

# ***Asset Management Webinar Series***

## ***Using Risk Assessments to Identify Local Priorities***

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

Contact [ccbf@amo.on.ca](mailto:ccbf@amo.on.ca) for more information

# Asset Management Webinar Series

- 1) Leadership and Governance in Asset Management
- 2) Establishing Asset Hierarchy & Conducting Data Gap Analysis
- 3) Understanding Service Levels
- 4) **Using Risk Assessments to Identify Local Priorities**
- 5) Developing a Financial Strategy Using Whole Lifecycle Costs
  - November 5

# AGENDA

- Asset Management Ontario
  - Troy Mander, Director, Asset Management
- Municipality of North Grenville
  - Brad Brookman, Director of Finance / Treasurer
- Q&A

# Using Risk Management to Plan Your Asset Management Priorities

Troy Mander

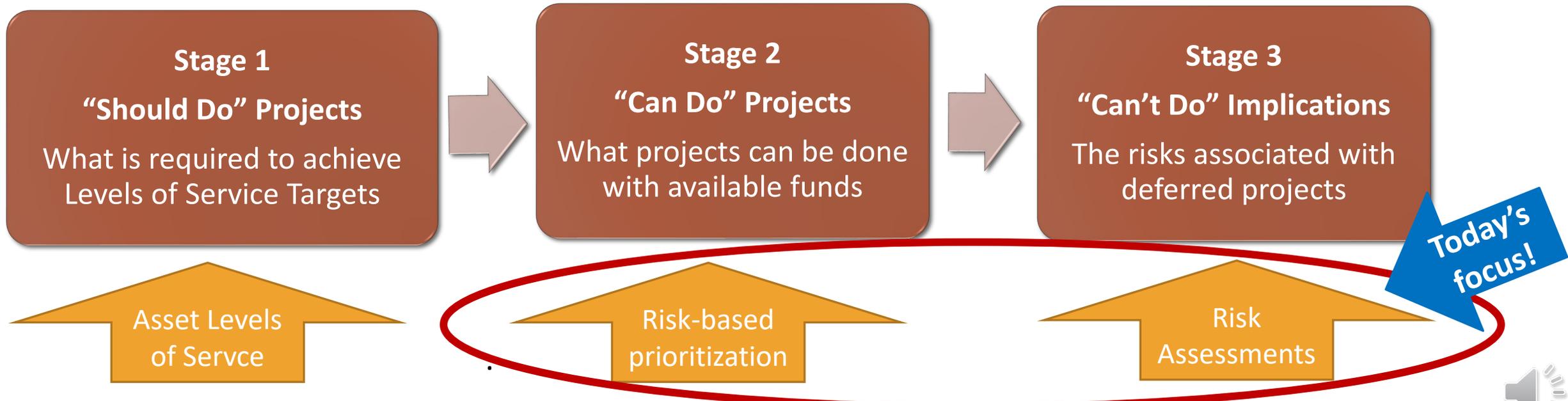
October 29, 2021



# Risk in the context of O.Reg 588/17

- The regulation requires in the Asset Management Plan:
  - An identification of the lifecycle activities (projects) that the municipality will undertake
  - An explanation of how the municipality will manage the risks associated with not undertaking any of the lifecycle activities (projects) identified

## What is required in the Asset Management Plan



# Risk Management Improves Asset Management Planning

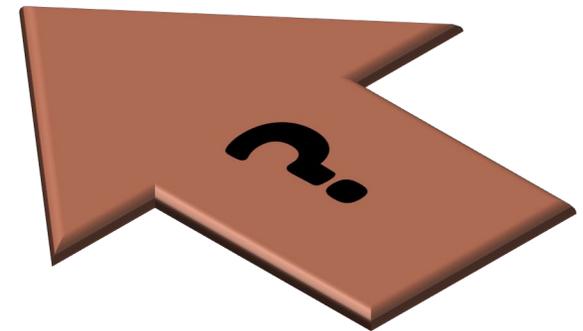
- Improves understanding on the state of the infrastructure
- Communicates municipal service & asset vulnerabilities
- Validates selection of reasonable & sustainable LOS targets
- Provides evidence for establishing asset priorities
- Informs emergency response planning



