



Annual General Meeting and
Readiness Workshop

June 6, 2017

Balancing Levels of Service and Risk

Daryush Esmaili

Manager, Corporate Asset Management



Agenda

About Guelph

- Guelph's Asset Portfolio
- Asset Management at Guelph

Risk Identification and Analysis

- Strategic Objectives
- Qualitative Evaluation
- Quantitative Evaluation

Risks and Levels of Service

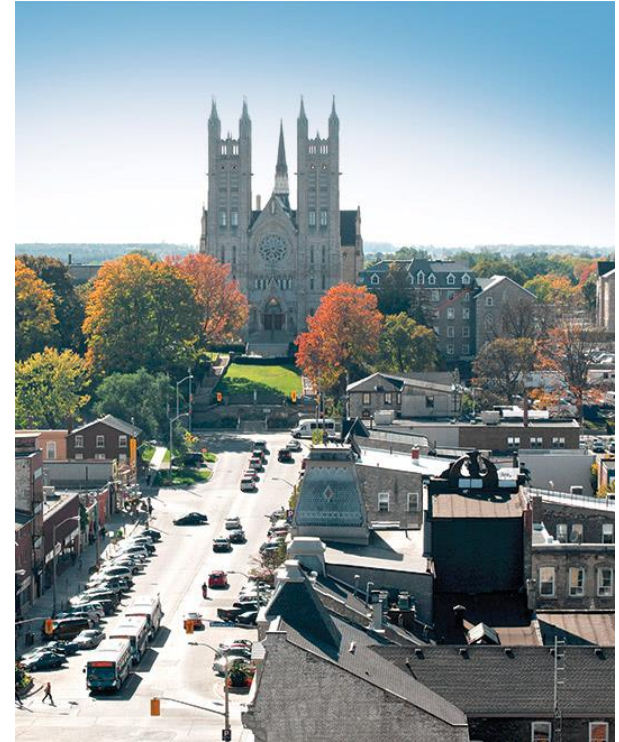
- Key Principles
- Value Optimization
- Defining Risks and Risk Management

Risk Management Activities

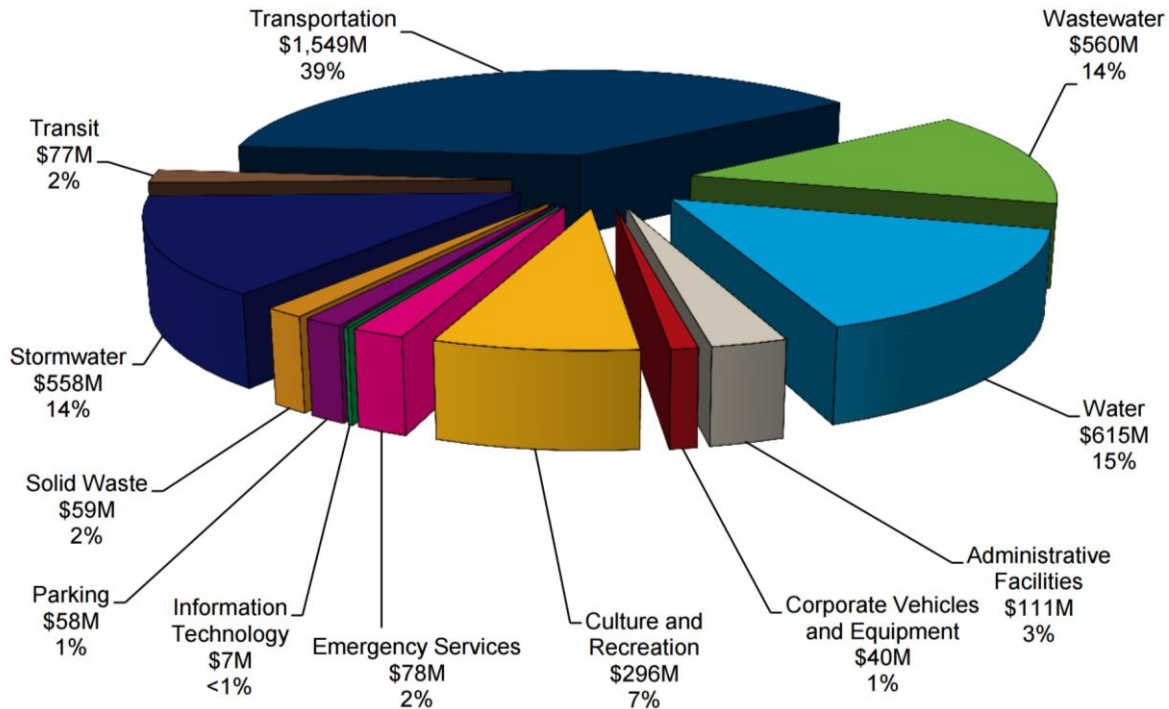
- Treatment Options
- Cost-benefit Analysis
- The long-term goal

