Solid waste management facilities or equipment
- Other municipal buildings such as recreation and sports facilities, libraries, and cultural and community centers

The other primary funding source for municipalities in Alberta is the Canada Community-Building Fund (CCBF), previously known as the Gas Tax Fund. All municipalities and Metis Settlements are eligible to receive funding under this program. The program provides grants for capital costs of infrastructure projects that meet the program eligibility criteria, which limits the funding to use in essential infrastructure, such as roads and bridges, public transit, drinking water and wastewater infrastructure, and recreational facilities. Municipalities determine projects and activities based on local priorities and can pool and bank this funding, providing financial flexibility.

Funding is first transferred from the federal government to the provinces and territories who in turn distribute the funding to their communities. Each province or territory develops its own formula for distributing funds to their communities. In Alberta, CCBF funding allocations for municipalities are calculated on a per capita basis, according to the most recent Municipal Affairs Population List. Municipalities (with the exemption of summer villages) receive a minimum allocation of $50,000 per year. Summer villages receive a base allocation of $5,000 per year, in addition to the per capita amount. [4]

In 2023, RMA members received $45,108,951 of the $265,415,054 Alberta received in funding. This equates to just 17% of funding, despite the fact that 41% of Alberta's public and private investment, and 26% of Alberta's GDP is in rural Alberta. [5]

RMA Advocacy

RMA has been a strong advocate for consistent and sustainable funding processes that support the sustainability of rural municipalities. Rural municipalities face an increasing infrastructure deficit because municipal taxation revenues alone are not sufficient to build and maintain these vital infrastructure networks. To address this issue, long-term, predictable funding from other levels

[4] CCBF – Funding allocations and eligibility
[5] Infrastructure And Transportation In Rural Alberta

of government is necessary to ensure the sustainability of rural Alberta's utility network and the viability of rural communities. Funding programs must be designed to reflect the unique needs of rural infrastructure. Current per capita funding distribution and merit-based mechanisms often place rural municipalities in direct competition with higher-capacity urban municipalities, which does not adequately address the specific challenges faced by rural areas. Programs like the Canada Community-Building Fund (CCBF) and the Local Government Fiscal Framework (LGFF) need to consider these rural-specific requirements to be effective.

Methodology

The primary data source used for this analysis data received directly from RMA members in a structured workbook format. The data collected from members was compiled into a database used for the assessment of utility infrastructure.

Data was received through a structured data request to municipalities. 25 RMA members responded to the workbook collection and included utility information in the workbook. Data received from these municipalities was filtered into three main categories.

1. Class 1 data contained a condition rating, replacement cost, structure type, and useful life value. These data attributes allowed a fulsome analysis using the mathematical formula of the deterioration curve.

    a. Class 1 data accounted for 27.77% of all data received.

2. Class 2 data contained structure type, useful life, and replacement cost. These data attributes allowed us to extrapolate a deficit based on Class 1 data and the replacement cost.

    a. Class 2 data accounted for 70.10% of all data received.

3. Class 3 data is the remainder of the data received from municipalities. This data is accounted for through further extrapolation processes.

    a.Class 3 data accounted for 2.14% of all data received.

To account for the remaining rural municipalities who did not participate in utility workbook completion, MFIS reported water, wastewater, and stormwater main length was used to extrapolate the deficit. More information can be found in Appendix B, Technical Methodology.

The following steps were taken to refine the information and identify the infrastructure deficit:

- Adjustments were made to ensure all cost figures used were in 2023 dollars (Inflation rates used are from the Statistics Canada Consumer Price Index).

- 8.69% of Class 1 utility assets have an inspection date in 2023, the remainder were manually aged to represent their expected asset condition and life consumed in 2023.

ASSET SUBCATEGORY	USEFUL LIFE
Water Treatment Facility	30
Lagoon System	55
Valves	25
Stormwater Pump Station	45
Wastewater Lift Station	48

- Standardized useful life figures were applied based on the assigned asset subtype. The useful life was used to determine how far along the curve each asset subcategory moves each year.
- Weighted averages, based on expected replacement value, were calculated for the effective age and condition level of the overall portfolio.

A detailed overview of the methodology used can be found in Appendix B of this report.

Data Summary

The data summary section of this report provides an overview of the current profile of utility infrastructure in rural Alberta.

Portfolio Profile

CATEGORY	RESULT		
	WATER	WASTEWATER	STORMWATER
Kilometers of mains in the portfolio:	7300	2587	946
Average first in service year:	2008	1999	2010
Average kilometers of mains per RMA member:	106	37	14
Percent of assets with a 100% condition rating:	0.03%	1.84%	1.35%
Percent of assets with less than 50% condition rating:	48.87%	39.96%	15.54%

Inspection Recency

LAST INSPECTION DATE	% OF ASSETS
2023	8.69%
2022	62.76%
2021	4.91%
2020	2.35%
2019	1.52%
Older than 2019	19.77%

Overall Deficit Findings

As noted, the infrastructure deficit represents the gap between the current value of infrastructure and its value if it were in an optimal state (87% on the curve). In simpler terms, it's the difference between what we have today and what we need to invest back into our utilities to ensure they are safe, reliable, and financially efficient. As an example, if a piece of infrastructure, like a water main, would normally have a 50-year life span, each year we let the main sit it can be expected to lose 2% of its expected life. Depending on where the asset is on the curve, this 2% of life being consumed can result in vastly different condition impacts. We can reverse this natural aging process by reinvesting into the water main and performing the necessary maintenance to reduce its effective age and bring its condition back up the curve. This process holds for a larger portfolio of assets as well. When we consider multiple water infrastructure assets, investing in maintenance for one water main per year may only hold us on the current point of the curve, as the non-repaired water mains naturally age 2% per year.

Value, in this context, is a direct reflection of a utility asset's condition. Utility infrastructure that is well-maintained and in good repair has a higher value because it is safe, reliable, and capable of supporting the necessary demand. Conversely, utility infrastructure in poor condition has a lower value due to the risks and limitations it presents.

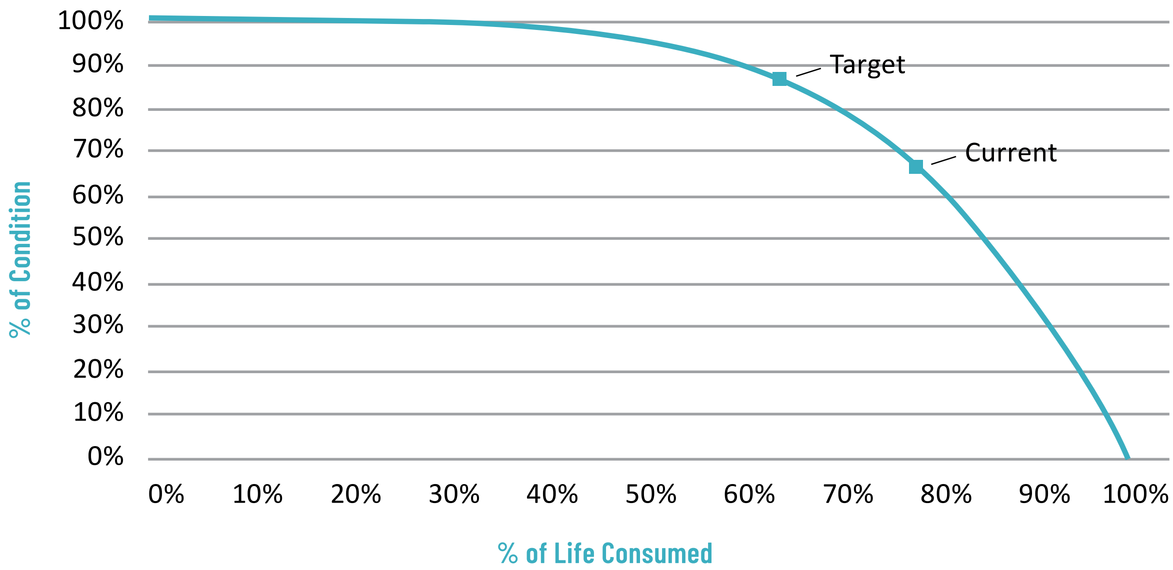
Based on the deterioration curve, any utility asset can lose value if it isn't properly maintained. Factors like usage, weather conditions, and age can cause an asset to deteriorate over time. Heavy use, extreme weather events, and natural aging processes all contribute to the wear and tear of utility infrastructure. If we don't invest in repairs and maintenance, the asset's condition worsens, its value decreases, and it becomes less safe and reliable. Therefore, the infrastructure deficit highlights the amount of investment needed to bring the utility assets up to their optimal state.

The infrastructure deficit grows when investment in maintenance and repairs is insufficient to keep up with the rate of deterioration. For example, if a wastewater main requires $1,000,000 in repairs to maintain its condition but only receives $500,000, the deficit increases by the unmet need of $500,000. Over time, if the necessary repairs are not made, the condition of the wastewater main continues to decline, and the cost to bring it back to an optimal state rises, increasing the deficit. Conversely, the infrastructure deficit shrinks when adequate investments are made to repair and maintain the main. Regular maintenance and timely repairs are crucial to managing and reducing the deficit, as they prevent small issues from becoming major problems that are more expensive to fix.

Alberta's rural municipal utility portfolio has a deficit of $2.96 billion. This overall deficit analysis has been supplemented with additional analyses for more specific utility characteristics, like structure type, subtype, and regional levels. All of these more detailed analyses show utility infrastructure, no matter what characteristics we look at, is at a **poor condition level** and **in need of significant investment.**

Overall Rural Municipal Road Infrastructure Deficit

As noted, the overall rural municipal utility infrastructure deficit is $2.96 billion. This equates to approximately $4,150 per person based on the total population of RMA's member municipalities (approximately 714,000 people). The figure and table below show that the overall RMA utility portfolio is well below the target condition level. This is an expensive point of the curve, and increases the risk to fundamental usability, safety and reliability of the utility network.