# Definition: Risk

*“Effect of uncertainty on objectives”* ISO 31000

- **Risk can never be eliminated** – only managed
- Leadership & Council determines the appetite & level of risk the municipality should accept
  - Are we willing to pursue the objective? (appetite)
  - How much uncertainty are we willing to accept in pursuit of the objective? (residual risk & risk tolerances)



# Options to Treat Asset Risks

## Avoid

- E.g.: Avoid providing the service
  - Generally not an option for public service organizations
- Avoid unrealistic service objectives
  - E.g.: No flooding during intense storms

## Accept & Mitigate

- Share
  - Outsource operations to 3<sup>rd</sup> party
  - Insurance
- Manage
  - Set reasonable asset levels of service
  - Emergency response planning
  - Demand management



# Utilizing Enterprise Risk Management for Asset Management



# Definition: Enterprise Risk Management

*“A structured, continuous process across an entire organization to identify, assess and respond to threats and opportunities related to the achievement of objectives”*

- ERM is a consistent, objective, evidence-based approach to decide organizational priorities
- ERM includes an organizational framework, policy, governance structure, formal processes & practices
- A best practice for leading public & private organizations



# Why adopt an ERM philosophy for Asset Management?

- Municipalities are a complex enterprise of different services, assets & risks
  - Therefore risks to assets & services should not be evaluated in “silos”
  
- An ERM approach has several advantages:
  - A transparent consistent means to measure an organization’s risk exposure & ability to meet service objectives
  - A means to objectively determine asset management priorities across the organization’s infrastructure portfolio
  - A method to assess corporate sustainability in relationship to its service objectives
  - A means to communicate the organization’s risks & priorities



# Managing Risk in the Organization

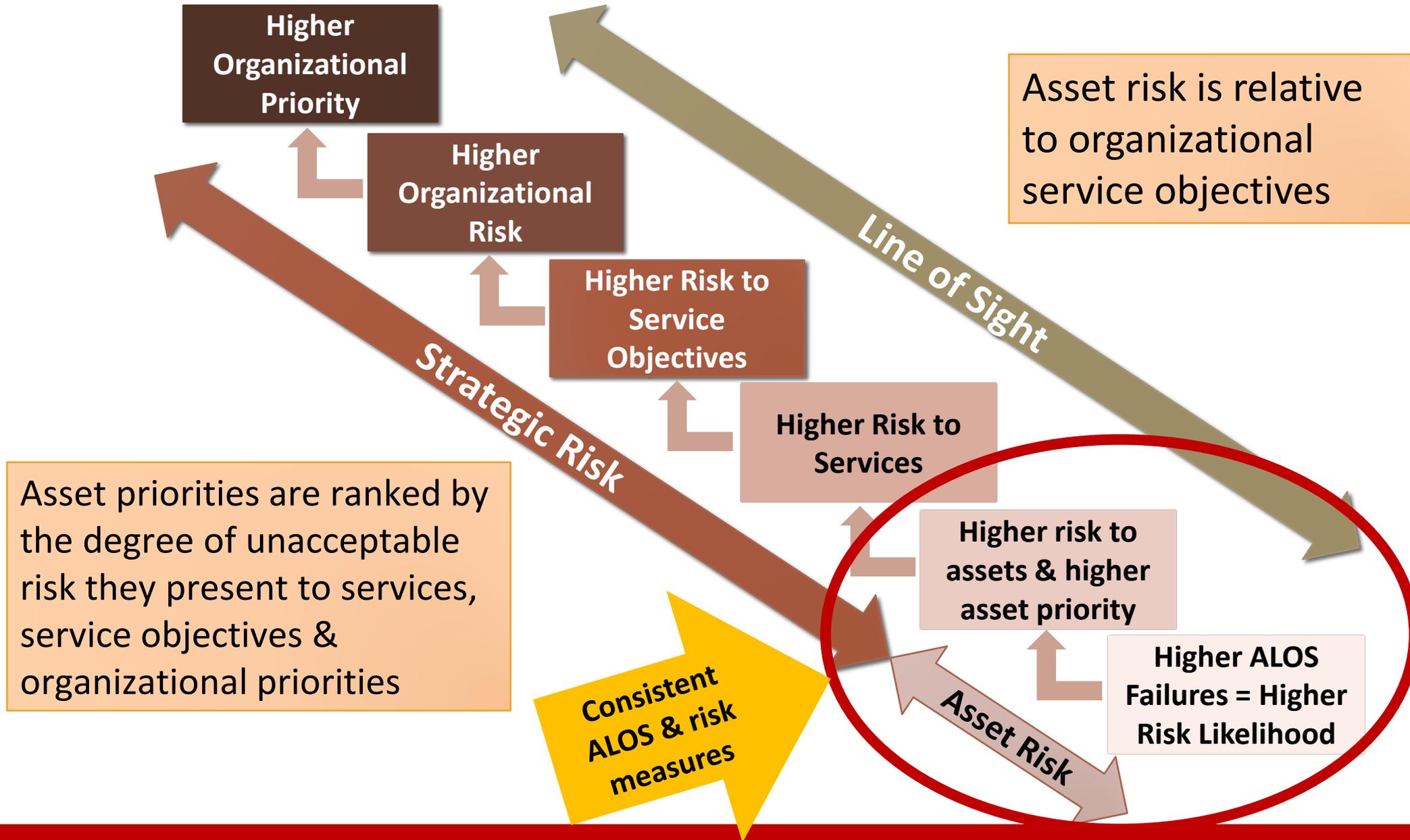
- Risk management should form a part of the organization's culture & businesses
- Managing risk requires perspectives from all levels of the organization