About Guelph

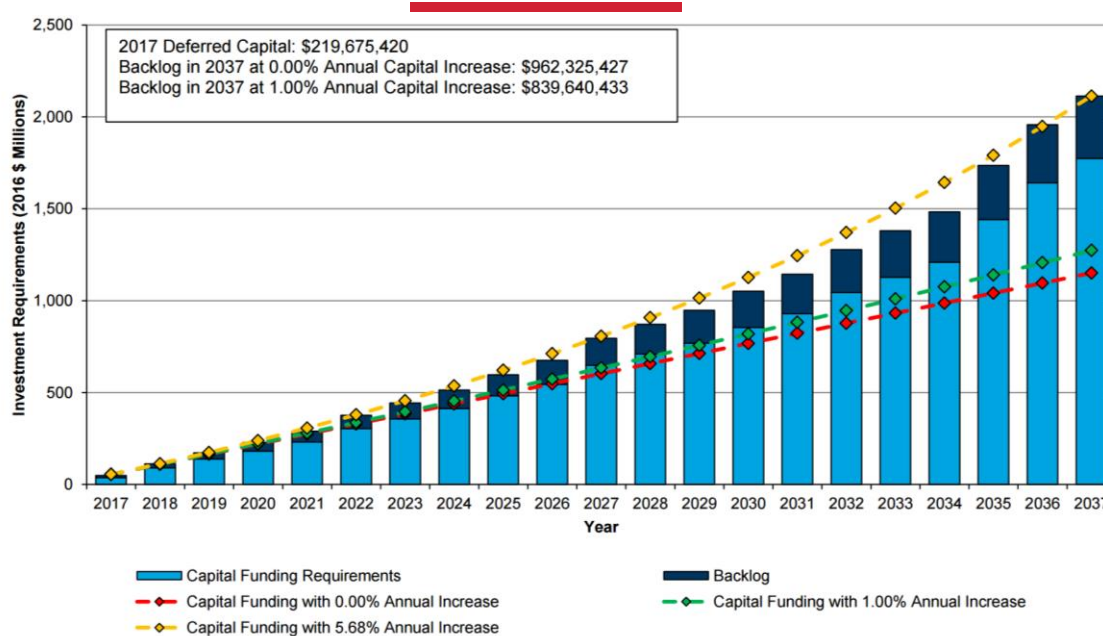
- 100 km west of Toronto
- Population of approximately 130,000
- Approximately \$4 billion in infrastructure assets
- 500km infrastructure network
- Single-tier municipality
- Created Corporate Asset Management Team in March 2016



Guelph's Asset Portfolio



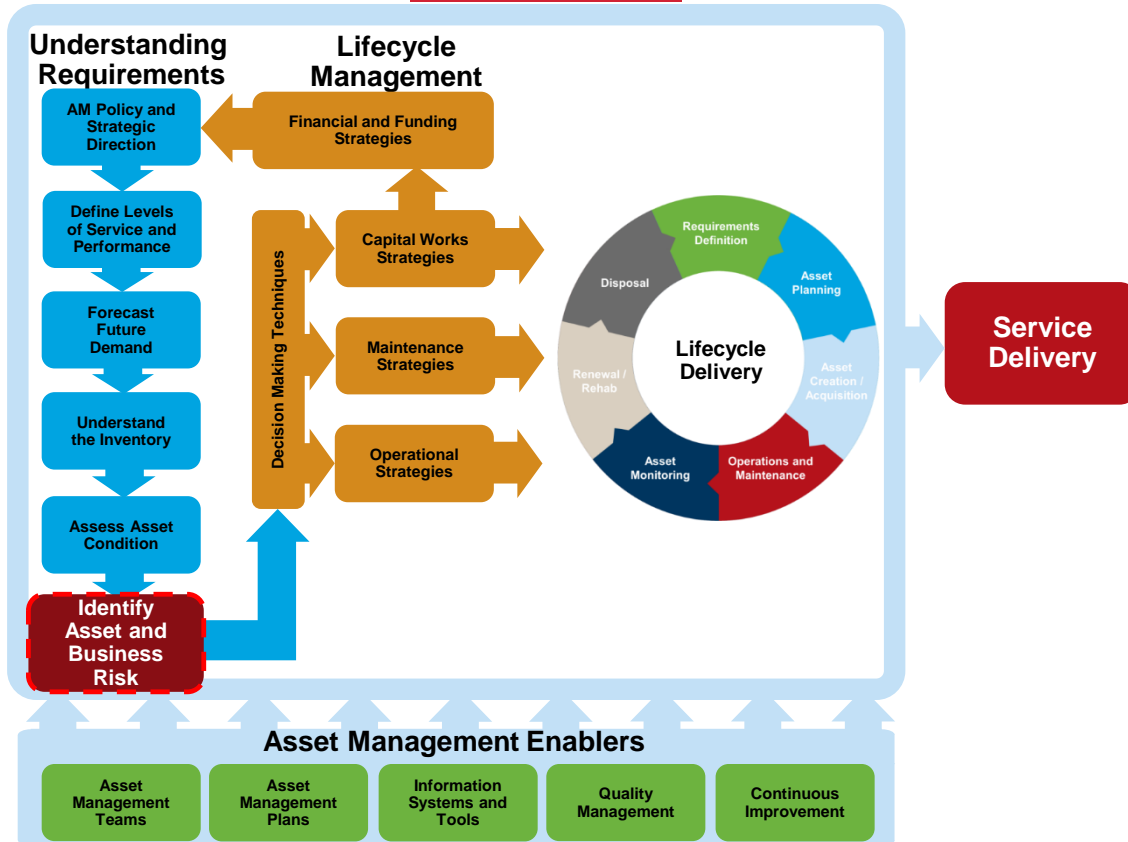
Our Asset Management Challenge



Note:

