



Municipalité de
RUSSELL
Township

TOWNSHIP OF RUSSELL
ASSET MANAGEMENT PLAN
PUBLIC WORKS INFRASTRUCTURE
JUNE 2017

—
WSP

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EXECUTIVE SUMMARY



EXECUTIVE SUMMARY

WSP was retained to undertake the development of a comprehensive Asset Management Plan that the Township of Russell (Township) can utilize to assist with decisions regarding the construction, operation, maintenance, renewal, replacement, disposal, and funding of their Road, Bridge, Sidewalk, and Storm Water infrastructure assets.

This Asset Management Plan was prepared in accordance with the Ontario Ministry of Infrastructure's, "Guide for Municipal Asset Management Plans" and has been structured based on the following sections.

1. Executive Summary
2. Introduction
3. State of Local Infrastructure
4. Expected Levels of Service
5. Asset Management Strategy
6. Financing Strategy

The scope of this Asset Management Plan includes the transportation and storm water infrastructure owned and operated by the Township of Russell. The Town's transportation and storm water linear infrastructure consists of approximately 245.3 km of roads, 27.2 km of sidewalks, and 89.5 km of storm sewers. Additionally, there are 14 bridges and 11 culverts.

Information documented in the 2012 Road Inventory and Needs Study and the 2015 Road Inventory and Needs Study, the 2012 Storm Water Drainage System Management Plan and Maintenance Program (McIntosh Perry), and OSIM Inspections of 14 Bridges and 11 Culverts by HP Engineering Inc., were used to establish the baseline inventory.

The asset condition for the paved roads was updated based on a 2016 condition assessment completed by WSP per the MTO SP-024 Manual for Condition Rating of Flexible Pavement. However, WSP's assessment did not include earth and gravel roads. For these, the baseline condition information from the previous studies was updated using an age-based approach.

For sidewalks, storm water, bridge and culvert assets the available condition information from the previous reports was used.

A desktop assessment of risk was undertaken to provide an understanding of safety and functionality of the Township's infrastructure at a system level. The priority of works associated with the infrastructure, however, has largely been determined by the Township's 2015 Road Inventory and Needs Study, augmented with the results from WSP's condition assessment.

Full life cycle investments for maintenance, rehabilitation, renewal and replacement needs were applied over a 10 year planning period from 2017 to 2026. The major capital projects for the Township projected over the 10 year planning period include:

- Rehabilitation / replacement studies of seven bridges (for the full bridge, or individual bridge components) per OSIM Reports
 - Two bridges may require complete replacement (R-006, R-027). *Note the needs forecast includes only recommendations for work as specified in the OSIM reports.*
- Minor rehabilitation of 12 bridges
- Rehabilitation / replacement study of 10 culverts (full, or components) per OSIM Reports
 - Replacement of three culverts (RC-001, RC-029, and RC-039)
- Minor rehabilitation of five culverts (RC-002, RC-007, RC-008, RC-030, and RC-038)
- Replacement of 12.1 km of sidewalks
- Rehabilitation or replacement of 57.0 km of road segments (refer to Table 2-12 or Appendix A)
- Condition assessment of Storm Sewers and replacement / rehabilitation program

Yearly expenditure forecasts were summarized by infrastructure category to determine the annual average investment required for infrastructure sustainability. The projected infrastructure investment needs were compared to the Township's historical expenditures to identify potential funding gaps or surpluses.

Next steps have been provided at the end of each section of this plan to elaborate on how the Township can continue to improve and update this Asset Management Plan in the future. A brief summary of the next steps is provided below in Table 0-1.

Table 0-1 Summary of Next Steps

SECTION	NEXT STEPS
State of the Local Infrastructure (Section 2.0)	Maintain and update the asset inventory: <ul style="list-style-type: none"> • Expand the bridge / culvert inventory to separately track individual components per the OSIM inspections. • Review and revise sidewalk IDs to ensure unique identification for each asset. Ongoing condition assessment programme: <ul style="list-style-type: none"> • Institute a routine programme for road condition assessments, and track changes over time. • Institute a periodic CCTV inspection program for buried infrastructure. • Implement operational practices to capture condition information details whenever buried infrastructure is exposed.
Expected Levels of Service (Section 3.0)	Track values for technical performance measures each year.

SECTION	NEXT STEPS
Asset Management Strategy (Section 4.0)	Conduct risk assessment on sidewalks. Establish project prioritization framework to prioritize between asset types. Track ongoing expenditures and their impact / efficacy.
Financial Strategy (Section 5.0)	Determine the appropriate funding strategy (strategies) for any identified funding gaps. Determine the appropriate funding strategy for the proposed intervention activities.

CONDITION

SCORE
B

	CONDITION TARGET	AVERAGE CONDITION	CONDITION RATING
ROADS	3.0 to 4.0	3.3	B-
SIDEWALKS	3.0	2.3	C-
STORM SEWERS	3.0	4.2	A-
BRIDGES	Fair to Good	Fair	B
CULVERTS	Fair to Good	Fair	B

QUICK FACTS

245

Kilometers of Road Infrastructure

28

Average age of Road Surfaces in Years

90

Kilometers of Storm Sewers

27

Average age of Storm Sewers in Years

LEVELS OF SERVICE

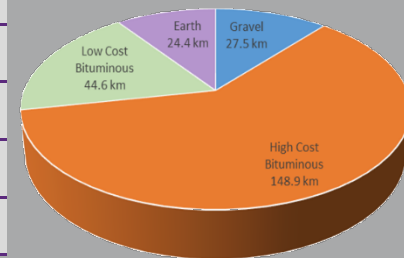
SCORE
B

Roads "To provide a smooth, comfortable riding surface at the posted speed limit"

RISK

	RISK RATING	RISK LEVEL
ROADS	4.0	Low
SIDEWALKS	7.4	Medium
STORM SEWER	5.5	Medium
BRIDGES	10.4	Medium
CULVERTS	9.1	Medium

ROAD SURFACE TYPE



CURRENT LEVEL OF SUSTAINABLE FUNDING

\$3.55M

CURRENT AVERAGE ANNUAL INVESTMENT

\$1.45M

ANNUAL FUNDING DEFICIT

\$2.09M



INTRODUCTION



INTRODUCTION

The Township of Russell is a lower tier municipality within the United Counties of Prescott Russell, located southeast of Ottawa in Eastern Ontario. There are four urban communities within the Township's boundaries: Embrun, Russell, Marionville and Limoges.

The Town's linear transportation infrastructure consists of approximately 245.3 km of roads, 27.2 km of sidewalks and 89.5 km of storm sewers. Additionally, there are 14 bridges and 11 culverts.

1.1 BACKGROUND

The Ontario Ministry of Infrastructure's, "Building Together: Guide for Municipal Asset Management Plans" (June 2011), indicates that any municipality seeking provincial infrastructure funding must demonstrate how its proposed project fits within a detailed Asset Management Plan. This helps to ensure that limited resources are directed to the most critical needs.

WSP was retained to undertake the development of a comprehensive Asset Management Plan that the Township of Russell (Township) can use to guide decisions related to the management of their road, sidewalk, bridge, culvert, and storm water infrastructure assets.

This Asset Management Plan was prepared in accordance with the Ontario Ministry of Infrastructure's, Guide for Municipal Asset Management Plans.

1.2 PURPOSE

The objective of this Asset Management Plan is to provide a strategic document that will guide decisions related to how the Township's road, bridge, culvert, sidewalk, and storm water infrastructure will be managed most efficiently and effectively allocate resources in a manner that will meet the Township's desired levels of service within the lowest overall lifecycle costs.

This Plan identifies the costs and benefits of infrastructure investment decisions across the organization's asset portfolio. To demonstrate the impact of investment decisions, target Levels of Services were set for each asset class so that performance against these targets could be measured. A Financial Plan is also included in this document which shows how current levels of investment are measuring up against the asset needs. This plan will help to demonstrate the impacts of investment decisions across the organization. It ultimately provides a 10 year capital needs forecast based on available condition assessment information, from 2017 to 2026, and makes recommendations for how the Township may advance its asset management programme moving forward.

1.3 DEVELOPMENT OF AN ASSET MANAGEMENT PLAN

This Asset Management Plan only documents the asset management strategy for the core public infrastructure of Transportation systems: roads, sidewalks, bridges, culverts, and storm water. It is

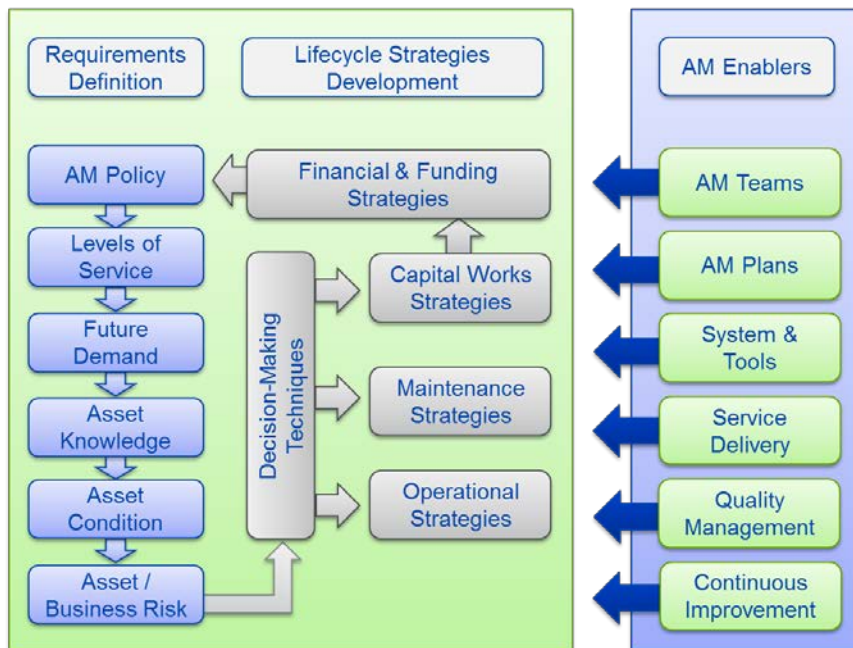
anticipated that future government funding of infrastructure projects will be contingent on an Asset Management Plans. It is highly recommended that the Township consider future integration of Asset Management Plans to promote consideration of mutual needs, infrastructure interdependencies, and avoidance of institutional siloing.