While graphically, we can see the portfolio is far below the optimal condition level, it is also helpful to compare some key calculations of where the current utility portfolio is, compared to an idealized target state. The following table shows a comparison between the current utility portfolio and a hypothetical ideal target state portfolio. The comparison shows overall portfolio values, life consumed, condition, the annual holding cost (investment required to hold the position on the curve), and the effective age.

CATEGORY	CURRENT	TARGET
Portfolio Value:	$10.27 Billion	$13.23 Billion
Life Consumed:	78.10%	64.00%
Condition:	67.20%	86.58%
Holding Cost:	$492.37 Million	$241.11 Million
Effective Age:	50.76 years (useful life 64.99)	50.76 years (useful life 64.99)

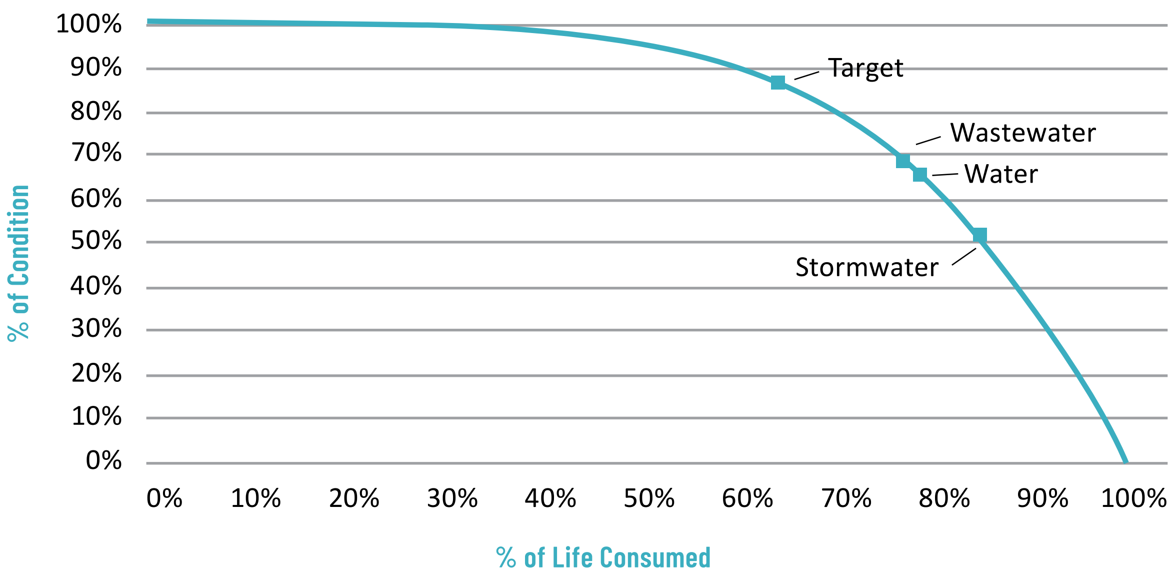
Utility Subtype Comparison

As noted, we have conducted additional analyses on a range of utility characteristics to better understand this deficit figure. The overall utility portfolio can be categorized and broken up in several ways, each providing a unique perspective on the overall condition and needs of the network. By examining utility categorized by type, subtype, and other characteristics, we can gain a more nuanced understanding of the infrastructure deficit and identify specific areas requiring attention. This information will allow us to make more informed decisions about where to allocate resources and how to address the infrastructure deficit most effectively.

Data Note: It is very important to note that the following analyses can only account for utility assets with a condition rating. Many municipalities were not able to provide a condition rating for their assets. This has resulted in medium to low confidence in the accuracy of the following graphs as only 11 of 69 municipalities were able to provide utility information containing condition data. As a result of these sample sizes, the results may be subject to significant variation. We have attempted to account for this in our assessment of the results.

The sections below show the results of each sub-analysis of various characteristics. Note: the detailed data these graphs represent can be found in Appendix C.

Utilities by Type



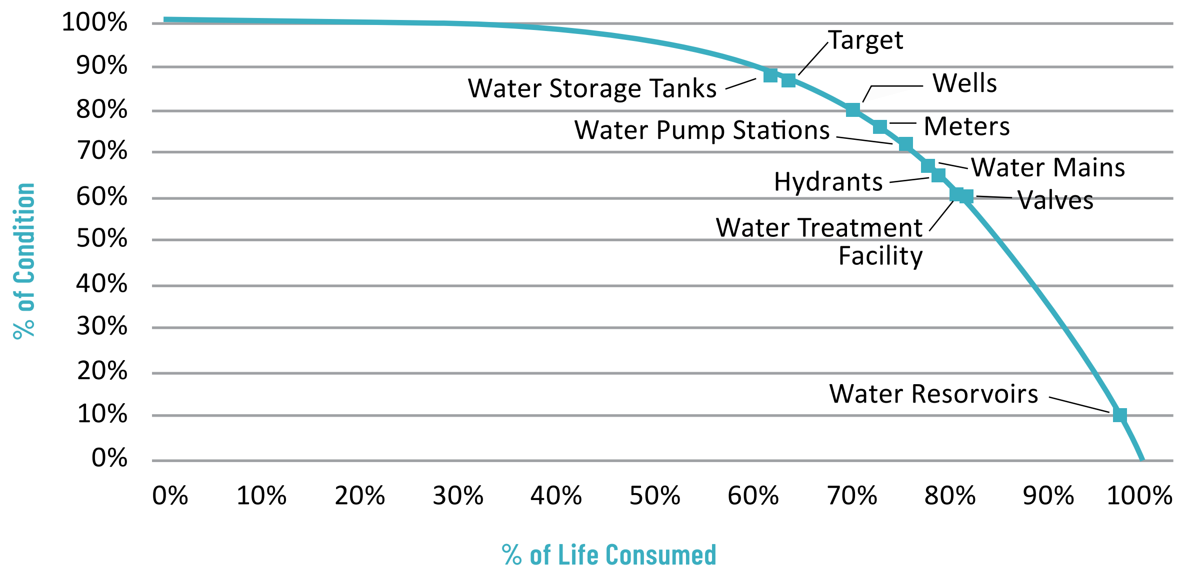
The utility portfolio is composed of three primary asset types; water, wastewater, and stormwater. The majority of the portfolio is composed of water, followed by wastewater, and finally stormwater.

Water and wastewater assets sit at very similar conditions on the curve. Stormwater assets are significantly lower, both in condition and life consumed.

For Consideration:

Water and storm have only a 6.80% life consumed difference, but their conditions vary significantly with an 15.10% difference. This variation reflects the steepness of the deterioration curve at the specific age points for these structures. Although stormwater assets are 6.80% father along in their lifespan, they have deteriorated much farther down the curve than water assets.

Utilities by Subtype - Water

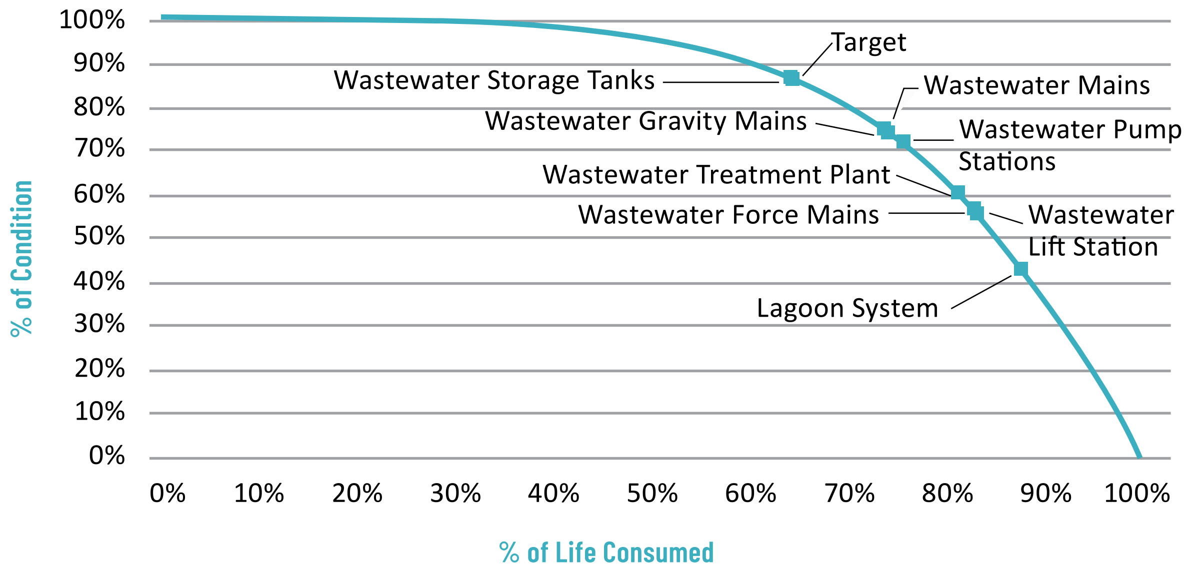


Building off the analysis above, water assets can be even further divided into additional sub-types. Water mains, followed by water pump stations account for the majority of water asset replacement cost in rural Alberta. Other subtypes provided by municipalities were hydrants, meters, valves, water reservoirs, water storage tanks, water treatment facility, and wells.

Water mains sit at a comparative mid point on the curve. Considering they make up much of the portfolio, this aligns with the water utility portfolio's condition rating of 66.90%. Water storage tanks are in better condition than the target point of the curve. At a utility portfolio level (water, wastewater, and stormwater) this decreases the infrastructure deficit.

Note: Water mains of various diameters have been consolidated under the category 'Water Mains' for the sake of clarity.