- * Revenues include various funding sources including the tax base, development charges, and grants and subsidies. This forecast does not include water, wastewater or stormwater asset systems or revenues.
- ** 1982-2015 average annual Non-Residential Building Construction Price Index (NRBCPI) increase of 3.7 per cent applied to future investment needs to account for inflation.

Asset Management at Guelph



Value Optimization



The Best Possible Decision



Maximum Levels of Service



Minimum Risks



Minimum Lifecycle Costs

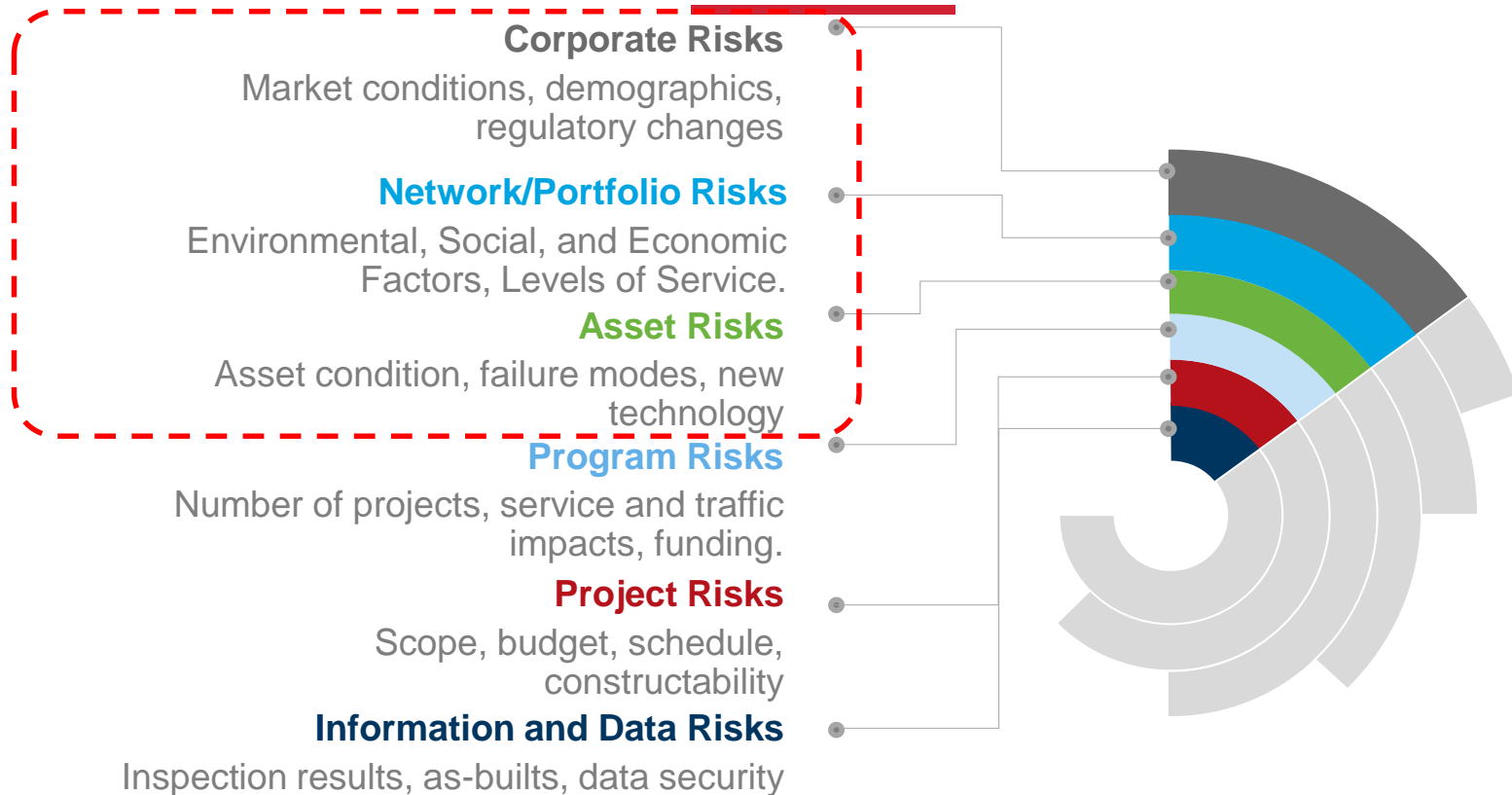


Defining Risks

- The effect of uncertainty on objectives.
- Risk events are events which may compromise the delivery of the organisation's strategic objectives.



