Asset Management

A Short Introduction

The What
The Why
The Who
The How

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- Matt Delorme

TRACT

LandInfo Technologies

Project completed in partnership with Municipalities Newfoundland and Labrador

This initiative is delivered through the Municipal Asset Management Program, delivered by the Federation of Canadian Municipalities and funded by the Government of Canada

Funded By:

FCM FEDERATION OF CANADIAN MUNICIPALITIES FÉDÉRATION CANADIENNE DES MUNICIPALITÉS

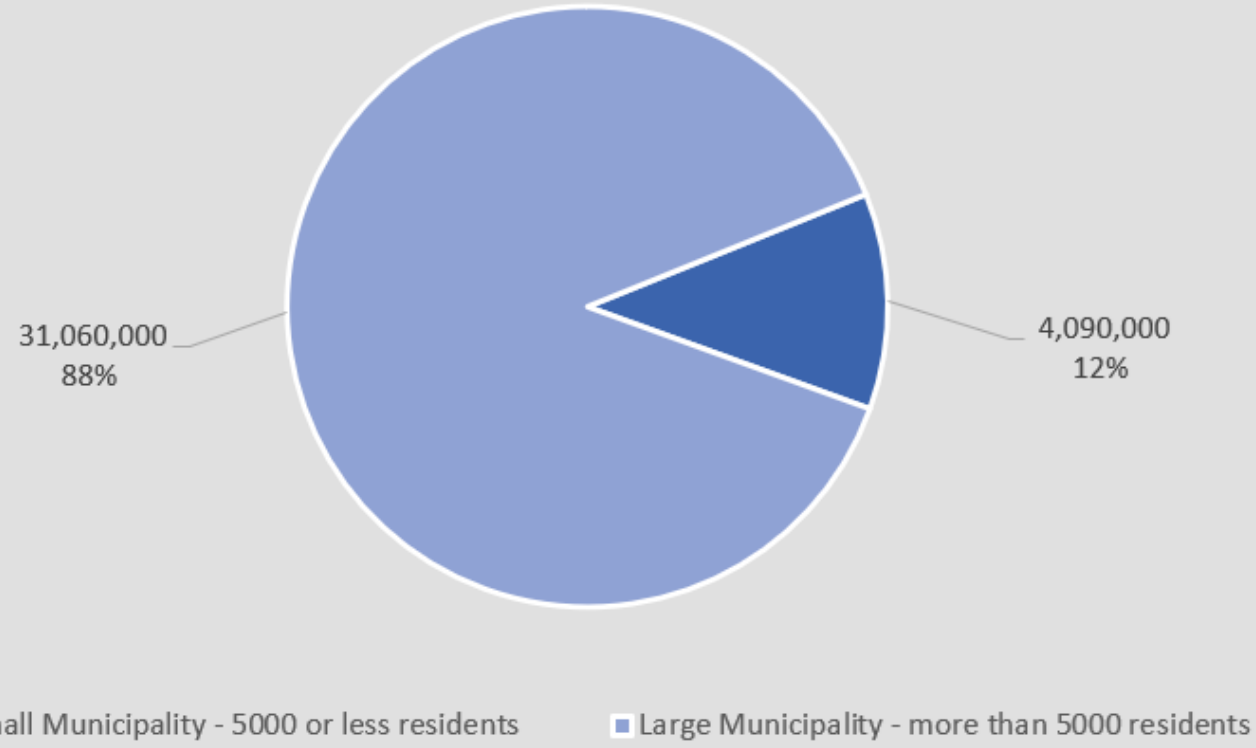
Government of Canada Gouvernement du Canada

Asset Management

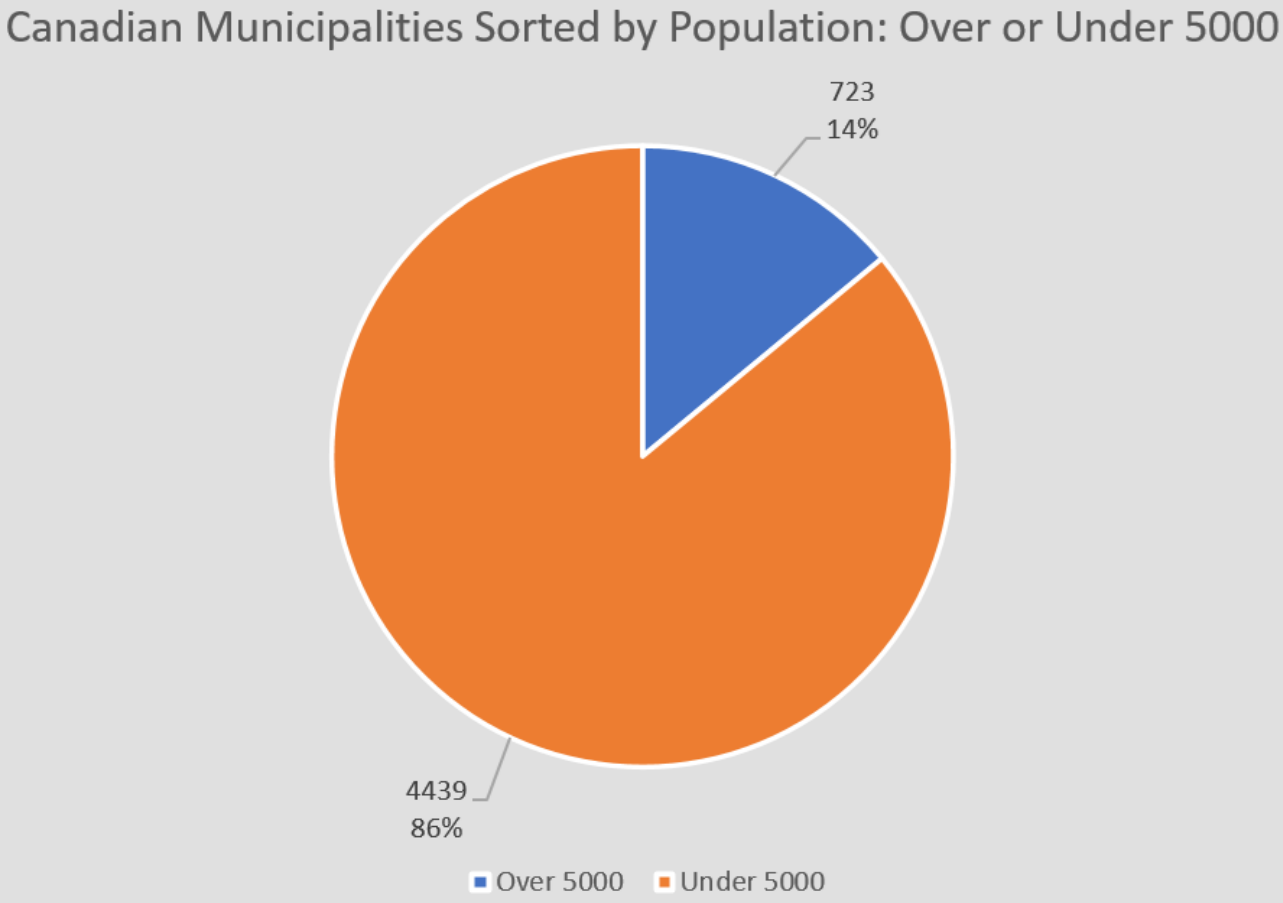
A Short Introduction

The How

Distribution of Canadian Population Living in Small and Large Municipalities



Municipalities in Canada with population decreases between 2011 and 2016, Statistics Canada



Municipalities in Canada with population decreases between 2011 and 2016, Statistics Canada

Challenges for Small Municipalities

Small municipalities face unique challenges implementing asset management. They are required to provide a similar range of services as larger urban centers with much smaller budgets. Often, small municipalities rely on a limited number of staff to take on many diverse responsibilities.

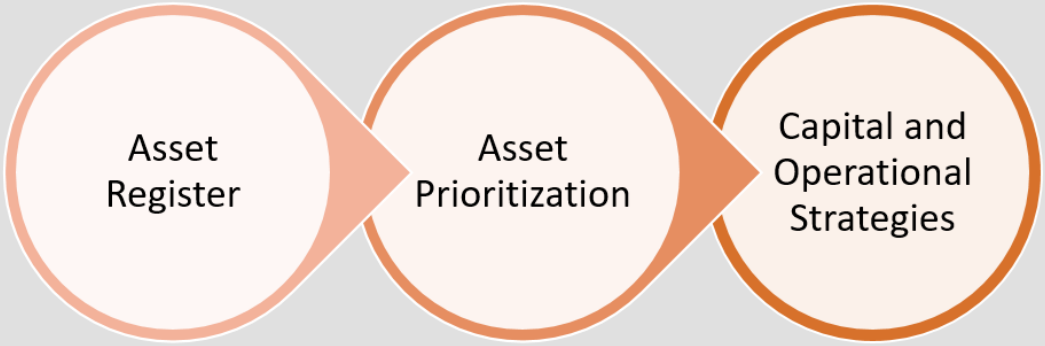
Methodology

We recommend a three-step methodology to implement asset management in small municipalities. Also we strongly suggest municipalities explore open-source software and open-data solutions.

