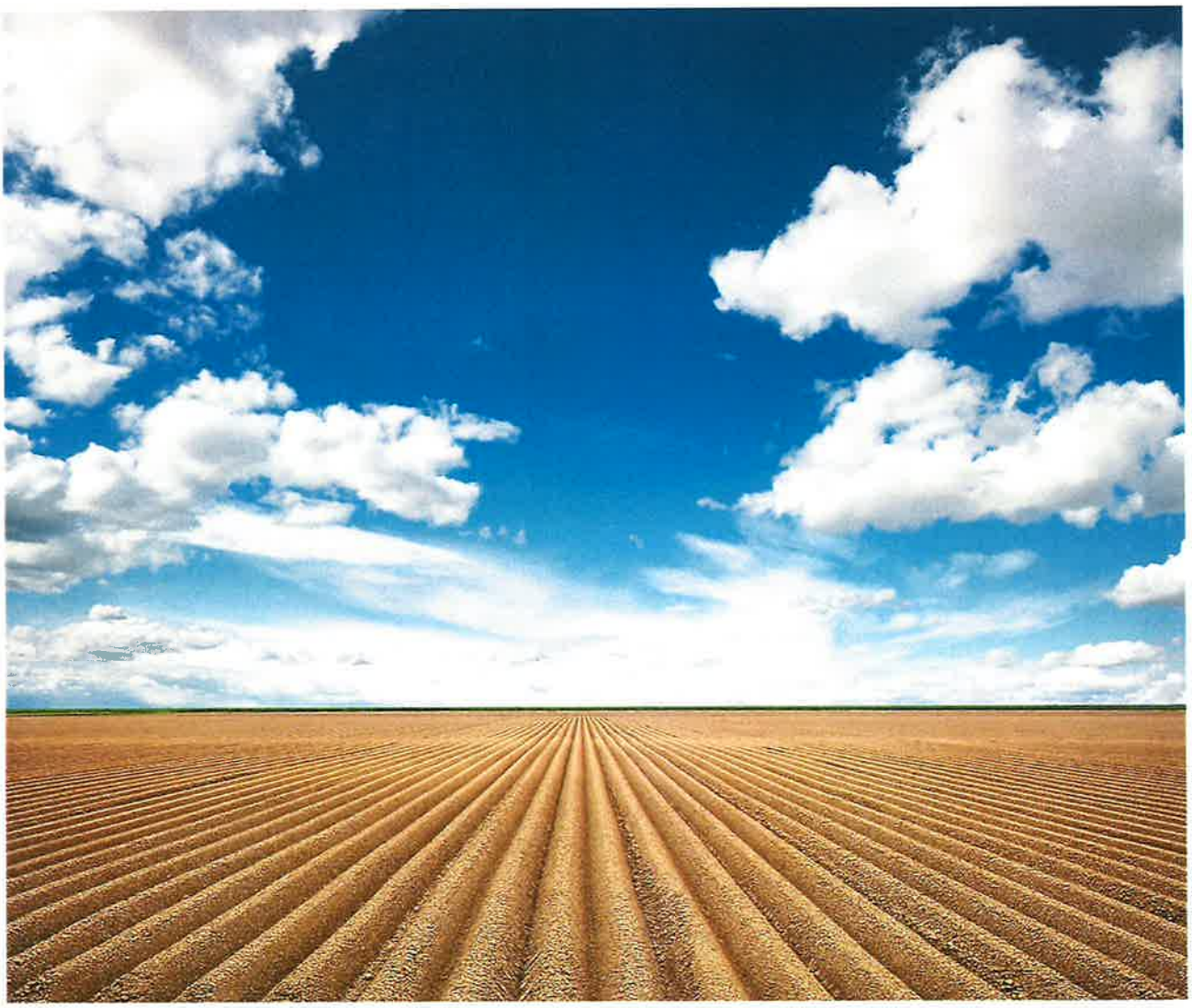
ASSET MANAGEMENT PLAN 2022



Presented to Township Council July 2022

ASSET MANAGEMENT PLAN 2022

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1. INTRODUCTION

This 2022 version of the Township of East Garafraxa ("the Township") Asset Management Plan ("AMP") has been built on the most recent AMP of the Township, updated in 2019.

This AMP is concerned only with "core assets", namely Roads, Bridges, Culverts and Water System. Other assets such as buildings, vehicles, land, land improvements, technology, and other equipment are not included here. Those assets will be included in the next version of the AMP which is required by Regulation to be completed by June 2024. In the case of the Township, core assets make up most of the tangible capital assets owned by the Township. Data on core assets in the 2024 AMP will be updated and expanded beyond what is disclosed in this 2022 AMP.

The format of this AMP is in five sections, a structure recommended by the Ontario Government 2013 publication *Building Together: Guide for Municipal Asset Management Plans.* But due to developments that have arisen since 2013, the Township has added sections on Climate Change Impacts, and a section to disclose the Regulation 588/17.

1.1 Legislated Requirements

In December 2017, *Ontario Regulation 588/17 ("the Regulation") Asset Management for Municipal Infrastructure* was passed under the *Infrastructure for Jobs and Prosperity Act.*

The Regulation firstly required all municipalities to develop a Strategic Asset Management Policy, to provide guidance for future capital investment decisions. The Township adopted its Policy in 2017.

The main content of the Regulation goes on to list specific requirements on the types of analysis a municipal AMP should include. The expectation is that by following these specific requirements in the Regulation, the content of AMP's will be made more consistent across the Province. The deadline for completing an AMP was set out in the Regulation, but was later deferred by one year by the Province, in part in response to COVID complications. The core asset AMP deadline became June 30, 2022 and the broader all-assets AMP deadline became June 30, 2024. The Regulation also contains even more specific requirements that apply only to municipalities over 25,000 population.

Specific requirements in the Regulation will be referred to in each section of this AMP.

1.2 Asset Data

Available asset data will be disclosed in this AMP, but where data is not available, that fact will also be disclosed, along with suggestions to address the problem of incomplete data.

The Quality and Confidence of the data used in this AMP is critical, and will be discussed in each section. The following table describes the Confidence Grade for data used herein:

TABLE 1 DATA CONFIDENCE

GRADE LEVEL	DESCRIPTION
5 Highly Reliable	Data is based on sound records, procedure, investigation, and analysis Dataset is complete and estimated to be accurate within 2%
4 Reliable	Data is also based on sound records, etc. but has minor shortcomings, for example some data is old, some documentation is missing and reliance is sometimes placed on unconfirmed reports or an extrapolation Dataset is complete and estimated to be accurate within 10%
3 Uncertain	Data is based on records that are incomplete or unsupported, or is extrapolated from a limited sample Dataset is incomplete and estimated to be accurate within 25%
2 Very Uncertain	Data is based on unconfirmed verbal reports and/or cursory inspection and analysis, due to lack of resources devoted to obtaining more accurate data Dataset is incomplete and estimated to be accurate within 40%
1 Missing or Unknown	Data is unknown, has not been gathered, or very little data is held, so what is available is not used here Considered as not accurate and therefore not used.

Efforts planned, or currently underway, to improve on the quality of data used for this AMP will be explained in the following sections of the AMP.

1.3 Asset Management Overview

Well-managed public infrastructure is vital to the prosperity and the quality of life of communities large and small. Ontario municipalities have an important responsibility to ensure such infrastructure is planned, built or acquired, and maintained in a sustainable way. This is often referred to as the Asset Life Cycle, and includes asset disposal. A

detailed AMP, adopted and adhered to, is essential for a municipality to carry out that responsibility for its infrastructure.

Benefits of asset management include:

- Demonstrate the Township is compliant with legislation
- Enable Township to make informed and traceable decisions about its assets
- Enable Township to coordinate and plan accordingly, by taking a risk-based approach to asset management
- Higher customer satisfaction by reducing the likelihood of interruptions in service due to asset failure and breakdown
- Documented funding plans and strategy to manage infrastructure needs in a timely way, and reduce the need for responding to financial emergencies

Although all municipalities including the Township may believe they have adequate asset management practices in place, by following the specifics in the Regulation many will discover areas where they are coming up short in their existing activities. Completing an updated AMP will identify problem-areas, and guide municipalities towards the actions they need to take, both in the short-term and longer-term, to maintain the levels of service their residents and business have come to expect, and rely upon every day.

1.4 AMP Integration

The AMP should be integrated with other Township records and plans. There should be a direct integration, or link, of the AMP with:

- The annual Township Budget
- The Township Development Charges Bylaw and Background Study
- Township capital asset accounting records
- Road Needs Assessment
- OSIM bi-annual studies of bridges and culverts

Circumstances are constantly in a state of change for municipalities, as new reporting requirements come out, as the municipality experiences growth in population, and as the cost of capital assets increase. The Province is very aware of this; that is why the first specific requirement of the Regulation we will mention is, no surprise, a requirement to update the AMP every five years, after the 2024 broader version is completed. It is incumbent on the Township, and expected by the Province, to keep on top of the circumstances that impact the Township AMP over time, and make changes to its AMP in response.

2. LEVELS OF SERVICE

All AMPs need to balance affordability of municipal services with customer needs and expectations. The way this is expressed in AMPs is known as Levels of Service (LOS).

2.1 Levels of Service Measures

LOS are specific measures that describe the extent and the quality of services which the municipality provides to its residents. In asset management, a great deal of work has gone into the area of LOS. A very large number of LOS measures have been developed, along with them many associated measures known as Key Performance Indicators (KPI), which can become quite extensive.

Smaller municipalities like the Township should keep in perspective the value of LOS. Only those LOS that are relevant and insightful to the Township should be kept. It is an easy mistake to make to "go overboard" with LOS and KPI, and you may find diminishing returns of value as the list of LOS measures kept becomes ever larger.

The main types of LOS measures are:

1. **Customer LOS**
2. **Technical LOS**

Customer LOS are simple, plain language description of services that customers receive. For example, What level of storm intensity is the Township Storm Sewer Network designed to handle? A 1-in-10 year storm? A 1-in-100 year storm?

Technical LOS are also called KPI and they take the Customer LOS down to a specific measurement that will indicate how a municipality is performing the service described in the Customer LOS. Technical LOS should be retained over time, to identify trends in the service level quality. For example, What is the % of Storm Sewer mains that are considered resilient to a 1-in-10 year storm? is a specific Technical LOS measurement.