Different Perspectives of Risks



Best Practices in Risk Assessment

- ISO 31000
- ISO55000, PAS55:2008, IIMM
- Public Infrastructure Engineering Vulnerability Committee (PIEVC)
- AWWA J100
- WERF SIMPLE Tool and Risk Management Suite



Seven Fundamentals

- In general, the following steps can be applied:
 1. Establishing the Context
 2. Risk Identification
 3. Risk Analysis
 4. Risk Evaluation
 5. Risk Treatment
 6. Monitoring and Review
 7. Communication and Consultation

Risk Exposure = Consequences of Failure X Probability of Failure

Risk Identification: Strategic Objectives

Service Delivery

Risk of not meeting customer expectations.

Employees

Risk that employees, contractors or other people at the City will be negatively impacted by a policy, program, process or project including physical harm.

Public

Risk of a negative impact on the citizens of Guelph.

Physical Environment

Risk that natural capital will be damaged.

Reputation

Risk associated with anything that can damage the reputation of the City or undermine confidence in the City of Guelph.

Financial

Risk related to decisions about assets, liabilities, income and expenses including asset management, capital and operational funding, economic development, theft or fraud.

Regulatory

Risk related to the consequences of non-compliance with laws, regulations, policies or other rules.

Risk Analysis: Qualitative Rating

Consequence Scale

Scale	Impact
1	Minor
2	Moderate
3	Major
4	Catastrophic

Likelihood Scale

Scale	Likelihood
1	Rare (1 - 20% likelihood)
2	Unlikely (20 - 40% likelihood)
3	Possible (40 - 60% likelihood)
4	Likely (60 - 80% likelihood)
5	Almost Certain (80 - 100% likelihood)

Consequences: Qualitative Rating

Scale	Consequence Category	Service Delivery	Employees
3	Major	<ul style="list-style-type: none"> • Underachievement of business unit goals (<50% achieved) • Unable to perform non-essential service • Disclosure of non-confidential but embarrassing information • Project scope: major changes required • Project deadlines overrun >50% and <75%. 	<ul style="list-style-type: none"> • Death in the workplace • Significant loss of employee knowledge • External exposure of confidential employee information • Strike
4	Catastrophic	<ul style="list-style-type: none"> • Unable to perform one or more essential services and no alternatives exist. • Unrecoverable loss of information from critical systems • Unrecoverable facility loss • External exposure of critical confidential information • Project end product is essentially useless • Project cancellation Project deadlines overrun > 75%. 	<ul style="list-style-type: none"> • Employee injury, critical • No improvement in employee satisfaction • Increase in the number union grievances (>10%)