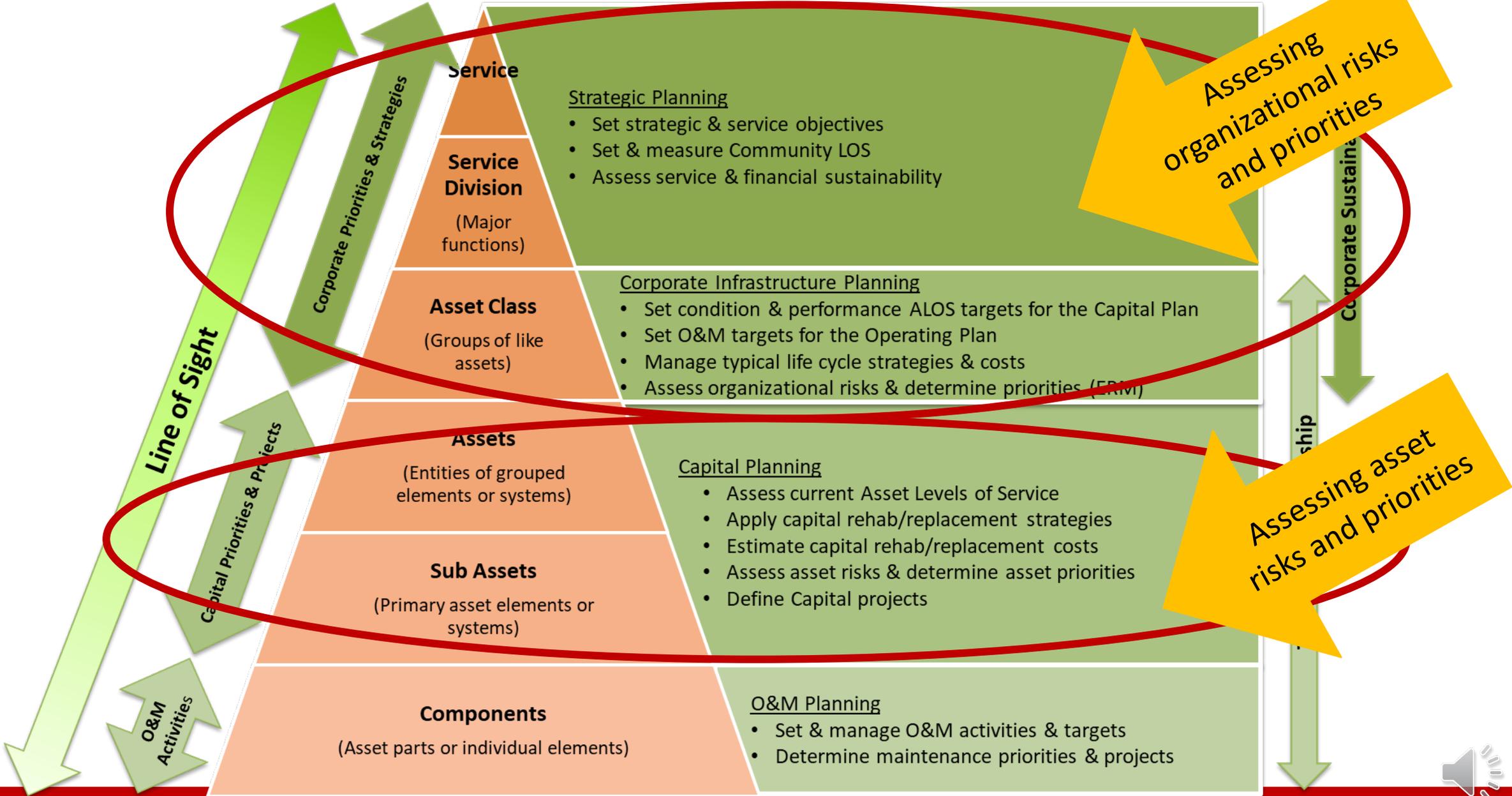
# AMONTario Enterprise Asset Risk Management Concepts & Modelling