Utilities by Subtype - Wastewater

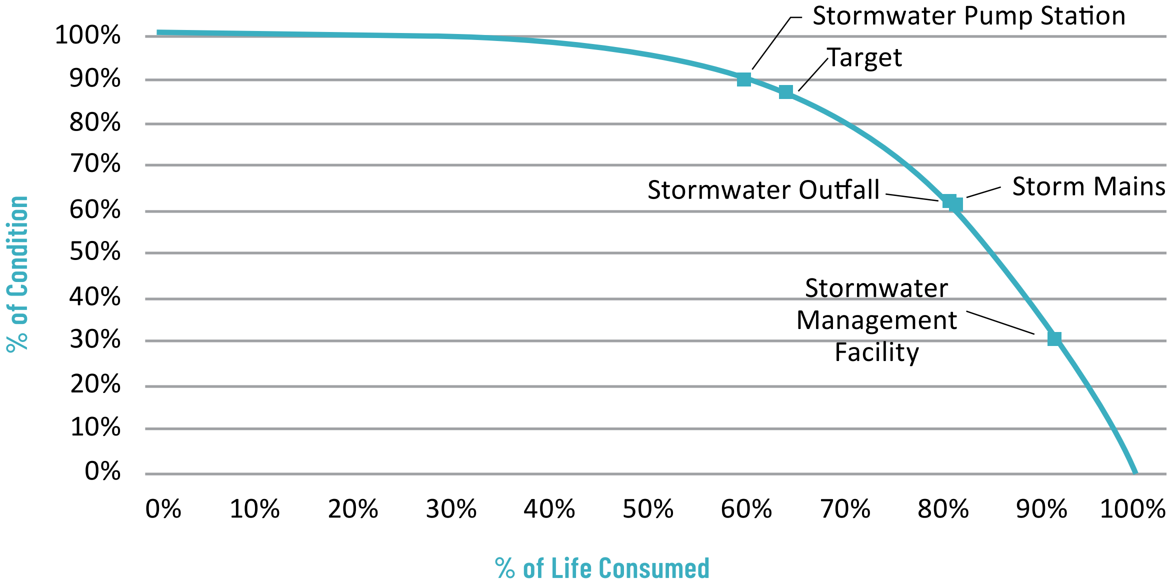


Similar to the analysis above, wastewater assets can be even further divided into additional sub-types. Wastewater mains comprise the vast majority of the wastewater asset replacement cost in rural Alberta. Other subtypes provided by municipalities were lagoon systems, force mains, gravity mains, wastewater mains, life stations, wastewater pump stations, wastewater storage tanks, and wastewater treatment facilities.

Considering wastewater mains make up much of the portfolio, this aligns with the wastewater utility portfolio's condition rating of 68.88%. Similar to water storage tanks, wastewater storage tanks are in better condition than the target point of the curve. At a utility portfolio level (water, wastewater, and stormwater) this decreases the infrastructure deficit.

Note: Wastewater mains (excluding force and gravity mains) of various diameters have been consolidated under the category 'Wastewater Mains' for the sake of clarity.

Utilities by Subtype - Stormwater

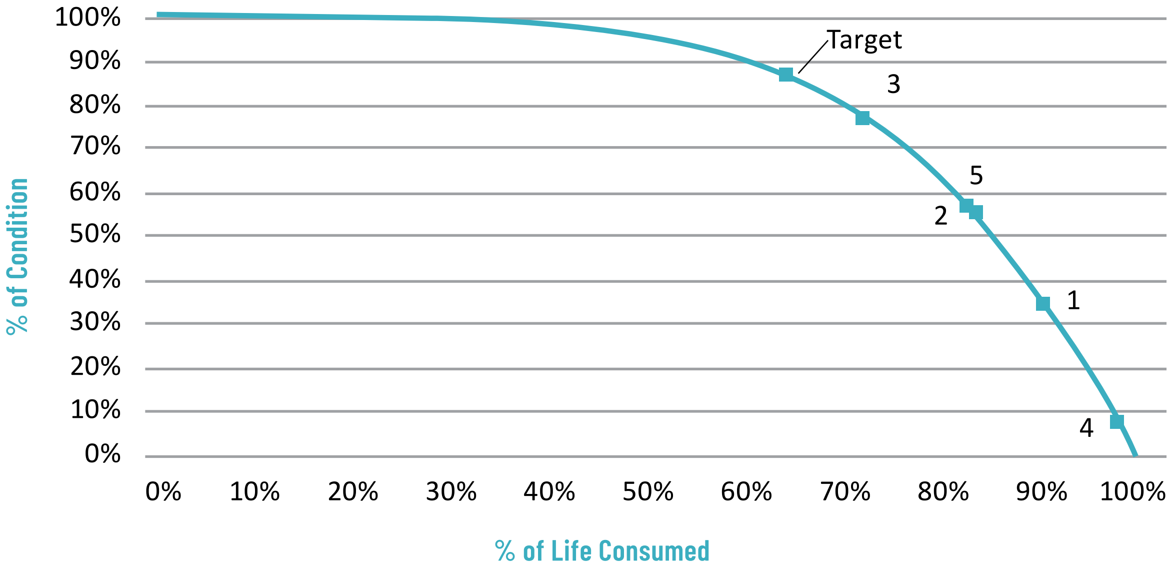


Building off the analysis above, water assets can be even further divided into additional sub-types. Stormwater management facilities, closely followed by storm account for the majority of stormwater asset replacement cost in rural Alberta. Other subtypes provided by municipalities were outfalls and stormwater pump stations.

The average condition of the stormwater portfolio is 51.80%. This is very close to the midpoint between storm mains and stormwater management facilities, aligning with the fact that they make up the majority of the wastewater portfolio. Stormwater pump stations are in better condition than the target point of the curve. At a utility portfolio level (water, wastewater, and stormwater) this decreases the infrastructure deficit.

Note: Stormwater mains of various diameters have been consolidated under the category 'Stormwater Mains' for the sake of clarity.

Utilities by RMA District



Utility assets can be analyzed by the location of the municipality who manages the asset. This analysis considers the current state of utilities between the RMA's five districts as distinct sub-groups. On average, 2.2 of 13.8 municipalities per district are included in this analysis, and several districts only have one municipality with reported data, which limits its representative value. Again, this graph should be analyzed with the knowledge that a small number of utility assets are able to be represented here.

It is clear the deficits seen in utilities impacts all municipalities and all regions of the province in some capacity. However, the regional differences seen are surprising and greatly exceed the results seen in the Bridge analysis. It is expected that sample size differences are predominantly responsible for the variation seen here, as the large number of Bridge results showed a very small distribution between regions. As a result, we are hesitant to conclude there is a significant regional difference in asset condition and recommend additional study with complete data.