While the previous Plan by Public Sector Digest documented all of the Township's infrastructure categories, it had two major deficiencies. First, the condition rating assigned to infrastructure asset systems was a blend of theoretical asset condition based on age and a theoretical annual investment that was calculated using assumed economic Service Life Spans for infrastructure that were inconsistent with the actual engineering Service Lives. This approach produced inaccurately poor infrastructure condition scores. The second deficiency was that, though an annual cost was identified for the plan, no actual infrastructure investments were identified.

This document looks at a 10 year planning horizon from 2017 to 2026 but should be re-evaluated on a five year basis. It has been developed so that regular updates can be made to reflect the Township's changing needs and funding availability.

Below is a typical asset management framework as presented in the International Infrastructure Management Manual. It outlines the relationship between the processes and procedures being presented in this Plan.

Figure I-1 Typical Asset Management Framework



Asset management is the philosophy of actively managing assets with the intention of achieving a specific objective; in this case, delivering the Township's services at the lowest lifecycle cost. This plan should not be a standalone document; it is an iteration of a continually-evolving framework for best management of the Township's infrastructure, to be integrated into day-to-day operations and reviewed on an annual basis. Although certain principles of asset management such as Condition Assessment, Levels of Service and Capital Planning are addressed within this document, these are high level approaches and assessments that are to be refined as the Township's asset management program grows. This Asset Management Plan will require on-going and continual work to ensure its success.

On-going work or next steps to the refinement of the asset management strategy are presented at the end of each section.

I.4 RELATIONSHIP TO OTHER PLANNING DOCUMENTS

This Asset Management Plan relied upon other targeted planning documents in developing the overall strategy. This document has already drawn upon the valuable work completed under other planning documents such as the:

- Township of Russell. ["Township of Russell, Master Plan, Transportation chapter"](#). Township of Russell Municipal Council.
- 2012 Storm Water Drainage System Management Plan and Maintenance Program (McIntosh Perry).



2 STATE OF THE LOCAL INFRASTRUCTURE

STATE OF THE LOCAL INFRASTRUCTURE

2.1 INVENTORY OF ASSETS

Key asset inventory information including location, size, length, material and other attribute information is displayed in the inventory of assets.

PS 3150 VS ASSET MANAGEMENT

Effective January 1, 2009, the Public Sector Accounting Board's (PSAB) Rules on Tangible Capital Assets (PS 3150) required that local governments record their Tangible Capital Assets on the statement of financial position and amortize them over their useful lives, moving all governments to a universal full accrual accounting system. In order to comply with this directive, municipalities across Ontario needed to develop an inventory of all of their infrastructure assets, along with an assumed replacement cost.

PS 3150 provides accounting information for all tangible capital assets (TCA) using historical cost valuation. An Asset Management Plan needs to provide the financial information and timing associated with future replacements, rehabilitations, disposals, expansions and maintenance for the tangible capital assets. Table 2-1 below summarizes key differences between PS 3150 and asset management.

Table 2-1 PS 3150 vs. Asset Management

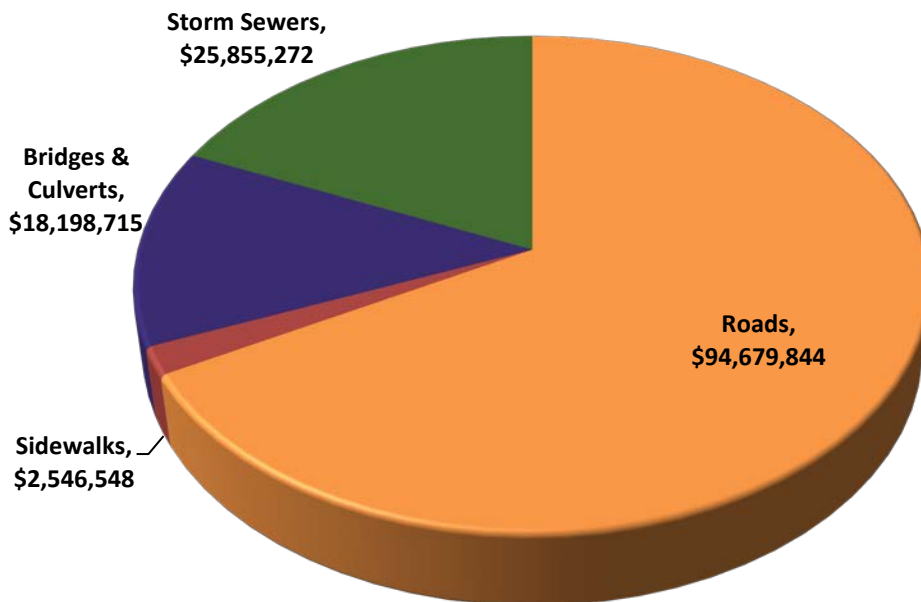
	PS 3150	ASSET MANAGEMENT
Use	To inventory TCAs and provide valuations	To inventory TCAs and provide a long term, sustainable forecast
Valuation	Amortize costs of assets	Project future costs (taking into account inflation) of assets
Procedure	Use assumed economic service life to determine asset amortization	Use condition and risk to determine asset needs
Reporting	Audited Financial Statements, Financial Information Returns	Asset Management Plans

The majority of the information used in the development of this Asset Management Plan was based on the Township's 2016 PS 3150 data. This includes road, bridge, culvert, sidewalk, and storm sewer assets. Where more recent data meeting the requirements of this plan was available, best efforts were made to incorporate the newer data. The information was augmented by available condition inspection reports and Road Needs Study data.

2.2 ASSET VALUE

The estimated life expectancy of each asset type and current year (2016 CAD) replacement value are both listed in the inventory of assets. The life expectancy and assumed replacement values used in this plan are based on the replacement values assigned to each asset under the previous PS 3150 compliance exercise and subsequent condition assessments. The life expectancies are based on a number of factors, including industry accepted standards, engineering best practice, and local experience by Township of Russell Staff. While the PS 3150 values were escalated forward to 2016 at a rate of 3% per year to determine the 2016 replacement cost, this is an approximation of the actual costs that may be incurred due to changes in technology, designs, and even infrastructure requirements. The total current year (2016 CAD) replacement costs for each asset category are displayed below in Figure 2-1.

Figure 2-1 Total Replacement Values (2016 CAD) by Asset Category



Net book value depicts an assets' value as the difference between the purchase or original construction price and the final accumulated amortization.

2.3 ASSET CONDITION

2.3.1 ASSET CONDITION RATING SCALE

The condition of the individual assets was estimated based on the age and expected life of each asset, condition information documented by Township staff, and available inspection reports and condition assessments.

WSP conducted a road condition assessment for the paved roads, in compliance with the MTO SP-024 Manual for Condition Rating of Flexible Pavements, and applied these revised conditions to the asset inventory. Assets were assigned a condition rating of 1 to 5 based on the rating scale shown in Table 2-2.

Table 2-2 Asset Condition Rating Scale

RATING	DESCRIPTION	DEFINITION & ESTIMATED INTERVENTION COST
1	Very Poor	Requires asset replacement, replacement cost
2	Poor	Required major rehabilitation, large dollar amount
3	Fair	Minor maintenance, small dollar amount
4	Good	No work required, no dollar amount, perform normal maintenance
5	Excellent	No work required, no dollar amount

It is important to undertake regular condition assessments of all infrastructure assets to compare against baseline condition and performance information, known risks, and organizational priorities in order to determine and prioritize capital projects.

The field inspection work involved in a condition assessment provides a snapshot representation of each asset's condition at that point in time. It should be noted that the condition ratings developed in this Asset Management Plan have been assigned using a mixture of previous field inspections of transportation infrastructure as provided to WSP depreciated via desktop analysis, where our condition assessment did not review a particular road segment, with a review of paved roads' condition conducted by our inspectors.

To complete future updates of the Asset Management Plan, it is recommended that the Township undertake regular condition assessments of its infrastructure and use maintenance records, local knowledge and CCTV records of piping to update condition ratings of buried infrastructure on an ongoing basis.

ROADS AND SIDEWALKS

The Township's Road Inventory and Needs Study (2012) previously established the structural adequacy of the roads and sidewalk, and projected future works and maintenance expenditures over a 10 year period. The need to improve an individual road and sidewalk section was determined by comparing the existing physical characteristics of the road system to the minimum standards, as defined in the Inventory Manual for Municipal Roads (Ministry of Ontario guidelines). The condition rating which was provided in the study is a score on a 100 points basis. It provides an overall indication of the physical condition of the road and sidewalk segment – the higher the condition rating, the better the asset condition. WSP converted the 100 point score to a 5 point Condition Rating scale as shown in Table 2-3. The development of the sidewalk condition rating method was based on the three most critical deficiencies. The importance for repair or greatest safety concern of the deficiencies was determined to be a vertical step separation, followed by a horizontal crack and then spalling.

Table 2-3 Road and Sidewalk Condition Rating Scale

RATING	CONDITION	ROAD INVENTORY AND NEEDS STUDY'S SCORE
1	Very Poor	0 -20
2	Poor	21 - 40
3	Fair	41 - 60
4	Good	61 - 80
5	Excellent	81 - 100

From the Township's 2012 Road Inventory and Needs Study and the 2015 Road Inventory AADT and basic road information was obtained, which was used to compare the relative importance and benefit of improving each road and sidewalk segment. Each segment assessed by WSP was rated based on the Ministry of Transportation's priority rating scheme:

$$\text{Priority Rating} = 0.2(100 - \text{PCI}) \times (\text{AADT} + 40)^{1/4}$$

The study used an empirical approach for the road segment, which considers not only the existing condition (as per the condition rating), but also the traffic volumes that it serves. In this regard, roads of equal condition are prioritized based on their traffic volumes, with priority given to those which serve the greater number of users. While a road may be in poor condition and hence have a low condition rating, it may have a low priority if the volume of traffic served is also low.

The study also developed a priority rating method for each sidewalk segment. The priority is based not only on the sidewalk condition, but also its purpose and use. Sidewalk segments along major roadways through the Municipality as well as those along school walking routes were determined to be of higher importance than those through residential areas, because of their higher potential use. Thus, the lower the prioritized condition rating the higher the segment is on the list for repairs. This would be considered the worst case if their locations are also of higher potential use.

WSP has recommended road and sidewalk segments to be improved within the 10 year planning period (2017 – 2026) based on the Priority Rating. Focusing on higher risk assets (assets in a worse condition with a greater traffic flow) will ensure that the greatest benefits to be achieved for the improvement dollar expended.