01 | Asset Register

02 | Asset Prioritization

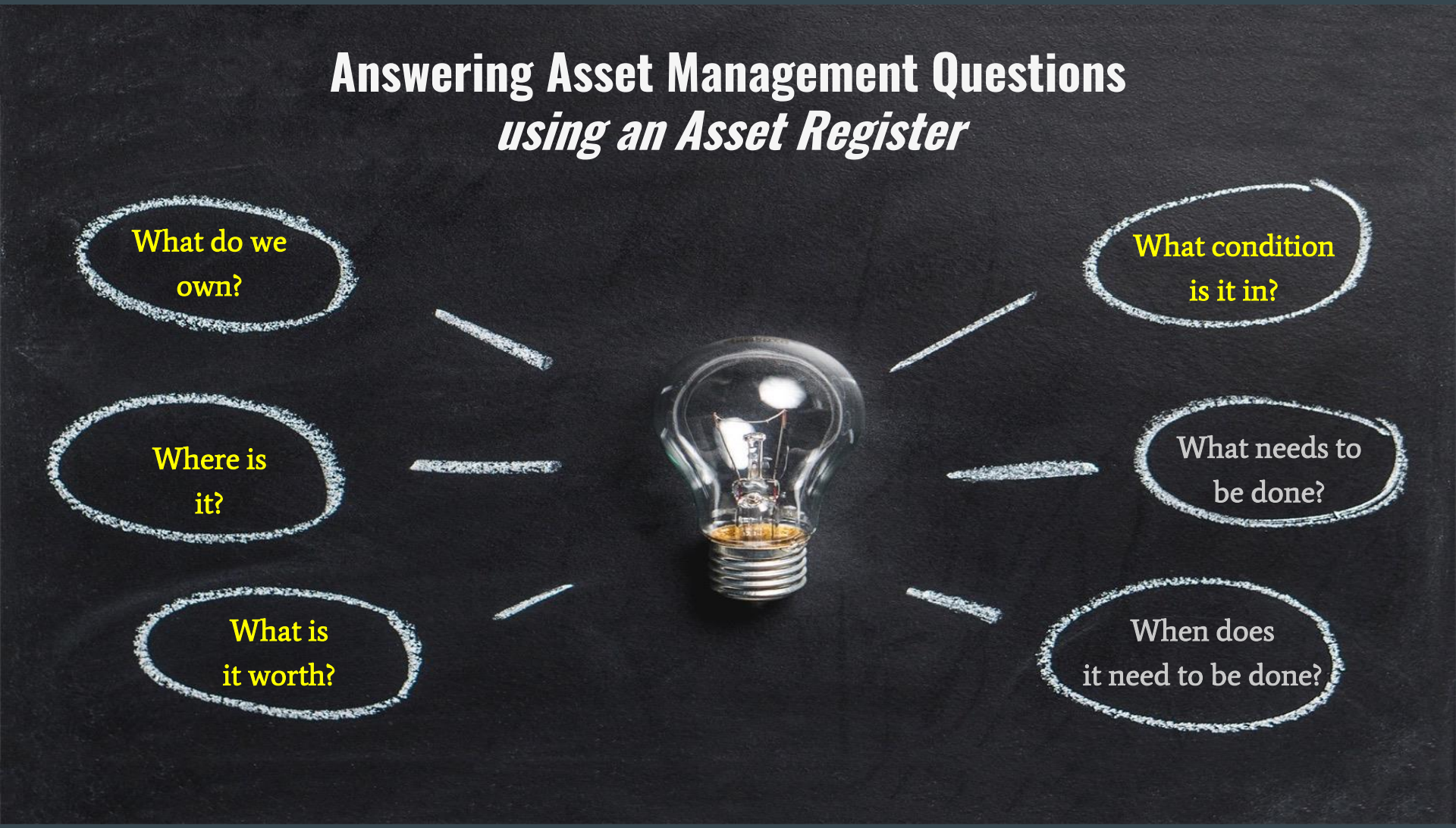
03 | Capital and Operational Strategies



1

Asset Register

Answering Asset Management Questions
using an Asset Register



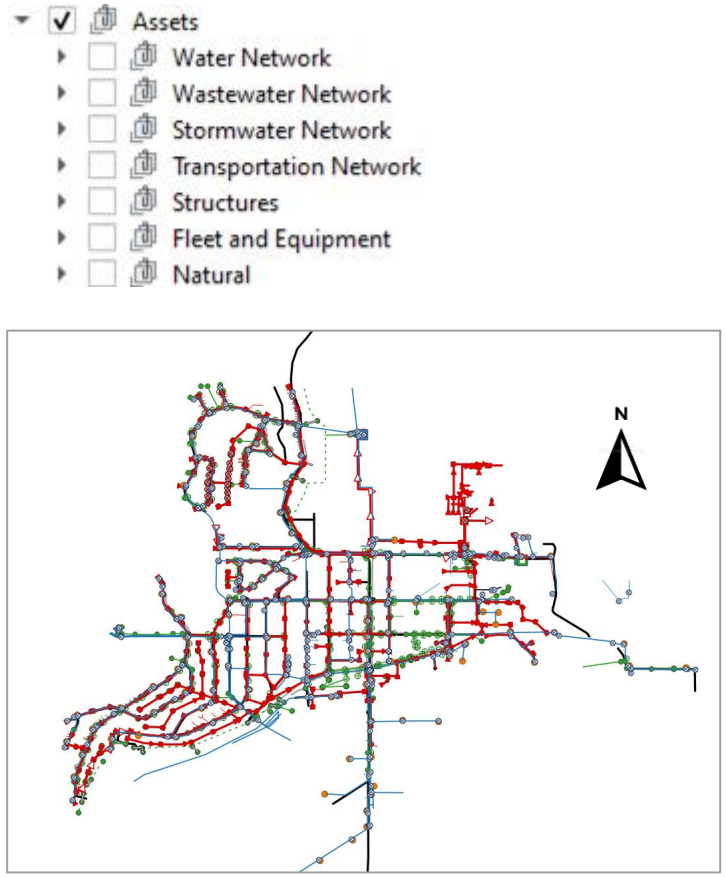
1

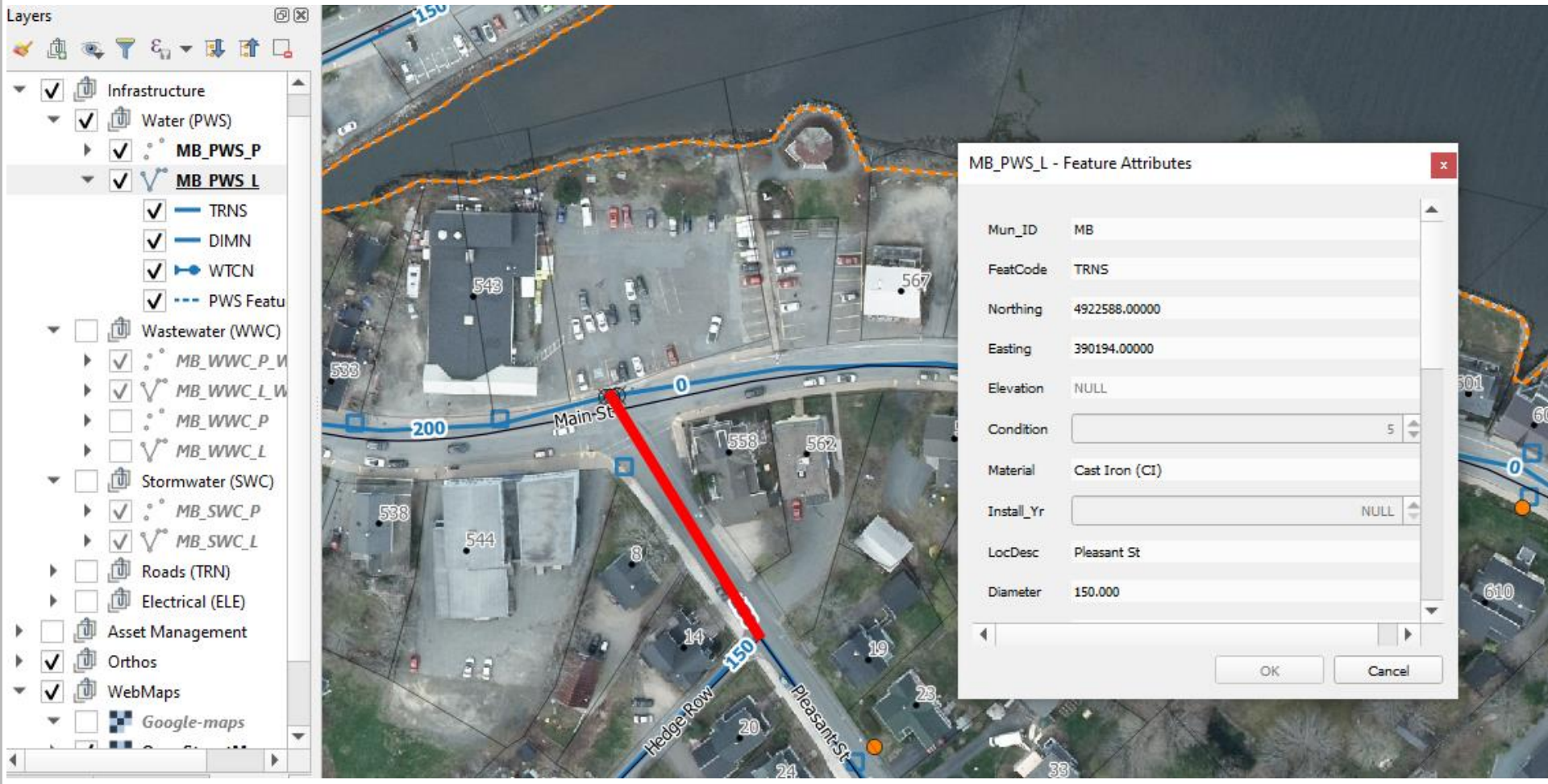
Asset Register

List all fixed assets which are owned by a municipality

Record and maintain information pertaining to each asset

Identify and verify an asset when required




Layers
Infrastructure
Water (PWS)
MB_PWS_P
MB_PWS_L
TRNS
DIMN
WTCN
PWS Featu
Wastewater (WWC)
MB_WWC_P_W
MB_WWC_L_W
MB_WWC_P
MB_WWC_L
Stormwater (SWC)
MB_SWC_P
MB_SWC_L
Roads (TRN)
Electrical (ELE)
Asset Management
Orthos
WebMaps
Google-maps
MB_PWS_L - Feature Attributes
Mun_ID MB
FeatCode TRNS
Northing 4922588.00000
Easting 390194.00000
Elevation NULL
Condition 5
Material Cast Iron (CI)
Install_Yr NULL
LocDesc Pleasant St
Diameter 150.000
OK
Cancel
Main St
Hedge Row
Pleasant St
150
200
0