Consequences: Qualitative Rating

Risk Category	Risk Category Definition	1 - Minor	2 - Moderate	3 - Major	4 - Catastrophic
Health and Safety	<i>The risk of injury to the employee, contractor and/or public as a result of City or contractor actions and/or inactions</i>	<ul style="list-style-type: none"> Minor reportable injuries not resulting in lost time 	<ul style="list-style-type: none"> Minor, non-life threatening injury or near miss incident(s) resulting in some lost time 	<ul style="list-style-type: none"> Critical injury due to City or contractor action/inaction resulting in major lost time 	<ul style="list-style-type: none"> Death due to City or Contractor action/inaction
Financial/ Cost	<i>The risk associated with decisions regarding assets, liabilities, income and expenses resulting in cost overruns</i>	<ul style="list-style-type: none"> Project cost overruns of up to 2% of original project budget Minor damage to an asset or loss of a replaceable asset 	<ul style="list-style-type: none"> Project cost overruns of 5-10% of original budget Decreased usefulness of infrastructure Fines up to \$100,000 Reduced revenue for businesses Reduced economic development 	<ul style="list-style-type: none"> Project cost overruns of 10-45% of original budget Significant decrease in infrastructure usefulness Fines up to \$1 million Reduced revenue for many businesses Significant decrease in economic development 	<ul style="list-style-type: none"> Project cost overruns greater than 45% of original budget Uninsured loss, insured loss or fines greater than \$10 million Bankruptcy Lack of financial capacity to support current demands Increase in Guelph economic condition of more than 20%
Schedule	<i>The risk associated with a project taking longer than the scheduled end date, resulting in both cost and performance consequences</i>	<ul style="list-style-type: none"> Minor project scope change Project completion is delayed by less than 2 weeks 	<ul style="list-style-type: none"> Moderate project scope change Project completion is delayed between 2 weeks and 1 month 	<ul style="list-style-type: none"> Major project scope change Project completion is delayed between 1 and 3 months 	<ul style="list-style-type: none"> Project cancellation Project completion is delayed by more than 3 months
Service Delivery/ Benefits	<i>The risk that the City's deliverable will not meet contractual obligations and/or client expectations</i>	<ul style="list-style-type: none"> Some business goals not met (up to 5%) Minor decrease in social programs (<5%) 	<ul style="list-style-type: none"> Underachievement of business goals (5-15% not achieved) Inability to execute non-essential services Moderate decrease in social programs (<20%) 	<ul style="list-style-type: none"> Underachievement of business goals (15-35% not achieved) Inability to execute essential services Major decrease in social programs (<50%) 	<ul style="list-style-type: none"> Underachievement of business goals (>35% not achieved) Inability to execute more than 1 essential service (no alternatives available) Project end product is useless Major decrease in social programs (>50%)
Stakeholders	<i>The risk that project stakeholders (employees, public, private partners) will be or will perceive to have been negatively impacted by a decision, treatment, strategy or process of the City</i>	<ul style="list-style-type: none"> Stakeholders communicate displeasure with project decision making, management, strategy and/or processes of the City 	<ul style="list-style-type: none"> Loss of stakeholders confidence such that project may be slowed or impeded temporarily 	<ul style="list-style-type: none"> Loss of stakeholders confidence such that restrictions are put in place regarding budget allocations 	<ul style="list-style-type: none"> Loss of future funding partners
Public/ Reputation	<i>The risk associated with anything that can damage the reputation of the City or undermine confidence in the City of Guelph</i>	<ul style="list-style-type: none"> Minor negative publicity or complaints to the City 1 negative media story from 1-2 local media outlets 	<ul style="list-style-type: none"> Moderate negative publicity, editorial or complaints to the City 3-4 negative media stories, spanning multiple days from 2 or more local media outlets Complaints reach Director or General Manager level 	<ul style="list-style-type: none"> Significant negative publicity, editorial or complaints to the City 5+ negative media stories, spanning multiple days from local media outlets Negative media coverage on provincial or national stage Complaints reach CAO or City Council level Public demand for employee removal 	<ul style="list-style-type: none"> Integrity breach resulting in decreased trust in City Council or Administration Loss of confidence in City processes and deliverables Recurring negative media coverage on national or international stage
Environment	<i>The risk of both immediate and long term contamination, damage and/or destruction of the surrounding physical environment</i>	<ul style="list-style-type: none"> Concerns regarding potential, non-lasting impacts to environmental assets 	<ul style="list-style-type: none"> Concerns regarding potential, short term, reversible environmental damage impacting a small area 	<ul style="list-style-type: none"> Concerns regarding potential, short term, reversible environmental damage impacting a large area 	<ul style="list-style-type: none"> Concerns regarding potential, long term, irreversible environmental consequences City is fined for damages and/or permits revoked
Regulatory	<i>The risk related to the consequences of non-compliance with laws, regulations, policies or other rules</i>	<ul style="list-style-type: none"> Isolated non-compliance to policies or rules by few employees 	<ul style="list-style-type: none"> 1st warning from regulatory bodies Internal compliance reporting deficiencies in one division 	<ul style="list-style-type: none"> 2nd warning from regulatory bodies Internal compliance reporting deficiencies in multiple divisions or departments 	<ul style="list-style-type: none"> Legal Judgement against City Loss of license to operate Imprisonment of staff Sanctions imposed by regulatory bodies

Qualitative Risk Matrix

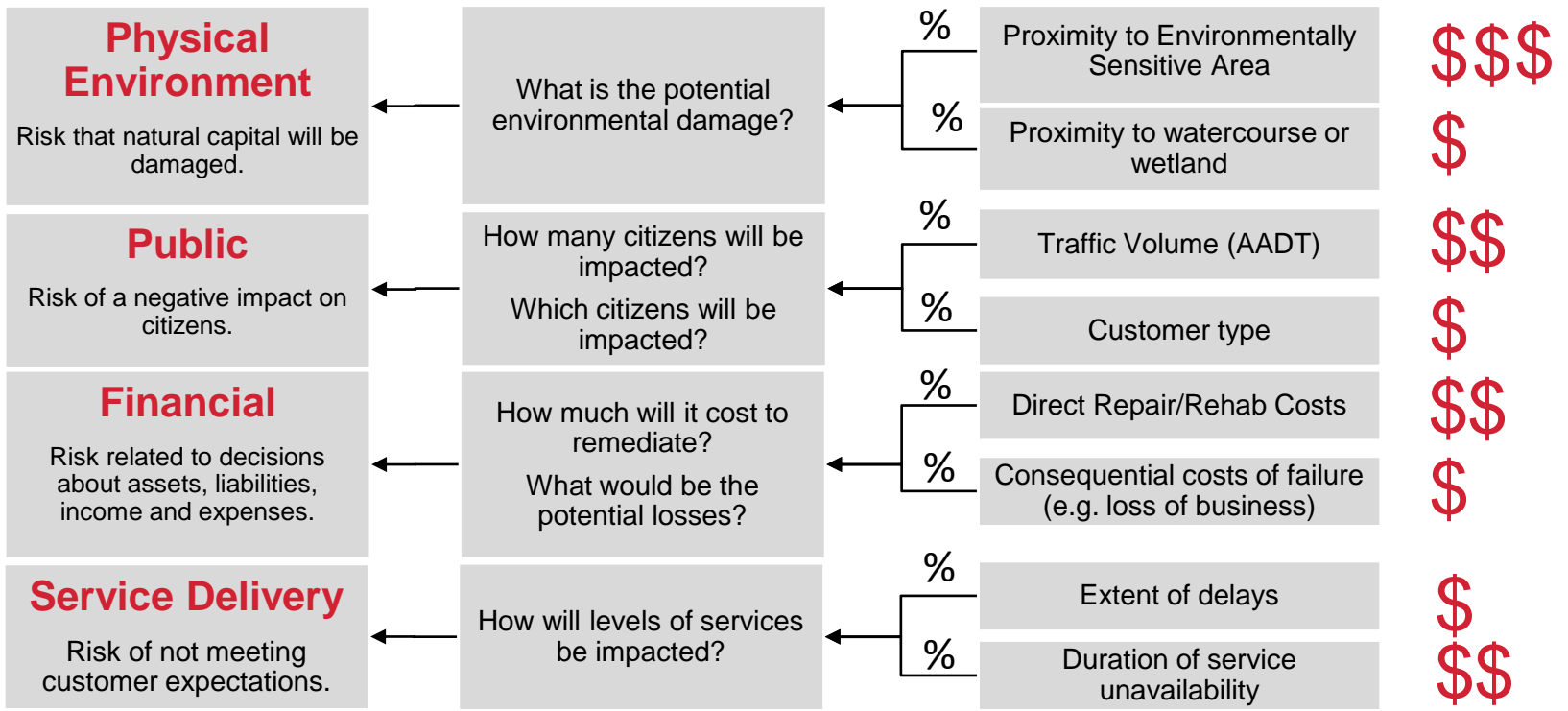
Top Priority:
Develop mitigation
plan and monitor

