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Role: Manager of Corporate Assets
Sector: Government - Municipal
Asset owner: Town of New Tecumseth



Introduction

Description of assets in study

The Town manages and operates the following assets supporting town's services.
Roads - 372 Centreline Kms, Bridges and Culverts -90, Stormwater mains – 160 kms, Storm ponds -22; Water mains (Transmission & Distribution) -230kms, Wastewater mains – 124kms, Wastewater treatment plants – 3, Sewer Pumpstations -13 stations, Fleet -175; Parks & Outdoor recreation- 45 parks, Facilities & Indoor recreation -21 buildings.

When was the activity carried out?

Six years

Why was the activity carried out?

Corporate direction, regulatory requirement from the province (Ontario Regulation 588/17), Environmental impact/sustainability due to climate change. The activity enabled us to have a complete inventory of our assets, discuss service levels across the corporation, define asset risks and critical services and develop a finance strategy for the services that are underfunded.

Terminology

Consequence of failure (CoF): A measure of the direct and indirect impacts on the Town if an asset failure was to occur.

Critical assets: Assets for which the financial, business or service level consequences of failure are sufficiently severe to justify proactive inspection and rehabilitation. Critical assets have a lower threshold for action than non-critical assets.

Incident: Occurrence caused by either human action or natural phenomena that may harm and may require mitigation.

Probability (likelihood) of failure (PoF): Probability is defined as the likelihood or chance that an event will occur within a specified time frame

Remaining life: The period from the current point in time to the time an asset requires renewal.

<i>Risk:</i>	<i>Risk refers to the uncertainty that surrounds future incidents and outcomes. It is a function of likelihood and consequence.</i>
<i>Risk cost:</i>	<i>The assessed annual cost or benefit relating to the consequence of an event. Risk cost equals the costs related to the event multiplied by the probability of the event occurring.</i>
<i>Risk management:</i>	<i>ISO 31000 defines risk management as “coordinated activities to direct and control an organization regarding risk”.</i>
<i>Triple Bottom Line:</i>	<i>The confluence of risks and opportunities associated with environmental, social, and economic performance has made sustainability a strategic priority. Measuring an organization’s environmental, social and economic performance is referred to as “Triple bottom line”. A sustainability report for an organization will help understand how well the reporting organization is doing on the triple bottom line.</i>
<i>Threat:</i>	<i>The presence of a hazard or vulnerability may be natural or human induced, either accidental or intentional to damage or destroy an asset. (E.g. Arson, Vandalism, Flooding, Heat wave, Storm surge, Pandemic etc.)</i>
	<i>A characteristic or attribute of an asset which renders it susceptible to effects of an incident</i>
	<i>Infrastructure asset consists of long-lived capital assets that can be preserved for several years longer than most capital assets. They can be linear or vertical.</i>

Description of activity

Methodology

The Probability or Likelihood of failure is the condition of the asset. The condition of an asset is either based on visual inspection or study or age based. In our case, the roads, bridges, buildings have study-based condition where a consultant reviewed the condition and gave Pavement Condition Index (PCI), Bridge Condition Index (BCI), Facility Condition index (FCI) etc. This is 1 to 100 score (100 Very good and 1 Very poor). This was scaled to 1 to 5 by the Town's Asset Management team. Assets like Fleet was visually inspected by the fleet department and 1 to 100 score was assigned. Here 100 score indicates very poor and 1 as very good based on our Fleet policy. The scores were again scaled to 1 to 5 for Asset Management purpose. The Probability of Failure (PoF) is Very Good for 1 and score 5 assigned to asset in very poor condition. The consequence of Failure is 1 to 5 with 1 as least Consequence of Failure (CoF) and 5 having the highest CoF.