State of Infrastructure Report

1. SUMMARY OF ALL ASSET CLASSES

a) Estimated Replacement Costs and Annual Reserve

This table shows the total estimated replacement costs and annual reserves required of your asset classes.

	Cost ($)	Cost (%)	Annual Reserve ($)	Annual Reserve (%)
Transportation	**$ 11.1 M**	**21%**	**$ 433.2 K**	**33%**
Barriers and Fences	$ 55.5 K	0%	$ 1.0 K	0%
Bridges	$ 697.5 K	1%	$ 14.0 K	1%
Lights	$ 2.4 M	5%	$ 40.8 K	3%
Roads	$ 5.7 M	11%	$ 318.4 K	24%
Sidewalks and Trails	$ 940.6 K	2%	$ 35.5 K	3%
Signs and Signals	$ 233.0 K	0%	$ 5.8 K	0%
Other	$ 1.0 M	2%	$ 17.8 K	1%
Stormwater	**$ 4.2 M**	**8%**	**$ 53.2 K**	**4%**
Catch Basins	$ 497.6 K	1%	$ 6.2 K	0%
Manholes	$ 130.2 K	0%	$ 1.6 K	0%
Pipes	$ 2.6 M	5%	$ 34.9 K	3%
Pumping Stations	$ 0.0 K	0%	$ 0.0 K	0%
Other	$ 954.1 K	2%	$ 10.4 K	1%
Wastewater	**$ 10.3 M**	**20%**	**$ 183.7 K**	**14%**
Manholes	$ 1.2 M	2%	$ 14.4 K	1%
Pipes	$ 6.8 M	13%	$ 95.0 K	7%
Pumping Stations	$ 1.2 M	2%	$ 41.4 K	3%
Valves	$ 0.0 K	0%	$ 0.0 K	0%
Wastewater Treatment	$ 1.1 M	2%	$ 32.8 K	2%
Other	$ 0.0 K	0%	$ 0.0 K	0%
Water Supply	**$ 16.0 M**	**30%**	**$ 275.1 K**	**21%**
Hydrants	$ 651.0 K	1%	$ 8.1 K	1%
Pipes	$ 11.5 M	22%	$ 153.2 K	12%
Pumping Stations	$ 477.0 K	1%	$ 16.3 K	1%
Valves	$ 359.6 K	1%	$ 6.0 K	0%
Water Treatment	$ 2.9 M	5%	$ 88.5 K	7%
Other	$ 114.5 K	0%	$ 2.8 K	0%
Facilities	**$ 9.9 M**	**19%**	**$ 294.4 K**	**22%**
Firehall	$ 3.5 M	7%	$ 114.1 K	9%
Indoor Parks and Rec	$ 158.0 K	0%	$ 4.7 K	0%
Municipal Offices	$ 2.6 M	5%	$ 70.8 K	5%
Outdoor Parks and Rec	$ 2.6 M	5%	$ 72.9 K	6%
Public Works	$ 589.8 K	1%	$ 14.6 K	1%
Other	$ 464.1 K	1%	$ 17.3 K	1%
Fleet	**$ 882.0 K**	**2%**	**$ 84.6 K**	**6%**
Vehicles	$ 882.0 K	2%	$ 84.6 K	6%
Other	$ 0.0 K	0%	$ 0.0 K	0%
Other	**$ 0.0 K**	**0%**	**$ 0.0 K**	**0%**
Other	$ 0.0 K	0%	$ 0.0 K	0%
Grand Total	**$ 52.4 M**	**100%**	**$ 1.3 M**	**100%**

State of Infrastructure Report

Water Network

2. Water Supply

a) Summary of Inventory, Costs, and Condition

The following table summarizes the water network data that has been captured and reported on.

14,830 m	Total length of water pipe
60	Number of hydrants
77	Number of valves
89,579	Number of other assets captured

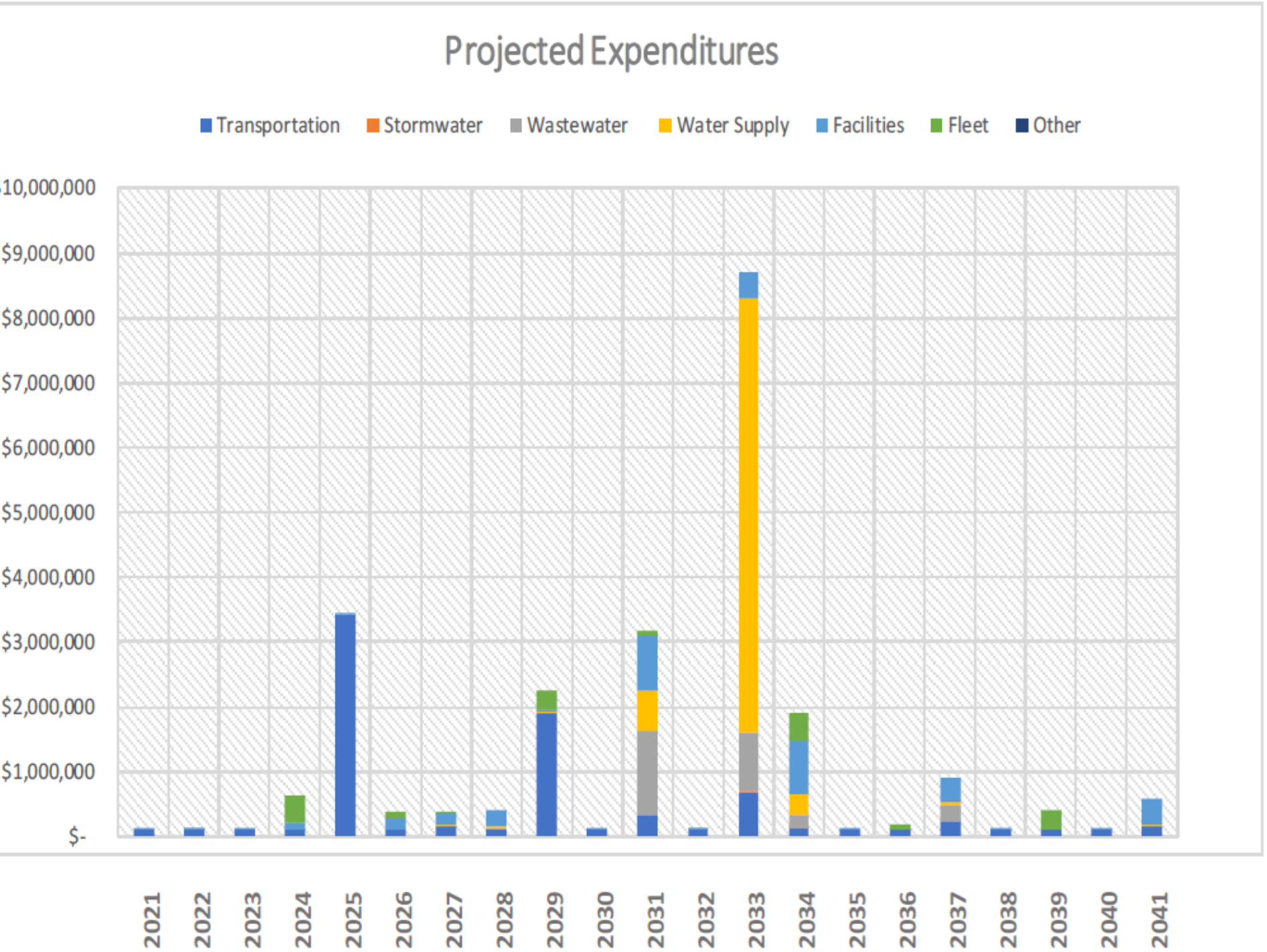
The following table shows estimated value and annual reserves required for different water network asset groups.

	Cost ($)	Cost (%)	Annual Reserve ($)	Annual Reserve (%)
Hydrants	$ 651.0 K	4%	$ 8.1 K	3%
Pipes	$ 11.5 M	72%	$ 153.2 K	56%
Pumping Stations	$ 477.0 K	3%	$ 16.3 K	6%
Valves	$ 359.6 K	2%	$ 6.0 K	2%
Water Treatment	$ 2.9 M	18%	$ 88.5 K	32%
Other	$ 114.5 K	1%	$ 2.8 K	1%
Grand Total	**$ 16.0 M**	**100%**	**$ 275.1 K**	**100%**

These tables summarize the average condition of different water network asset groups.