The Regulation is quite specific about LOS measures. It contains a **Table in section 5(2)** where some basic LOS measures, for core assets, are provided as a minimum requirement for inclusion in any AMP.

The Township has not been actively maintaining any LOS data and so the data provided in this AMP for LOS would have a Grade Level of Uncertain. IT IS

RECOMMENDED that greater time and effort be put into the development of more accurate LOS measures in future. For purposes of this AMP, only the basic, minimum LOS measures as listed in the Regulation are disclosed.

TABLE 2 : Basic LOS in the Regulation

SERVICE PROVIDED	Customer LOS	Technical LOS and KPI's
Roads	Township road network is safe, convenient and available to the whole community	Asphalt surfaces measured by PCI average PCI = 7.0 in 2017 average PCI = 5.9 in 2019
	Meet Minimum Maintenance Standards MMS per Ont. Regulation 239/02	Gravel surface road condition rating: Average = 5.3 in 2017 Average = 4.3 in 2019
	Service requests are responded to promptly Example : potholes filled	No specific measures are kept on response time data; generally considered adequate LOS
	Roads are safe to use: traffic signs and road markings are well maintained and visible	Staff perform regular road patrols and replace damaged signs. Pavement markings are re-done as needed.
Storm Water Network: mains, ponds, catch-basins	Network is maintained in good condition to provide continuous service delivery	% of properties resilient to a 5-year storm : 100% *estimate only* % of properties resilient to a 100-year storm : 75% *estimate only*
Potable drinking water system	Provide a safe and reliable supply of drinking water to residents connected to a municipal water system	% of properties in Marsville connected to system: 100% % of prop. in Marsville where Fire Flow is available 100%
	Service requests are responded to promptly	Number of Boil-Water Advisories issued : 2021 – x 2020 - x
		Number of watermain breaks 2021 - x 2020 - x
Bridges and culverts > 3 m. diameter AKA Structures	All Bridges and Culverts provide safe vehicular and pedestrian passage	BCI measures obtained from bi-annual OSIM studies: **PER 2020-2021 OSIM review:** Good = over 70 = 14 Fair = 50 to 70 = 7 Poor = BCI < 50 = 3
	All structures are fully compliant with regulatory requirements	Is an OSIM review completed bi-annually as required? **YES**

	Traffic types supported by the Structure Network • Heavy trucks • Passenger vehicles • Emergency vehicles • Cyclists • pedestrians	Structures with Loading restrictions:
NOTE: the MTO established a target for BCI measures where the expectation is to have 85% of structures in "Good" condition = a BCI above 70 by the year 2021. The Township has not met this MTO target, but it has completed three major bridge rehabilitations over the past ten years.		

The Township currently tracks some LOS measures as part of the MMS for roads, and for Provincial water guidelines through an external consultant that tracks and documents LOS measures in annual reports to Council.

Asset Management Ontario (AMONT) is an organization providing help, training, and advice to municipalities about asset management. AMONT offers these "tips" for developing LOS measures:

- keep LOS simple, focus on the asset's service objectives
- minimize number of LOS, ask "Why do we need this LOS?" and "What will this LOS tell us about the asset?"
- will the data needed for an LOS be available?

It is expected that LOS is an area of asset management that the Province will expand upon in the future, asking municipalities to develop and maintain more LOS measures.

2.2.1 PROPOSED Levels of Service

In Part 6 of the Regulation, the topic of Proposed Levels of Service is addressed, although these will not apply until 2025, so they don't apply to this version of the AMP, or to the 2024 version. However they are mentioned here for awareness purposes.

Proposed LOS represent target LOS that the municipality aspires to achieve in future. by June of 2025 the Township must have decided upon its Proposed LOS and must begin to measure and track its progress towards reaching them.

The next stage of LOS development would be to set **Target Values** for each Technical LOS which the Township strives to achieve. This is another activity the Township could plan on for the future. When setting Target Values, some limitations on what could be considered realistically achievable LOS targets are:

- Budget and financial capacity

- Available external contractors and service providers
- Potential staff time that could be devoted to improvements in LOS

Proposed LOS are mentioned in this AMP as recognition of their existence and as a reminder for the future.

Part 9 of the Regulation requires ANNUAL REVIEWS of the AMP. This will become effective with the release of this 2022 AMP. Part of the Province's expectation for Annual AMP Reviews is a tracking of LOS starting at the least with the LOS as shown in this AMP, and re-measuring them every year, beginning with 2023, to both identify trends in LOS and to introduce new LOS measures.

2.2 Risk Measurements

The second major AMP topic to be discussed in the LOS section is RISK. Risk is directly linked to LOS, and risk represents a combination of two factors:

1. chance, or likelihood, of an event occurring
2. consequence of such an event to residents/customers

Risk of Asset Failure = Probability of Failure x Consequence of Failure

In asset management , Risk relates to the likelihood and consequence of an asset failure or breakdown that prevents the continued provision of service. The failure could be caused by a weather-related event. For example, a severe winter storm recently happened in Texas, with a very low Likelihood but severe Consequences. Another example might be a snow-plow breakdown, causing the vehicle to be out-of-service, and impacting the time it takes for the remaining plows to reach all Township roads.

A Risk Matrix is the common tool used to evaluate risk for an asset. Values are assigned to the levels of Likelihood and the levels of Consequence of an asset failure. A sample Risk Matrix that the Township might use is illustrated below.

TABLE 3 : RISK MATRIX with values added

CONSEQUENCE	Insignificant = 1	Minor Impact = 2	Moderate = 3	Major Impact = 4	Catastrophic = 5
LIKELIHOOD					
Rare = 1	1 L	2 L	3 L	4 M	5 M
Unlikely = 2	2 L	4 L	6 M	8 M	10 M
Possible = 3	3 L	6 M	9 M	12 H	15 H
Likely = 4	4 M	8 M	12 H	16 H	20 H
Almost Certain = 5	5 M	10 M	15 H	20 H	25 H

Instead of numeric values, often the matrix risk-values are simply expressed as L for Low, M for Medium and H for High. These codes are also shown in the matrix above.

Climate Change has substantially impacted risk levels for many municipal assets. For example, increased frequency and severity of weather events, like floods and power outages due to storms, demands more LOS measures around asset resiliency, measuring the ability to withstand such events. The area of Climate Science has become very extensive, and this AMP has included a separate section to discuss climate measures and impacts.

The Township has not developed its own Risk measurements to any great extent, and so the values for Risk Assessment, that will appear in the State of the Infrastructure section which follows, are generic evaluations of Township staff, without specific support behind them.

IT IS RECOMMENDED that time and effort be devoted by the Township in future to a more specific assessment of asset risk, to guide the setting of priorities in future Township budgets for capital assets.

3. STATE OF THE INFRASTRUCTURE

This AMP section discloses specific data about the Township's assets. It must include data about existing core asset inventory and the condition of those assets.

Another required component is Replacement Cost estimates. Township financial records are based on historical costs, and because many assets are quite old, those financial values are of little use in asset management, and can even be misleading. Historical values are shown in the summary Table 5 below, just to indicate how far off from current replacement values they are.

These are the sources of data used to compile this AMP section, with data-confidence ratings shown:

TABLE 4 : Data Sources used

Source of Data		Data Confidence	
Township's last AMP 2016 plus 2019 Update		4 - Reliable	Somewhat outdated
Township asset accounting records		4 - Reliable	Somewhat outdated
2021 OSIM report on Bridges and large culverts		5 – Highly Reliable	Current
Discussions with current Township staff		5 – Highly Reliable	Current
Road Study 2002		3 – somewhat Reliable	Outdated
2021 Year-End annual Water System Report		5 – Highly Reliable	current

A new Road Study is scheduled for completion in 2022.

Table 5 lists the main core asset categories with Historical Cost values, Replacement Cost estimates and a generic high-level Condition estimate. More in-depth Tables for each asset category follow. Road Bases are separated because they are assets that will never totally be replaced, except in rare situations where a full road reconstruction is considered necessary.

Table 5 : High Level Core Asset Valuations

Core Asset Category	Financial Records Historical Cost	Replacement Cost 2022 estimated		Overall Condition assessment
Stormwater ponds	648,507	685,000		Good
Stormwater mains and catchbasins	73,875	236,700		Good
Water facility	136,070	310,000		Fair
Water mains	113,720	400,000		Fair
Wells, Hydrants and equipment	100,500	268,250		Good
Asphalt road surfaces	2,350,000	4,625,000		Good to Fair
Gravel road surfaces	435,297	1,500,000		Fair
Bridges and large culverts (over 3 metres)	6,546,744	25,150,000		Good to Fair
Smaller culverts, cross-culverts, guiderails, posts	411,729	500,000		Good
SUBTOTAL	**$ 10,816,442**	**$ 33,674,950**		
Road Bases – all roads	5,420,172	18,125,000		$125K/ km
	$ 16,236,614	**$ 51,799,950**		

Core Township assets have total estimated current replacement cost of about $51.8 million, or 3.2 times the value showing on the Township books and the audited financial statements.

Water system assets above are funded from system users and have replacement costs estimated at about $1 million. Tax-supported core assets have replacement costs of about $32.6 million, excluding Road Bases (see note on previous page).

Next this State of the Infrastructure section looks at each core asset category more closely. Detailed asset lists appear in the **AMP Appendix.**

Stormwater assets

Stormwater mains (4-inch, 6-inch and 12-inch Main Drain), catchbasins (25), manholes and detention ponds (9) are all relatively newer assets compared with those in other categories, and no replacements or rehabilitations are foreseen in the next few years. Regular maintenance including clean-outs and CCTV inspections should be sufficient to keep these assets in functioning condition. All stormwater assets are considered to be in good condition.

Water System assets - Marsville

The following data is taken from the 2021 annual water system review, done by an external consultant that also operates the system year-round, under a contract with the Township.