BRIDGES AND CULVERTS

According to Ontario Regulation 104/97, every public bridge in Ontario must undergo an inspection every two years. Bridge and culvert condition was established based on the most recent Ontario Structure Inspection Manual (OSIM) report which was prepared by HP Engineering Inc. in August 2015. An OSIM report for each structure has been prepared and recommended works identified in the report are being implemented in the next 10 year planning period (2017- 2016).

Bridges and culverts were assigned a condition rating of "Excellent", "Good", "Fair" or "Poor". The OSIM reports provide condition state tables for each material type and for specialized elements where required. As a general rule of thumb, the following table is used for most condition states.

Table 2-4 OSIM General Condition Ratings

RATING	DESCRIPTION	DEFINITION
2	Poor	This refers to an element (or part of an element) where severe and very severe defects are visible. In concrete, any type of spalling or delamination would be considered “poor” since these defects usually indicate more serious underlying problems in the material (e.g. corroding reinforcing steel). These types of defects would normally trigger rehabilitation or replacement if the extent and location affect the overall performance of that element.
3	Fair	This refers to an element (or part of an element) where medium defects are visible. These types of defects may trigger a “preventative maintenance” type of remedial action (e.g. sealing, coating, etc.) where it is economical to do so.
4	Good	This refers to an element (or part of an element) where the first sign of “light” (minor) defects are visible. This usually occurs after the structure has been in service for a number of years. These types of defects would not normally trigger any remedial action since the overall performance of the element is not affected.
5	Excellent	This refers to an element (or part of an element) that is in “new” (as constructed) condition No visible deterioration type defects are present and remedial action is not required. Minor construction defects do not count as visible deterioration type defects.

STORM SEWERS

The Township’s Storm Water Drainage System Management Plan and Maintenance Program (McIntosh Perry, 2012) previously established the inventory and assessed the drainage system within the urban boundaries of Russell Township. It also formulated a capital and maintenance plan over a 10 year period. Over 12,000 m of sewers were CCTV inspected in 2011. The pipe sections and associated manholes inspected were given a basic condition rating of either A, B or C based on the CCTV reports. A rating of A indicates the pipe is in good condition and no work is needed, B rating requires minor repairs in six to 10 years and a rating C requires major repairs in one to five years. WSP converted the A,B & C Condition Rating scale to ‘Good’, ‘Fair’ and ‘Poor’ as shown in Table 2-5.

Table 2-5 Storm Sewers Condition Rating Scale

RATING	CONDITION	DRAINAGE SYSTEM STUDY’S SCORE
1	Very Poor	C-
2	Poor	C

RATING	CONDITION	DRAINAGE SYSTEM STUDY'S SCORE
3	Fair	B
4	Good	A
5	Excellent	A+

WSP recommends pipes and manholes to be repaired within the 10 year planning period (2017 – 2026) based on the aforementioned Management Plan and Maintenance Program. It will ensure that the greatest benefits to be achieved for the improvement dollar expended.

2.3.2 AVERAGE ASSET CATEGORY CONDITION

The Township of Russell's average condition ratings for each of the asset categories: roads, sidewalks, bridges, culverts, and storm sewers, are presented below.

A letter grade corresponding to the average asset category condition has been assigned based on the breakdown provided in Table 2-6.

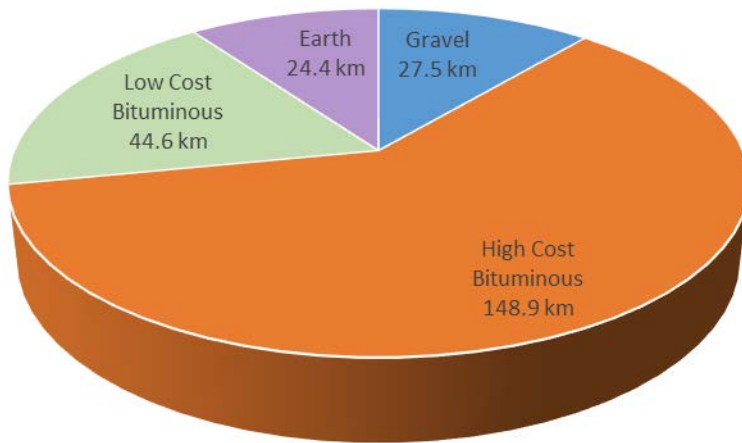
Table 2-6 Condition Rating and Grade

CONDITION RATING	GRADE
4.7 - 5.0	A+
4.4 - 4.6	A
4.0 - 4.3	A-
3.7 - 3.9	B+
3.4 - 3.6	B
3.0 - 3.3	B-
2.7 - 2.9	C+
2.4 - 2.6	C
2.0 - 2.3	C-
1.7 - 1.9	D+
1.4 - 1.6	D
1.0 - 1.3	D-

ROADS

The Township of Russell is responsible for approximately 245.3 km of roads which include high cost bituminous (HCB), low cost bituminous (LCB), gravel and earth surfaces. The breakdown of the Township's roads by surface type is displayed in Figure 2-2.

Figure 2-2 Township of Russell Road Surface types



The average condition of each surface type and the overall condition rating for the Township of Russell's roads are displayed below in Table 2-7.

Table 2-7 Average Roads Condition

SURFACE TYPE	AVERAGE AGE (YEARS)	EXPECTED SERVICE LIFE (YEARS)	2016 AVERAGE CONDITION RATING	AVERAGE GRADE	OVERALL GRADE
Earth	35	5	3.0	D-	A-
High Cost Bituminous	23	25	4.6	A	
Low Cost Bituminous	22	15	4.4	A	
Gravel	33	10	3.0	B-	

SIDEWALKS

The Township of Russell has approximately 27.2 km of sidewalks. The average condition rating for the Township of Russell's sidewalks is shown in Table 2-8.

Table 2-8 Average Sidewalks Condition

ASSET CATEGORY	AVERAGE AGE (YEARS)	EXPECTED SERVICE LIFE (YEARS)	2016 AVERAGE CONDITION RATING	OVERALL GRADE
Sidewalks	33.5	50	2.32	C-

BRIDGES

The Township of Russell is responsible for the operation and maintenance of 14 bridges. Four of the bridges have exceeded their expected service lives. However, recent condition reports, as well as planned rehabilitation works indicate that the Bridges are in relatively good condition for their age. The overall condition rating for the Township of Russell's bridges is shown in Table 2-9.

Table 2-9 Average Bridge Condition

BRIDGE STRUCTURE	AVERAGE AGE (YEARS)	EXPECTED SERVICE LIFE (YEARS)	2016 AVERAGE CONDITION RATING	OVERALL GRADE
Concrete	43	50	3.8	B

BRIDGE CULVERTS

The Township of Russell is responsible for the operation and maintenance of 12 culverts. The culverts are generally in good condition. However, three culverts have been identified for replacement based on the 2015 OSIM inspections. The average condition of each culvert type and the overall condition rating for the Township of Russell's culverts are shown in Table 2-10.

Table 2-10 Average Bridge Culvert Condition

CULVERT TYPE	AVERAGE AGE (YEARS)	EXPECTED SERVICE LIFE (YEARS)	2016 AVERAGE CONDITION RATING	AVERAGE GRADE	OVERALL GRADE
Steel	21	40	3.6	B	B
Concrete	57.5	50	2.5	C	

STORM SEWERS

The Township of Russell is responsible for the operation and maintenance of approximately 89.5km of storm sewers, 1302 catch basins and 563 storm sewer manholes. The overall condition rating for the Township of Russell's storm sewers is shown in Table 2-11.

Table 2-11 Average Storm Sewer Condition

ASSET CATEGORY	AVERAGE AGE (YEARS)	EXPECTED SERVICE LIFE (YEARS)	2016 AVERAGE CONDITION RATING	AVERAGE GRADE	OVERALL GRADE
Storm Sewer Main	27	100	4.2	A-	A-
Catch Basin	27	75	3.7	B+	

ASSET CATEGORY	AVERAGE AGE (YEARS)	EXPECTED SERVICE LIFE (YEARS)	2016 AVERAGE CONDITION RATING	AVERAGE GRADE	OVERALL GRADE
Manhole	27	75	3.5	B	
Storm Service Pipe	27	100	4.3	A-	
Storm Outlet	33	100	4.1	A-	

2.4 NEXT STEPS

This section has been prepared based on the most complete data set available for each asset category. Moving forward, the Township's asset inventory will need to be maintained and augmented to support the objectives of the Township's Asset Management Planning framework. This may include improved segmentation for Township bridge and culvert assets (per the OSIM inspections). This will ensure a more accurate representation of the state of the local infrastructure for future updates to this Asset Management Plan.

Recommended updates to the Township's current infrastructure inventory systems are presented in Table 2-12 for each asset category. Note that this table does not include all the needs that may be expected for the Township's bridge or bridge culvert assets, as these can be expected to be refined on a biennial basis as recommendations from OSIM inspections.