	Average Condition
Hydrants	1.6
Pipes	3.2
Pumping Stations	2.0
Valves	1.3
Water Treatment	1.8
Other	2.6

Condition	
Rating	Description
1	Very Good
2	Good
3	Fair
4	Poor
5	Very Poor


Projected Expenditures
Transportation
Stormwater
Wastewater
Water Supply
Facilities
Fleet
Other
$10,000,000
$9,000,000
$8,000,000
$7,000,000
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
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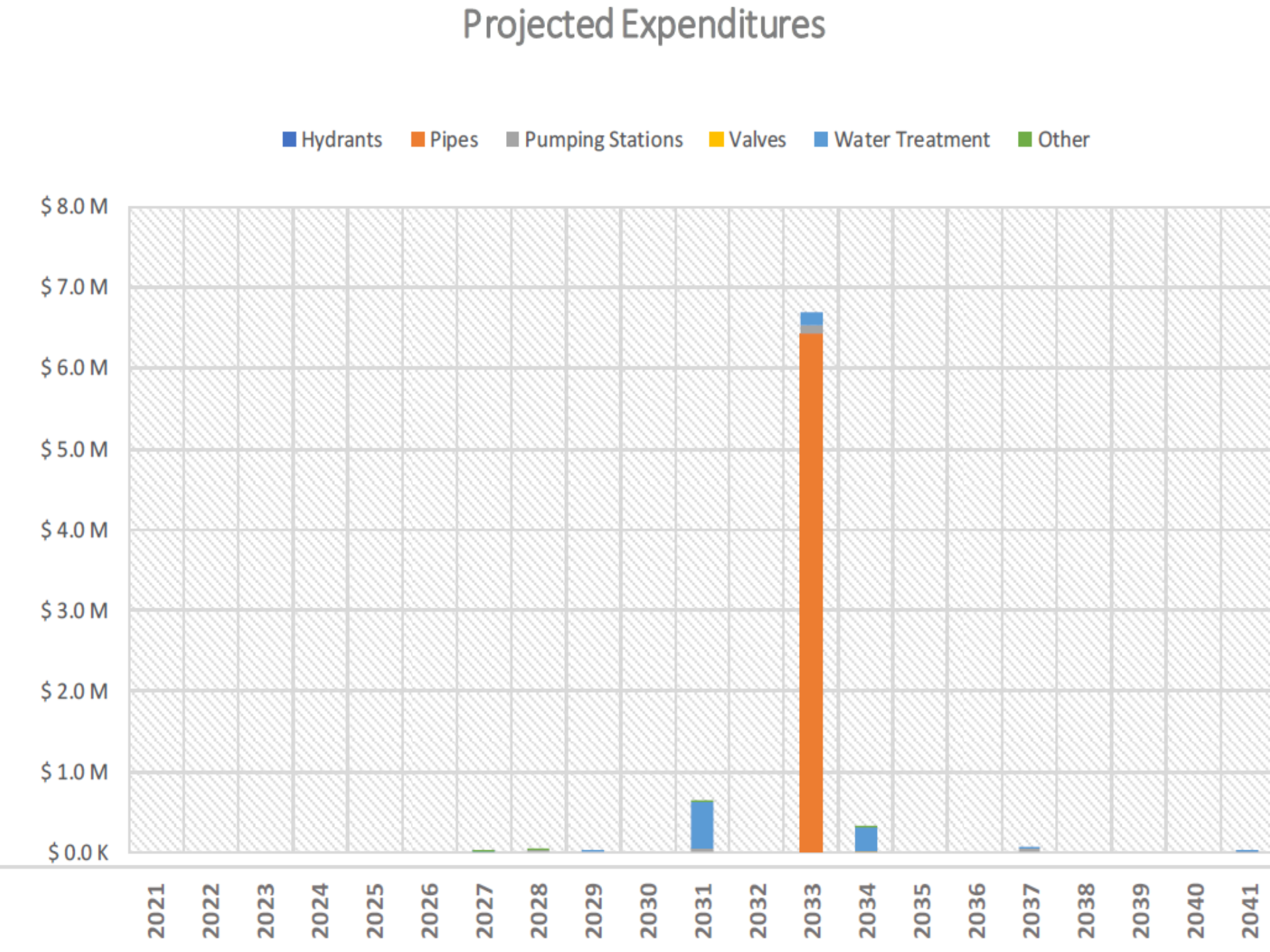
Projected Expenditures
Hydrants
Pipes
Pumping Stations
Valves
Water Treatment
Other
$ 8.0 M
$ 7.0 M
$ 6.0 M
$ 5.0 M
$ 4.0 M
$ 3.0 M
$ 2.0 M
$ 1.0 M
$ 0.0 K
2021
2022
2023
2024
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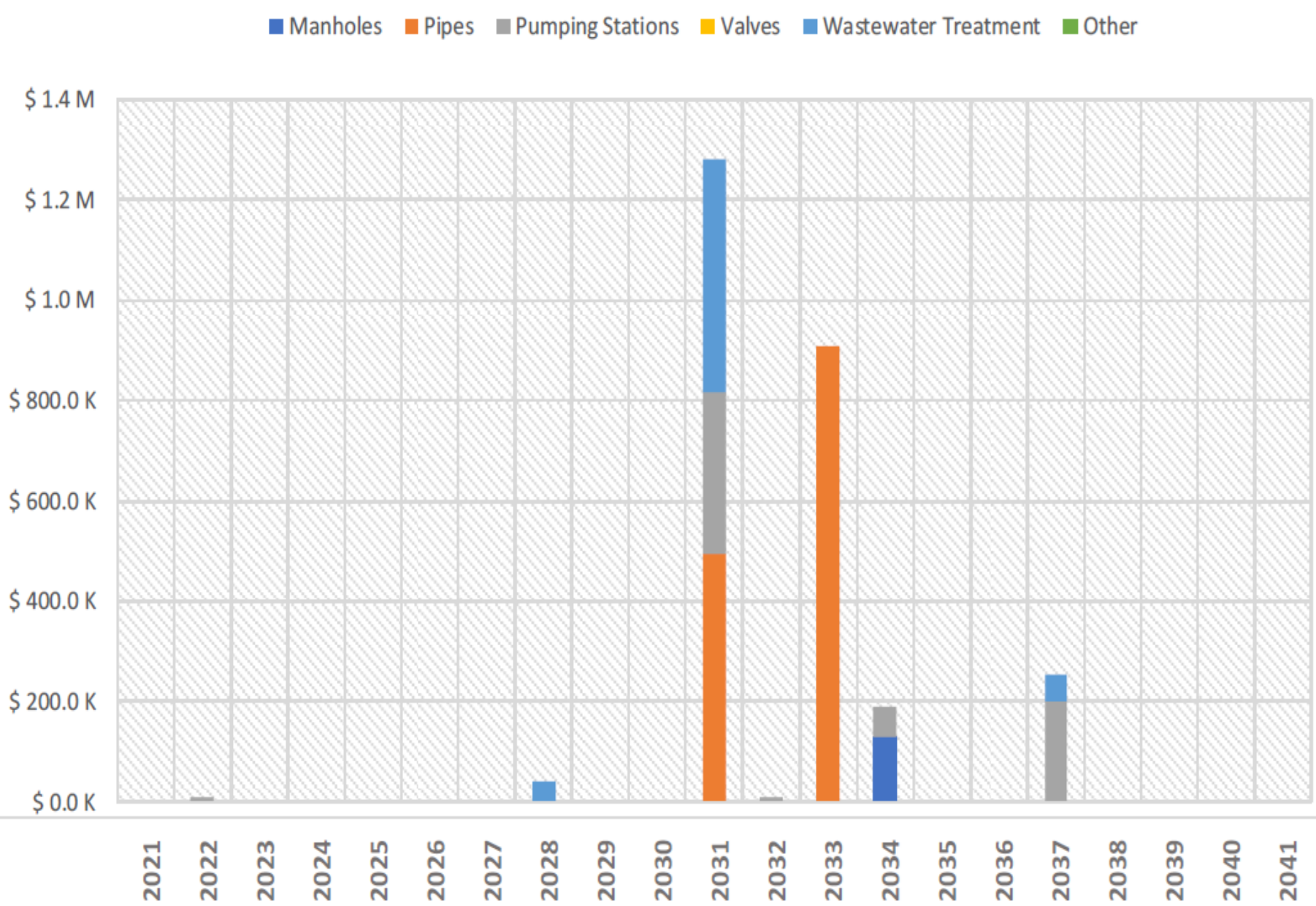
2041