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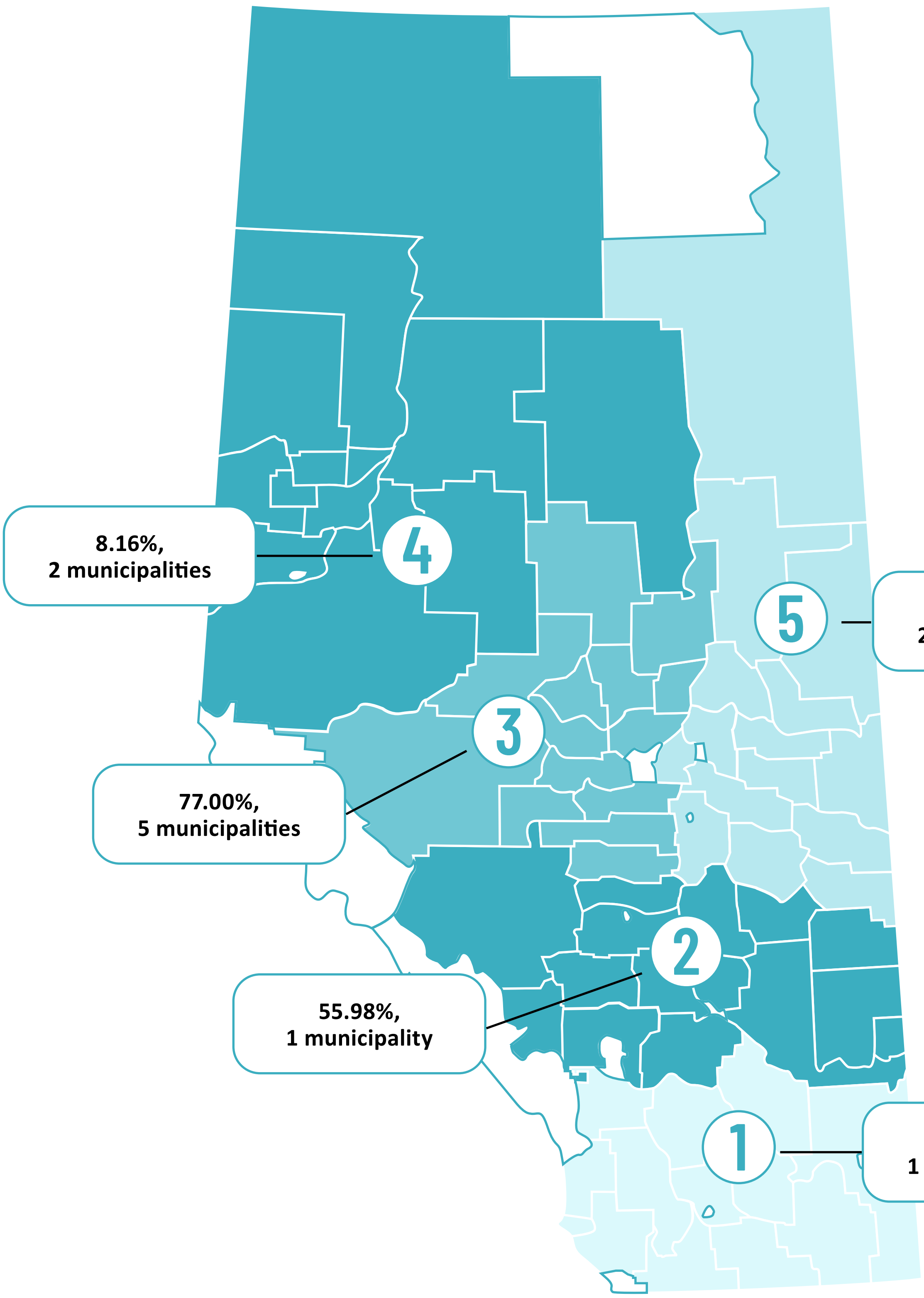
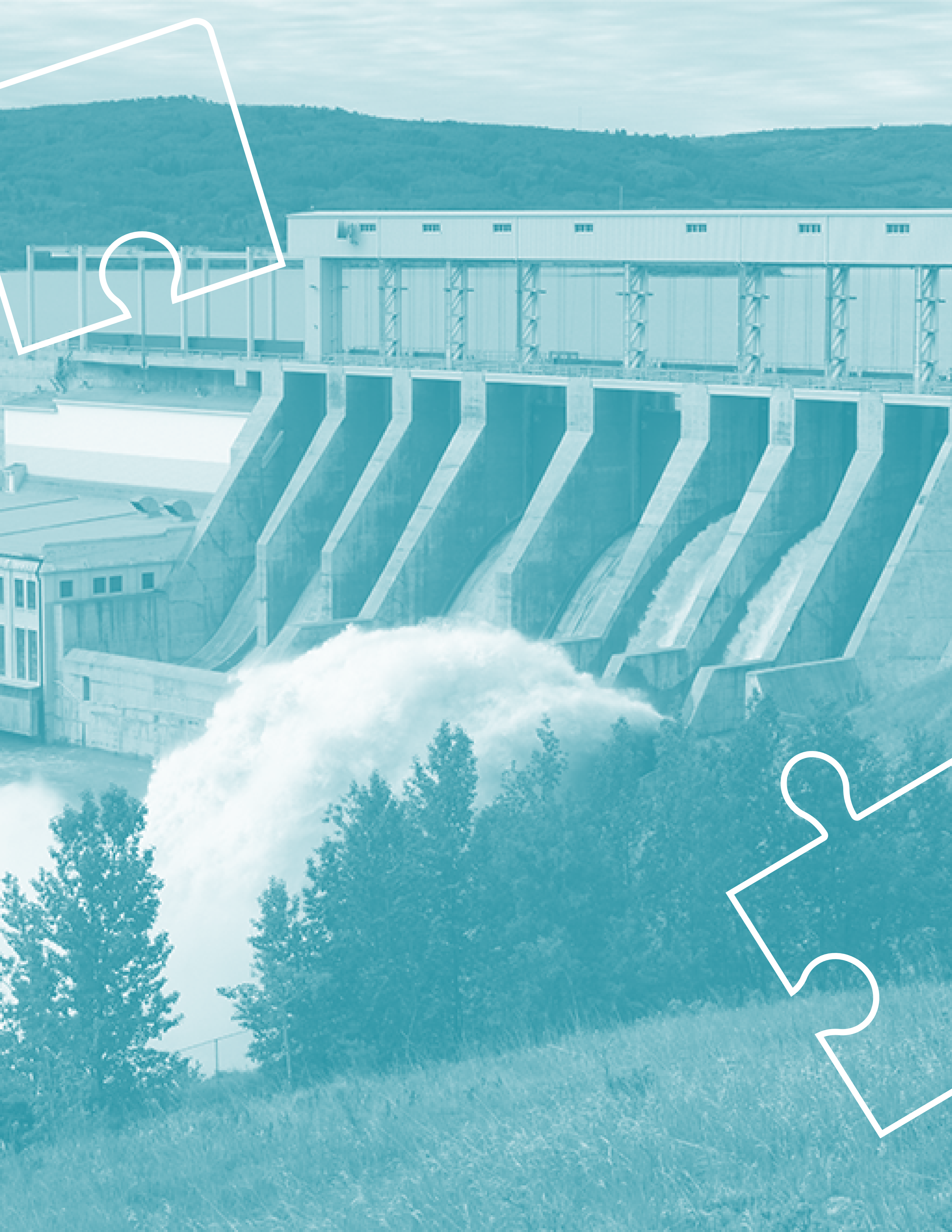




Financial Summary

As noted above, the overall infrastructure deficit for RMA member utilities is $2.96 billion. To understand the gravity of this number, there are a few things to consider. Firstly, it is important to understand the meaning of the term holding cost.

Holding Cost: How much it costs to keep the portfolio at the same condition level from one year to the next. As an example, if a water main sits at 50% condition in 2023, it naturally deteriorates to approximately 48% condition in 2024, consistent with the deterioration curve. The cost to ‘fix’ the water main in 2024 and return it back to 50% condition level constitutes the holding cost.

The holding cost of the rural municipal utility portfolio at its current level of 67.20% condition is $492,374,984. This means it costs $492 million annually just to keep the portfolio’s condition at its current depreciated point. Any investment level below that will result in even further deterioration of the portfolio. As discussed earlier, keeping infrastructure at 87% condition is the least expensive point on the curve year-over-year. Instead, If the utility portfolio was invested into and brought up to 87% condition, the holding cost would decrease significantly to just $241 million per year.

PORTFOLIO (CURRENT)	
67.20% condition	$492 Million Holding Cost

PORTFOLIO (IDEAL)		
86.58% condition	$241 Million Holding Cost	11.79 Year ROI

This means that investing $2.96 billion into rural municipal utilities to bring the portfolio to 87% condition would reduce the year-over-year holding cost by $251 million. This creates a return on investment (ROI) in 11.79 years.

Projecting the Future State

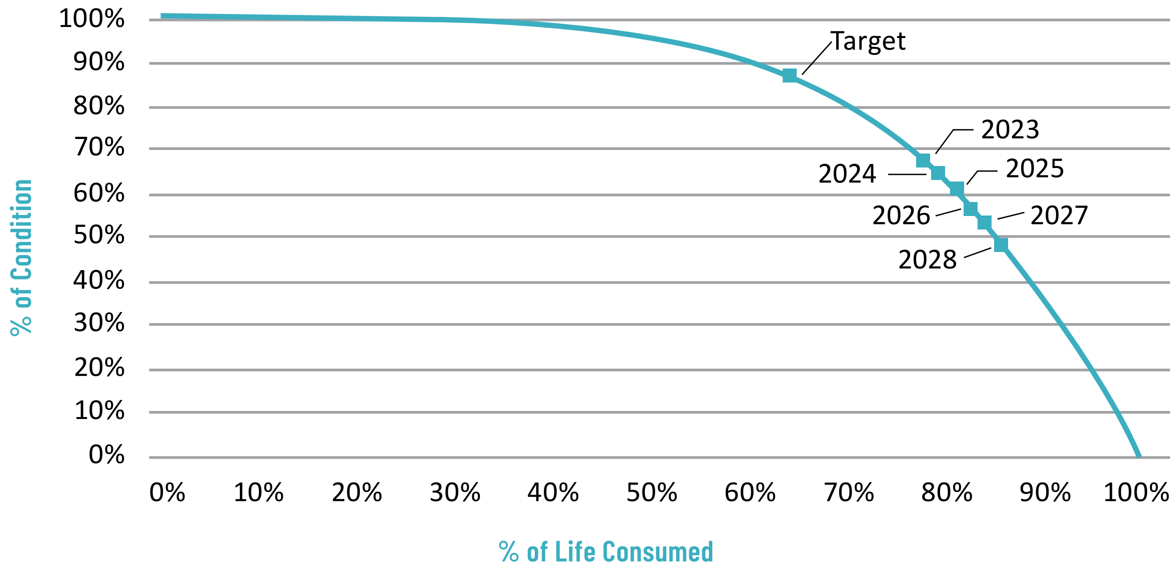
The level of investment used to project the future state of the rural municipal utility portfolio is $18.15 million. This number represents the total project cost of all RMA member utility projects supported by the Strategic Transportation Infrastructure Program (STIP) and the Municipal Sustainability Initiative (MSI) funding. An average of 2020, 2021, and 2022 values were used to account for variability in funding across years, and the data available as of the time of publication of this report. The STIP program is funded 75% by the Government of Alberta and 25% by the municipality themselves. Based on previous RMA analysis conducted in 2018, RMA members are spending a significant portion of their total municipal expenses on core infrastructure such as utilities and roads. This suggests that any significant growth in spending on utility assets will have to come from the province.

2023-2028 Outlook

If Alberta continues with the same level of provincial investment[6] ($18.15M) into rural municipal utility assets, 2028 will see a dramatically decreased utility portfolio condition rating. Condition will drop from 67.20% to 49.13%, decreasing the value of the portfolio by $2.76 billion. The utility network will be unable to keep up with the demand being placed on it, especially at significantly reduced condition levels.

For Consideration:

Rural Alberta's infrastructure sits at a critical point on the deterioration curve. Investment needs to be made now to save significantly in the long term.



6 Strategic Transportation Infrastructure Program 2023 Approved projects

Rural municipal utility infrastructure is currently positioned at a critical point on the deterioration curve, with more rapid deterioration anticipated very soon. The current level of provincial funding is nowhere near enough to maintain the current 67.20% condition rating, accounting for approximately 3.7% of the $492 million annual holding cost. **Further, in 2028, the cost to move the portfolio to the 87% target levels will almost double to $5.72 billion from $2.96 billion today.** This highlights the urgent need for increased funding and strategic investment to prevent further deterioration and ensure the safety and functionality of the utility portfolio. As a result, without a significant increase in investment, the condition and value of the utility infrastructure in rural Alberta will decline rapidly.

In 2028, it would cost $2.76 billion to get back to where we are in 2023.

In 2028, the holding cost will be $691.49 million annually. The condition continues to follow the curve and drop at a staggering rate.