Table 6 Water System asset details

Component	Date acquired	Replac. Cost estimate	Comments in annual report 2021	Condition estimate
Hydrants – 3	1972	$ 25,500	reached end of 50-yr life, still functional	Fair
Treatment Plant and pumphouse	1972	$310,000	50 yrs. old, expected life of 75 years	Fair
Pumps, chemical injectors, SCADA sensor, chemical feed pump	varies		Replaced as needed, functional *(see Note below)*	Fair
Water tank, storage	2013	$ 12,750	Expected life to 2025	Fair
Well #1 commissioned plus upgrades	2001 2003	$ 75,000 $ 80,000	Aged to within 5 years of preferred replacement	Fair
Well #2 uncommissioned	2001	$ 75,000		Fair
150mm pressurized mains	1972	$400,000	reached end of 50-yr. life but remains functional as-is	Fair

In January 2022, the system experienced a pump failure, and one new pump and motor were purchased for approx. $15,000.

All water system assets are in only Fair condition in this AMP, largely in recognition of their advanced stage in their useful lives. Many of the water assets are 50 years old.

Roads

The Township road network has of 37.8 km. of paved roads, 0.9 km. of surface-treated road, and 107.9 km. of gravel roads for a total network of 146.6 km. or 293 lane-km.

The road conditions have not been independently evaluated for 20 years, and are to be re-evaluated in 2022. Since the 20-year-old data is not reliable, for the purposes of this AMP all roads are simply being evaluated as Fair. Normally the roads would be listed by segment, but in this AMP the disclosure is simplified into a basic list by length, and split into Paved length and Unpaved length.

Road assets also include signs, but for this AMP signs have been excluded.

Roads are classified by the Ministry of Transportation (MTO) into Classes, per O. Reg. 612/06. Road classes are based on both Speed Limits and Average Daily Traffic (ADT) volumes. A Class 1 example would be a four or six lane road like Dixie Road in Brampton. Township roads are low-volume and two lanes. The Township has no roads

in Classes 1, 2, 3, or 4. MTO Class 5 roads have speeds between 40-80 Km/hr. and ADT of 200 to 499. Class 6 roads have speeds between 40-80 Km/hr. and ADT of 0 to 99 vehicles.

The Township road network consists of 0.00 km of Class 5 roads and 0.00 km of Class 6 roads. Roads in residential subdivisions have speed limits of 40 km/hr. **Table 7** lists the Township road network by name and by road type.

Table 7 Township Road network

Road Name	Surface Treated	Asphalt Hard-top	Gravel Surface	Total Length	Condition Estimate
Grand Crescent		0.172		0.172	Fair
Maple Street		0.101		0.101	Fair
Victoria Blvd.		0.392		0.392	Fair
5th Sideroad			0.338	0.338	Fair
10th Sideroad			12.361	12.361	Fair
15th Sideroad			4.722	4.722	Fair
20th Sideroad		4.827		4.827	Fair
EG-WG Townline			6.168	6.168	Fair
EG-Caledon Townline		3.870		3.870	Fair
EG-Erin Townline		6.004	1.397	7.401	Fair
Winston Churchill Blvd.		0.485		0.485	Fair
9th Line			11.433	11.433	Fair
10th Line		2.092	10.533	12.625	Fair
11th Line			13.615	13.615	Fair
12th Line			9.133	9.133	Fair
13th Line		0.289	10.657	10.946	Fair
15th Line			9.062	9.062	Fair
16th Line			8.178	8.178	Fair
17th Line		8.172		8.172	Fair
18th Line	0.896		3.068	3.964	Fair
19th Line			5.681	5.681	Fair
A Line		2.370	1.560	3.930	Fair
Old Carriage Rd		1.725		1.725	Fair
Brookhaven		2.147		2.147	Fair
Rayburn Meadows		1.257		1.257	Fair
Cedar Place		0.284		0.284	Fair
Greenwood Cres.		0.638		0.638	Fair
Hilltop Cres.		0.633		0.633	Fair
John Street		0.106		0.106	Fair
Maywood Drive		0.256		0.256	Fair
Springview Court		0.268		0.268	Fair
Woodland Drive		1.071		1.071	Fair
Nature's Landing Dr.		0.637		0.637	Fair
	0.896	37.796	107.906	146.598	

A comprehensive study of the road network is scheduled to be completed during June to November of 2022. Data from the study will appear in the 2024 Township AMP.

Bridges and Large Culverts (over 3 m. span)

These assets are required to be inspected every two years, per the MTO Ontario Structures Inspection Manual (OSIM) guidelines. Condition is measured by a Bridge Condition Index (BCI) measure, established through the MTO. BCI measures are

- 70 to 100 = Good
- 50 to 69 = Fair
- 20 to 49 = Poor
- Below 20 = Critical

The Township has 24 of these assets and 2021 inspection results were BCI values of 14 Good, 7 Fair, 2 Poor and one is Critical. The average BCI across all 24 assets went from 65.4 in 2019 to 68.8 in 2021. **Table 8** lists the 24 bridge/large culvert assets and their BCI as measured in 2021:

Table 8 Bridges and Culverts

I.D.	Located on		Replac. Cost	B.C.I.	
0001	20th Sideroad	CSP multi-plate Ellipse culvert 1976	250,000	44.42	Poor
0002	10th Line	Cast-in-place concr rigid frame 1950	550,000	73.71	Good
0003	10th Line	Prefabricated fibreglass bridge **2015**	750,000	99.70	Good
0004	10th Line	Cast-in-place concr rigid frame 1945	550,000	74.02	Good
0005	10th Line	CSP multi-plate Ellipse culvert 1972	300,000	18.36	Critical
0006	11th Line	Precast concrete I-Girder 1987	4,000,000	74.70	Good
0007	12th Line	Bowstring Arch **(concrete, 2020 rehab.)**	4,000,000	81.67	Good
0008	13th Line	Steel Truss (timber deck) **2014 rehab**	2,800,000	52.25	Fair
0009	10th Line	Precast concrete I-Girder **(replac 2008)**	4,700,000	92.45	Good
0010	11th Line	Cast-in-place concr rigid frame **2003**	1,100,000	90.03	Good
0011	20th Line	CSP multi-plate Ellipse culvert 1969	350,000	70.46	Good
0014	10th Sideroad	Cast-in-place concrete T-beam 1930	800,000	67.86	Fair
0015	13th Line	Cast-in-place concr box culvert 1979	750,000	74.86	Good
0016	EG-WG TnLn	Cast-in-place concr box culvert 1960	400,000	32.55	Poor
0017	13th Line	Cast-in-place concr box culvert 1940	400,000	52.55	Fair
0019	16th Line	Cast-in-place concr box culvert 1960	500,000	74.54	Good
0021	12th Line	CSP multi-plate Ellipse culvert **2007**	250,000	73.89	Good
0022	18th Line	Cast-in-place concr box culvert 1940	250,000	74.71	Good
0023	19th Line	Cast-in-place concr box culvert **2007**	400,000	95.56	Good
0024	EG-Caledon	Cast-in-place concr box culvert 1950	500,000	68.31	Fair
0026	EG-Erin TnLn	Cast-in-place concr box culvert 1940	450,000	55.85	Fair
0027	EG-Caledon	Cast-in-place concr box culvert 1945	250,000	74.37	Good
0029	EG-Erin TnLn	Cast-in-place concr box culvert 1940	450,000	68.47	Fair
0031	EG-WG TnLn	Cast-in-place concr box culvert 1940	400,000	64.60	Fair
			25,150,000		

In addition to these 24 assets, there are also bridges/culverts on the municipal boundary that are shared with neighbouring municipalities. Those assets will be included on the AMP of the other municipality, as they are the owners, but the Township cost-shares in any major rehabilitation done to those assets. This cost-sharing situation will appear, and have some impact, in the Financing Strategy section of this AMP.

Smaller bridges and culverts include the ID numbers 12, 13, 18, 20, 25, 28 and 30 which are intentionally missing from Table 8, plus a large number of corrugated steel culverts valued at under $2,000 apiece. Collectively, they are valued on the Township books at $411,729. Condition ratings for these assets are not available. For this AMP, these assets are all listed as being in Good condition. They are estimated to have a replacement value of roughly $500,000 per Table 5.

Bridge and culvert cost values also include, where applicable, concrete end-barriers, guide posts (post+wire) and steel beam guide rails.

Normally in any AMP section on State of the Infrastructure, within asset Tables like Tables 5 to 8 above, a Risk measurement would be disclosed next to the condition assessment of each asset. Risk measurement methods were covered in the Levels of Service section.

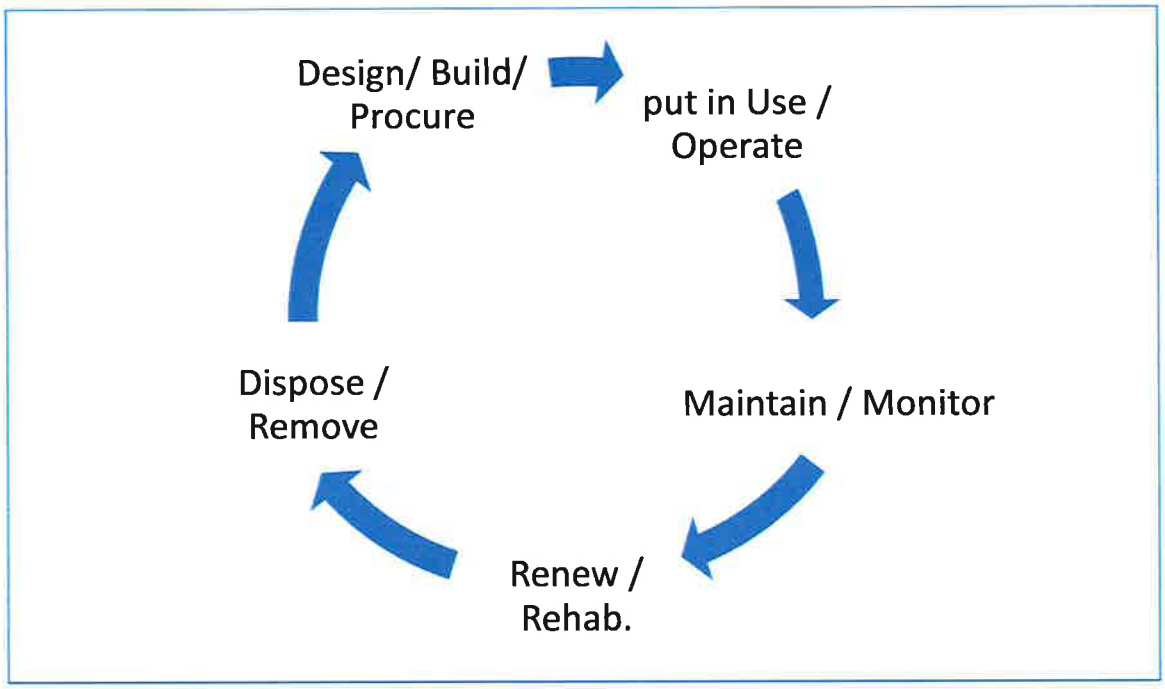
Risk values have been excluded from the Asset Tables in this section because the Township has not completed any formal risk assessment on its core assets. For this 2022 AMP, for all core assets, for simplicity and due to a lack of reliable information, Risk is assessed as Moderate.