Projected Expenditures



The Economist

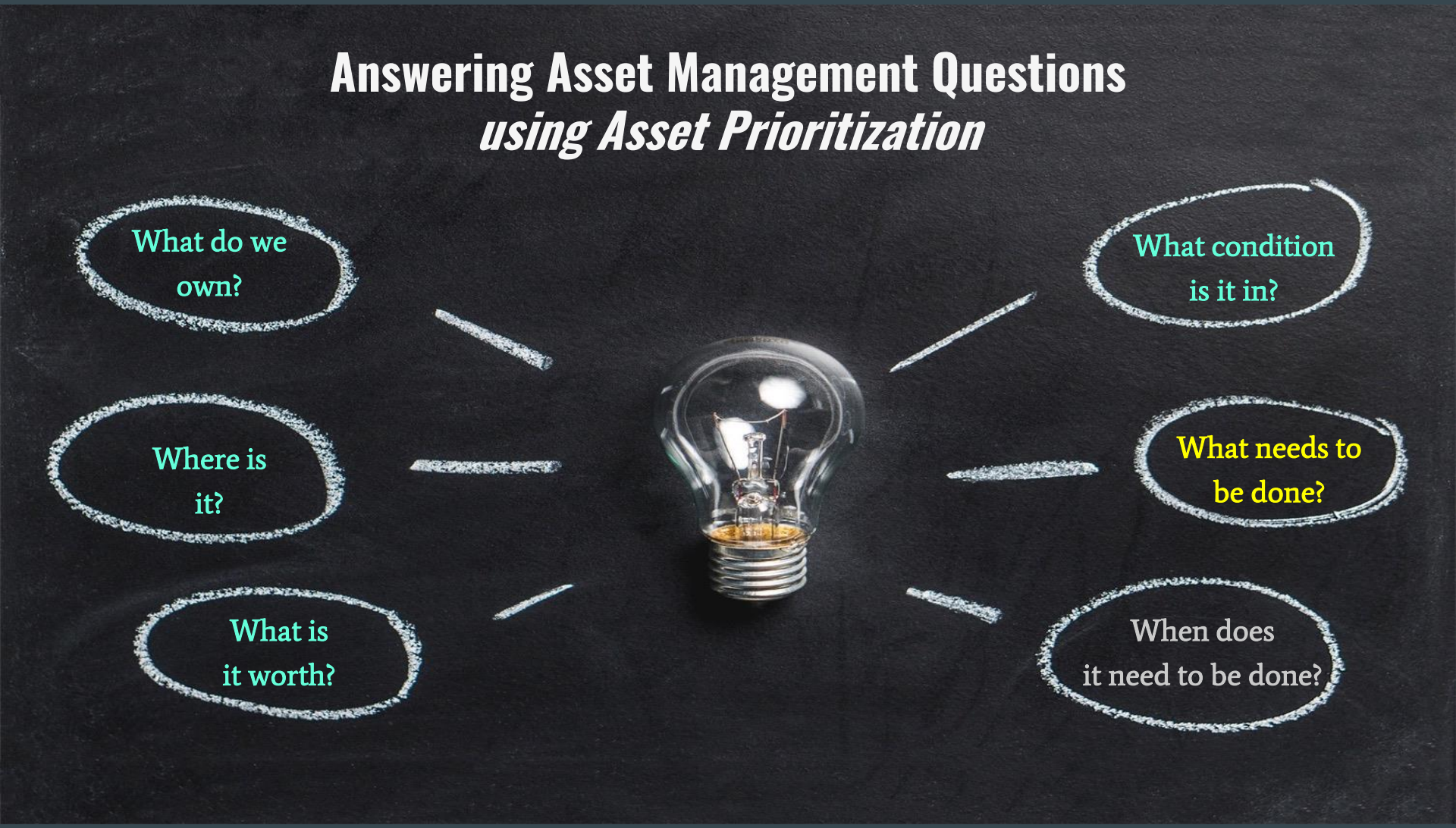
May 6th 2017

The world's most valuable resource is no longer oil, but data

2

Asset Prioritization

Answering Asset Management Questions
using Asset Prioritization



2

Asset Prioritization

Generally, there is more to be done than resources allow

We need to prioritize and justify these choices

Do RISK assessment to prioritize assets

Understanding Risk

- *Risk cannot be eliminated,*
- *only managed to an acceptable level*

Calculating Risk

- Probability of Failure (PoF)
- Consequence of Failure (CoF)
- Risk = PoF x CoF

Risk Matrix

Probability of Failure		Consequence of Failure	
1	Rare	1	Minor
2	Unlikely	2	Moderate
3	Possible	3	Significant
4	Likely	4	Major
5	Almost Certain	5	Catastrophic

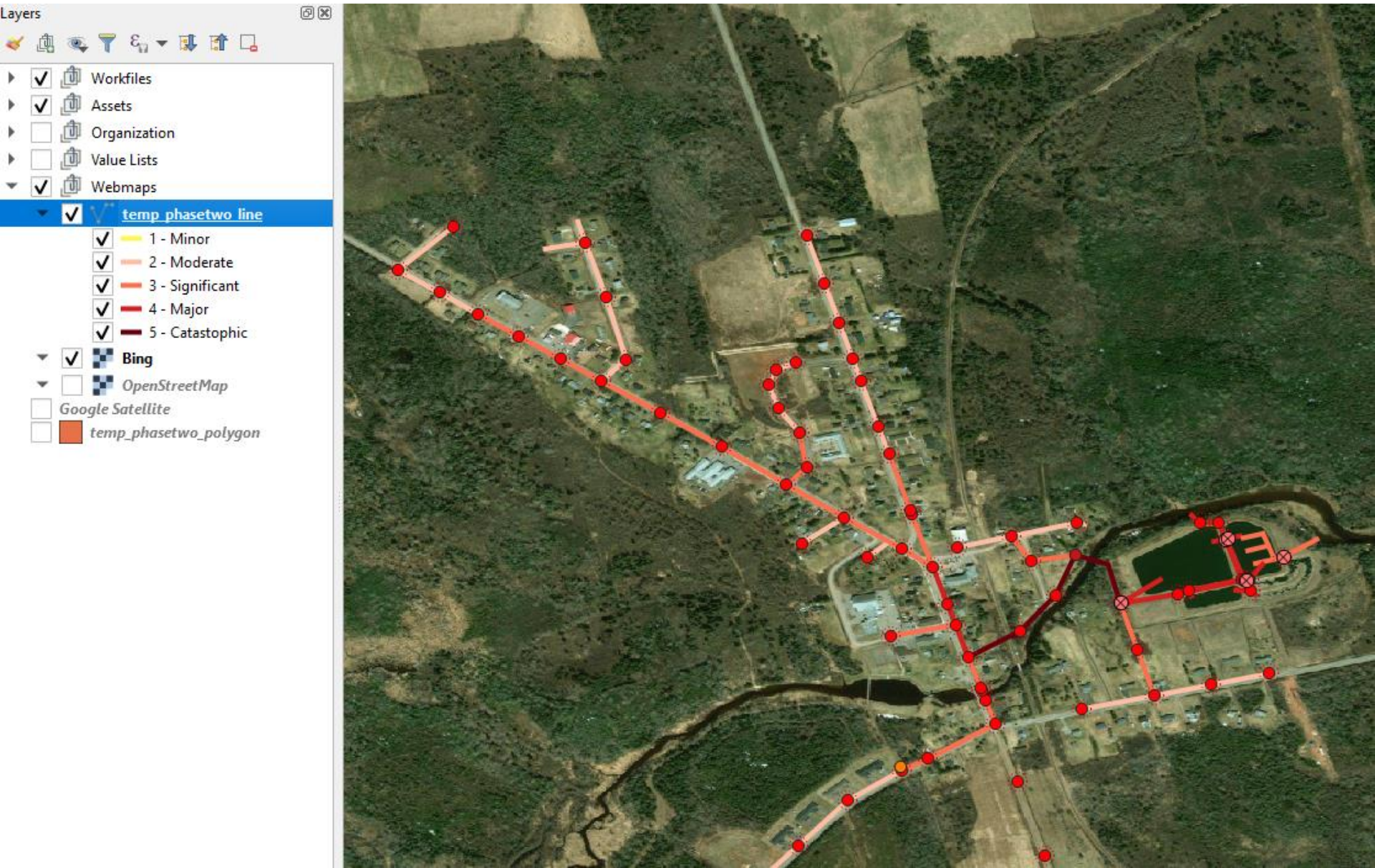
Probability \ Consequence	1	2	3	4	5
1	1	3	6	10	15
2	2	5	9	14	19
3	4	8	13	18	22
4	7	12	17	21	24
5	11	16	20	23	25

RISK LEVEL	RANK	SOCIAL / CULTURAL / POLITICAL	ECONOMIC	LEGAL	ENVIRONMENTAL	TECHNOLOGICAL
INSIGNIFICANT	1	Public will not notice. No impact to cultural resources or groups. No impact to relations with other levels of government.	Costs are minor and expected within ongoing operational budget.	No regulatory or legal impacts.	No impact to the environment.	System is state of the art.
MINOR	2	Minor public notice, public contacts municipality. Inerruption of service less than X hour(s) No impact to cultural resources or cultural groups. No impact to relations with other levels of government.	Property damage greater than $X but less than $X. Unexpected operational cost can be accomodated by redistribution of yearly budget.	Failure may result in small claims.	Short term effects to the environment requiring one time remediation of mitigation to restore the system to its original state.	Existing system state of the art with some improvements possible.
MODERATE	3	Moderate public notice. Interruption of service greater than X hours. Coverage in local news, requires official mjnicipal response. Cultural resources threatened but not destroyed, impact to cultural groups limited.	Property damage greater than $X but less than $X. Unexpected operational cost requires cancellation of minor planned activities accommodate. No long term financial impacts.	Failure may result in litigation and informal inquiry.	Short term effects to the environment requiring longer term remediation or mitigation which restore the system to its original state.	Existing system functional but not state of the art.
MAJOR	4	Potential for injury. Public notice is widespread. Interruption of service greater than X day(s) Coverage in national news. Cultural resources may be unrecoverable. Impact to cultural groups widespread.	Property damage greater than $X but less than $X. Unexpected operational cost requires cancellation of major planned activities to accommodate. Long term financing required to accommodate.	Failure may result in class action litigation and formal inquiry.	Long term effects to the environment requiring sustained remediation or mitigation. System may not ultimately reach its original state.	Existing systems obsolete but can be made partially functional by workarounds.
CATASTROPHIC	5	Potential for loss of life. Interruption of service greater than X day(s).	Property damage greater than $X. Loss commercial service greater than X day(s). Financing requirements may render the municipality insolvent.	Failure results in contravention of laws, significant litigation, court action and multiple litigations.	Permanent or long term environemntal effects that cannot be remediated or mitigated.	Existing systems obsolete and non-functional requiring immediate replacement.