Monitor
or Inspect

5 - Almost Certain	5	10	15	20
4 - Likely	4	8	12	16
3 - Possible	3	6	9	12
2 - Unlikely	2	4	6	8
1 - Rare	1	2	3	4
Likelihood / Impact	1 - Minor	2 - Moderate	3 - Major	4 - Catastrophic

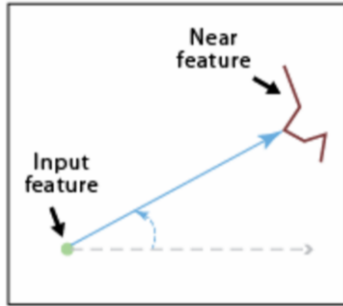
Potentially run to failure

Quantifying the Consequences

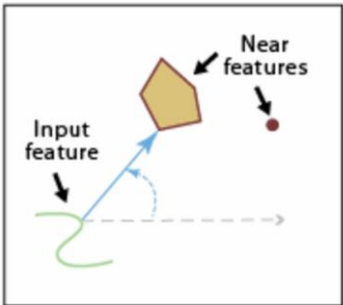


Quantifying the Risk

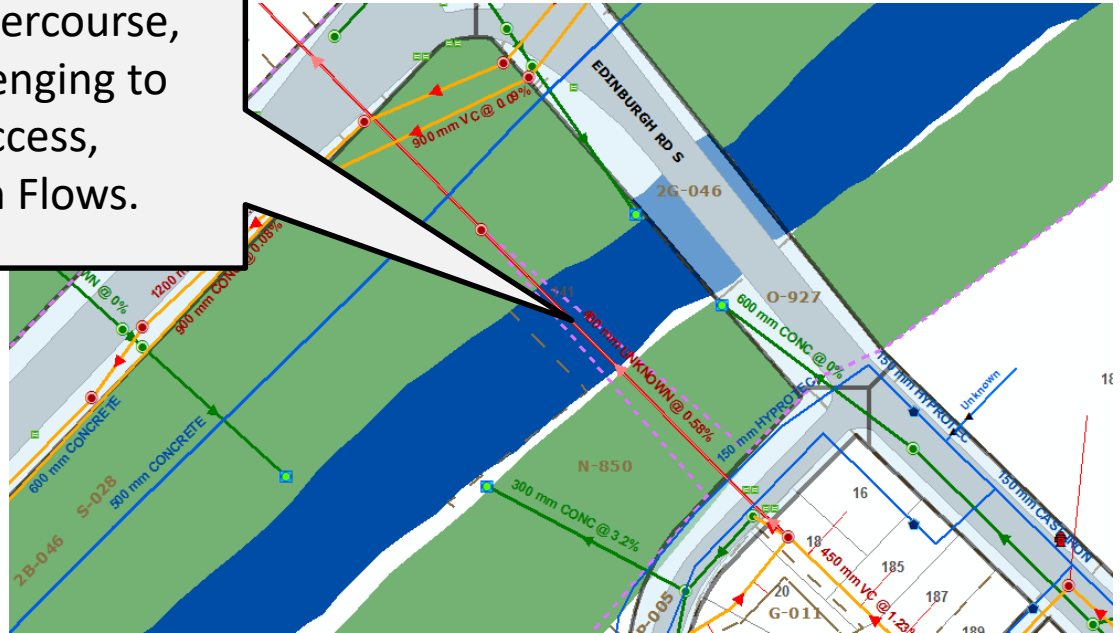
POINT TO LINE



MIXED FEATURE TYPES



Siphon in ESA, Close to watercourse, Challenging to Access, High Flows.