Year	Life Consumed	Condition	Value	Holding Cost	Target Holding Cost	Cost to get to Target
2023	78.10%	67.20%	$10.27 billion	$492.37 million	$241.11 million	$2.96 billion
2024	79.70%	64.10%	$9.80 billion	$533.33 million	$241.11 million	$3.44 billion
2025	81.30%	60.73%	$9.28 billion	$570.06 million	$241.11 million	$3.95 billion
2026	82.90%	57.12%	$8.73 billion	$608.63 million	$241.11 million	$4.50 billion
2027	84.50%	53.25%	$8.14 billion	$649.09 million	$241.11 million	$5.09 billion
2028	86.10%	49.13%	$7.51 billion	$691.49 million	$241.11 million	$5.72 billion

Other Findings and Considerations

From this analysis, we have highlighted a number of key findings and considerations for RMA members and the Government of Alberta overall. Specifically, these are:

Infrastructure resiliency is a growing concern:

Infrastructure resiliency is particularly important for utility infrastructure, where failures have immediate, direct impacts on residents and communities. Failures in these systems are wide reaching, and unlike road network issues, there are no alternative options or re-routing that can address failures. Utilities such as water, electricity, and stormwater are essential services that must remain reliable and operational under all conditions. The failure or underperformance of these critical services can have severe consequences, impacting both daily life and emergency response capabilities. A utility portfolio already showing signs of underinvestment is particularly vulnerable to these risks, potentially deteriorating faster without adequate intervention.

Climate change is expected to have significant impacts on infrastructure, including increased risks of fire, flooding, erosion, and other severe weather events. Combined, this can overtax the infrastructure, impact expected lifespans, require more regular maintenance, or require major rehabilitation interventions over and above regular expected maintenance investment. A utility portfolio that is already showing signs of underinvestment may deteriorate even faster with the impacts of climate change, particularly given the risk of flooding and major storm events.

Beyond maintenance, climate resiliency considerations may require adjustments in materials and construction techniques as well. These adaptive remediations may be required outside of normal investment cycles, further increasing the needed investment into the portfolio. Of course, these adaptive measures may be more expensive in and of themselves. Overall, there is a clear need for investment into both climate adaptation and resiliency as it relates to municipal infrastructure, including utility infrastructure.

There is increasing need for additional utility funding:

There is also a need for continued investment in infrastructure maintenance and renewal to address the existing infrastructure deficit and ensure that infrastructure remains safe, reliable, and resilient. This includes investing in utility rehabilitation and replacement projects to address deteriorating infrastructure and improve overall network performance. When considering new investment, adopting new technologies in the construction and maintenance of utilities will be essential for improving efficiency, safety, and resilience. Technologies such as advanced materials, sensors, and data analytics can help municipalities better understand the condition of their utilities, predict maintenance needs, and optimize repair and replacement schedules. By embracing innovation, municipalities can reduce long-term maintenance costs and ensure that their utility infrastructure remains safe and reliable for years to come.

Asset management remains a challenge for municipalities:

Effective asset management is essential for municipalities to maintain and improve their infrastructure in a strategic and sustainable manner. Despite RMA's significant efforts over the years, this analysis has revealed that many rural municipalities are still struggling to implement comprehensive asset management practices. This gap poses a significant challenge for the upkeep and development of rural utility networks. One of the primary challenges in asset management is the lack of comprehensive data collection. Many municipalities do not have the resources or systems in place to regularly assess and record the condition of their utilities and other infrastructure assets. This deficiency hinders their ability to make informed decisions about maintenance, rehabilitation, and replacement projects. Without accurate data, municipalities cannot prioritize their efforts effectively, leading to potential neglect of critical infrastructure needs.

As well, the practices for asset management vary widely among municipalities, resulting in inconsistent approaches to infrastructure maintenance and investment. While some municipalities have established robust asset management frameworks, others have yet to develop or adopt such practices. This inconsistency leads to disparities in infrastructure conditions across the province, with some areas receiving adequate attention and resources, while others experience accelerated deterioration and increased risks. However, the cost of conducting regular inspections, maintaining detailed asset inventories, and implementing advanced management systems can be prohibitive. Resource constraints and on-staff expertise are a primary barrier to effective asset management. Many rural municipalities operate with limited budgets and staffing, making it challenging to allocate sufficient resources for comprehensive asset management activities. Consequently, many municipalities are forced to take a reactive rather than proactive approach to infrastructure maintenance, addressing issues only when they become critical.

What's Next?

The final report will consolidate the findings from each individual asset type report, summarizing the total infrastructure deficit for all asset categories. This comprehensive overview will offer stakeholders a clear picture of the scale of the infrastructure challenge faced by rural municipalities and recommendations to address it.

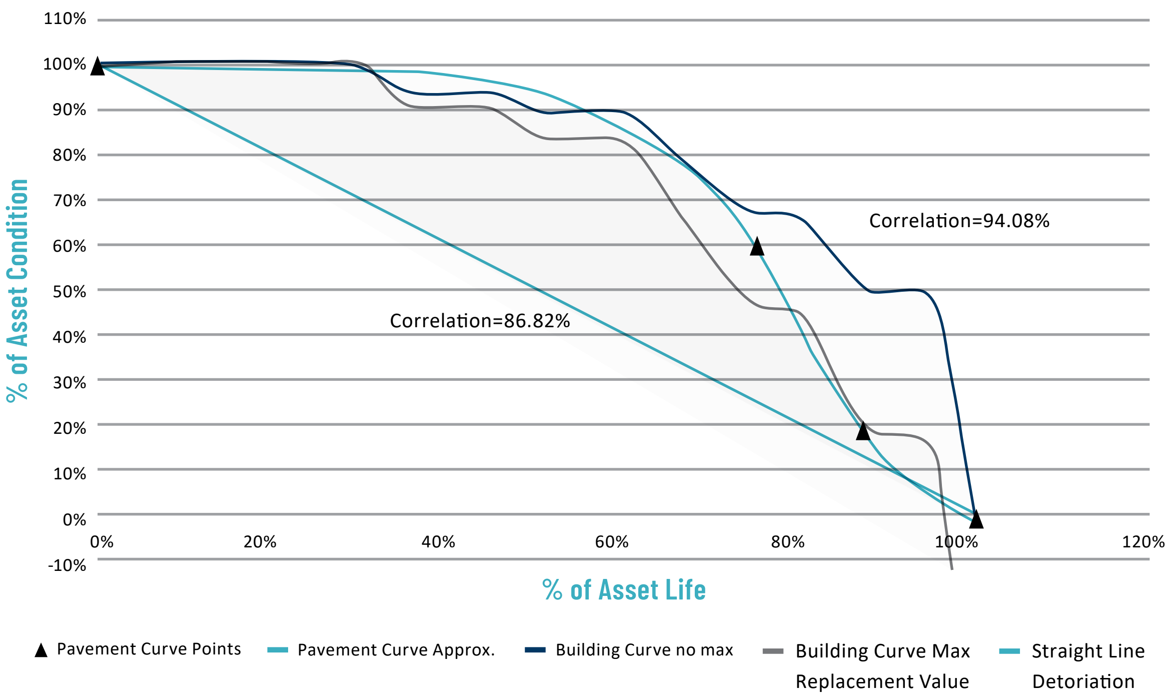
Questions about this report, or any others in the series, can be directed to **Wyatt Skovron, General Manager of Policy and Advocacy** at **780.955.4096** or **wyatt@rmalberta.com.**

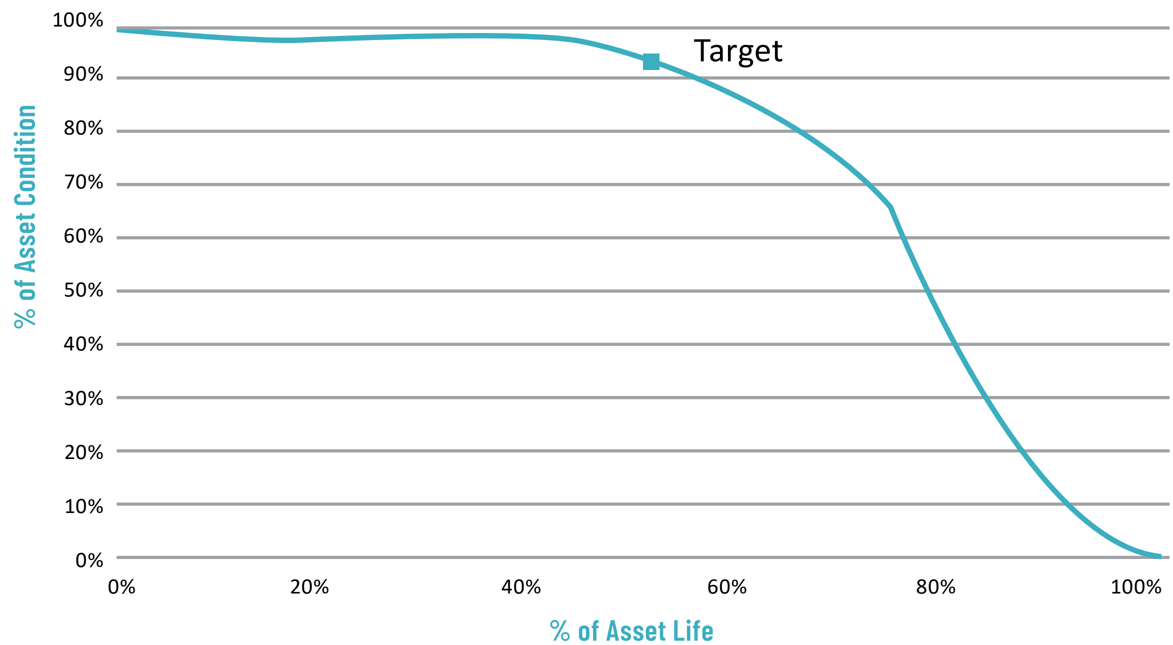
Appendix A: Deterioration Curve Technical Data

Two different deterioration curves have been used to analyze the state of rural infrastructure in Alberta. The first curve, an S-Curve, is used for bridges and roads infrastructure. The S-Curve was adapted from a standard pavement deterioration curve. The second deterioration curve, the Utility Curve, is used for utility (water, wastewater, and stormwater) infrastructure. The Utility Curve was adapted from a standard sanitary sewer deterioration curve. Both curves are mathematical formulas that forecast the condition of the overall portfolio based on the weighted average point in the asset's life.