4. ASSET MANAGEMENT STRATEGY

This AMP section relates to identifying a set of actions that will assist the Township in maintaining its core assets in such condition that they may continue to provide current levels of service to residents.

These actions typically include:

- Non-infrastructure solutions
- Maintenance activities
- Renewal or rehabilitation
- Replacement and Expansion
- Disposal



ASSET LIFECYCLE aka CRADLE-to-GRAVE

Non-infrastructure solutions and maintenance activities involve the work carried out in day-to-day care of existing assets, to keep them in operating condition. Renewal and rehabilitation is the next Asset Strategy phase, when assets need a major overhaul to remain operational. Replacement is the stage where an asset is beyond rehabilitation, can no longer provide service and must be replaced. Expansion includes making plans to expand services due to growth, which normally involves more, or larger, assets than those previously in use, and not simply replacing "same with same". Disposal involves the removal of an expired asset that is no longer of any use.

The Township currently faces serious near-term financial shortfalls for its capital assets, which will be made clear in the Financial Strategy section 5 of the AMP. This reality places the primary emphasis within the Township's Asset Strategy on maintenance activities and non-infrastructure solutions, because it is known that necessary funds are not available for renewals, rehabilitations and replacements of core assets.

This Table identifies typical actions the Township could take, specifically for roads and bridges and culverts:

Table 9 Typical Lifecycle Actions

Non-infrastructure solutions		Changes in asset use to lessen stress on the asset : making changes to hours of operation, take break times during asset use, safer storage, regular cleaning
Maintenance activity		Snow-plowing, sweeping, grading of ruts and pot-holes, shouldering, crack sealing, cold patching, weed + grass cutting, ditching, dust control, re-graveling, deck washing, OSIM inspections, component repairs as indicated by the inspection, line-painting All part of day-to-day Public Works activities
Renewal + Rehabilitation		Asphalt removal and resurfacing. Replace joints, concrete abutments, barriers, decks, bearings, wingwalls
Replacement		Remove existing asset and install new asset of approx. the same dimension and materials
Expansion		Install a new, different asset to perform similar function, but with increased size, or more capacity, or more features, or improved technology
Disposal		Remove the replaced asset from its former location, sell or trade-in, landfill, incineration

It is recommended that the Township develop a multi-year Capital Plan that looks at existing assets and evaluates their physical condition. Based on what the data shows, realistic timetables for asset replacements need to be established. These timetables would then be converted to budget requirements based on current asset market prices, anticipated inflation increases and a matching up to the expected replacement dates.

Then the required funding per year should be analyzed against sources of funds available. If necessary, compromises should then be made to accommodate financial shortfalls, but without over-extending reasonable asset lifecycles by over-extending replacement dates.

Where compromises are made, because of financial shortfalls, they should be reflected in increased operating budgets for repair and maintenance costs, on older assets with delays to their replacement times.

Another aspect of an Asset Strategy is lifecycle record-keeping, maintaining ongoing service records or "log books" for large assets, such as documenting when parts were replaced or rebuilt, for example. It is recommended that these asset lifecycle records be maintained.

Good maintenance of assets will

- Avoid the need for earlier-than-planned replacement
- Save financial resources through fewer major repairs
- Ensure asset performance meets customer expectations for levels of service (for example, residents expect a road that they can drive on without damaging their vehicle)
- Benefit Township employees' health and safety by reducing chances of accidents caused by asset failure

When performing asset maintenance, these factors should be considered:

- Is the repair cost-effective? How much longer will the asset last by doing this?
- Time delays : how long will the repair work put the asset out-of-service? Example road closures or temporary single-direction traffic
- Have local utilities been contacted? (gas, hydro)
- Will this work impact neighbouring municipalities?

In summary, because of limited resources, in the near-term the Township Asset Strategy will consist mostly of good maintenance practices, to keep Township assets in working condition, to meet service levels expected by residents. This will be the case until there are sufficient finances put in place to make asset replacements.

Older assets will require more maintenance, and the Township may find that its Operating Budget for maintenance needs to be increased due to the age of existing assets.

5. FINANCIAL STRATEGY

The Financial Strategy outlines the recommended approach to raising the funds needed to address the full asset lifecycle costs outlined in section 4 of the AMP, namely:

- Annual maintenance of core assets
- Major rehabilitation or renewal costs (capital costs) to extend asset useful life
- Asset replacement costs (capital costs)
- Asset inventory expansion costs (capital costs)
- Related to Replacements, a Capital Program to fully fund replacements based on a best-estimate for the expected timing of replacements

Calculations should take Inflation into consideration.

There will always be a shortfall, commonly referred to as an Infrastructure Gap. This AMP will use the term "I-Gap" for this. The Financial Strategy must, by necessity, **compromise** in addressing the I-Gap, based on limited resources and the magnitude of the I-Gap. It will likely be the case that addressing the I-Gap will be a slower, more gradual process than what would be ideal. The main goal of the Township should be to consistently, although gradually, reduce its I-Gap over a period of years. This main goal will attempt to move the Township towards asset management **sustainability.**

The term **Capital costs** will be used to include major rehabilitations, complete replacements, and expansion of capital assets. There will need to be some Capital cost deferrals due to a lack of available funding. Tax-supported funding levels for Capital costs in 2022 are as low as the Township has seen, so there is a long way to go to get to a sustainable level of Capital cost funding.

All types of funding sources will be included. External sources are based on the current state of amounts of funding, including

- Federal Gas Tax
- OCIF Provincial grant funding

The amounts of these two external funds are not under the control of the Township and are subject to change from time to time.

Internal sources of funds, which are under Township control, include:

- Property taxation
- Development Charges (although restricted in their use)
- Reserves established by the Township

The following estimates are for annual operational costs required to maintain core assets based on 2021 actual costs. All of these costs are funded through property taxes, except waterworks funded by user fees from those on the water system. There can be no deferrals of these costs, they must be paid at the time they are incurred, to continue the operation of the related assets.

Employee costs are considered indirect costs and are excluded, although it is recognized that a portion of time spent on the job by Township staff is devoted to maintaining and operating core assets.

Table 10 Annual Operating Costs for Core Assets

Asset Group	Description of Maintenance Cost	Amount from 2021
Water System	Hydro, inspection, repairs as needed	$ 42,411
Water system	Insurance protection	1,850
Bridges + culverts	Repairs, parts, contracted service	30,542
Gravel roads	Dust control , calcium chloride	91,601
	Gravel + crushing + hauling	102,422
	Winter sand + salt 50%	31,505
Paved roads	Winter sand + salt 50%	31,505
	Crack Sealing and cold patching	37,944
	Grass mowing and weed-spraying	5,856
	Road markings / line-painting	6,000
	Liability insurance	25,981
		401,617

These annual costs can potentially increase substantially. Inflation will cause large increases in some of these costs (fuel is a prime example). Existing assets will be worn-down and repair costs will increase, if major capital asset rehabilitations and replacements are constantly being postponed

In addition to these direct operating costs, there are costs related to the operation of non-core assets such as buildings and vehicles. Those will be shown in this Table in the 2024 expanded version of the AMP.

Capital asset cost data for preparation of forecasts of major asset rehabilitations and replacements normally come from:

- Roads Needs Studies

- OSIM bridge and culvert reviews, every 2nd year per legislation
- Annual capital summary for water system, from external contractor

The Township has not done any recent road studies, so there is no reliable data to use until the next road study is completed later in 2022. For purposes of this AMP, estimates are used based on the inventory of 37.8 km of paved roads (see Section 4). It is estimated that to keep paved roads well maintained, about 1 km per year of repaving is required, based on a road-surface life of 30-35 years. This lifespan estimate for paved surfaces is higher than you will see in many other municipal plans, because of lower traffic volumes in the Township. This may be an under-estimate of the work needed, but the 1 km figure will be used here. There may be a backlog of repaving currently, but that will be made apparent in the next road study, and is disregarded for these AMP calculations. A rough cost estimate of $100,000 for one km. of repaving is used.

Bridges and culverts project data come from the 2021 OSIM review, and water asset data comes from the 2021 consultant's estimates for capital work. The timing of the projects is left the same as shown in those reports, although due to limited funds, it is recognized some projects may be deferred, and the Township would be accepting the inherent risks of project deferral.

Property taxation is normally the largest source of funding for capital work, however this amount was set very low in the 2022 Township Budget, and mustl be increased gradually as much as future budget approvals will permit.

Township Capital Reserves also have not been built up to the level required to meet future capital project needs. In recognition of this, in the following financial plan, OCIF grants are used to the maximum available each year, as are Development Charges.

Another source of financing for capital projects is Long Term Debt. The Township will need to take on some debt to meet its capital needs, due to the low level of its other funding sources. Debt has not been used by the Township in the past. Debt is a sensible method to finance large projects, because ongoing debt repayments will spread the capital asset cost over several years, matching fact that the related asset should be in service for many years, therefore the residents benefitting from the services provided by that asset will be paying for the asset, instead of the full cost being borne by those residents of the year in which the asset was acquired.

Debt Policy of many municipalities often does not permit taking on debt to replace or rehabilitate any existing asset, with the Debt Policy limiting any new debt to only new asset additions, such as construction of a new building. The following financial analysis shows the Township is not in a strong enough financial position to avoid using new debt, as a source of funds for asset replacements, when a large project comes up.