Table 2-12 State of Local Infrastructure Next Steps

Asset Category	Identified Need	Year	Cost (2016 CAD)
Roads	Repair or rehabilitation of 11 road segments: 01100, 02110, 02120, 02600, 02610, 02620, 03000, 03010, 02630, 02640, 06400.1	2017	\$1,026,000
Sidewalks	Lifecycle replacement of 440m of sidewalk segments: Concession (R136) - Legion to First St., First St. to Castor, Castor to Main, Main to Craig	2017	\$74,236
Storm	Year 1 of 5 year program to repair / replace Condition 2 segments MH repair program (year 1 of 10)	2017	\$73,670
Bridges & Culverts	Repairs per OSIM reports	2017	\$1,249,000
Bridges & Culverts	Studies per OSIM reports	2017	\$295,500

Asset Category	Identified Need	Year	Cost (2016 CAD)
Total 2017			\$2,718,406
Total Immediate			\$2,718,406
Roads	Repair or rehabilitation of 9 road segments: 06400.2, 03720, 03730.1, 01200, 04730.1, 06100, 88160, 50010, 50020	2018	\$1,058,160
Storm	Year 2 of 5 year program to repair / replace Condition 2 segments MH repair program (year 2 of 10)	2018	\$73,670
Bridges & Culverts	Repairs per OSIM reports	2018	\$2,206,500
Total 2018			\$3,338,330
Roads	Repair or rehabilitation of 9 road segments: 01210, 03920, 07000, 07050, 07100, 07300, 07500, 88050, 03040	2019	\$969,800
Sidewalks	Repairs to 8.1 km of sidewalk segments	2019	\$789,975
Storm	Year 3 of 5 year program to repair / replace Condition 2 segments MH repair program (year 3 of 10)	2019	\$73,670
Bridges & Culverts	Repairs per OSIM reports	2019	\$119,700
Total 2019			\$1,953,145
Roads	Repair or rehabilitation of 8 road segments: 01430, 01440, 02430.1, 03200, 03215, 52050, 55480, 86060	2020	\$1,131,360
Sidewalks	Repairs to 6.7 km of sidewalk segments	2020	\$267,301
Storm	Year 4 of 5 year program to repair / replace Condition 2 segments MH repair program (year 4 of 10)	2020	\$73,670
Total 2020			\$1,472,331
Total Short-Term			\$6,763,806

Asset Category	Identified Need	Year	Cost (2016 CAD)
Roads	Repair or rehabilitation of 6 road segments: 04320.2, 04520, 52040, 80150, 82080, 82230	2021	\$1,033,705
Sidewalks	Repairs to 1.5 km of sidewalk segments	2021	\$20,930
Storm	Year 5 of 5 year program to repair / replace Condition 2 segments MH repair program (year 5 of 10)	2021	\$73,670
Total 2021			\$1,128,305
Roads	Repair or rehabilitation of 4 road segments: 03220, 03910, 04530.1, 88020	2022	\$799,800
Sidewalks	Repair of 223 m of sidewalk	2022	\$1,170
Storm	Year 1 of 5 year program to repair / replace Condition 3 segments MH repair program (year 6 of 10)	2022	\$107,576
Bridges & Culverts	Replacement of Bridge RC-001 per OSIM recommendations	2022	\$334,000
Total 2022			\$1,242,546
Total Medium-Term			\$2,370,851
Roads	Repair or rehabilitation of 3 road segments: 01015, 01150, 10000	2023	\$255,000
Sidewalks	Repair of 227 m of sidewalk	2023	\$1,114
Storm	Year 2 of 5 year program to repair / replace Condition 3 segments MH repair program (year 7 of 10)	2023	\$107,576
Total 2023			\$363,690
Roads	Repair or rehabilitation of 14 road segments: 02320, 52020, 52030, 52280, 55250, 58000, 58110, 58190, 58220, 58230, 80075, 82000, 86010, 86040	2024	\$1,242,680
Sidewalks	Repair of 500 m of sidewalk	2024	\$2,527

Asset Category	Identified Need	Year	Cost (2016 CAD)
Storm	Year 3 of 5 year program to repair / replace Condition 3 segments MH repair program (year 8 of 10)	2024	\$107,576
Total 2024			\$1,352,783
Roads	Repair or rehabilitation of 19 road segments: 01420, 01300, 52340, 52350, 52360, 52365, 52370, 55020, 55400, 55460, 55470, 55490, 55500, 55510, 55520, 58160, 58180, 58200, 82150	2025	\$1,265,680
Sidewalks	Lifecycle replacement of 12.1 km of sidewalk segments	2025	\$2,263,804
Storm	Year 4 of 5 year program to repair / replace Condition 3 segments MH repair program (year 9 of 10)	2025	\$107,576
Total 2025			\$3,637,060
Roads	Repair or rehabilitation of 24 road segments: 01110, 02510.1, 04200, 55190, 55320, 55330, 55340, 55350, 55360, 55370, 55390, 82250, 82260, 82270, 82280, 82300, 82330, 82340, 82350, 82360, 82370, 82420, 82440, 82470	2026	\$1,623,880
Storm	Year 5 of 5 year program to repair / replace Condition 3 segments MH repair program (year 10 of 10)	2026	\$107,576
Total 2026			\$1,731,456
Total Long-Term			\$7,084,989

ASSET CATEGORY**INVENTORY UPDATES TO SUPPORT ASSET MANAGEMENT PLANNING**

Roads	Continue to update Road Inventory and Needs studies (condition of paved surfaces assessed within this project) Inventory updates including “Actual Year of Last Resurfacing Works” and Year of Road Construction” as work is completed Update Annual Average Daily Traffic Counts (AADT)
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ASSET CATEGORY	INVENTORY UPDATES TO SUPPORT ASSET MANAGEMENT PLANNING
Sidewalks	Update condition assessment study Review & revise asset identification to ensure unique IDs provided to each segment
Bridges & Culverts	N/A
Storm	Assessed condition (CCTV results) Update 2012 Storm Water Drainage System Management Plan and Maintenance Program



3

EXPECTED LEVELS OF SERVICE



EXPECTED LEVELS OF SERVICE

Levels of service are qualitative and quantitative descriptions of the Township's objectives for their infrastructure. They provide the means to measure affordability of the infrastructure and its management against infrastructure users' needs and expectations. The asset management decision making process is driven by the impact of the levels of service on citizens, communities and the natural environment. This section outlines the Township's desired levels of service for their road, sidewalk, bridge, culvert, and storm water infrastructure.

3.1 MINIMUM REGULATORY REQUIREMENTS

As a minimum level of service, there are regulatory requirements associated with the Township's infrastructure that must be met. The regulatory requirements applicable to the Township are summarized in Table 3-1. These requirements are not being identified as a Level of Service since they are already a minimum target and therefore must be met by the Township.

Table 3-1 Minimum Regulatory Requirements

ASSET CATEGORY	REGULATORY REQUIREMENTS
Roads, Sidewalks, Bridges & Culverts	Minimum Maintenance Standards (Ontario Regulation 239/02, Municipal Act, 2001) Ontario Structure Inspection Manual (OSIM) Public Transportation and Highway Improvement Act (Ontario Regulation 104/97, Standards for Bridges)
Storm	Environmental Protection Act Ontario Water Resources Act, R.S.O. 1990

3.2 LEVELS OF SERVICE BY ASSET CATEGORY

The levels of service have been defined for each of the asset categories: Roads, Sidewalks, Bridges, Culverts, and Storm Water Collection System.

Each level of service has been defined through technical performance measures. In order to actively track the Township's performance in meeting the desired levels of service, an assigned value will provide a means to measure the performance. The target values, existing values and target timeframes for each technical performance measure by asset category are listed in Table 3-3 to Table 3-7. A letter grade has been assigned to indicate how well the Township is meeting their desired performance measures for each category. Table 3-2 below outlines the Service Level Scoring.

Table 3-2 Level of Service Performance Measures Success Scoring

GRADE	GUIDELINES
A	Currently meeting or exceeding performance level targets for the asset category
B	Asset category is showing positive improvement in achieving Levels of Service targets by target timeframe
C	Asset category is showing no improvement in achieving levels of Service Targets by target timeframe
F	Actual Level of Service is trending away from Level of Service target

ROADS

LEVEL OF SERVICE: "TO PROVIDE A SMOOTH, COMFORTABLE RIDING SURFACE AT THE POSTED SPEED LIMIT"

Table 3-3 Level of Service Performance Measures for Roads

TECHNICAL PERFORMANCE MEASURE	UNIT	EXISTING VALUE	TARGET VALUE	TARGET TIMEFRAME (YEAR)	CURRENTLY MEETING TARGET?
Average condition rating of gravel roads	1-5	3.0	3.0	2026	✓
Average condition rating of LCB roads	1-5	4.3	3.0	2026	✓
Average condition rating of HCB roads	1-5	4.3	3.5	2026	✓
Average condition rating of earth roads	1-5	1.0	3.0	2026	X
Frequency of gravel road maintenance (grading, dust control)	No/yr	<1	1	2017	X
Frequency of LCB, HCB and EXP road maintenance (crack sealing, pothole repair)	No/yr	TBD	2	2017	X
Percentage of Class 4 roads with HCB/LCB	%	79.8	80.0	2026	X
Percentage of Class 5 roads with HCB/LCB	%	99.1	70.0	2026	✓
Percentage of Class 6 roads with LCB/HCB	%	0.0	60.0	2026	X

TECHNICAL PERFORMANCE MEASURE	UNIT	EXISTING VALUE	TARGET VALUE	TARGET TIMEFRAME (YEAR)	CURRENTLY MEETING TARGET?
Traffic Loading: Vehicles per hour per lane per direction	No.	TBD	≤1100	2026	X

The existing breakdown of the Town's roads by Highway Class and surface type is summarized in Table 3-4.

Table 3-4 Roads by Highway Class and Surface Type

SURFACE TYPE	CLASS 3		CLASS 4		CLASS 5		CLASS 6	
	KM	%	KM	%	KM	%	KM	%
Earth	0.0	0.0	0.0	0.0	0.0	0.0	37.0	100.0
G/S	0.0	0.0	23.7	20.2	0.62	0.9	0.0	0.0
HCB	23.2	100.0	54.0	46.2	62.8	94.9	0.0	0.0
LCB	0.0	0.0	39.2	33.6	2.8	4.2	0.0	0.0
Total	23.2 km	100.0%	116.9 km	100.0%	66.2 km	100.0%	37.0 km	100.0%

SIDEWALKS

LEVEL OF SERVICE: "TO PROVIDE PEDESTRIAN FRIENDLY SIDEWALKS THAT PROMOTE WALKING IN RUSSELL'S COMMUNITIES"

Table 3-5 Level of Service Performance Measures for Sidewalks

TECHNICAL PERFORMANCE MEASURE	UNIT	EXISTING VALUE	TARGET VALUE	TARGET TIMEFRAME (YEAR)	CURRENTLY MEETING TARGET?
Average condition rating of sidewalks	1-5	2.32	3.0	2026	✓
Percentage of sidewalks adjacent development frontage	%	TBD	90%	2026	

BRIDGES & CULVERTS

LEVEL OF SERVICE: "TO PROVIDE A COMFORTABLE RIDING SURFACE AND SAFE MEANS OF PASSAGE THAT MEETS THE NEEDS OF ALL USERS"

Table 3-6 Level of Service Performance Measures for Bridges & Culverts

TECHNICAL PERFORMANCE MEASURE	UNIT	EXISTING VALUE	TARGET VALUE	TARGET TIMEFRAME (YEAR)	CURRENTLY MEETING TARGET?
Average condition rating of bridges	-	3+	3+	2026	✓
Average condition rating of culverts	-	3+	3+	2026	✓

STORM WATER COLLECTION

LEVEL OF SERVICE: "TO PROVIDE RELIABLE AND EFFICIENT STORM WATER COLLECTION WITH A STRONG FOCUS ON THE ENVIRONMENT PROTECTION"

Table 3-7 Level of Service Performance Measures for Storm Sewers

TECHNICAL PERFORMANCE MEASURE	UNIT	EXISTING VALUE	TARGET VALUE	TARGET TIMEFRAME (YEAR)	CURRENTLY MEETING TARGET?
Average condition rating of storm sewers	1-5	4.0	3.0	2026	✓

3.3 NEXT STEPS

It is recommended that the Township continue to track the values for the above technical performance measures on an annual basis, rather than on the same cycle as the Asset Management Plan update, so that corrective actions can be implemented to achieve the target Levels of Service.