# The Risk Hierarchy: Integrating ALOS into the Risk Framework



# Alignment of the Service to Asset Hierarchy to Organizational Processes



# AMONTario LOS Framework

Inputs to the risk assessments & modelling

| Condition Levels of Service  |  |                            |              | Performance Levels of Service   |  |                        |              |
|--|--|----------------------------|--------------|---|--|------------------------|--------------|
| ALOS Measures  | Corresponding Likelihood of Failure Measures |                            |              | ALOS Measures   | Corresponding Likelihood of Failure Measures |                        |              |
| PCI, BCI, FCI, PACP, General Ratings (“Very Good” to “Very Poor”), Maximum Age, etc. | <b>Risk Ratings</b>                          | <b>Estimated Timeframe</b> | <b>% LoF</b> | 1. Operational Functionality<br>2. Capacity to Meet Demands<br>3. Operational Resiliency<br>4. Environmental Resiliency | <b>ALOS Rating</b>                           | <b>Risk Ratings</b>    | <b>% LoF</b> |
|  | Very Unlikely                                | >20 yrs.                   | <10%         |   | Very Good                                    | Very Unlikely          | <10%         |
|  | Unlikely                                     | 11-20 yrs.                 | 10%-30%      |   | Good   | Unlikely               | 10%-30%      |
|  | Possible                                     | 6-10 yrs.                  | 30%-60%      |   | Fair   | Possible               | 30%-60%      |
|  | Likely                                       | 1-5 yrs.                   | 60%-90%      |   | Poor   | Likely                 | 60%-90%      |
|  | Very Likely or Certain                       | <1 yr.                     | >90%         |   | Very Poor                                    | Very Likely or Certain | >90%         |

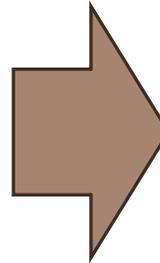
Measured using specific asset design criteria in combination with operational or site assessments