The financial forecast that follows covers 2022 to 2031 for core asset capital projects. The stated goal of increasing tax support for capital is built into the forecast. Inflationary adjustments of 3% per year are added to project costs estimates each year, starting with 2023, compared to the amounts taken from consultant reports.

All projects in the forecast relate to existing assets. No provision is made for any new roads, bridges, or culverts, or water system assets, anytime in the next ten years; figures in Table 11 are just for rehabilitation of, or replacement of, existing assets.

Many municipalities have used capital forecasts, that clarify their capital asset needs, to justify committing to annual tax increases of 1% to 2% for more tax support of capital work, on top of operational budget tax increases. The 2022 Township tax levy was about $3.0 million, so a 1% increase raises $30,000.

Finally, note that in the 2019 Update of the previous Township AMP, consultants estimated **the optimal annual capital spending by the Township should be $1.1 million** over their forecast period of 2019 to 2028 (for all assets, not only core assets).

Table 11 provides a recommended financing scenario for capital costs that are currently expected over the next ten years for core assets only. This scenario is designed to:

- Fully fund each year's projects
- Do not over-use the sources of financing, and allow flexibility in case the project costs are higher than estimated (for example, annual inflation allowance of 3% may not be realistic as marketplace changes)
- Commit to modestly increase the Tax Levy support for capital projects on a consistent basis, never taking a "year off"
- Limit the use of new debt to only very large projects

Table 11 Forecast of Core Asset Capital Needs

Year	Capital Spending Needs		Sources of Financing		Shortfall
2022	Repaving roads	0	Gas Tax	35,000	
	Add to Roads Reserve	15,000	OCIF grant	0	
	Bridges+culverts 2 rehab's	35,000	Devel Charge	0	
	Add to Bridges Reserve	55,000	**Tax Levy**	**70,000**	
	Water system	51,500	Own Reserves	51,500	
2023	Roads repaved	103,000	Gas Tax	269,000	
	Bridges+culverts	417,150 border	OCIF grant	175,000	
	Water system	0 bridge	Develop Charge	61,500	
	Border Rd – Caledon	150,000	**Tax Levy**	**74,650**	
	Adding to Reserves	60,000	Own Reserves	150,000	
			Debt	0	
2024	Roads repaved	106,000	Gas Tax	91,000	
	Bridges+culverts	15,000 design	OCIF grant	15,000	
	Water system		Devel Charge	15,000	
			Tax Levy	**80,000**	
	Adding to Reserves	80,000	Own Reserves		
			Debt		
2025	Roads repaved	109,000	Gas Tax	138,750	
	Bridges+culverts	817,500	OCIF grant	158,500	
	Water system		Devel Charge	129,250	
			Tax Levy	**90,000**	
	Add to Reserves	90,000	Own Reserves	100,000	
			Debt	400,000	

2026	Roads repaved Bridges+culverts Water system Adding to Reserves	112,000 112,000 rehab 100,000	Gas Tax OCIF grant Devel Charge **Tax Levy** Own Reserves Debt	110,000 82,650 31,350 **100,000**	
2027	Roads repaved Bridges+culverts Water system Adding to Reserves	115,000 20,000 design 110,000	Gas Tax OCIF grant Devel Charge **Tax Levy** Own Reserves Debt	75,000 44,000 16,000 **110,000**	
2028	Roads repaved Bridges+culverts Water system Adding to Reserves	118,000 220,000 12,400 120,000	Gas Tax OCIF grant Devel Charge **Tax Levy** Own Reserves Debt	90,700 150,000 47,300 **120,000** 62,400 0	
2029	Roads repaved Bridges+culverts Water system Adding to Reserves	121,000 20,000 design 130,000	Gas Tax OCIF grant Devel Charge **Tax Levy** Own Reserves	100,000 24,100 16,900 **130,000**	
2030	Roads repaved Bridges+culverts Water system Adding to Reserves	125,000 186,000 140,000	Gas Tax OCIF grant Devel Charge **Tax Levy**	150,000 117,600 43,400 **140,000**	
2031	Roads repaved Bridges+culverts Water system Adding to Reserves	130,000 30,000 design 150,000	Gas Tax OCIF grant Devel Charge **Tax Levy** Own Reserves Debt	111,800 0 18,200 **150,000**	
Capital Spending includes both specific project costs found in current studies, PLUS additions to Reserves for Capital Projects. If Debt is used, debt repayments would be a third element of annual Capital Spending.				

Like any multi-year plan, project budgets are subject to changes by Council, and each year going further-out in the forecast, the numbers become more uncertain.

Any financial plan must have flexibility built-in as a crucial element of the plan. The existing Township reserves need to be built up, for any unexpected capital road or bridge or culvert project, so that the Township has some capacity to respond to any emergency situation. Climate change will certainly increase the chances of an emergency (see Section 6). For this reason, the plan intentionally keeps the use of Own Reserves to a limited amount.

There is a requirement to spend Gas Tax within five years of its receipt, or else those funds must be returned. This forecast was based on using some Gas Tax money every

year to avoid the "claw-back" of this money from the Township. At the end of 2021, the Township Gas Tax fund is very close to breaching this 5-year spending threshold.

For further support of Table 11 numbers, Table 12 provides a forecast of how this ten-year scenario impacts various financing sources, based on the amounts in Table 11.

Table 12 Ten-Year Review of Sources of Financing

		Gas Tax	OCIF	Reserves	Reserves	
			Grant (#)	Roads&Bridg	Water	
2021	**Closing balances**	**476,099**	**50,000**	**808,896**	**186,901**	
2022	Additions	81,793	111,761	70,000	2,000	
	Withdrawals	- 35,000	0	0	-51,500	
2022	**Closing balances**	**522,892**	**161,761**	**878,896**	**137,401**	
2023	Additions	85,350	100,000	60,000	1,000	
	Withdrawals	-269,000	-175,000	-150,000	0	
2023	**Closing balances**	**339,242**	**86,761**	**788,896**	**138,401**	
2024	Additions	85,350	100,000	80,000	1,000	
	Withdrawals	-91,000	-15,000	0	0	
2024	**Closing balances**	**333,592**	**171,761**	**868,896**	**139,401**	
2025	Additions	88,764	100,000	90,000	1,000	
	Withdrawals	-138,750	-158,500	-100,000	0	
2025	**Closing balances**	**283,606**	**113,261**	**858,896**	**140,401**	
2026	Additions	88,764	100,000	100,000	1,000	
	Withdrawals	-110,000	-82,650	0	0	
2026	**Closing balances**	**262,370**	**130,611**	**958,896**	**141,401**	
2027	Additions	92,315	100,000	110,000	1,000	
	Withdrawals	-75,000	-44,000	0	0	
2027	**Closing balances**	**279,685**	**186,611**	**1,068,896**	**142,401**	
2028	Additions	92,315	100,000	120,000	1,000	
	Withdrawals	-90,700	-150,000	- 62,400	-12,400	
2028	**Closing balances**	**281,300**	**136,611**	**1,126,496**	**131,001**	
2029	Additions	96,000	100,000	130,000	1,000	
	Withdrawals	-100,000	-24,100	0	0	
2029	**Closing balances**	**277,300**	**212,511**	**1,256,496**	**132,001**	
2030	Additions	96,000	100,000	140,000	1,000	
	Withdrawals	-150,000	-117,600	0	0	
2030	**Closing balances**	**223,300**	**194,911**	**1,396,496**	**133,001**	
2031	Additions	99,850	100,000	150,000	1,000	
	Withdrawals	-111,800	0	0	0	
2031	**Closing balances**	**211,350**	**294,911**	**1,546,496**	**134,001**	

(#) The Ministry of Infrastructure (MOI) has advised that beginning in 2023, the calculations of annual OCIF funding will be changing. MOI will be "*using forward-looking Current Replacement Values and estimates*" to calculate the OCIF. The Township is unclear what that will mean for its OCIF, so in Table 12 we have simply used $100,000 per year as an estimate of future OCIF funding.

Unspent Gas Tax and OCIF funds may be invested and earn some interest each year, which will be added to the respective fund. This interest income is ignored in table 12.

Gas Tax has historically been increased, by the Federal Government, every second year, by a combined factor of inflation and population changes. For Table 12, this has been presumed to continue, and a 4% increase every second year has been used in the Table.

Development charges (DC) are not shown in Table 12 because of the uncertainty in predicting what will be collected each year. There are more than enough DC already collected to cover all the DC withdrawals shown in Table 11.

Balances in funds held, showing on each year-end Closing Balance in Table 12, indicates the **flexibility** in this plan to respond to any unexpected needs for capital asset financing during the ten year period. There are unspent balances at every year-end in Gas Tax and OCIF and Own Reserves, to deal with additional projects, if needed.

Although there are not many withdrawals from the Road/Bridge Reserve showing in Table 12, there are many culverts in the Township that have spans less than 3 metres, and so were not included in the OSIM study. For example, culvert 17 on the 13th Line is in poor condition and would cost $400,000 to replace (in 2022 dollars). Therefore, the picture in Table 12 may be overly optimistic, but should replacement or major repairs of smaller culverts come up, there is some funding available for a response.

There is another reason that the Road and Bridge Reserves balances may appear overly optimistic.

The Township has a serious problem that should be disclosed here, related to the future **financing of its vehicle fleet.** Vehicles are not core assets, and not part of this AMP, instead they will be included in the 2024 version. However, the Township must address a financing shortfall for replacement of its vehicles.

The Township Vehicle Fleet Reserve (not in Table 12) has been depleted significantly. Multiple vehicles in the fleet are getting close to the end of their useful lives. It is recommended that the Township begin in 2023 to increase the amount raised through the tax levy for vehicle replacements. Gas Tax, OCIF grants and Development Charges are all **non-eligible** as financing sources for vehicles, there is only taxation available, as well as possible trade-in values in some cases. Awareness of this situation is reflected in the tables, by purposely limiting the annual increases in Additions to Road and Bridge Reserves, in Tables 11 and 12, to small amounts, so more funds can be added to the Fleet Reserve instead.

If action is not taken, the Township risks asset failure in some of its vehicles, and the Township will start to see some significant operating expenses for vehicle repairs, as breakdowns happen more frequently, which could start happening as early as 2022.