4 ASSET MANAGEMENT STRATEGY



ASSET MANAGEMENT STRATEGY

Infrastructure sustainability is dependent on activities such as maintenance, repairs, upgrades and replacements when necessary. The application of these activities relies heavily on the level of funding available and the effective allocation of that funding. To ensure recommended works are appropriately prioritized, an assessment of risk was undertaken to determine the urgency of the works associated with the Township's infrastructure. The asset management strategy outlines the planned action strategies and determines the risk for the Township's infrastructure assets.

4.1 PLANNED ACTION STRATEGIES

Recommended works were classified based on six (6) planned action strategies: non-infrastructure solutions, maintenance activities, renewal/rehabilitation activities, replacement activities, disposal activities and expansion activities, as outlined in the Ministry of Infrastructure Ontario's, "Guide for Municipal Asset Management Plans". A description of each strategy is outlined below.

4.1.1 NON-INFRASTRUCTURE SOLUTIONS

Non-infrastructure solutions produce lower costs for long-term asset sustainability. Cost and time savings are optimized by implementing an organizational approach for all infrastructure works. Important non-infrastructure solutions include implementation of an Asset Management Plan and regular inspections of the various infrastructure assets. Results of inspections should be used to regularly update the Asset Management Plan. Bridges and culverts are to be inspected every two (2) years, roads are to be inspected every three (3) years and other infrastructure should generally be inspected at least every five (5) years.

4.1.2 MAINTENANCE ACTIVITIES

Maintenance is essential to managing infrastructure, as the expected level of service often relies on maintenance activities. Regular maintenance can also add significant life to assets. It is important that the Township of Russell schedule regular inspections of its assets to identify maintenance requirements. Annual maintenance expenditures for the Township's infrastructure have been estimated and incorporated into the final investment requirements. The Township should track the sufficiency and efficacy of its ongoing maintenance expenditures over time, and adjust as needs dictate.

Specific maintenance actions recommended for the Township are described in Table 4-1 and Table 4-2.

Table 4-1 Recommended Maintenance for Roads

ACTIVITY	UNIT COST	ANNUAL COST
Annual Earth Maintenance		
Grass Cutting, Ditch Cleaning, Culvert Cleaning	\$228/km	\$5,560
Routine Grading	\$158/km	\$3,853
SUBTOTAL EARTH		\$9,413
Annual HCB Road Maintenance:		
Grass Cutting, Ditch Cleaning, Culvert Cleaning	\$247/km	\$72,189
Rout and Seal Cracks	\$2/m	\$116,905
Patching Potholes (est. ~2 potholes/km)	\$5/m ²	\$2,923
Repair of pavement edges	\$75/m ²	\$547,991
SUBTOTAL HCB		\$740,007
Annual LCB Road Maintenance:		
Grass Cutting, Ditch Cleaning, Culvert Cleaning	\$247/km	\$84,415
Rout and Seal Cracks	\$2/m	\$136,705
Patching Potholes (est. ~2 potholes/km)	\$5/m ²	\$3,418
Repair of pavement edges	\$75/m ²	\$640,804
SUBTOTAL LCB		\$865,341
Annual Gravel Road Maintenance:		
Dust Control (est. 0.6kg/m ²)	\$1.21/kg	\$25,247
Grass Cutting, Ditch Cleaning, Culvert Cleaning	\$228/km	\$11,286
Routine Grading	\$158/km	\$7,821
SUBTOTAL GRAVEL		\$44,354
TOTAL ANNUAL ROAD MAINTENANCE		\$1,659,115

Table 4-2 Recommended Maintenance for Storm Water

SERVICE	QUANTITY		UNIT	COST / UNIT	FREQUENCY	ANNUAL BUDGET
	RUSSELL	EMBRUN				
Flush Sewers	18980	27983	m	\$1.75	2	\$41,093
CCTV	18980	27983	m	\$1.25	5	\$11,741
Inspect Manholes	280	448	ea	\$6.00	5	\$874
Inspect Catchbasins	363	505	ea	\$6.00	5	\$1,042
Clean Catchbasins	363	505	ea	\$9.00	1	\$7,812
TOTAL ANNUAL MAINTENANCE						\$62,560

4.1.3 RENEWAL / REHABILITATION ACTIVITIES

Rehabilitation is necessary when an asset does not perform to its desired level of service. Significant repairs designed to extend the life of the asset are determined through regular inspections. Rehabilitation over replacement is advantageous when there are only a few components that need repair. Recommended renewal/rehabilitation activities are found in Section 6.1 and include, but are not limited to resurfacing roads, and repair of sidewalks, storm sewers, bridges and culverts.

4.1.4 REPLACEMENT ACTIVITIES

Occasionally, the extent of damage or deterioration to an asset is too great and rehabilitation is deemed unfeasible. At this point, replacement is necessary. As an asset approaches the end of its service life, more frequent inspection may be necessary to determine if replacement of the asset is critical in the short-term, or if deferral of the asset replacement is possible. The recommended replacement activities within the 10 year planning period include, but are not limited to, the replacement of 12.1km of sidewalks, two bridges, and three culverts.

4.1.5 DISPOSAL ACTIVITIES

Disposal costs are associated with the reduction of services or elimination of demands placed on systems. By establishing target levels of service, an organization can clearly determine whether or not infrastructure or particular assets are needed.

For the Township of Russell's road, sidewalk, bridge, culvert, and storm systems, no superfluous assets were identified. Asset disposal costs associated with infrastructure replacement activities are generally included with the estimates made for asset replacement.

4.1.6 EXPANSION ACTIVITIES

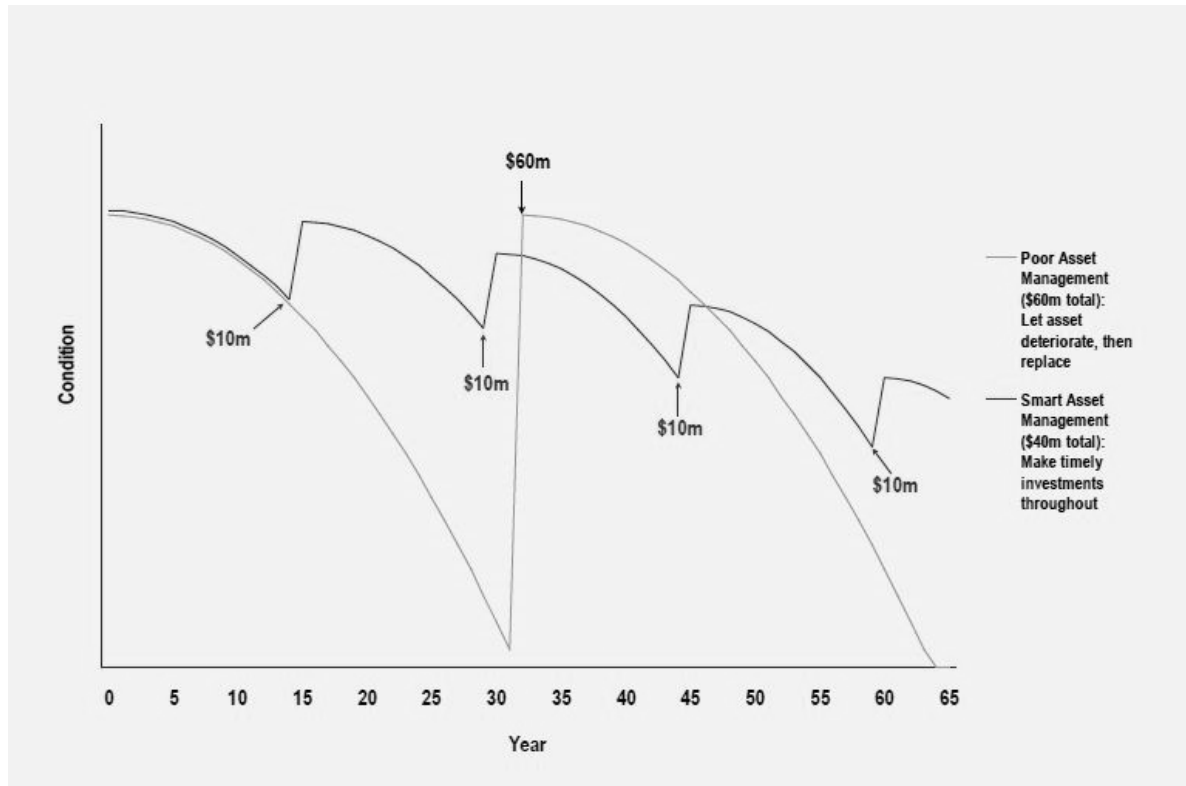
Expansion activities are required to extend services to previously un-serviced areas or to expand services to accommodate growth demands. At present, no expansion activities have been included in this Plan.

4.2 ANALYSIS OF PLANNED ACTIONS

An analysis of planned actions was used to determine the most effective strategy for managing the Township's infrastructure. The analysis compares two strategies for managing infrastructure; one with

timely renewal investments, and one without timely investments. These two strategies are depicted in Figure 4-1.