# Asset Levels of Service control Likelihood of Failure

Risk =  Consequence  LoF 



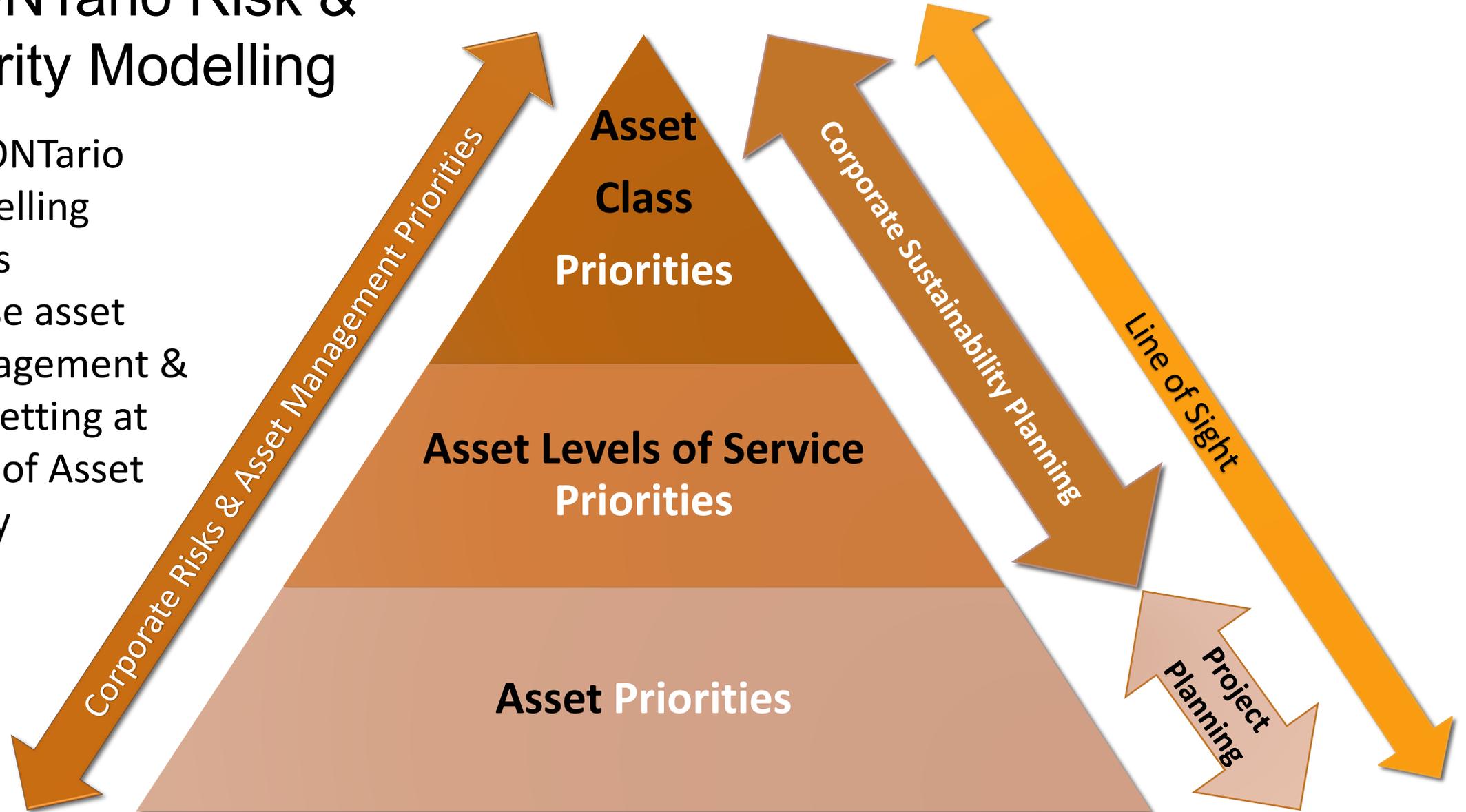
Failing ALOS targets OR  
setting inadequate ALOS  
targets  
= **Unacceptable Risk**