It was mentioned that many municipalities have committed to a 1% or 2% annual tax increase for capital needs, on top of Operational increases. For the Township, that sort of

commitment would amount to about $50,000 more taxes per year. The increase in Tables 11 and 12 for Additions to Reserves is only about $10,000 per year, for the Roads and Bridges Reserves combined, to intentionally leave more room for future increases in taxation to be put towards building the Vehicle Fleet Reserve instead.

If the Township, for example, committed to raising an extra $50,000 more in taxes each year, above 2022 Budget levels, for building its capital reserves, only $10,000 of that increase would go to its Road and Bridge Reserves while $40,000 would go into its Vehicle Fleet Reserve. Even that amount may not be sufficient to replace Township vehicles should there be an asset failure, with a vehicle, earlier than expected. In such an event, the Township may have to take funds out of its Road or Bridge Reserve to pay for vehicle replacements, if the Vehicle Fleet Reserve is not sufficient to cover the cost. Reserves are under full control of Council, so a re-direction by Council of reserve spending, away from the original purpose of a Reserve, is permitted.

New Debt is used only once in Table 12, in 2025 for a major bridge rehabilitation (for a bridge on the 13th Line that would cost $2.8 million to replace). It is possible that there could be one-time infrastructure grants available for such a project, and if the Township successfully applied for such a grant, debt could be avoided.

Even though much of the water system assets are decades old, the consultant's ten-year capital forecast for water asset capital work shows many upcoming years with only minor repair and maintenance costs forecasted, which appear as zero-amounts for capital expenses in Table 11. The large expense in 2022 relates to an equipment failure that happened in early 2022. This 2022 event could be a sign that the water system assets will need more work than what was indicated by the consultant, and perhaps sooner than expected.

The annual addition of just $1,000 to the Water Reserve in Table 12 is because, in 2021 and 2022, operating costs of the water system were very close to user fee revenues received, so there was not very much net surplus to go into the Reserve. This situation is expected to continue, even if minor increases to user fee rates are made.

This AMP only includes core assets. There are other Township assets such as buildings, vehicles, park amenities, machinery and equipment, parking lots, streetlights, and technology that are not included here. The Township has several assets in these asset categories that are close to the end of their service lives and will need to be dealt with.

The true I-Gap that exists in the Township is not fully measurable at this time due to lack of current data about the road conditions, and the volume of work required on roads, and a lack of information about the physical condition of buildings and vehicles, and the capital needs for them. For this AMP, only a small annual increase for tax support for roads and bridges has been included, in recognition that the I-Gap at the Township is potentially in roads to some degree, but certainly there is a larger I-Gap in vehicles and buildings. Due

to a lack of reliable asset data, a more complete I-Gap measurement will have to wait until the more comprehensive 2024 AMP, that includes all assets, is completed.

6. CLIMATE CHANGE

The impacts of climate change present an increasingly serious challenge to municipal infrastructure. As temperatures and sea levels rise, and extreme weather events occur with greater frequency, it is critical that municipalities attempt to understand the emerging threat of climate change and develop strategies to ensure that vital services and critical infrastructure continue to operate as expected.

This will require consideration of four key factors of climate change (**exposure, vulnerability, resiliency and adaptation,** see comments below) at every stage of an asset's lifecycle.

Globally, there has been a serious increase in weather-related loss events, resulting in property damage and/or bodily injury. Municipal infrastructure is at particular risk to meteorological, hydrological and climatological events, potentially leading to an increasing rate of asset deterioration, failure and service disruption. The global increase in frequency of "climate events" has grown from about **300 events** in 1980 to **900** in 2014.

Meteorological events (Tropical storm, convective storm, local storm)

Hydrological events (Flood, mass earth movement)

Climatological events (Extreme temperature, drought, forest fire)

Moving from a global perspective to just Canada, Canada is warming up twice as fast as the rest of the world, and municipalities across the country are facing the biggest impacts (see Exposure section). Historical trends can no longer be used to predict future scenarios, and what used to be infrequent extreme weather occurrences are now common.

FOUR KEY FACTORS

Exposure refers to the state of being in a place, or situation, where there is no protection from something harmful or unpleasant. Exposure is a combination of the probable range of a climate stressor and the physical characteristics of a geographic location, for example sea-level concerns for a coastal region.

In 2018, the Inter-governmental Panel on Climate Change (IPCC, an international body responsible for assessing the science related to climate change) reported that the world

has already warmed by 1.0 degree C above pre-industrial levels (1850-1900) due to human activities, and is projected to reach 1.5 degrees C by 2030-2052, at the current rate of warming.

Canada is warming at a faster rate with overland temperatures increasing an average of 1.7 degrees C between 1948 and 2016, and about 2.3 degrees C for northern Canada, with the majority of the warming due to human activities. Ontario's Ministry of the Environment and Climate Change (MOECC) reports that the average annual temperature in Ontario has increased by 1.4 C over the last 60 years, and models suggest that by 2050 the average annual temperature in Ontario could increase by another 2.5 C to 3.7 C. Along with this, comes the increased likelihood of extreme weather events such as prolonged heatwaves, wind storms / tornadoes, and flooding.

Vulnerability refers to a weakness in the ability of a person, structure, or natural system to respond to a negative force, such as a hazard. A municipality's vulnerability to a hazard can be addressed, by developing adaptation strategies that strengthen infrastructure, support local eco-systems, and build community awareness and preparedness.

There has been a great deal of work done on the topic of climate change, and this work can be referred to as **climate science**, for short. There are many resources available to learn more about the subject, from a municipal perspective. FCM (Federation of Canadian Municipalities) is a primary source of material. Part of the climate science work has been the development of complicated climate forecast models, which can be found on the internet. For Canadian modelling, there is

- **climateatlas.ca**
- **climatedata.ca**

These websites contain models based on 30-year timeframes, and on different scenarios or assumptions of climate adaptation efforts. The scenarios are based on how much effort will be made to make changes to address climate change. These scenarios are based on RCP levels (Representative Concentration Pathways) for future greenhouse gas (GHG) emissions:

- **RCP 2.5**, low emissions scenario, presumes much work gets done to limit GHG
- **RCP 4.5** and **RCP 6.0**, moderate emissions scenario, some efforts made
- **RCP 8.5**, high emissions scenario, no changes made from way things are today, the "we will just ignore it" scenario

The models then give forecasts, for each scenario, of multiple measures based on different data sets (temperature, precipitation, agriculture data sets). 30-year time periods for measurement are the recent past (1976 to 2005), the near-term (2021 to 2050), and longer term (2051 to 2080).

Here is a small sample, taken from climateatlas.ca, for East Garafraxa:

TABLE 13

Data Set	Measurement Description	1976 to 2005	2021 to 2050	2051 to 2080	
TEMPERATURE					
	Days when temp goes above 30 C				
	RCP 4.5	7.3 days	22.5	35.5	
	RCP 8.5	7.3 days	23.5	48.7	
	Mean temp for the year				
	RCP 4.5	7.5 C	9.5 C	10.8 C	
	RCP 8.5	7.5 C	9.5 C	11.4 C	
	Nights when temp not below 20C				
	RCP 4.5	4.1 nights	7.8	14.4	
	RCP 8.5	4.1 nights	8.3	24.5	
	Longest spell of 30+C days – heat waves				
	RCP 4.5	2.5 days	5.9	7.5	
	RCP 8.5	2.5 days	6.9	10.9	
PRECIPITATION					
	Annual total precipitation				
	RCP 4.5	950 mm	985 mm	1010 mm	
	RCP 8.5	950 mm	985 mm	1010 mm	
	Days of heavy precipitation 20mm+				
	RCP 4.5	6.1 days	7.9	8.0	
	RCP 8.5	6.1 days	7.9	8.7	
AGRICULTURE					
	Frost-free season, in days				
	RCP 4.5	164.5 days	185.3	201.0	
	RCP 8.5	164.5 days	185.5	211.5	
	Days with frost likely includes all winter				
	RCP 4.5	147.5 days	127.5	118.6	
	RCP 8.5	147.5 days	122.6	103.7	
OTHER MEASURES AVAILABLE					
	Freeze-Thaw Cycles				
	Winter Days below -15C				
	Mild Winter Days from -5C to -14C				
	Number of heat waves				

Three words which best summarize the Climate Projections report are "warmer," "wetter" and "wilder." This is just a small sample of climate forecast measures to be found on these sites. When going through the modelling online, there are also line graphs provided on-screen, spanning 1975 to 2080, so the models let you drag across the graph, and stop on any single year to see the values for that specific year.

Remember that "all models are wrong, but some are useful!"

Resiliency is the capacity to recover quickly from difficulties. A resilient municipality has the capacity to survive, and adapt, to chronic stresses and acute shocks, such as

population growth (or decline), aging populations, influxes of new immigrants, economic swings, or climate change impacts like severe storms, or flooding. Resiliency is the ability to **continue to operate**, for example, despite the loss of a single road or bridge. It also refers to the physical restraints on repair or replacement of an asset (how quickly can it be returned to service?).

Municipal resiliency can be improved by reducing short-term and long-term risks resulting from climate change. FCM has created a guide on Building Sustainable and Resilient Communities with Asset Management.

Some municipalities are creating Reserves for Climate Impact Recoveries. A portion of net operating surplus, that would normally just go into a Tax Rate Stabilization Reserve, is earmarked instead for use when the municipality needs to perform recovery actions, following a weather event, that caused damage to its corporate assets.

Adaptation refers to taking actions to help communities and their eco-systems cope with changing climate conditions. FCM states that about 44% of Canada's GHG emissions, that cause climate change, are under the direct or indirect control of municipalities. Although private sector industry, and residential homes, also contribute to GHG emissions, the substantial impact from municipal assets explains why so many municipalities are devoting time and resources to this subject.

Many municipalities have recently been working on Climate Change Action Plans (CCAP), as endorsed by their Councils (County of Dufferin, County of Grey), identifying some actions that can be taken locally, and setting targets for future local levels of GHG emissions. Others have their CCAP (Burlington, Guelph, Clarington) available online, and can be reviewed to find ideas useful for East Garafraxa. The GHG targets are set based on local actions they have committed to taking in coming years. Like their AMPs, these CCAPs will be monitored and updated every few years.