Understanding Probabilities

Condition Assessments

- High-level screening
- Detailed Assessments

History

- Failure history
- Maintenance and inspection history

Vintage

- Characteristics of asset type
- Design standards at the time of construction

Asset 1



Asset 2



Asset 3



Understanding Probabilities

Master Plans / Capacity

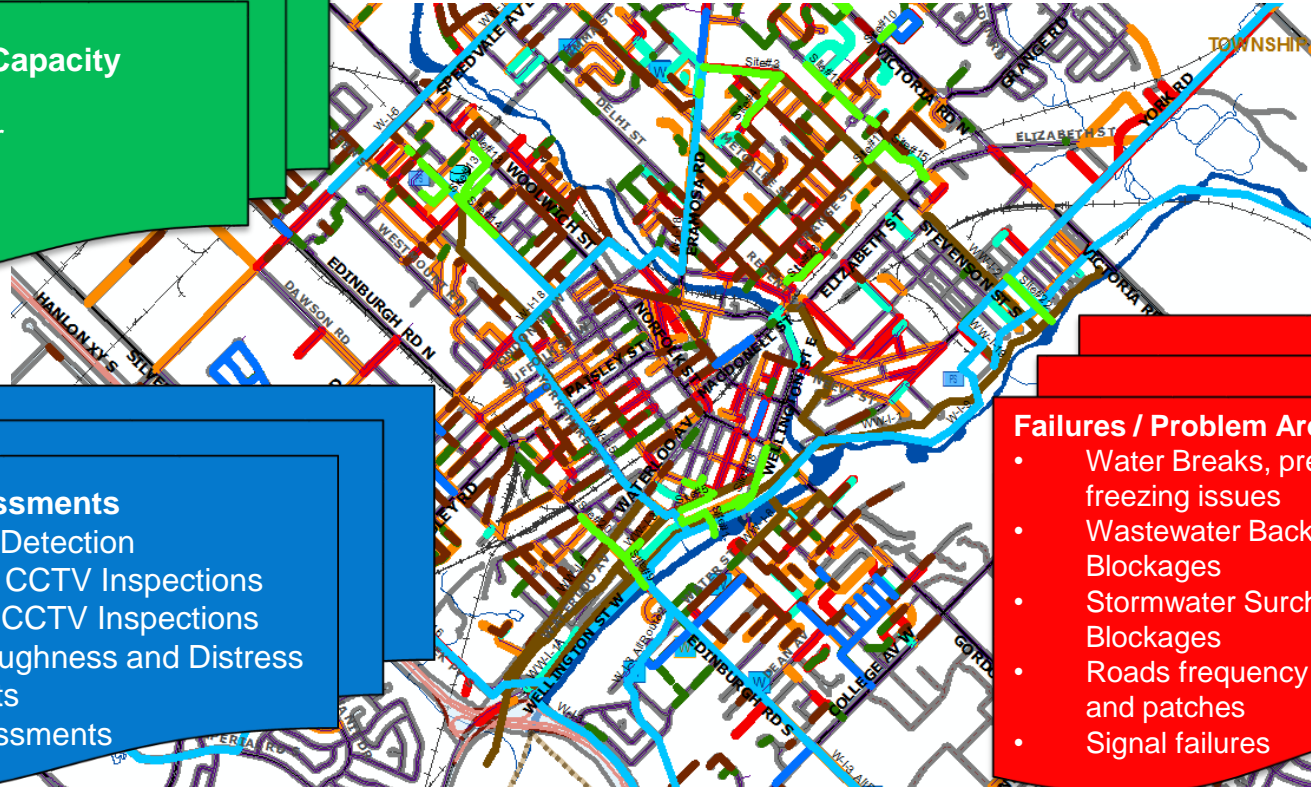
- Water
- Wastewater
- Stormwater
- Roads