Meeting appropriate ALOS  
targets  
= **Acceptable Risk**

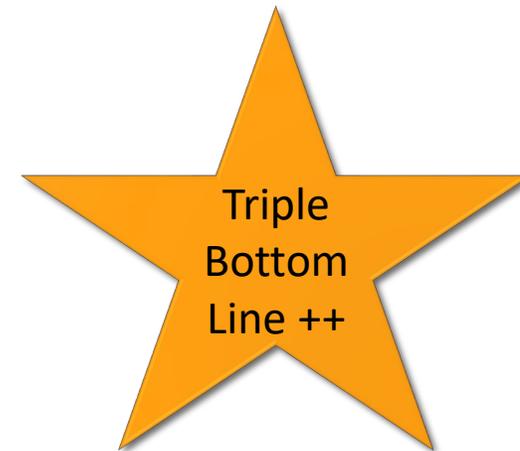
# AMONTario Risk & Priority Modelling

The AMONTario risk modelling facilitates enterprise asset risk management & priority setting at all levels of Asset Hierarchy



# Measuring Consequences of Asset Failure

- AMONTario includes the impacts of asset failure to:
  - The health & safety of the public & employees
  - Community services & Municipal operations
  - Municipal finances
  - The natural environment
  - Municipal reputation



# AMONTario Consequence Table (Condensed)

| Consequence Categories   | Consequence Severity Ratings <sup>1,2</sup>   |   |   |   |   |
|--|---|---|---|---|---|
|  | Very Low  | Low   | Medium  | High  | Very High   |
| <b>Health &amp; Safety</b>   | <b>1</b>  | <b>2</b>  | <b>3</b>  | <b>4</b>  | <b>5</b>  |
| Consider the impacts to the health and safety of the public and municipal staff including potential mental and physical injury, illness and loss of life as a result of asset failure, impairment, malfunction.                  | - Negligible or no injury or illness.<br>- No medical attention required.   | - Minor injury or illness lasting up to a few weeks.<br>- Recovery at home.   | - Moderate injuries or illness lasting up to several weeks.<br>- Hospitalization and/or treatment lasting up to several days.   | - Significant injuries or illness lasting up to many weeks.<br>- Hospitalization and/or treatment lasting up to several weeks.<br>- Potential short-term (<1 year) disabilities.  | - Extensive long-term injuries or illness or possibly death.<br>- Hospitalization and/or treatment lasting up to several months.<br>- Potential long-term (>1 year) or permanent disabilities.  |
| <b>Community Services</b>  | <b>1</b>  | <b>2</b>  | <b>3</b>  | <b>4</b>  | <b>5</b>  |
| Consider the impacts to infrastructure integrity, community service functions, and municipal operations as a result of asset failure, impairment, malfunction, underperformance or insufficiency.                                | - Negligible interruption/impairment of services.<br>- Integrity of services/ infrastructure is unaffected<br>- Limited to a few people or residences in the community.<br>- Nonessential services are affected | - Minor interruption/impairment of services.<br>- Minor affect to integrity of services/infrastructure<br>- Affects an isolated area, some people or residences in the community.   | - Moderate interruption/impairment of services.<br>- Moderate affect to integrity of services/infrastructure<br>- Affects a sizable area, many people or residences in the community.   | - Significant interruption/impairment of services.<br>- Significant affect to integrity of services/infrastructure<br>- Affects a large area, population or number of residences in the community.  | - Extensive interruption/impairment of services.<br>- Extensive affect to integrity of services/infrastructure<br>- Affects a very large area, population or number of residences in the community.   |
| <b>Financial</b>   | <b>1</b>  | <b>2</b>  | <b>3</b>  | <b>4</b>  | <b>5</b>  |
| Consider the impacts to municipal finances including:<br>- Unplanned capital and operating costs and associated revenue losses, to address and correct unexpected asset failures, impairments or                                 | Affects of unforeseen events are financially minor and may require either of the following to maintain safe and desirable service operations, finance revenue or operating losses and/or pay                    | Affects of unforeseen events are financially modest and require any number of the following to maintain safe and desirable service operations, to finance revenue or operating losses and/or pay  | Affects of unforeseen events are financially moderate and require any number of the following to maintain safe and desirable service operations, to finance revenue or operating losses and/or pay  | Affects of unforeseen events are financially significant and require any number of the following to maintain safe and desirable service operations, to finance revenue or operating losses and/or pay                                       | Affects of unforeseen events are financially extensive and require any number of the following to maintain safe and desirable service operations, to finance revenue or operating losses and/or pay   |
| <b>Environment</b>   | <b>1</b>  | <b>2</b>  | <b>3</b>  | <b>4</b>  | <b>5</b>  |
| Consider the impacts to the natural environment as a result of asset failure, impairment, malfunction, underperformance or insufficiency.  | - Negligible or no damage to the environment.<br>- Very short-term (<1 month) or no environmental impact.   | - Minor damage affecting a localized area.<br>- Short-term impacts to the environment (1 to 6 months).  | - Moderate damage affecting a significant area.<br>- Medium-term (6 months to 1 year) impacts.<br>- Possible warnings from  | - Significant damage affecting a large area.<br>- Long-term (1 to 2 years) impacts.<br>- Warnings issued and possible fines from environmental agencies.  | - Extensive damage affecting a widespread area.<br>- Very long-term (> 2 years) or permanent impacts.<br>- Warnings, fines and monitoring   |
| <b>Reputation</b>  | <b>1</b>  | <b>2</b>  | <b>3</b>  | <b>4</b>  | <b>5</b>  |
| Consider the impacts to the image and reputation of the municipality, Council and staff from a community or broader public perspective as a result of asset failure, impairment, malfunction, underperformance or insufficiency. | - Negligible or no media/social media attention.<br>- Negligible or no community concern.<br>- No changes in public trust and confidence of staff and Council.  | - Minor local media/social media attention lasting up to a few days.<br>- Minor levels of concern by some residents in the community possibly resulting in some complaints to staff or a local Councillor.<br>- Some short-term negative opinion and loss of public confidence in staff | - Moderate media/social media attention lasting up to a few weeks.<br>- Moderate levels of concern by many residents in the community resulting in several complaints and discussions and/or meetings with members of staff and Council.<br>- Some lasting negative opinion and | - Significant media/social media attention lasting up to several weeks.<br>- Significant levels of concern by a large number of residents in the community resulting in many complaints, discussions and meetings with members of staff and | - Extensive media/social media attention lasting many weeks and possibly regional or national media attention.<br>- Extensive levels of concern by a very large number of residents in the community and some external to the community resulting in a high |