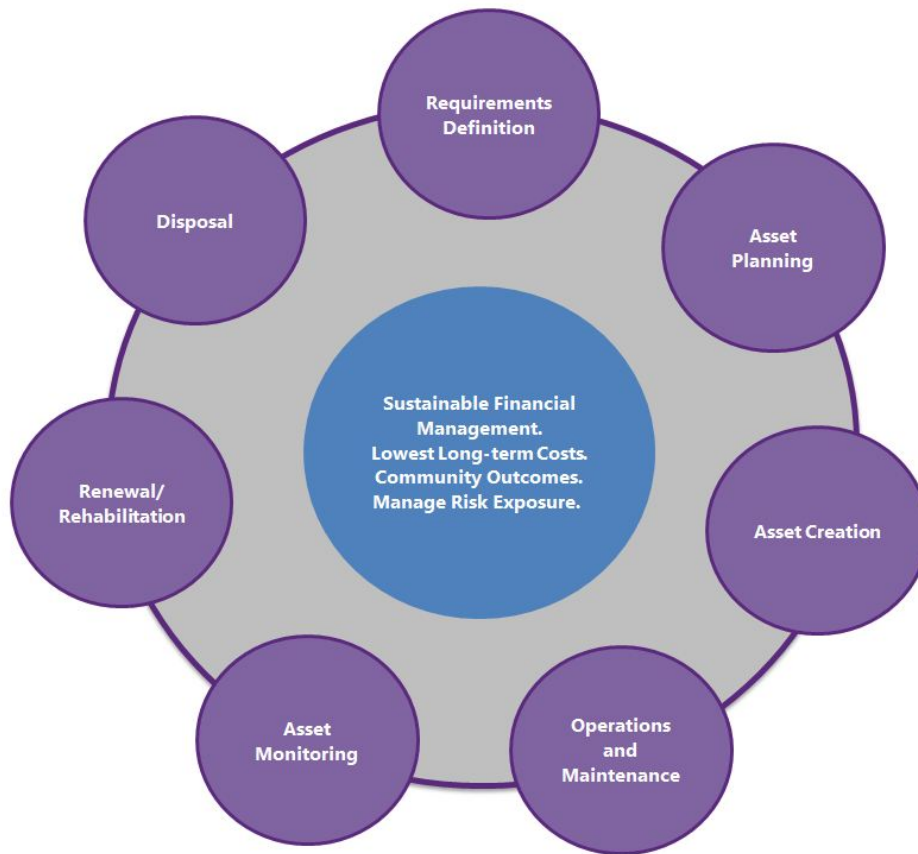
Figure 4-1 Small but Timely Renewal Investments Save Money (Figure 1, Ministry of Infrastructure, “Guide for Municipal Asset Management Plans”)



Implementing an annual maintenance program and completing timely renewal works will keep the infrastructure performing at the desired levels of service, and at the same time prolong the life of the infrastructure and reduce overall spending. Therefore, the most cost effective strategy for managing the Township’s infrastructure is to perform annual maintenance and complete timely renewal works. Figure 4-2 summarizes the typical asset lifecycle needs that will promote a financially sustainable, long-term forecast for the Township’s road, sidewalk, bridge, culvert, and storm system infrastructure.

After the recommended works have been identified to ensure each asset will perform at the desired level of service, the recommended works will be distributed over a ten year planning period. The recommended works for the infrastructure will be distributed based on priority levels determined through the assessment of risk. Following the application of full life cycle investments for maintenance, rehabilitation, renewal and replacement needs, the projected reinvestment needs will be compared to the current annual capital budget to determine the adequacy of the funding for the sustainability of the infrastructure.

Figure 4-2 Asset Ownership Lifecycle



4.3 ASSET LIFECYCLE TREATMENTS

The following sections outline the assumptions made in determining the total costs to undertake the projected lifecycle treatments for each of the Township's road, sidewalk, bridge, culvert, and storm system assets.

4.3.1 ROADS AND SIDEWALKS

Recommended lifecycle treatments for roads and sidewalks have been included in Table 4-3. Please note that it has been assumed that roads will undergo continued maintenance and rehabilitation and will not require complete road base replacement over the 10 year planning period.

Table 4-3 Recommended Lifecycle Treatments for Roads, Sidewalks and Street Lighting

RECOMMENDED TREATMENT	TIMING	ESTIMATED COST
Resurfacing (HCB)	Every 25 years	\$240,000/km
Resurfacing (LCB)	Every 15 years	\$170,000/km
Dragging and Rolling (G)	Every 10 years	\$100,000/km
Sidewalk Replacement	End of Service Life (50 years)	\$125/m ²
Pothole Repair	As required	\$5/m ²
Rout and Seal Cracks	As required	\$3/m
Manual Chip Seal of Pavement Edges	As required	\$75/m ²
Dust Control	Annually	\$0.726/m ²
Routine Grading	Annually	\$160/km
Grass cutting, ditch cleaning and culvert cleaning	Annually	\$250/km

4.3.2 BRIDGES AND CULVERTS

Recommended lifecycle treatments for the bridges and culverts have been included in Table 4-4 Recommended Lifecycle Treatments for Bridges and Culverts.

Table 4-4 Recommended Lifecycle Treatments for Bridges and Culverts

RECOMMENDED TREATMENT	TIMING	ESTIMATED COST
Bridge Replacement (Concrete Structure)	End of Service Life (50 years)	Cost varies by bridge \$107,000 - \$2,911,000
Culvert Replacement (Steel)	End of Service Life (40 years)	Cost varies by diameter \$255,000/m - \$500,000/m
Culvert Replacement (Concrete)	End of Service Life (50 years)	Cost varies by diameter \$325,000/m - \$475,000/m
Bridge Maintenance/Cleaning (including washing of bearings, bearing seats, truss members, sweeping of bridge decks, curbs and gutters, removal of debris from expansion joints, debris pick-up or minor removal of aggregate, cleaning of catch-basins, man-holes and deck drains)	Annually	Cost varies by bridge type, size (Average ~1% of initial cost)

4.3.3 STORM WATER COLLECTION SYSTEM

Recommended lifecycle rehabilitation for the storm water collection system has been included in Table 4-5.

Table 4-5 Recommended Lifecycle Treatments for Storm Water Collection

RECOMMENDED TREATMENT	TIMING	ESTIMATED COST
Replacement of Sewers	End of Service Life (80 years)	Cost varies by diameter, material \$200 - \$800 per meter
Replacement of Manholes	End of Service Life (80 years)	\$8,100 per manhole
Replacement of Catch Basins	End of Service Life (80 years)	\$2,300 per catch basin
Flushing and Cleaning of Sewer	As required	\$4,000 per km

It is recommended that storm sewers (pipes and manholes) be flushed every two years and CCTV'd every five years. Catch basins should be cleaned yearly and should be inspected every five years. The camera and flushing programs are recommended to be implemented for identifying and forecasting replacement and repair needs. Emergency repairs can cost significantly more than a repair under normal circumstances. The need for emergency repairs of buried infrastructure can be significantly reduced if critical sections can be identified and repaired before a failure occurs. Maintenance and inspections of these mains can prolong the life of these assets. A yearly maintenance cost will be included in the maintenance activities for the next ten years as identified in Section 5 of Financing Strategy.

4.4 INFLATION

The rehabilitation, renewal and replacement costs for the Township's infrastructure have been projected over a ten year planning period from 2017 to 2026. Due to the uncertainty of annual inflation, present value dollars (2016 CAD) have been utilized in all calculations. An inflation rate of can be applied to help assess rehabilitation costs in future years, but care should be taken and consideration given to conducting a sensitivity analysis when relying on this information for capital needs analyses.

4.5 PROCUREMENT

Procurement is the act of obtaining goods, services or works from an external source. The Ministry of Infrastructure's "Guide for Municipal Asset Management Plans" recommends that municipalities have procurement by-laws in place to serve as a basis for considering various delivery mechanisms.

The Township of Russell established Procurement Policy ADM/019 in 2004 (revised June 2007, and November 2009), as well as By-law #65-2013 (passed June 2013), which establish the process for which goods and services are procured. The by-law has been subsequently amended in September 2015 with by-law #2015-98. The intent of these policies and by-laws was to ensure competitive procurement and transparency to the public. The levels of service and the Township's ability to meet the associated targets and timeframes may be affected by any limitations of these by-laws.

4.6 OVERVIEW OF RISKS

Understanding risks is important to the safety and functionality of the Township's infrastructure. An assessment of risk was undertaken in order to determine the priority of the works associated with the infrastructure. The recommended works were distributed over the ten (10) year planning period based on the priority determined through the risk assessment.

In determining the recommended capital plan, risk-based prioritization methods were applied. For needs identified with the road systems, MTO's prioritization framework was followed. For Bridges and Culverts, recommendations from the OSIM inspections were adopted directly. Sidewalks and storm water systems were prioritized based on their condition.

In order to provide a general risk overview of the systems as a whole, asset risks were normalized using the risk assessment approach summarized below, outlining how the assessment was carried out for the Township of Russell's infrastructure.

Every risk is expressed in terms of the following components:

- A hazardous event or incident;
- A cause;
- The probability (likelihood) of its occurrence; and
- A consequence.

Risk is expressed as: $Risk = Likelihood \times Severity$

The likelihood (or probability) is assigned to the individual risk events; in this case, the likelihood of asset failure as a whole. The severity is also assigned to the specific consequence regardless of its probability.

For the purposes of this Asset Management Plan, the only hazardous event considered was the failure of each asset. Please note that this assessment of risk is not a formal or comprehensive risk assessment of the Township's infrastructure and therefore does not include all potential risks associated with each asset. To complete future updates of the Asset Management Plan, it is recommended that the Township undertake regular risk assessments of its infrastructure. This approach is similar to that already followed by the Township for their DWQMS risk assessments.

Table 4-6 and Table 4-7 were used to assign likelihood and severity scores to the failure of each asset.