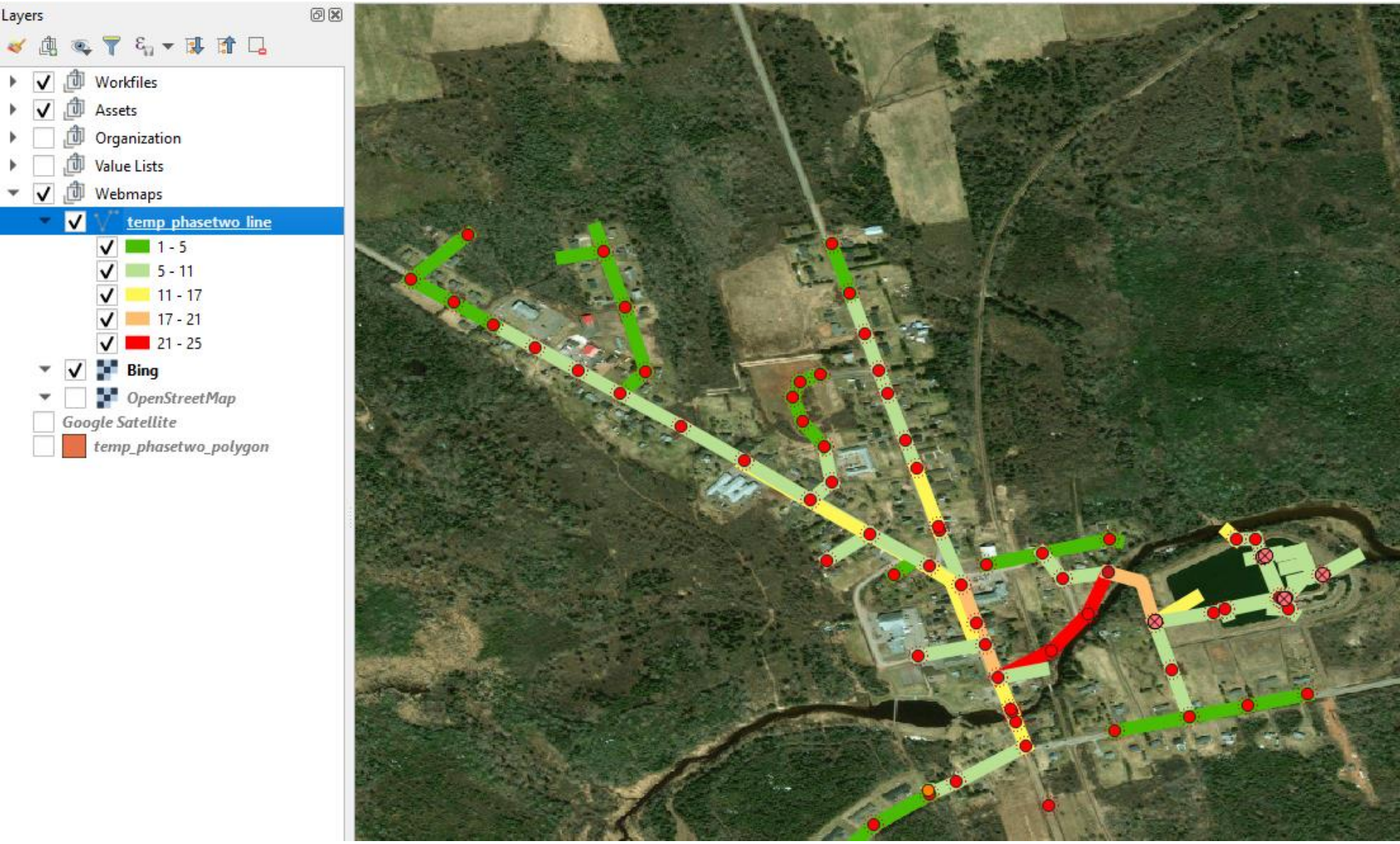
PoF


Layers
Workfiles
Assets
Organization
Value Lists
Webmaps
temp_phasetwo_line
1 - Rare
2 - Unlikely
3 - Possible
4 - Likely
5 - Almost Certain
Bing
OpenStreetMap
Google Satellite
temp_phasetwo_polygon

CoF


Layers
Workfiles
Assets
Organization
Value Lists
Webmaps
temp_phasetwo_line
1 - Minor
2 - Moderate
3 - Significant
4 - Major
5 - Catastophic
Bing
OpenStreetMap
Google Satellite
temp_phasetwo_polygon

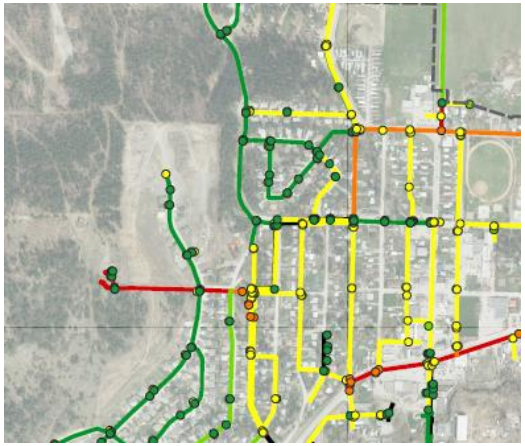
Risk

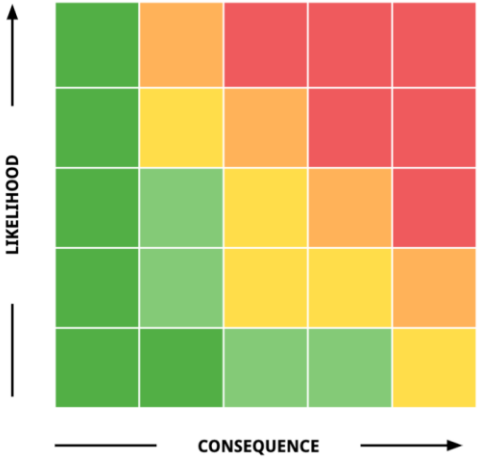

Layers
Workfiles
Assets
Organization
Value Lists
Webmaps
temp_phasetwo_line
1 - 5
5 - 11
11 - 17
17 - 21
21 - 25
Bing
OpenStreetMap
Google Satellite
temp_phasetwo_polygon