Probability/ Likelihood Table					
Likelihood	1	2	3	4	5
	Improbable	Unlikely	Possible	Likely	Almost Certain
	Never happens under unusual circumstances	The failure of the asset might occur at rare time as there is few history of this event occurring. Probably never will except under exceptional circumstances	The failure of the asset might occur at some time as there is a history of this event occurring	There is strong possibility of the failure of the asset occurring as there is a frequent history of occurrence	Very likely. Asset failure expected to occur in most circumstances.

Consequence Table							
Category	1	2	3	4	5	Weight	Notes
	Negligible	Low	Moderate	High	Catastrophic		
Strategic	No affect on Community well-being and Organization's Strategic Goals. No media exposure	Negligible impact on Community well-being and Organization's Strategic Goals. Minor local media exposure	Moderate impact on Community well-being and Organization's Strategic Goals. Moderate local media exposure lasting for several days	Significant impact on Community well-being and Organization's Strategic Goals. Intense local media exposure lasting several weeks and/or provincial	Major impact on Community well-being and Organization's Strategic Goals. Significant national exposure lasting several days or weeks.	0.10	
Environmental	Very negligible impact. Reversible within 1 week	Material damage of local importance. Minor, short-term (within 6 months) very isolated damage to the environment	Significant short term (less than 1 year) local damage to the environment	Significant long - term (greater than 1 year) widespread damage to the environment. GTA importance.	Major long - term (greater than 5 years) or permanent widespread damage to the environment. Some provincial importance	0.05	
Health and Safety	No obvious potential for injury or affects to health	Minor medical attention may be required	Potential for minor injury or affects to health of an individual. Full recovery is expected.	Hospitalization of some individuals may be required for a short period of time	Emergency and / or long term hospitalization required for one or more individuals	0.20	
Compliance	Breach of local standard operating procedures but not any mandatory policies or procedures	Ad hoc as opposed to systematic breaches of policies and procedures but not of laws or regulation	Breach of laws/ licenses, including a notifiable breach resulting in recommendations and active monitoring by regulator/ instances of breach of operational policies	Prosecution: Fines < 1M. Showcause notice from regulator, enforceable undertaking; Significant and systematic breach of policy	Prosecution with potential for executives to be jailed. Fines > 1M. Loss of critical license/accreditation. Significant and a systematic breach of governance policies	0.20	
Operational	Small number of customers experiencing service disruption No impact or reduced quality of service or service loss for few residents	Service disruption at a localized level Reduced quality of service or service loss for critical users for less than an hour An increase in complaints from the community (<10%)	Significant localized service disruption Service loss or major quality of service concern for critical users. An increase in complaints from the community (10%-25%)	Major service loss (less than a day and not able to maintain fire supply) A marked increase in complaints from the community (25%-50%)	Very major, widespread service disruption Disastrous service loss (for more than a day) Significant increase in complaints from the community (increase of 50% or more)	0.25	
Financial Impact	Less than \$5,000	\$5,000 - \$100,000	\$100,000 - \$250,000	\$250,000 - \$1M	Restoration is impossible or greater than \$1M	0.20	

		Note: Scores are given between 1 and 5 (lowest to highest). Each category holds a weighting from 0 - 1.							Consequence	Likelihood Calculated Annually By Asset	Risk Calculated Annually By Asset
Asset	Consequences	Consequence - Notes	Strategic	Environmental	Health & Safety	Compliance	Operational	Financial	Weighted Consequence Score	Score	Risk Score
			0.1	0.05	0.20	0.20	0.25	0.20			
Recreation Facilities	Revenue loss	High use building	4	2	4	4	4	3	3.70	1	3.70
Library Facilities	Revenue loss	High use building	4	2	4	4	4	2	3.50	1	3.50
Admin Facilities	Revenue loss	High use building	4	2	4	4	4	3	3.70	2	7.40
Roads Depot	Moving of Staff to another facility	Medium/ Low use building	3	2	4	4	4	2	3.40	1	3.40
Fire Halls	Compliance consequence	Medium/ Low use building	4	2	4	4	4	3	3.70	1	3.70