Condition Assessments

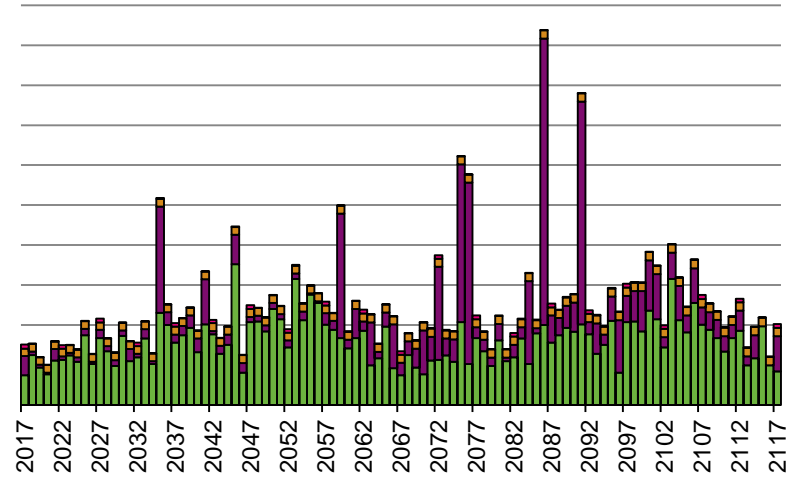
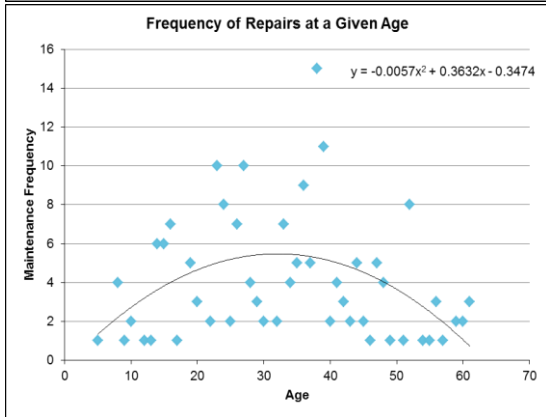
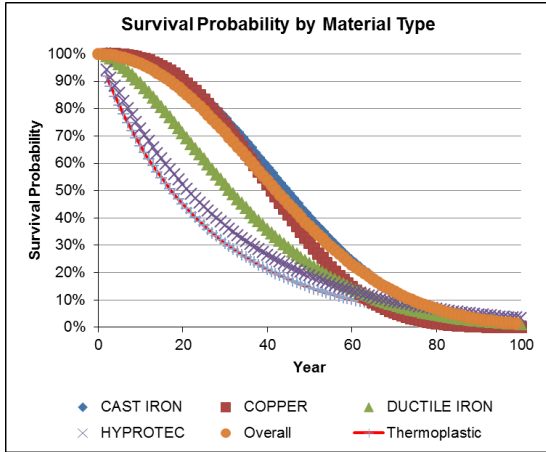
- Water Leak Detection
- Wastewater CCTV Inspections
- Stormwater CCTV Inspections
- Roads – Roughness and Distress Assessments
- Visual Assessments

Failures / Problem Areas

- Water Breaks, pressure and freezing issues
- Wastewater Backups / Blockages
- Stormwater Surcharging / Blockages
- Roads frequency of spot repairs and patches
- Signal failures

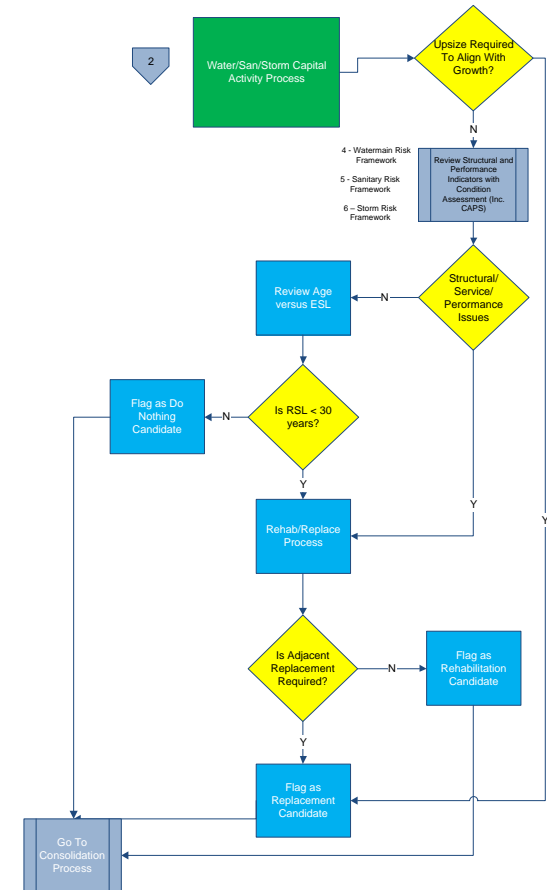


Predictive Modeling



Treatment Options

- Understanding the Risk:** Further field assessment or testing for the assets to better predict the risks.
- Mitigating the Risk:** Design and Operations (such as reducing detrimental physical and chemical stresses)
- Accepting the Risk:** Contingency strategies for Risk Management in the Event of a Failure
- Avoiding the Risk:** Strategies for New Infrastructure




Evaluating Treatment Options



Mitigated and Residual Risk

- With risk mitigation plans in place, the residual risk can be evaluated.

5 - Almost Certain	5	10	15	20
4 - Likely	4	8	12	16
3 - Possible	3	6	9	12
2 - Unlikely	2	4	6	8
1 - Rare	1	2	3	4
Likelihood / Impact	1 - Minor	2 - Moderate	3 - Major	4 - Catastrophic



Summary



- There are lots of different types of risks (i.e. project vs. network).
- A qualitative assessment can be a good starting point.
- Quantitatively assessed risks can be used for automated analysis and simulation.
- Making the best possible decisions can be a function of levels of service, risks and costs.

Thank You



Contact Details

Daryush Esmaili | Manager of Corporate Asset Management

📞 519-822-1260 x 2765

✉️ Daryush.Esmaili@guelph.ca



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