Asset Prioritization

By evaluating
probability of failure and **consequence of failure**

we can obtain a **risk value** in our asset register

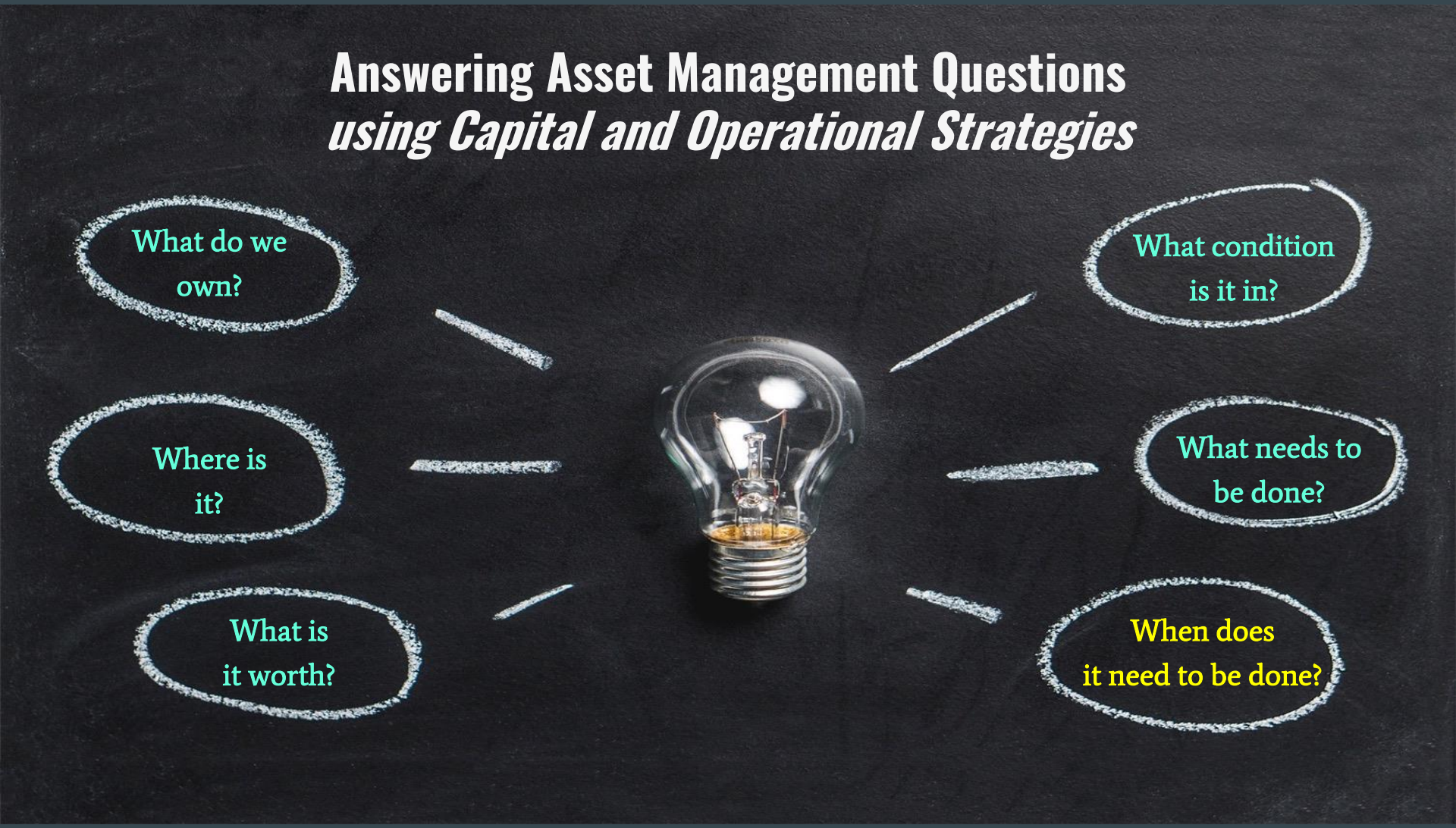




3

Capital and Operational Strategies

Answering Asset Management Questions
using Capital and Operational Strategies



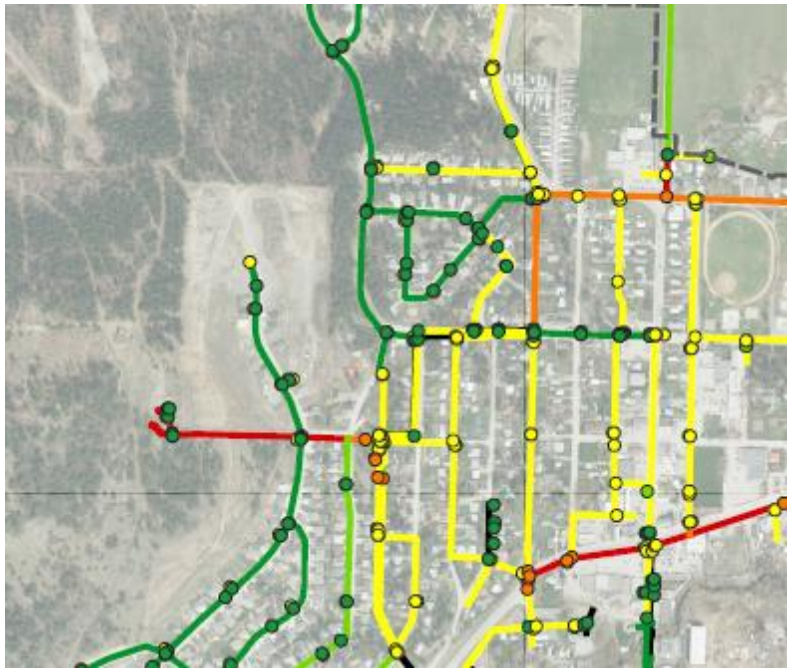
3

Capital and Operational Strategies

Inform your decisions based on managing risk

Typical plans and strategies include:

short-term capital planning
medium-term financing planning
long-term sustainable investment
operational strategies



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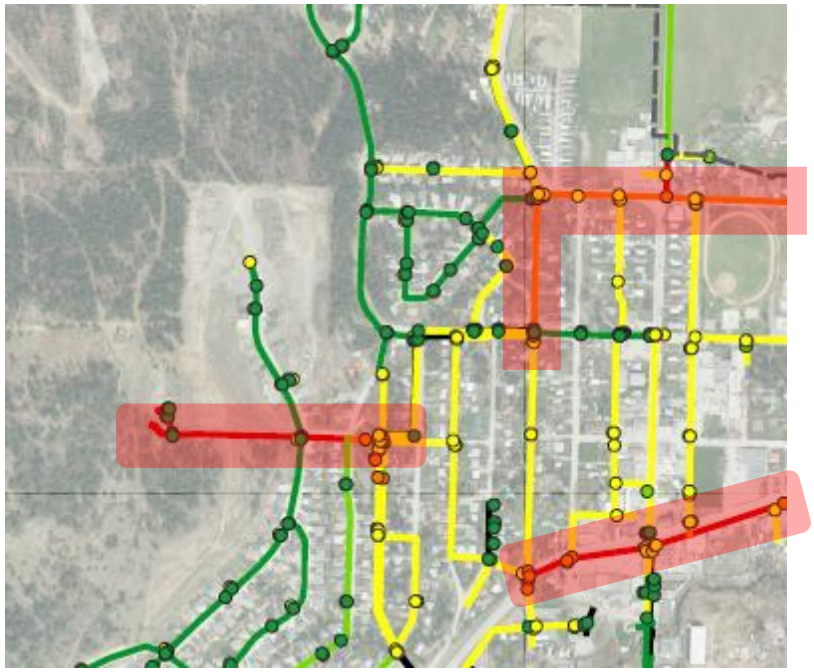


How

Create and maintain an asset register

Prioritize your assets

Utilize data to inform and justify decisions

- -Risk
- -Level of Service
- -Cost

Capital Plan Contents

Purpose of the Plan

Revenue Sources

Regulatory Requirements

Risk Assessment

Capital Works Recommendations

Financial Summary

Continuous Improvement Program

Asset Management

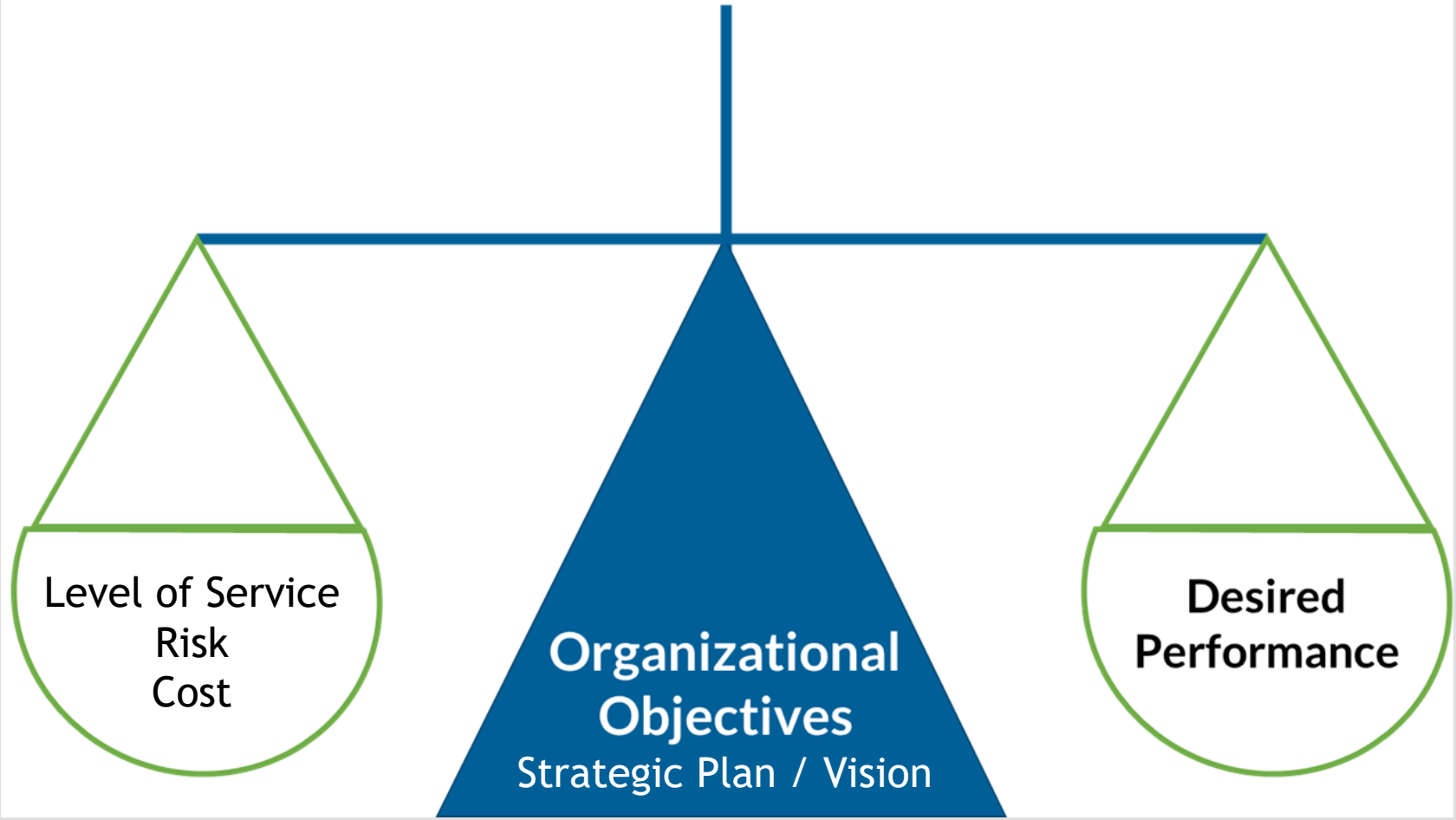
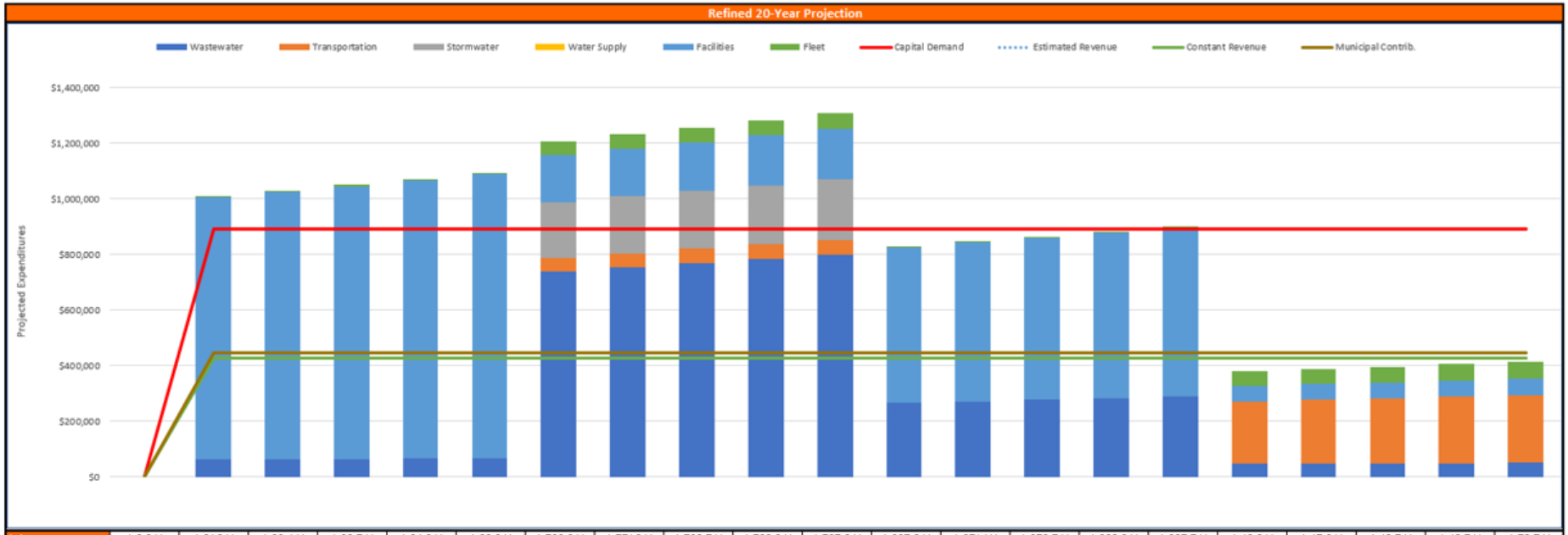