Table 4-6 Risk Likelihood Rating Scale

LIKELIHOOD	DESCRIPTION	RATING
Rare	The associated infrastructure is new (within warranty period) and therefore not expected to fail in the near future; or Condition rating of 5 (“Excellent”).	1
Unlikely	The infrastructure is not new, but is still within the first quarter of its anticipated service life; or Condition of 4 (“Good”).	2
Possible	The associated infrastructure is part way through its anticipated service life; or The asset has already been refurbished or rebuilt; or Condition Rating of 3 (“Fair”).	3
Likely	The associated infrastructure is approaching the end of its life cycle and therefore it is expected to fail in the near future; or Condition Rating of 2 (“Poor”).	4
Very Likely	The associated infrastructure has exceeded its life cycle and failure is considered imminent. Condition Rating of 1 (“Very Poor”).	5

Table 4-7 Risk Severity Rating Scale

SEVERITY	DESCRIPTION	RATING
Insignificant	No disruption to normal operation, no environmental impact, no financial investment.	1
Minor	Some manageable operation disruption, minor environmental impact, small financial investment; or Failure of a: <ul style="list-style-type: none"> • lower priority road with less than 500 AADT • a sidewalk • small diameter storm sewer (100-250mm) 	2
Moderate	Significant modification to normal operation but manageable, easy to mitigate environmental impact, moderate financial investment; or Failure of a: <ul style="list-style-type: none"> • medium priority of road with AADT from 500 to 1000 • medium priority (rural) Bridge culvert • medium diameter storm sewer (250-450mm) 	3

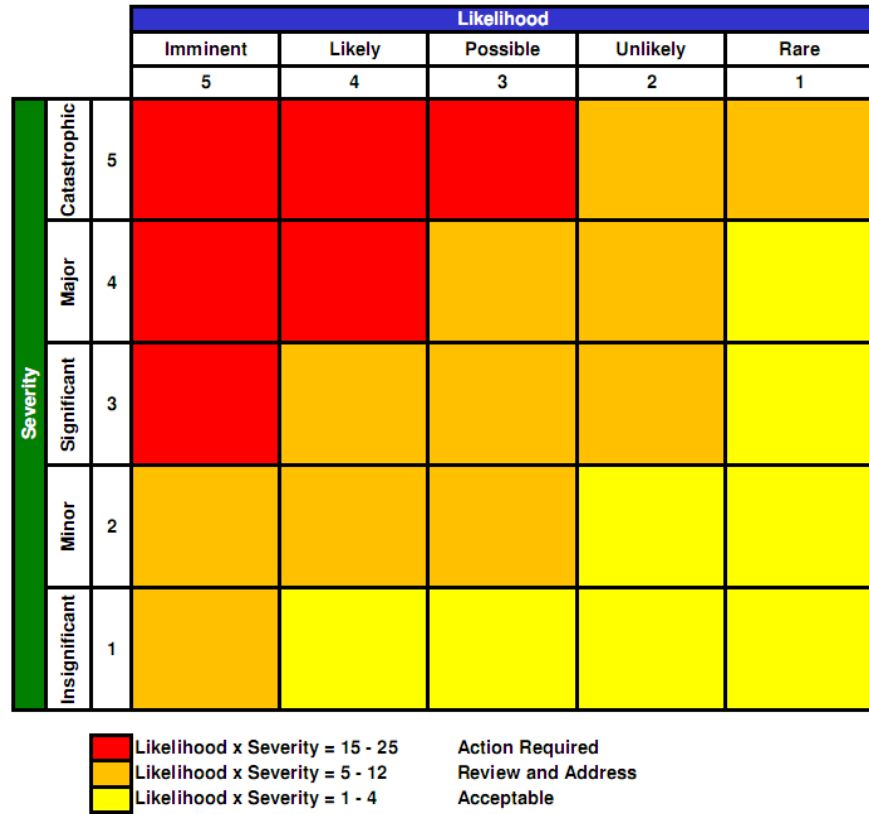
SEVERITY	DESCRIPTION	RATING
Major	Reduced production with inability to meet demand imminent, significant environmental impact, large financial investment; or Failure of a: <ul style="list-style-type: none"> • higher priority road with AADT over 1000 • higher priority (semi-urban) bridge culvert • large diameter storm sewer (450-900mm) or bridge (rural) 	4
Catastrophic	Inability to meet demand, potential injury, severe environmental impact, significant financial investment; or Failure of a: <ul style="list-style-type: none"> • very large diameter storm sewer (900-1800mm) • or bridge (semi-urban or urban) 	5

The risk “score” is determined as the product of the likelihood and severity ratings assigned to the event. This value was then used to assign priorities to the recommended works. Three risk levels were defined, based on the risk score of the particular event. These are shown in Table 4-8 and illustrated in Figure 4-3.

Table 4-8 Risk Levels

RISK = LIKELIHOOD X SEVERITY	LEVEL	ASSOCIATED RESPONSE
1 – 4	Low	Acceptable
5 – 14	Medium	Review and Address
15 – 25	High	Action Required

Figure 4-3 Risk Classification Chart



4.6.1 AVERAGE ASSET CATEGORY RISK

The recommended works were prioritized in order to minimize the average risk level over the ten year planning period. The average risk ratings for the Township of Russell’s infrastructure by asset category are presented in Table 4-9.

Table 4-9 Average Asset Category Risk

ASSET CATEGORY	TYPE	2016 AVERAGE RISK RATING	AVERAGE LEVEL	OVERALL LEVEL
	High Cost Bituminous	4.0	Low	Low (4.0)
	Low Cost Bituminous	4.2	Low	
	*Gravel	6.0	Medium	
Sidewalks	N/A	7.4	Medium	Medium (7.4)
Storm sewer	N/A	5.5	Medium	Medium (5.5)
Bridges	Concrete	9.9	Medium	Medium (9.9)
Bridge Culverts	Steel	8.5	Medium	Medium (9.1)
	Concrete	12.0	Medium	

4.7 NEXT STEPS

It is recommended that a more detailed risk assessment be undertaken for the Township's infrastructure through future Asset Management Planning activities to refine the results of the high level risk analysis performed under this study.

In addition to enhancing the risk assessment, it is recommended that the Township establish an integrated project prioritization frameworks to assist in capital planning and risk management. It is important to concurrently track the efficacy / impact of ongoing expenditures to validate or refine the investment strategy.



5 FINANCING STRATEGY

FINANCING STRATEGY

5.1 EXPENDITURE FORECASTS

5.1.1 TEN YEAR INVESTMENT NEEDS BY ASSET CATEGORY

Based on approaches to asset lifecycle investments, including installation, maintenance and replacement at the end of service life, ten year asset needs profiles have been created for the asset categories. The forecasted needs do not include the costs associated with staffing or the staffing growth requirements to meet the future infrastructure needs, nor does it include any expansion or upgrade activities that may be necessary to meet growing demands on the infrastructure. A summary of the ten year asset needs (in thousands of dollars) is included in Table 5-1.

Table 5-1 Ten Year Needs by Infrastructure Category

ASSET CATEGORY	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Roads	\$2,685	\$2,717	\$2,629	\$2,790	\$2,693	\$2,459	\$1,914	\$2,902	\$2,925	\$3,283
Sidewalks	\$74	\$0	\$773	\$267	\$21	\$1	\$1	\$0	\$1,593	\$0
Storm Sewers	\$175	\$175	\$175	\$175	\$175	\$131	\$131	\$131	\$131	\$131
Bridges & Culverts	\$1,545	\$2,207	\$120	\$0	\$0	\$334	\$0	\$0	\$0	\$0
Total (thousands 2016 CAD)	\$4,479	\$5,099	\$3,697	\$3,233	\$2,889	\$2,925	\$2,046	\$3,033	\$4,648	\$3,414

The major capital projects for the Town projected over the ten year planning period include:

- Rehabilitation / replacement studies of seven bridges (for the full bridge, or individual bridge components) per OSIM Reports
 - Two (2) bridges may require complete replacement (R-006, R-027). *Note the needs forecast includes only recommendations for work as specified in the OSIM reports.*
- Minor rehabilitation of 12 bridges
- Rehabilitation / replacement study of ten culverts (full, or components)
 - Replacement of three culverts (RC-001, RC-029, and RC-039)
- Minor rehabilitation of five culverts (RC-002, RC-007, RC-008, RC-030, and RC-038)
- Replacement of 12.1 km of sidewalks
- Rehabilitation or replacement of 72 km of road segments (refer to Table 2-12 or Appendix A)

- Condition assessment of Storm Sewers and replacement / rehabilitation program

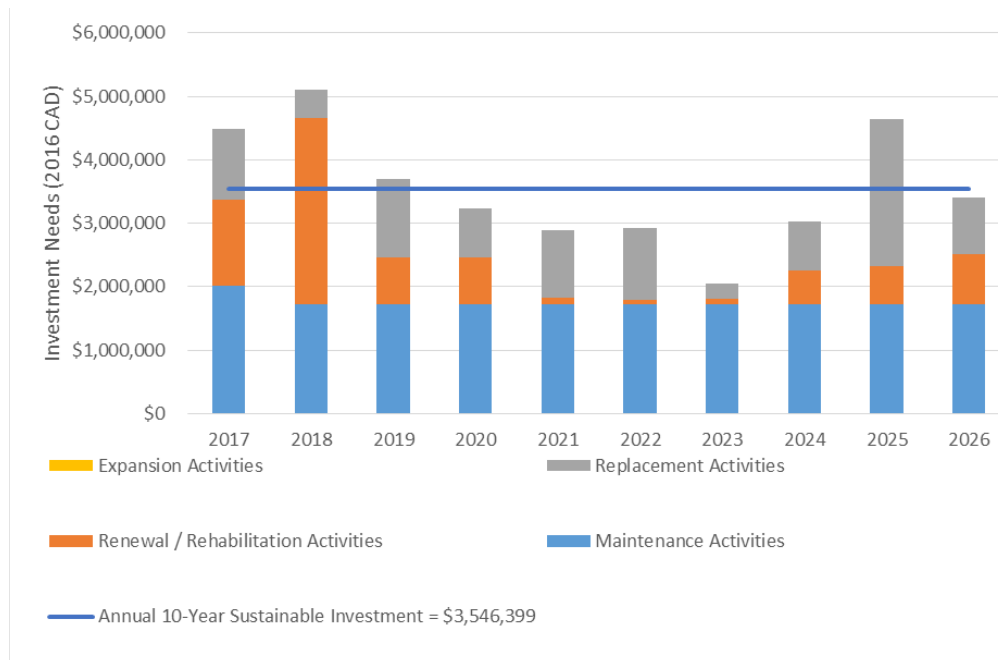
5.1.2 TEN YEAR INVESTMENT NEEDS BY PLANNED ACTION STRATEGY

A summary of the recommended works categorized by the previously defined planned action strategies over the next ten year period (in thousands of dollars) is included in Table 5-2. This forecast will assist Township staff in planning for the expenses associated with replacement, maintenance, rehabilitation and expansion of the Township’s infrastructure.