It is recommended that East Garafraxa staff monitor the CCAPs of other municipalities in the near term, and compile a checklist of specific actions, as listed by those municipalities in their CCAPs, that could also be done locally, and bring forward this checklist to Council for endorsement, and to request municipal funding if needed, for specific actions.

GREEN INFRASTRUCTURE

Another growing aspect of climate change work, within asset management, involves Green Infrastructure, also referred to as Natural Assets. Municipalities often have not collected very much data on these assets, and they have not assigned values to them.

Natural assets do not fall under the core assets required for this AMP, but should be accounted for, moving forward. Natural assets can serve as mitigation tools against many of the hazards of climate change, such as excessive heat waves and soil erosion. Natural assets can be grouped into three categories:

1. Naturally occurring assets
2. Enhanced natural assets

3. Engineered natural assets

Some examples of each category are:

Naturally occurring assets
Forests, parks and open space, wetlands, fields, lakes, creeks, rivers, soil
Enhanced natural assets
Urban street trees, urban parks/parkettes, rain gardens, stormwater ponds, community gardens on municipal land
Engineered natural assets
Green roofs, green walls, cisterns, permeable pavement, rain barrels

IMPACT ON INSURANCE COSTS

Weather-related insurance claims in Canada **averaged $400 million** between 1983 and 2008, and they **averaged $1.8 billion** between 2009 and 2017.The Insurance Bureau of Canada's (IBC) top 10 highest claims payout years on record include every year since 2016.

In 2020, the IBC reported that severe weather caused **$2.4 billion** in insured damage, while global losses from natural disasters hit **$270 billion**. In addition to insured losses, there are also uninsured losses incurred by government, business, and individuals. It has been reported that for every $1 of insured losses, there are $3 to $4 of uninsured losses.

Rather than wait for a weather disaster to strike and then respond, a better plan is to reduce the risk before it happens. It has been estimated that the benefits of investing in community adaptation and resilience outweigh the costs by a ratio of 6 to 1.

The insurance cost impact of climate change is already being experienced by municipalities, so many of them are moving forward with concrete actions. East Garafraxa could conduct some research into the actions that others have made so far, and then implement those that make sense for this township.

RECOMMENDATIONS

- Adjust lifecycle activity strategies for those assets that are particularly exposed or vulnerable to the impacts of climate change (adjust asset maintenance frequency)

- Develop policies that outline a commitment to consider the impact of climate change on existing infrastructure and future development (example: some municipalities are making commitments to installing electric vehicle charging stations, and then phasing-in electric vehicles for their fleet)

- Include climate change considerations in the design and planning phase of future asset additions (example: choice of energy systems going into new or renovated township buildings)

- Integrate impacts of climate change into risk management frameworks (see Risk comments in the LOS chapter). One example could be the impact of extreme heat on municipal staff working outdoors, action would be to set limits on time spent out in hot conditions.

Asset Management Plan 2022

O. Reg. 588/17: ASSET MANAGEMENT PLANNING FOR MUNICIPAL INFRASTRUCTURE filed December 27, 2017 under Infrastructure for Jobs and Prosperity Act, 2015, S.O. 2015,

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Asset Management Planning for Municipal Infrastructure

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11. Commencement Interpretation and Application

Definitions 1. (1) In this Regulation, "asset category" means a category of municipal infrastructure assets that is, (a) an aggregate of assets described in each of clauses (a) to (e) of the definition of core municipal infrastructure asset, or (b) composed of any other aggregate of municipal infrastructure assets that provide the same type of service; "core municipal infrastructure asset" means any municipal infrastructure asset that is a, (a) water asset that relates to the collection, production, treatment, storage, supply or distribution of water, (b) wastewater asset that relates to the collection, transmission, treatment or disposal of wastewater, including any wastewater asset that from time to time manages stormwater, (c) stormwater management asset that relates to the collection, transmission, treatment, retention, infiltration, control or disposal of stormwater, (d) road, or (e) bridge or culvert; "ecological

functions" has the same meaning as in Ontario Regulation 140/02 (Oak Ridges Moraine Conservation Plan) made under the Oak Ridges Moraine Conservation Act, 2001; "green infrastructure asset" means an infrastructure asset consisting of natural or human-made elements that provide ecological and hydrological functions and processes and includes natural heritage features and systems, parklands, stormwater management systems, street trees, urban forests, natural channels, permeable surfaces and green roofs; "hydrological functions" has the same meaning as in Ontario Regulation 140/02; "joint municipal water board" means a joint board established in accordance with a transfer order made under the Municipal Water and Sewage Transfer Act, 1997;

"lifecycle activities" means activities undertaken with respect to a municipal infrastructure asset over its service life, including constructing, maintaining, renewing, operating and decommissioning, and all engineering and design work associated with those activities;

"municipal infrastructure asset" means an infrastructure asset, including a green infrastructure asset, directly owned by a municipality or included on the consolidated financial statements of a municipality, but does not include an infrastructure asset that is managed by a joint municipal water board;

"municipality" has the same meaning as in the Municipal Act, 2001;

"operating costs" means the aggregate of costs, including energy costs, of operating a municipal infrastructure asset over its service life;

"service life" means the total period during which a municipal infrastructure asset is in use or is available to be used;

"significant operating costs" means, where the operating costs with respect to all municipal infrastructure assets within an asset category are in excess of a threshold amount set by the municipality, the total amount of those operating costs.

(2) In Tables 1 and 2, "connection-days" means the number of properties connected to a municipal system that are affected by a service issue, multiplied by the number of days on which those properties are affected by the service issue.

(3) In Table 4, "arterial roads" means Class 1 and Class 2 highways as determined under the Table to section 1 of Ontario Regulation 239/02 (Minimum Maintenance Standards for Municipal Highways) made under the Municipal Act, 2001; "collector roads" means Class 3 and Class 4 highways as determined under the Table to section 1 of Ontario Regulation 239/02; "lane-kilometre" means a kilometre-long segment of roadway that is a single lane in width; "local roads" means Class 5 and Class 6 highways as determined under the Table to section 1 of Ontario Regulation 239/02.

(4) In Table 5, "Ontario Structure Inspection Manual" means the Ontario Structure Inspection Manual (OSIM), published by the Ministry of Transportation and dated October 2000 (revised November 2003 and April 2008) and available on a Government of Ontario website; "structural culvert" has the meaning set out for "culvert (structural)" in the Ontario Structure Inspection Manual. Application 2. For the purposes of section 6 of the Act, every municipality is prescribed as a broader public sector entity to which that section applies. Strategic Asset Management Policies Strategic asset management policy 3. (1) Every municipality shall prepare a strategic asset management policy that includes the following: 1. Any of the municipality's goals, policies or plans that are supported by its asset management plan. 2. The process by which the asset management plan is to be considered in the development of the

municipality's budget or of any long-term financial plans of the municipality that take into account municipal infrastructure assets. 3. The municipality's approach to continuous improvement and adoption of appropriate practices regarding asset management planning. 4. The principles to be followed by the municipality in its asset management planning, which must include the principles set out in section 3 of the Act. 5. The municipality's commitment to consider, as part of its asset management planning, i. the actions that may be required to address the vulnerabilities that may be caused by climate change to the municipality's infrastructure assets, in respect of such matters as, A. operations, such as increased maintenance schedules, B. levels of service, and C. lifecycle management, ii. the anticipated costs that could arise from the vulnerabilities described in subparagraph i, iii. adaptation opportunities that may be undertaken to manage the vulnerabilities described in subparagraph i, iv. mitigation approaches to climate change, such as greenhouse gas emission reduction goals and targets, and v. disaster planning and contingency funding. 6. A process to ensure that the municipality's asset management planning is aligned with any of the following financial plans: i. Financial plans related to the municipality's water assets including any financial plans prepared under the Safe Drinking Water Act, 2002. ii. Financial plans related to the municipality's wastewater assets. 7. A process to ensure that the municipality's asset management planning is aligned with Ontario's land-use planning framework, including any relevant policy statements issued under subsection 3 (1) of the Planning Act, any provincial plans as defined in the Planning Act and the municipality's official plan. 8. An explanation of the capitalization thresholds used to determine which assets are to be included in the municipality's asset management plan and how the thresholds compare to those in the municipality's tangible capital asset policy, if it has one. 9. The municipality's commitment to coordinate planning for asset management, where municipal infrastructure assets connect or are interrelated with those of its upper-tier municipality, neighbouring municipalities or jointly-owned municipal bodies. 10. The persons responsible for the municipality's asset management planning, including the executive lead. 11. An explanation of the municipal council's involvement in the municipality's asset management planning. 12. The municipality's commitment to provide opportunities for municipal residents and other interested parties to provide input into the municipality's asset management planning. (2) For the purposes of this section, "capitalization threshold" is the value of a municipal infrastructure asset at or above which a municipality will capitalize the value of it and below which it will expense the value of it.

Update of asset management policy 4. Every municipality shall prepare its first strategic asset management policy by July 1, 2019 and shall review and, if necessary, update it at least every five years.

Asset Management Plans Asset management plans, current levels of service 5. (1) Every municipality shall prepare an asset management plan in respect of its core municipal infrastructure assets by July 1, 2021, and in respect of all of its other municipal infrastructure assets by July 1, 2023.

THESE DATES WERE DELAYED BY 1 YEAR, to July 2022 and July 2024 respectively.

(2) A municipality's asset management plan must include the following:

1. For each asset category, the current levels of service being provided, determined in accordance with the following qualitative descriptions and technical metrics and based on data from at most the two calendar years prior to the year in which all information required under this section is included in the asset management plan: i. With respect to core municipal infrastructure assets, the qualitative descriptions set out in Column 2 and the technical metrics set out in Column 3 of Table 1, 2, 3, 4 or 5, as

the case may be. ii. With respect to all other municipal infrastructure assets, the qualitative descriptions and technical metrics established by the municipality.

2. The current performance of each asset category, determined in accordance with the performance measures established by the municipality, such as those that would measure energy usage and operating efficiency, and based on data from at most two calendar years prior to the year in which all information required under this section is included in the asset management plan.

3. For each asset category, i. a summary of the assets in the category, ii. the replacement cost of the assets in the category, iii. the average age of the assets in the category, determined by assessing the average age of the components of the assets, iv. the information available on the condition of the assets in the category, and v. a description of the municipality's approach to assessing the condition of the assets in the category, based on recognized and generally accepted good engineering practices where appropriate.