S-Curve

In the early 2000s, it was determined that the S-Curve has a 94% correlation with a building deterioration curve provided by Alberta Infrastructure's asset management methodology. An Alberta Parks and Protected Areas report completed at that time validated the use of the standard pavement deterioration curve to approximate the deterioration of all infrastructure classes in the Parks and Protected Areas portfolio by comparing the predicted rate of decline with data provided from the Infrastructure Information Management System (IMS). Using the IMS, the primary comparison drawn predicted the cumulative maintenance expenses for a 500 sq. ft., stick frame constructed building. The results were then correlated with the pavement curve, assuming a 30-year life of the building. The result was a correlation of 94.08%. When contrasting the deterioration curve with a straight-line curve (traditionally used in accounting), the straight-line curve resulted in a lower correction of 86.97%.

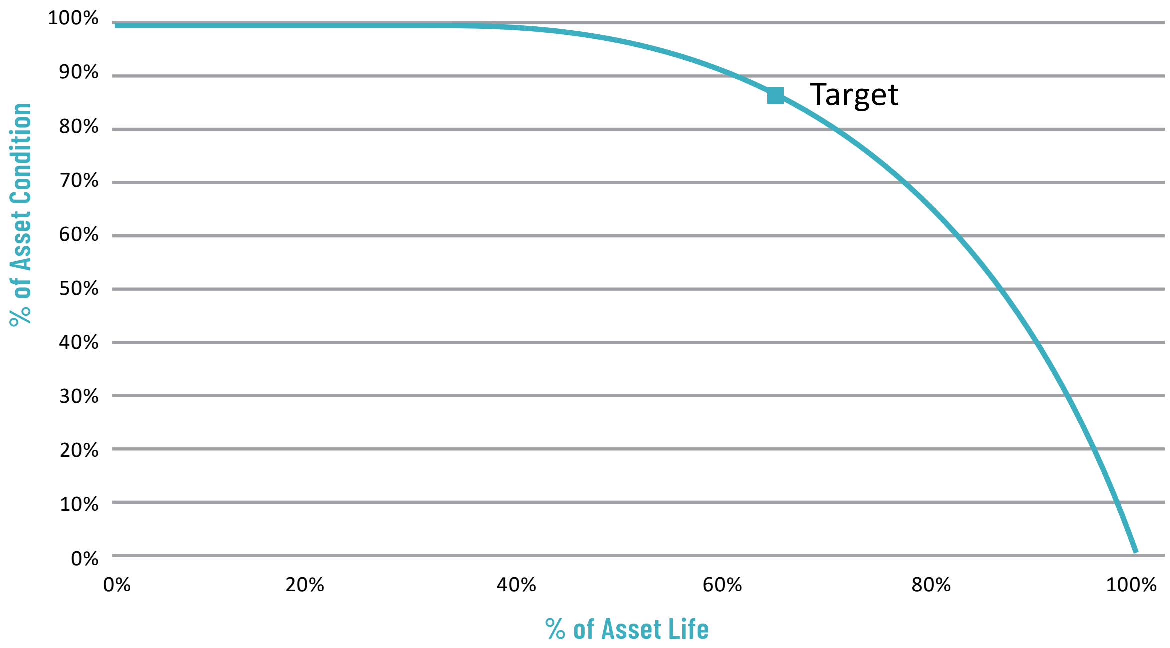




target point of the S-Curve is a derived calculation which considers the life consumed compared to the slope (i.e. holding cost) of the curve at any given point. It is intuitive that the best value point on the curve is one where we have utilized as many of the 'cheap' years of an asset, while not letting it start to slide down to steeper points on the curve. The S-Curve begins to slope downward at 50% of the infrastructure life span (94% condition). The most economical option is if the curve can be prevented from dropping by lengthening the infrastructure life at this point. The holding cost is determined by the required investment to stay at the same point on the curve, year over year. The deficit calculation is based on the one-time investment required to move the portfolio to its target state (50% of life expectancy).

Utility Curve

Through the development of this project, it became apparent that the standard S-Curve was not going to provide an effective model for all asset types that are in-scope. In particular, we observed a number of instances, including from RMA members themselves, where the standard deterioration curves for utility infrastructure were quite different than the standard S-Curve model above. While consensus of a baseline utility curve appears to be less settled than road infrastructure, it was decided to leverage utility modelling conducted by the City of Ottawa[7] to derive our utility curve. Specifically, a curve-fitting exercise was conducted on a published sanitary infrastructure curve to derive the curve below.



Despite the change in shape, the Utility Curve functions similarly to the S-Curve above. The optimum point is a derived calculation which considers the annual investment required to keep assets at the previous year's condition level. Keeping assets at this condition through investment will keep annual depreciate below the annual change in value of the depreciating asset.

However, the Utility Curve does not have the same inflection points as the S-Curve above, so the key point of acceleration is less prominent. As a result, the target point of the Utility Curve is a different derived calculation which considers annual investment required to keep assets at the previous year's condition level. It is again intuitive that the best value point on the curve is one where we have utilized as many of the 'cheap' years of an asset, while not letting it start to slide down to steeper points on the curve. The steepest slope of the Utility Curve beings at around 64% of the infrastructure life span (87% condition). The most economical option is to keep assets at this condition, where annual depreciation will stay below the annual change in value of the depreciating asset.

7 Strategic Asset Management Plan

Like the S-Curve above, through investment, the curve can be prevented from dropping by lengthening the infrastructure life at this point. The holding cost is determined by the required investment to stay at the same point on the curve, year over year. The deficit calculation is based on the one-time investment required to move the portfolio to its target state (64% of life expectancy).

As noted, this curve will only apply to various utility infrastructure for that specific report, and is not applied to the Bridge & Culvert, or Roads reports.

Deterioration Curves Interpretation

Regardless of the specifics of the deterioration curve being used, using a deterioration curve results in a better analysis of the infrastructure deficit than the standard straight-line deterioration method used in Tangible Capital Asset (TCA) accounting. The first key advantage of this curve over the traditional straight-line depreciation approach is its ability to account for varying rates of degradation over an asset's lifespan. The assumption of the same level of annual degradation in the straight-line approach means there is no optimal point to maintain assets, leading to potentially inefficient allocation of resources. Additionally, the accounting-focused straight-line approach tends to underestimate an asset's condition early in its lifespan and overestimate it later when investment is critical, which can result in suboptimal asset management decisions. In contrast, the curve used in this analysis provides a more realistic and asset-management focused view of infrastructure deterioration. By incorporating factors such as the optimal condition to maintain assets and the varying rates of degradation over time, this approach offers a more accurate assessment of the infrastructure deficit. This is particularly valuable for long-term planning and decision-making, as it allows municipalities to prioritize maintenance and investment efforts based on the actual condition of their assets.

Assets can be manually moved up and down a deterioration curve. To theoretically ‘age’ an asset, its useful life is used to move the asset along the curve each year. For example, an asset with a useful life of 50 years would move down the x-axis at 2% each year. In year zero, the asset would have a 0% life consumed, and consequently, a 100% condition. As an example of how this applies to the S-Curve above, in year one, the life consumed would be 2%, and the condition would be 99.52%. At year 25, the life consumed would be 50%, and the corresponding condition would be 93.96%. However, this assumes no investment into the asset. If investment is made into the asset, the asset would move up the y-axis based on the change to asset condition. For example, if an asset at 40% condition, and 80% life consumed receives an investment that improves its condition by 10%, the asset would move up the y-axis to 50% condition with a corresponding 77.5% life consumed. This essentially ‘de-ages’ the asset, extending its actual life. The utility curve functions similarly, though specific values will change.

Appendix B: Technical Methodology

To calculate the overall rural municipal infrastructure deficit, it was critical to be able to place the current state of infrastructure on the deterioration curve outlined above. To do this, two key pieces of information are needed: the ideal value of the infrastructure portfolio and the actual current value of the infrastructure. The deficit is calculated by subtracting the current value from the ideal value. However, it is important to note that the ideal value of infrastructure is not the same as the value of brand-new infrastructure. As shown in the "Deterioration Curve" section of the report, utility infrastructure should ideally be maintained at approximately 87% condition with 64% of its life consumed.

To complete the analysis of the infrastructure deficit there are two paths to calculate the total deficit, depending on what information is available on the asset. Both paths require:

- Utility Type
    - ex. Water, wastewater, stormwater.
- Structure Type
    - ex. Water main, stormwater management facility, wastewater lift station.
- Useful Life
    - Pre-populated in the workbook based on Infrastructure Canada standards. Municipalities were encouraged to override the provided value if their if their municipality uses a different expected useful life than the one prefilled.
- Estimated Replacement Cost
    - How much it would cost to fully replace the asset.

The first path relies on two key pieces of information for each asset: the condition assessment and last inspection date. The condition assessment is the y-axis of the deterioration curve and represents the average condition of the infrastructure as a percentage of its value. The last inspection date is required to ensure all assets can be viewed in 2023 dollars. The second path is used when the condition assessment is not available. This path requires the first in service year and the total capital investment into the asset. The first in service year is also the date of construction, and the total capital investment into the asset is the total dollar amount of capital that has been invested into this asset. This does not include scheduled maintenance or daily operating costs.

The following sections outline the various phases of work that were conducted to achieve placement on the deterioration curve.

Utility Information

Unlike bridges, there is not a central database of other asset types within the province. Municipalities are tasked with allocating their own resources to inspect, record, and analyze their infrastructure. To create the database needed in this project to analyze the infrastructure deficit, municipalities were asked to provide the project team information on their assets.