Figure 7-1: 20-Year Capital Demand Projection



Wastewater	$ 0.0 K	$ 61.2 K	$ 62.4 K	$ 63.7 K	$ 64.9 K	$ 66.2 K	$ 736.9 K	$ 751.6 K	$ 766.7 K	$ 782.0 K	$ 797.6 K	$ 265.8 K	$ 271.1 K	$ 276.5 K	$ 282.0 K	$ 287.7 K	$ 46.8 K	$ 47.8 K	$ 48.7 K	$ 49.7 K	$ 50.7 K
Transportation	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 50.4 K	$ 51.4 K	$ 52.4 K	$ 53.4 K	$ 54.5 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 225.3 K	$ 229.8 K	$ 234.4 K	$ 239.1 K	$ 243.9 K
Stormwater	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 200.7 K	$ 204.8 K	$ 208.8 K	$ 213.0 K	$ 217.3 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K
Water Supply	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K
Facilities	$ 0.0 K	$ 943.1 K	$ 961.9 K	$ 981.2 K	$ 1.0 M	$ 1.0 M	$ 168.2 K	$ 171.6 K	$ 175.0 K	$ 178.5 K	$ 182.1 K	$ 560.4 K	$ 571.6 K	$ 583.0 K	$ 594.7 K	$ 606.6 K	$ 54.1 K	$ 55.2 K	$ 56.3 K	$ 57.4 K	$ 58.5 K
Fleet	$ 0.0 K	$ 4.1 K	$ 4.2 K	$ 4.2 K	$ 4.3 K	$ 4.4 K	$ 49.6 K	$ 50.5 K	$ 51.6 K	$ 52.6 K	$ 53.6 K	$ 1.9 K	$ 1.9 K	$ 1.9 K	$ 2.0 K	$ 2.0 K	$ 54.9 K	$ 56.0 K	$ 57.1 K	$ 58.3 K	$ 59.4 K
Total	$ 0.0 K	$ 1.0 M	$ 1.0 M	$ 1.0 M	$ 1.1 M	$ 1.1 M	$ 1.2 M	$ 1.2 M	$ 1.3 M	$ 1.3 M	$ 1.3 M	$ 828.0 K	$ 844.6 K	$ 861.5 K	$ 878.7 K	$ 896.3 K	$ 381.2 K	$ 388.8 K	$ 396.6 K	$ 404.5 K	$ 412.6 K
Year	Immediate	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
	Now	Year 1 - 5					Year 6 - 10					Year 11 - 15					Year 16 - 20				
Capital Demand	$ 0.0 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K	$ 890.7 K
Estimated Reve	$ 0.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K
Constant Reven	$ 0.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K	$ 425.0 K
Municipal Contri	$ 0.0 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K	$ 445.4 K

Table 7-1 Capital Investment Summary

Sum of Asset Renewal Cost	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	Grand Total
Facilities	**$4,171,000.00**	**$45,000.00**	**$750,752.00**	**$209,350.00**	**$20,000.00**	**$5,196,102.00**
New Adminstration Building	$3,800,000.00					$3,800,000.00
Welkum Park Upgrades	$291,000.00					$291,000.00
Jordan River Trail Change	$5,000.00					$5,000.00
RMRF Barriers	$30,000.00					$30,000.00
Woodland Trail Upgrades	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$100,000.00
WGH Baseball Field Phase 1	$25,000.00					$25,000.00
WGH Baseball Field Phase 2		$25,000.00				$25,000.00
Financial Software			$576,702.00			$576,702.00
Public Works Building Upgrades Phase 1			$154,050.00			$154,050.00
Public Works Building Upgrades Phase 2				$60,070.00		$60,070.00
Municipal Building Windows				$13,120.00		$13,120.00
Municipal Building Roof				$116,160.00		$116,160.00
Fleet	**$80,000.00**	**$60,000.00**	**$50,000.00**			**$190,000.00**
ATV	$20,000.00					$20,000.00
Dodge Ram Truck	$60,000.00					$60,000.00
Truck Replacement		$60,000.00	$50,000.00			$110,000.00
Waste Water		**$785,722.79**				**$785,722.79**
Sandy Point Road WWC		$485,722.79				$485,722.79
Wastewater Lagoon		$300,000.00				$300,000.00
Transportation		**$700,000.00**			**$107,620.70**	**$807,620.70**
Jordan River Bridge		$700,000.00				$700,000.00
Tom Tigney Trail					$34,099.99	$34,099.99
Roseway River Trail					$22,818.02	$22,818.02
Jordan River Trail					$50,702.70	$50,702.70
Grand Total	**$4,251,000.00**	**$1,590,722.79**	**$800,752.00**	**$209,350.00**	**$127,620.70**	**$6,979,445.50**

Long Term Projections

revenue and target municipal contributions shown as the green and brown line respectively. The average annual requirement is $890,000 and XXXXXX expects to be able to meet the twenty-year demand with annual expenditures of $850,000 by adopting a risk management approach and prioritizing projects based on operational need. With a target 50% funding threshold, there is a municipal contribution of $425,000 annually to meet the twenty-year capital demands.

The estimated annual requirements for long-term management of asset renewal based on the risk assessment is $600,000 per year. This is lower than the medium term demands because infrastructure needs will drop once the current deficits related to aging wastewater infrastructure is addressed. A chart of the risk-based forecast for a one hundred-year planning period, shown in five-year blocks is shown in **Figure 7-2**. This projection is not suitable for detailed project planning given the uncertainty of costs and

What if there is not enough funding?

Level of service

Lower level of service

Accept more risk

Increase Revenue

9 CONTINUOUS IMPROVEMENT PROGRAM

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

Renew Asset Management Policy	The asset management policy is current based on the sunset date.
Renew Asset Management Roadmap	The asset management committee has met and identified priority tasks for the coming year.
Update Asset Register	The asset register has been updated in GIS and the Capital Inventory spreadsheet with the previous year's capital works.
Review Risk and Level of Service Assessment and Level of Service	The risk and level of service assessments have been reviewed by the asset management committee and updated if needed.
Update Capital Plan	This five-year capital plan has been updated if applicable to the coming year's fiscal period.

Last completed on:	February 2022
Person responsible:	Trudy Payne Chief Administrative Officer
Signature of completion:	
Next asset management update due on:	February 2023

Resources

Municipalities in Canada with population decreases between 2011 and 2016, Statistics Canada https://www12.statcan.gc.ca/census-recensement/2016/as-sa/98-200-x/2016002/98-200-x2016002-eng.cfm