4. For each asset category, the lifecycle activities that would need to be undertaken to maintain the current levels of service as described in paragraph 1 for each of the 10 years following the year for which the current levels of service under paragraph 1 are determined and the costs of providing those activities based on an assessment of the following: i. The full lifecycle of the assets. ii. The options for which lifecycle activities could potentially be undertaken to maintain the current levels of service. iii. The risks associated with the options referred to in subparagraph ii. iv. The lifecycle activities referred to in subparagraph ii that can be undertaken for the lowest cost to maintain the current levels of service.

5. **For municipalities with a population of less than 25,000,** as reported by Statistics Canada in the most recent official census, the following:

i. A description of assumptions regarding future changes in population or economic activity.

ii. How the assumptions referred to in subparagraph i relate to the information required by paragraph 4.

6. For municipalities with a population of 25,000 or more, as reported by Statistics Canada in the most recent official census, the following: i. With respect to municipalities in the Greater Golden Horseshoe growth plan area, if the population and employment forecasts for the municipality are set out in Schedule 3 or 7 to the 2017 Growth Plan, those forecasts. ii. With respect to lower-tier municipalities in the Greater Golden Horseshoe growth plan area, if the population and employment forecasts for the municipality are not set out in Schedule 7 to the 2017 Growth Plan, the portion of the forecasts allocated to the lower-tier municipality in the official plan of the upper-tier municipality of which it is a part. iii. With respect to upper-tier municipalities or single-tier municipalities outside of the Greater Golden Horseshoe growth plan area, the population and employment forecasts for the municipality that are set out in its official plan. iv. With respect to lower-tier municipalities outside of the Greater Golden Horseshoe growth plan area, the population and employment forecasts for the lower-tier municipality that are set out in the official plan of the upper-tier municipality of which it is a part. v. If, with respect to any municipality referred to in subparagraph iii or iv, the population and employment forecasts for the municipality cannot be determined as set out in those subparagraphs, a description of assumptions regarding future changes in population or economic activity. vi. For each of the 10 years following the year for which the current levels of service under paragraph 1 are determined, the estimated capital expenditures and significant operating costs related to the lifecycle activities required to maintain the current levels of service in order to accommodate projected increases in demand caused by growth,

including estimated capital expenditures and significant operating costs related to new construction or to upgrading of existing municipal infrastructure assets. (3) Every asset management plan must indicate how all background information and reports upon which the information required by paragraph 3 of subsection (2) is based will be made available to the public. (4) In this section, "2017 Growth Plan" means the Growth Plan for the Greater Golden Horseshoe, 2017 that was approved under subsection 7 (6) of the Places to Grow Act, 2005 on May 16, 2017 and came into effect on July 1, 2017; "Greater Golden Horseshoe growth plan area" means the area designated by section 2 of Ontario Regulation 416/05 (Growth Plan Areas) made under the Places to Grow Act, 2005.

Asset management plans, proposed levels of service

6. (1) Subject to subsection (2), **by July 1, 2024**, every asset management plan prepared under section 5 must include the following additional information: 1. For each asset category, the levels of service that the municipality proposes to provide for each of the 10 years following the year in which all information required under section 5 and this section is included in the asset management plan, determined in accordance with the following qualitative descriptions and technical metrics: i. With respect to core municipal infrastructure assets, the qualitative descriptions set out in Column 2 and the technical metrics set out in Column 3 of Table 1, 2, 3, 4 or 5, as the case may be. ii. With respect to all other municipal infrastructure assets, the qualitative descriptions and technical metrics established by the municipality.

2. An explanation of why the proposed levels of service under paragraph 1 are appropriate for the municipality, based on an assessment of the following: i. The options for the proposed levels of service and the risks associated with those options to the long term sustainability of the municipality. ii. How the proposed levels of service differ from the current levels of service set out under paragraph 1 of subsection 5 (2). iii. Whether the proposed levels of service are achievable. iv. The municipality's ability to afford the proposed levels of service.

3. The proposed performance of each asset category for each year of the 10-year period referred to in paragraph 1, determined in accordance with the performance measures established by the municipality, such as those that would measure energy usage and operating efficiency.

4. A lifecycle management and financial strategy that sets out the following information with respect to the assets in each asset category for the 10-year period referred to in paragraph 1: i. An identification of the lifecycle activities that would need to be undertaken to provide the proposed levels of service described in paragraph 1, based on an assessment of the following:

A. The full lifecycle of the assets.

B. The options for which lifecycle activities could potentially be undertaken to achieve the proposed levels of service.

C. The risks associated with the options referred to in sub-subparagraph B.

D. The lifecycle activities referred to in sub-subparagraph B that can be undertaken for the lowest cost to achieve the proposed levels of service. ii.

An estimate of the annual costs for each of the 10 years of undertaking the lifecycle activities identified in subparagraph i, separated into capital expenditures and significant operating costs. iii. An identification of the annual funding projected to be available to undertake lifecycle activities and an

explanation of the options examined by the municipality to maximize the funding projected to be available. iv. If, based on the funding projected to be available, the municipality identifies a funding shortfall for the lifecycle activities identified in subparagraph i, A. an identification of the lifecycle activities, whether set out in subparagraph i or otherwise, that the municipality will undertake, and B. if applicable, an explanation of how the municipality will manage the risks associated with not undertaking any of the lifecycle activities identified in subparagraph i.

5. For municipalities with a population of less than 25,000, as reported by Statistics Canada in the most recent official census, a discussion of how the assumptions regarding future changes in population and economic activity, set out in subparagraph 5-i of subsection 5 (2), informed the preparation of the lifecycle management and financial strategy referred to in paragraph 4 of this subsection.

6. For municipalities with a population of 25,000 or more, as reported by Statistics Canada in the most recent official census, i. the estimated capital expenditures and significant operating costs to achieve the proposed levels of service as described in paragraph 1 in order to accommodate projected increases in demand caused by population and employment growth, as set out in the forecasts or assumptions referred to in paragraph 6 of subsection 5 (2), including estimated capital expenditures and significant operating costs related to new construction or to upgrading of existing municipal infrastructure assets, ii. the funding projected to be available, by source, as a result of increased population and economic activity, and iii. an overview of the risks associated with implementation of the asset management plan and any actions that would be proposed in response to those risks.

7. An explanation of any other key assumptions underlying the plan that have not previously been explained. (2) With respect to an asset management plan prepared under section 5 on or before July 1, 2021, if the additional information required under this section is not included before July 1, 2023, the municipality shall, before including the additional information, update the current levels of service set out under paragraph 1 of subsection 5 (2) and the current performance measures set out under paragraph 2 of subsection 5 (2) based on data from the two most recent calendar years. Update of asset management plans

8. (1) Every municipality shall review and update its asset management plan at least five years after the year in which the plan is completed under section 6 and at least every five years thereafter. (

2) The updated asset management plan must comply with the requirements set out under paragraphs 1, 2 and 3 and subparagraphs 5-i and 6-i, ii, iii, iv and v of subsection 5 (2), subsection 5 (3) and paragraphs 1 to 7 of subsection 6 (1).

Endorsement and approval required

8. Every asset management plan prepared under section 5 or 6, or updated under section 7, **must be, (a) endorsed by the executive lead of the municipality; and (b) approved by a resolution passed by the municipal council.**

Annual review of asset management planning progress

9. (1) Every municipal council shall conduct an annual review of its asset management progress on or before July 1 in each year, starting the year after the municipality's asset management plan is completed under section 6.

(2) The annual review must address, (a) the municipality's progress in implementing its asset management plan; (b) any factors impeding the municipality's ability to implement its asset management plan; and (c) a strategy to address the factors described in clause (b).

Public availability

10. Every municipality shall post its current strategic asset management policy and asset management plan on a website that is available to the public, and shall provide a copy of the policy and plan to any person who requests it.

Following Tables in the Reg. itemize specific measures expected to appear in the AM Plan.

Table 1

Water assets Column 1 Service attribute Column 2 Community levels of service (qualitative descriptions) Column 3 Technical levels of service (technical metrics) Scope 1. Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system. 2. Description, which may include maps, of the user groups or areas of the municipality that have fire flow. 1. Percentage of properties connected to the municipal water system. 2. Percentage of properties where fire flow is available. Reliability Description of boil water advisories and service interruptions. 1. The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system. 2. The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system.

Table 2

WasteWater assets

Column 1 Service attribute Column 2 Community levels of service (qualitative descriptions) Column 3 Technical levels of service (technical metrics) Scope Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system. Percentage of properties connected to the municipal wastewater system.

Reliability 1. Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes. 2. Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches. 3. Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes. 4. Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described in paragraph 3. 5. Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system. 1. The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity

compared to the total number of properties connected to the municipal wastewater system. 2. The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system. 3. The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.

Table 3

StormWater management assets

Column 1 Service attribute Column 2 Community levels of service (qualitative descriptions) Column 3 Technical levels of service (technical metrics) Scope Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system. 1. Percentage of properties in municipality resilient to a 100-year storm. 2. Percentage of the municipal stormwater management system resilient to a 5-year storm.

Table 4

Roads

Column 1 Service attribute Column 2 Community levels of service (qualitative descriptions) Column 3 Technical levels of service (technical metrics) Scope Description, which may include maps, of the road network in the municipality and its level of connectivity. Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality. Quality Description or images that illustrate the different levels of road class pavement condition. 1. For paved roads in the municipality, the average pavement condition index value. 2. For unpaved roads in the municipality, the average surface condition (e.g. excellent, good, fair or poor).

Table 5

Bridges and Culverts

Column 1 Service attribute Column 2 Community levels of service (qualitative descriptions) Column 3 Technical levels of service (technical metrics) Scope Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists). Percentage of bridges in the municipality with loading or dimensional restrictions. Quality 1. Description or images of the condition of bridges and how this would affect use of the bridges. 2. Description or images of the condition of culverts and how this would affect use of the culverts. 1. For bridges in the municipality, the average bridge condition index value. 2. For structural culverts in the municipality, the average bridge condition index value.

Commencement

This Regulation comes into force on the later of January 1, 2018 and the day it is filed.