Table 5-2 Ten Year Needs by Planned Action Strategy

PLANNED ACTION STRATEGY	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Maintenance Activities	\$2,017	\$1,722	\$1,722	\$1,722	\$1,722	\$1,722	\$1,722	\$1,722	\$1,722	\$1,722
Renewal / Rehabilitation Activities	\$1,355	\$2,939	\$741	\$744	\$113	\$70	\$89	\$535	\$611	\$791
Replacement Activities	\$1,107	\$439	\$1,234	\$767	\$1,054	\$1,134	\$235	\$776	\$2,316	\$901
Total (thousands 2016 CAD)	\$4,479	\$5,099	\$3,697	\$3,233	\$2,889	\$2,925	\$2,046	\$3,033	\$4,648	\$3,414

Figure 5-1 Ten Year Needs by Planned Action Strategy

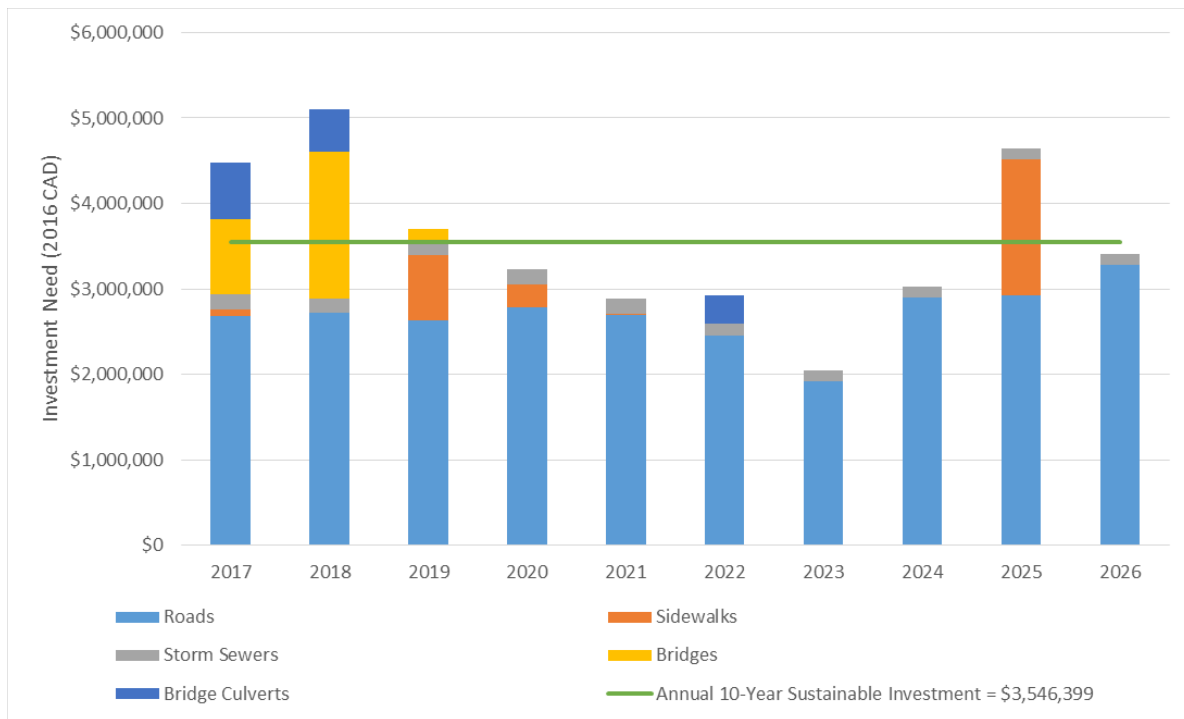


5.2 EXPENDITURE HISTORY VS FORECASTS

ROADS, SIDEWALKS, STORM SEWERS, BRIDGES AND CULVERTS

The recommended annual maintenance investment for the roads and storm sewers is approximately \$1,721,675. The current average annual sustainable infrastructure investment projected for the roads, sidewalks, storm sewers, bridges, and culverts over the ten year planning period, inclusive of the annual maintenance, is approximately \$3,546,299. The projected annual expenditures over the planning period are summarized in Figure 5-2.

Figure 5-2 Roads, Sidewalks, Storm Sewers, Bridges and Culverts 10-Year Investment Requirements



Per the Township’s audited financial records, the average annual capital and maintenance expenditure for the roads, sidewalks, storm sewers, bridges, and culverts between the years of 2012 to 2016 has been \$1,448,224. The breakdown of the yearly expenses is presented in Table 5-3. Note that the expenses listed for 2016 reflect budgeted values, not actuals.

Table 5-3 Annual Expenses for Roads, Sidewalks, Storm Sewer, Bridges and Culverts

CATEGORY	2013	2014	2015	2016	2017 PROPOSED BUDGET	AVERAGE (2013 – 2017)
Roads (capital)	\$204,059	\$453,887	\$656,426	\$650,300	\$1,365,000	\$665,934
Sidewalks (capital)						\$0

CATEGORY	2013	2014	2015	2016	2017 PROPOSED BUDGET	AVERAGE (2013 – 2017)
Storm (capital)	\$334,208	\$410,739	\$55,350	\$100,000	\$136,230	\$207,305
Bridge (capital)	\$41,309	\$184,819	\$60,000		\$615,000	\$180,226
Roads (operation)	\$484,378	\$426,885	\$298,132	\$380,400	\$0	\$317,959
Sidewalks (operation)						\$0
Storm (operation)						\$0
Bridge (operation)						\$0
Average Annual Expenditure						\$1,448,224

The difference between the forecasted annual sustainable investment and the existing average annual investment is \$2,098,175. However, this figure does not necessarily reflect the actual funding situation in the Township as it does not capture transfers to and from reserves.

5.3 FUNDING STRATEGY

The funding strategy has not been explicitly identified for this AMP. The exact funding of the sustainable infrastructure plan will be further determined through other studies to be undertaken by the Finance and Budget Departments. Numerous potential sources of funding are available to the Township of Russell to support the sustainable infrastructure investments, ranging from use of reserve accounts to grants, taxes to user fees.

RESERVE ACCOUNTS

The Township currently contributes a portion of revenue to reserve accounts, from which funds can be drawn upon when needed. Reserve accounts play an important role in long term financial planning. The benefits of having reserve accounts for infrastructure are as follows:

- Provides a buffer for unexpected expenditures
- Accumulation of funding for significant future infrastructure investments

The Township of Russell's budget includes contributions to reserves, primarily for lifecycle replacement of assets, future capital projects, and contingencies.

DEBENTURE

Debenture financing involves taking out a loan to fund infrastructure needs at a fixed interest rate. It is a long term debt that is paid back over time according to a fixed payment schedule. Both corporations and governments frequently issue this type of bond in order to secure capital.

USER FEES

User fees are levies charged to the users of a good or service. A rate is typically used to determine the user fees, which may or may not be based on full cost recovery.

DEVELOPMENT CHARGES

Development charges are fees collected from developers to help fund growth related capital infrastructure. Development charges are used by most municipalities in Ontario to ensure that the cost to provide infrastructure in new developments is not passed on to existing residents through higher property taxes.

The Development Charges Background Study determines the appropriate charges to apply for new developments.

PUBLIC PRIVATE PARTNERSHIPS

The Public Private Partnership program, P3 Canada, is a federally funded program that aims to improve the delivery of infrastructure with contracts between the public sector and private parties. Public private partnerships are a long term approach to developing infrastructure that enhances the accountability of the private sector for infrastructure assets over their expected service lives. The private party assumes responsibility for the design, construction, financing and operation of the infrastructure. The public sector repays the operating and capital expenditures to the private party throughout the life of the infrastructure. This allows for a significant portion of the risk associated with infrastructure development to be passed over to the private party.

Public private partnerships are not the right solution for all infrastructure developments; however they can provide many benefits when applied to the right projects.

FEDERAL GAS TAX

The Federal Gas Tax Fund (GTF) provides predictable, long term funding for municipalities to help build and revitalize infrastructure. Funding is provided twice a year to provinces and territories who then distribute this funding to their municipalities. Municipalities can pool, bank and borrow against this funding. Currently, federal GTF can be used for the following:

- **PUBLIC TRANSIT**
- wastewater infrastructure
- drinking water
- solid waste management
- community energy systems
- **LOCAL ROADS AND BRIDGES**
- capacity building
- **HIGHWAYS**
- local and regional airports
- short-line rail
- short-sea shipping
- disaster mitigation
- broadband and connectivity
- brownfield redevelopment
- culture
- tourism
- sport
- recreation

GRANTS/RECOVERIES

This Asset Management Plan is intended to be used as a tool during capital grant application processes. Although grants may become available in the future, the sustainable funding plan cannot rely on awarded grants in order to balance the funding needs.

TAXATION

Property taxes are levies on a property which are issued by the governing municipality in which the property is located. Two components make up the property tax calculation for Ontario Municipalities:

- The annual operating expenditure to provide services to residents; and
- The total current market value of the assessment base (property) over which the operating expenditure is to be recovered.

The tax rate is determined by divided the annual operating expenditure by the total assessment value.

5.4 NEXT STEPS

After identifying the Township of Russell's infrastructure funding gaps and the available funding strategies/sources, it is recommended that the Township determine the appropriate strategy (strategies) going forward to fund the identified gaps.

It is also recommended that the Township seek approval to adopt this Asset Management Plan in principle, as a sustainable strategy. It is understood that annual funding will still be subject to the annual budget approval process.

The Township should continue to develop its infrastructure inventory in GIS. This will allow the Township to view where various infrastructure assets are located in relation to each other. The benefit of incorporating GIS with Asset Management Planning is that future projects will be able to be combined based on location, and as such lower costs. For example, the resurfacing of a road segment will be combined with the replacement of the respective sewer main.

This Asset Management Plan should be updated when regular inspections are completed and when conditions are re-assessed; every two years for bridges, every three years for roads and at least every five years for other infrastructure.

Asset management is a cost effective measure to help optimize investments, create long-term savings, and better manage infrastructure risks. The ten-year action plan has been developed with the goal of further enriching the Township's holistic and progressive approach to asset management. The implementation of this Asset Management Plan will assist the Township of Russell in making informed decisions to meet the desired levels of service, reduce overall risk and improve the infrastructure over the ten year timeframe of the plan.

The image shows a cover page for 'Appendix A Asset Inventory'. The background is a dark purple color with a white corner cutout in the top right. A teal-colored rectangular area is overlaid on the bottom right, also with a white corner cutout in the top left. The text 'Appendix A Asset Inventory' is centered in the teal area.

Appendix A Asset Inventory

ABOUT US

WSP is one of the world's leading professional services firm, working with governments, businesses, architects and planners and providing integrated solutions across many disciplines. The firm provides services to transform the built environment and restore the natural environment, and its expertise ranges from environmental remediation to urban planning, from engineering iconic buildings to designing sustainable transport networks, and from developing the energy sources of the future to enabling new ways of extracting essential resources. It has approximately 15,000 employees, mainly engineers, technicians, scientists and architects, as well as various environmental experts, based in more than 300 offices, across 35 countries, on every continent.

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