This risk score came from the Municipal Finance Officers Association of Ontario (MFOA). The risk register includes various consequences like Strategic, Environmental, Health & Safety, Compliance, Operational and Financial. A weighted score was discussed which is standardized for all asset categories. The scoring was done for each asset categories separately like Transportation, Water, Wastewater, Stormwater, Fleet, Fire etc. based on discussion with business groups. For example, roads associate risks to different types of roads like arterial, collector, local roads and gravel roads. Roads closer to schools, recreation centres and emergency facilities like paramedic stations and fire halls have higher CoF. The same strategy was used for other transportation assets like signals, streetlights, bridges, signs etc. Water assets had higher CoF due to the sensitivity around water in the town as well as stringent regulations around quality of water by the federal and provincial government. However, we have looked at the spares availability and other factors to reduce risk in this service. Fleet that was more used by operations like roads, water, wastewater, parks for maintenance was given higher CoF than those used by the building and planning department. Fire Services is a critical service that involves human life and rescue. Most of the assets like fire apparatus and fleet have higher CoF of 5 and equipment gears and communication with high CoF of 4. This is to elevate fire assets as priority.

How did the risks link to the business objectives? Did the approach produce an overall cost/benefit?

Asset risks is used but again business decisions are also dependent on the council's priorities along with asset management recommendations. We are at the initial stage of asset management decision driven business decisions.

Did the approach take account of the position over time (i.e. including asset deterioration)? The approach looked also into age-based deterioration in addition to deterioration modelling suggested by study. For example, we had a solid recommendation of degradation curves on many of our assets. However, vertical assets like equipment, fleet are more based on run to failure and hence straight-line depreciation was taken.

Was this a one-off exercise or a rolling repeatable programme?

This is a rolling repeatable programme in asset management to constantly review the asset risks and asset condition to come up with an evidence-based decision making for asset replacements.

References

Self-Assessment Tool for Risk from Municipal Finance Officers Association

Risk types

Strategic risk, Environment risk, Operational risk, Health & Safety risk, Compliance risk, Financial risk, Reputational Risk, Residual Value risk etc.

Risk management process

We don't have a corporate risk register. The risk register was primarily used in the asset inventory. We are hoping to include financial measurement like replacement costs to show financial value for high risk and critical assets.

Tools used

A spreadsheet was used as desktop exercise for the Asset Management team, and it is later included in the asset registry. Brightly Predictor tool is used as analytical tool to come up with various dashboard type displays.

Costing

There were no costs involved in assessing risks. The replacement costs of assets was independently evaluated by the asset management team.

People

Manager of Corporate Assets and Infrastructure Asset Management Technologist was involved in the exercise. We approached the directors on how they view asset risks and critical assets in their services. A risk management strategy was approved by the council.

Evaluation

What was the main output of the activity?

A risk strategy was approved by the council and later I documented risks in asset management and included these in asset registry. I also met the regulations of the province. The risks score was identified between 1 to 25 with highest risks given between 20 to 25 and lowest risks for 1 to 3.

Ranking Matrix						
		Consequence				
		1	2	3	4	5
Likelihood	1	1	2	3	4	5
	2	2	4	6	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20
	5	5	10	15	20	25

Risk Levels:

	▪ Risk is Severe for any thing 20 and above
	▪ Risk is High for any thing 15 and below 20
	▪ Risk is Medium High for anything above 8 but below 15
	▪ Risk is Medium Low for anything 4 and above but 8 and below
	▪ Risk is Low for anything below 4

Validation

No validation is required currently but this case study demonstrates that risks are incorporated in asset prioritization. I am hoping to follow a continuous improvement model by updating risk scores on an annual basis by reviewing the CoF of each of the asset by asking the required questions to the senior management.

Outcome

We were able to meet the regulatory requirements of incorporating risks in asset management, but I am hoping to include climate risks in the near future as part of my risk register.