A request for asset management data was sent to all RMA members. This request included a stakeholder primer and requested volunteers to participate in the process, if they felt they had appropriate asset management data available. Municipalities were also provided with individualized workbooks during this engagement process. During this time, the project team presented work completed to date at the RMA 2024 Spring A Convention. The combination of personalized requests and publicity for participation resulted in an up-tick in project participation throughout RMA membership. 30 of 69 RMA members provided data to be utilized in this project. RMA is extremely grateful to all members who participated in this process and were able to provide any asset management data to the project. Municipalities that were unable to provide information are represented in the deficit calculation through an extrapolation process.

Infrastructure Workbook

To make collecting the required data as easy and uniform as possible, the project team created a workbook that was sent to all 69 rural municipalities in Alberta. This workbook was intended to collect detailed information on various infrastructure assets, including roads, bridges, and utilities. The data collected from these workbooks aimed to quantify the rural municipal infrastructure deficit, providing a foundation for informed advocacy and future planning. The workbook contained an introduction, FAQ, and separate tabs for each category of infrastructure (bridge, roads, and utilities). Specific directions to fill out the workbook and which data fields were required for each asset were clearly explained. The data fields were colour coded as follows:

GREEN: Mandatory for ALL assets.

GREY: Optional but helpful. Please try to fill out these fields if possible.

ORANGE: Mandatory. If you do not have this data, please see the blue columns.

BLUE: If you do not have data for all orange columns, all blue columns are required.

The following columns were requested for road assets:

- Green
    - Utility Type (dropdown menu)
    - Structure Type (dropdown menu)
    - Useful Life (pre-populated)
    - Estimated Replacement Cost
- Grey
    - File Number
    - Description or Name

    - Other (Please Describe)
    - If the Structure Type selected is “Other” this field becomes mandatory to describe the structure type
    - Primary Usage
    - External Maintenance Relationship?
    - Year Replacement Cost was Estimated
    - Average Daily Design Flow
- Orange
    - Condition Rating
    - % Condition Rating (if different than condition rating)
    - Last Inspection Date
- Blue
    - First in Service Year
    - Capital Investment into Asset

Data Standardization

To promote consistency across the analysis, municipalities directly providing data through the workbook process were asked to include the ‘year replacement cost was estimated’. Municipalities were asked to consider the year in which their dollars are valued. The example given was:

“If you've planned to spend $10 million to replace the asset in 2034 and you've already adjusted for inflation to 2034, enter 2034. If your estimate is in today's dollars (for example, $10 million in 2023 dollars), enter 2023. The inverse is also true, if in the year 2000 you estimated it would cost $5 million to replace the asset in 2024, and you end up spending the current value of $5 million (let's say it's $8 million now), please enter 2000. If you considered inflation in 2000 and today you've spent $5 million, enter 2023.”

When workbooks were received back from all municipalities who chose to participate, the deficit calculations began. In the analysis and calculation of the deficit, all dollar values been moved to be representative of 2023 values. This helps to ensure consistency across municipalities and asset categories. Inflation rates used are based directly on the Statistics Canada Consumer Price Index[8].

In keeping with the idea of consistency, where required, all assets have been manually ‘aged’ to reflect condition as of 2023. This involves utilizing the assets ‘useful life’. To categorize the useful life of assets, we turned to the Government of Canada Statistics: Infrastructure Canada data[9]. This data was released in 2022 and contains information for the asset categories of road assets, potable water assets, culture, recreation and sport facilities, wastewater assets, stormwater assets, and public transit assets. The data is entitled “Average expected useful life of new municipally owned [asset category], by urban and rural, and population size, Infrastructure Canada.” Where data exists, we have selected the average useful life specific to Alberta Rural Municipalities. When the rural category is not available, the Alberta Urban Municipalities value was selected. In very few

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[8] Consumer Price Index, annual average, not seasonally adjusted

[9] Statistics Canada: Infrastructure

categories, specific subcategories were not documented in the Infrastructure Canada database. In these cases, data was collected from various sources such as the participant workbook for the course “Asset Management for Municipal Staff: The Technical Basics”[10], and targeted to Rural Alberta as much as possible.

The primary subcategories used in the Water category are Water Treatment Facility, Water reservoirs (including dams) before intake, Storage tanks after intake not part of a treatment plant, Water pump stations, Local water pipes (diameter less than 416 mm), Transmission pipes (diameter greater than or equal to 416 mm), Pipes of unknown diameter, Hydrants, Valves, Meters, and Other. The following table contains a brief definition of the subcategories and their useful life.

ASSET SUBCATEGORY	DEFINITION	USEFUL LIFE (YEARS)[11]
Water Treatment Facility	Water treatment plants are facilities that remove harmful or undesirable substances from the source water, producing water that is fit for its specific purpose.	30
Water reservoirs (including dams) before intake	A pond, lake, or basin (natural or artificial) that stores, regulates, or controls water. Includes the number of reservoirs and water towers within the distribution, transmission, or integrated system.	30
Storage tanks after intake not part of a treatment plant	Potable water tanks are containers specifically designed for the safe storage of drinking water.	36
Water pump stations	Pump stations include pump stations within the non-linear potable water system.	20
Local water pipes (diameter less than 416 mm)	Local water pipes include all connecting pipes, of diameter less than 416 mm, between pump stations, rechlorination facilities and storage facilities if these are located within the distribution system.	58
Transmission pipes (diameter greater than or equal to 416 mm)	Transmission pipes include all connecting pipes, of diameter greater than or equal to 416mm, between pump stations, rechlorination facilities and storage facilities when located between the source and the treatment plant or between the treatment plant and the distribution system.	75
Pipes of unknown diameter	Water pipes of unknown diameter include all other connecting pipes, between pump stations, rechlorination facilities and storage facilities.	25
Hydrants	A hydrant is an outlet from a fluid main often consisting of an upright pipe with a valve attached, from which water can be tapped	60

[10] Asset Management for Municipal Staff: The Technical Basics

[11] Average expected useful life of new municipally owned potable water assets, Infrastructure Canada

Valves	A valve is a type of fitting that allows for regulation, control, and direction of water passing through a pipe	25
Meters	A meter records the amount of water supplied to a home or business.	15
Wells	A well is a hole drilled into the ground to access water contained in an aquifer	35

An 'Other' option was provided to municipalities to include assets that fell under the category of Utilities but did not fall into one of the subcategories. This option was not utilized for water assets.

The primary subcategories used in the Wastewater category are Water Treatment Plants (includes sludge handling plants), Lagoon systems, Wastewater pump stations, Wastewater lift stations, Wastewater storage tanks, Sewer pipes (diameter less than 450 mm), Sewer pipes (diameter greater than or equal to 450 mm but less than 1,500 mm), Sewer pipes (diameter greater than or equal to 1,500 mm), Sewer pipes (of unknown diameter), Sanitary force mains, Sanitary gravity mains, and Other. The following table contains a brief definition of the subcategories and their useful life.

WASTEWATER ASSET SUBCATEGORY	DEFINITION	USEFUL LIFE (YEARS)[12]
Wastewater treatment plants (includes sludge handling plants)	Wastewater treatment plants are facilities that remove contaminants from sewage to produce an effluent that is suitable to discharge.	40
Lagoon systems	A wastewater treatment lagoon is an earthen pond where wastewater is treated via natural and biochemical processes.	55
Wastewater pump stations	A wastewater pump station is a storage and collection chamber that lifts and distributes wastewater when it cannot naturally be carried by gravity.	31
Wastewater lift station	A wastewater lift station is a pumping station that moves wastewater from a lower elevation to a higher elevation.	48
Wastewater storage tanks	Wastewater storage tanks store raw wastewater until a pumper removes it.	76
Sewer pipes (diameter less than 450 mm)	A sewer pipe is a conduit for the elimination of waste materials.	54

[12] Average expected useful life of new municipally owned wastewater water assets, Infrastructure Canada

Sewer pipes (diameter greater than or equal to 450 mm but less than 1,500 mm)	A sewer pipe is a conduit for the elimination of waste materials.	80
Sewer pipes (diameter greater than or equal to 1,500 mm)	A sewer pipe is a conduit for the elimination of waste materials.	73
Sewer pipes (of unknown diameter)	A sewer pipe is a conduit for the elimination of waste materials.	39
Sanitary force mains	Force mains are pipelines that convey wastewater under pressure from the discharge side of a pump or pneumatic ejector to a discharge point.	38

An 'Other' option was provided to municipalities to include assets that fell under the category of Wastewater but did not fall into one of the subcategories. This option was utilized by several municipalities to enter wastewater gravity mains. The useful life was derived from the received information from municipalities and is approximately 80 years.

The primary subcategories used in the Stormwater category are Stormwater drainage pump stations, Stormwater management facilities, ponds and wetlands, Open ditches, Stormwater pipes (diameter less than 450 mm), Stormwater pipes (diameter greater than or equal to 450 mm but less than 1,500 mm), Stormwater pipes (diameter greater than or equal to 1,500 mm), Stormwater pipes (of unknown diameter), and Other. The following table contains a brief definition of the subcategories and their useful life.

STORMWATER ASSET SUBCATEGORY	DEFINITION	USEFUL LIFE (YEARS)[13]
Stormwater drainage pump stations	Stormwater drainage pump stations include stormwater drainage pump stations that are connected to drainage swales, ditches and storm sewers. Exclude combined pump stations which convey combined sewage/stormwater to wastewater treatment plants.	45
Stormwater management facilities, stormwater management ponds and stormwater wetlands	Stormwater management facilities – Stormwater management ponds and stormwater wetlands: includes engineered end-of-pipe facilities that have received a permit or approval to operate and which may provide peak flow control, runoff quality control, runoff control for downstream erosion, runoff volume control, etc. Includes dry ponds, wet ponds, and stormwater wetlands etc.	33

[13] Average expected useful life of new municipally owned stormwater water assets, Infrastructure Canada

Stormwater management facilities all other permitted, end-of-pipe facilities	Stormwater management facilities – All other permitted end-of-pipe facilities includes engineered end-of-pipe facilities that have received a permit or approval to operate and which are not stormwater ponds or wetlands (e.g. oil-grit separators, etc.).	55
Open ditches	Ditches are open trenches designed to reroute stormwater off a property.	36
Stormwater pipes (diameter less than 450 mm)	Stormwater pipes collect stormwater runoff through a surface inlet and drain it in a closed system, often inlet to inlet, to an appropriate outlet, such as a stream or other waterway.	53
Stormwater pipes (diameter greater than or equal to 450 mm to less than 1,500 mm)	Stormwater pipes collect stormwater runoff through a surface inlet and drain it in a closed system, often inlet to inlet, to an appropriate outlet, such as a stream or other waterway.	53
Stormwater pipes (diameter greater than or equal to 1,500 mm)	Stormwater pipes collect stormwater runoff through a surface inlet and drain it in a closed system, often inlet to inlet, to an appropriate outlet, such as a stream or other waterway.	87
Stormwater pipes (of unknown diameter)	Stormwater pipes collect stormwater runoff through a surface inlet and drain it in a closed system, often inlet to inlet, to an appropriate outlet, such as a stream or other waterway.	75

An ‘Other’ option was provided to municipalities to include assets that fell under the category of Stormwater but did not fall into one of the subcategories. This option was not utilized for stormwater assets.

To age the asset to 2023, the useful life was used to determine how far along the curve each asset subcategory moves each year. Except in cases where municipalities have indicated otherwise through the workbook, this involved assuming that no investment has been made into the asset since its last inspection date. 8.69% of Class 1 utility assets have an inspection date in 2023, the remainder have been manually aged to represent their expected asset condition and life consumed in 2023. In some cases, the result off the calculated condition rating or life consumed exceeded 0% or 100%, respectively. In these cases, the utility was capped at 0% condition and 100% life consumed. The manually capped assets account less than 1% of all utilities. More details regarding the manual aging process can be found in the following section entitled ‘Deterioration Curve’.

Extrapolation Process

Data was received through a structured data request to municipalities. Approximately 16% of RMA members responded to the workbook collection and included their utility information in

the workbook. Of the data received from these municipalities, 27.77% of the data contained the information needed to calculate an infrastructure deficit. This left two main groups of information to account for:

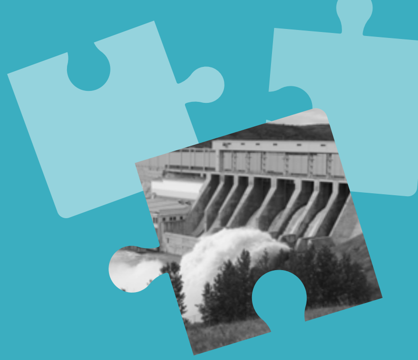
1. Data received from municipalities without the required information for the deficit calculation.
    a. For each asset the required data is a useful life value, replacement cost, structure type, and either a condition rating or total capital investment. More information can be found in the section entitled 'Appendix B: Technical Methodology.'
2. Municipalities who did not participate in the workbook process.

To extrapolate the information received through the workbook process, a process was required to account for the missing municipal information. To test this, the complete information received was evaluated as a ratio of several factors, including MFIS-reported municipally-owned water, wastewater, and stormwater system mains (kilometers) as well as TCA value data. Firstly, the process tested whether the complete information received represented a reasonably comparable sample to the remaining RMA members. To do this the reported MFIS TCA values, as well as the percentage of municipally-owned mains (compared to regional or other systems) were compared between our complete information sample to other RMA members. In both cases, this comparison resulted in a close alignment and supported the confidence of the further extrapolation process. Secondly, using the fully complete data, separate deficit values per kilometer of reported MFIS (municipally-owned) KM's of mains were calculated for water, wastewater, and stormwater each. This value was then applied to the kilometers of reported water/wastewater/stormwater mains for the municipalities who did not participate in the workbook process, or who provided data unable to be included in the original analysis process. It is important to note that only the municipally-owned system kilometers (as opposed to service providers, co-ops, regional systems, or other) were used to extrapolate for water and wastewater assets. MFIS data does not contain this breakdown for stormwater assets and as such the total reported value was used.

Exceptions to Methodology

In the case of a minority of RMA members, special circumstances were accommodated for to assist in the reporting of their asset management information. The following list details these situations:

1. A minority of municipalities were not able to participate in the structured workbook process. In such cases, the project team translated their provided asset management information into the workbook. The workbook was then sent back to the municipalities for confirmation.
2. A small number of municipalities were not able to provide condition ratings in a percentage format, only having subjective ratings such as "Good", "Fair", etc. The project team worked with these municipalities to translate their subjective condition ratings into percentage conditions. This translation was based on a standard useful life remaining of the asset. In all cases, municipalities approved the translation efforts.
3. A very small percentage of utilities did not have a last inspection date or year replacement cost was estimated. In these cases, it was assumed to use 2023 for both values.



Appendix C: Utility Characteristic Comparison Data

Note: It is important to remember that the values contained within these charts represent a limited subset of the rural utility portfolio. Only utilities with condition ratings were able to be included in this analysis.

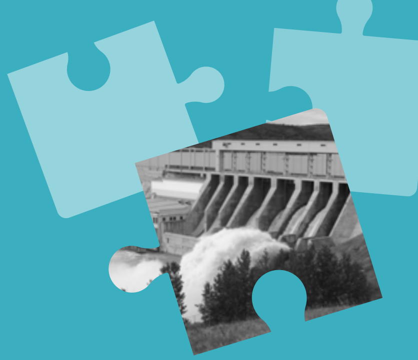
Utilities by Type

BY TYPE	LIFE CONSUMED	CONDITION	VALUE	CURRENT HOLDING COST	TARGET HOLDING COST	COST TO GET TO TARGET
Water	78.30%	66.90%	$611,892,025	$29,460,148	$14,426,446	$179,928,064
Wastewater	77.20%	68.88%	$507,674,852	$23,740,680	$11,625,659	$130,419,276
Stormwater	85.10%	51.80%	$32,662,085	$2,030,938	$994,537	$21,924,785

Water Utilities by Subtype

BY TYPE	LIFE CONSUMED	CONDITION	VALUE	CURRENT HOLDING COST	TARGET HOLDING COST	COST TO GET TO TARGET
Hydrants	78.60%	66.28%	$10,824,756	$526,119	$257,637	$3,316,088
Meters	73.20%	75.58%	$3,906,810	$166,497	$81,533	$568,244
Valves	81.60%	60.03%	$11,076,713	$594,374	$291,061	$4,898,674
Water Mains	77.90%	67.54%	$423,541,545	$20,199,837	$9,891,731	$119,382,958
Water Pump Stations	75.70%	71.49%	$103,298,852	$4,654,144	$2,279,104	$21,793,677
Water Reservoirs	97.90%	9.12%	$2,021,058	$713,938	$349,611	$17,167,923
Water Storage Tanks	63.20%	87.33%	$27,463,880	$1,013,020	$496,069	-$236,267
Water Treatment Facility	81.70%	59.87%	$29,071,854	$1,564,132	$765,945	$12,968,357
Wells	70.90%	78.73%	$686,557	$28,089	$13,755	$68,410

Note: Water Storage Tanks have a condition rating above the target point on the curve and therefore result in a negative cost to get to target.



Wastewater Utilities by Subtype

BY TYPE	LIFE CONSUMED	CONDITION	VALUE	CURRENT HOLDING COST	TARGET HOLDING COST	COST TO GET TO TARGET
Lagoon System	88.30%	43.07%	$25,293,326	$1,891,687	$926,347	$25,550,804
Wastewater Force Mains	82.90%	57.05%	$35,897,474	$2,026,744	$992,484	$18,576,688
Wastewater Gravity Main	74.40%	73.72%	$38,237,545	$1,670,773	$818,167	$6,668,940
Wastewater Lift Station	82.50%	57.99%	$34,314,444	$1,906,127	$933,418	$16,917,798
Wastewater Mains	74.20%	74.00%	$359,326,320	$15,640,328	$7,658,968	$61,049,214
Wastewater Pump Stations	75.50%	71.84%	$470,546	$21,099	$10,332	$96,542
Wastewater Storage Tanks	63.80%	86.83%	$10,476,681	$388,665	$190,327	-$30,261
Wastewater Treatment Plant	81.50%	60.36%	$3,658,517	$195,258	$95,616	$1,589,552

Note: Wastewater Storage Tanks have a condition rating above the target point on the curve and therefore result in a negative cost to get to target.

Stormwater Utilities by Subtype

BY TYPE	LIFE CONSUMED	CONDITION	VALUE	CURRENT HOLDING COST	TARGET HOLDING COST	COST TO GET TO TARGET
Stormwater Outfall	80.80%	61.72%	$111,150	$5,801	$2,841	$44,760
Storm Mains	80.80%	61.79%	$21,930,072	$1,143,285	$559,860	$8,798,773
Stormwater Management Facility	92.50%	29.61%	$6,868,206	$747,256	$365,927	$13,216,304
Stormwater Pump Station	60.20%	89.81%	$3,752,657	$134,595	$65,910	-$135,052

Note: Stormwater Pump Stations have a condition rating above the target point on the curve and therefore result in a negative cost to get to target.

Utilities by District

BY TYPE	LIFE CONSUMED	CONDITION	VALUE	CURRENT HOLDING COST	TARGET HOLDING COST	COST TO GET TO TARGET
1	90.80%	35.24%	$4,139,724	$378,352	$185,277	$6,029,505
2	83.40%	55.98%	$93,684,569	$5,390,403	$2,639,646	$51,196,898
3	72.20%	77.00%	$1,033,864,504	$43,249,957	$21,179,228	$128,593,489
4	98.20%	8.16%	$14,931,849	$5,897,131	$2,887,787	$143,569,269
5	82.90%	57.18%	$5,608,316	$315,923	$154,706	$2,882,964

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