# Risk Universe – Roads Example (Condensed)

| Asset Classes/Types                               | ALOS                      | Range of Possible Failures <sup>1</sup>   | Possible Consequences <sup>1,2</sup>   |  |  |  |   |
|---|---------------------------|---|--|--|--|--|---|
|   |                           |   | Health and Safety  | Community Services   | Financial  | Environment  | Reputation  |
| Roads<br>(All surfaces and roadside environments) | Condition                 | <ul style="list-style-type: none"> <li>- Severe cracking, rutting, ravelling</li> <li>- Loss of structural integrity to the pavement, base and sub base</li> </ul>  | <ul style="list-style-type: none"> <li>- Injuries</li> </ul>                           | <ul style="list-style-type: none"> <li>- Hazardous driving conditions</li> <li>- Damage to vehicles due to road surface conditions</li> <li>- Travel speeds below posted speeds</li> <li>- Vehicular accidents</li> <li>- Reduced ease of access to the community and business</li> <li>- Driver frustration</li> </ul>  | <ul style="list-style-type: none"> <li>- Insurance claims</li> <li>- Lawsuits</li> <li>- Reactive repair and/or replacement costs</li> <li>- Higher O&amp;M Costs</li> <li>- Lost opportunity costs (e.g. Added costs for full reconstruction in lieu more cost-effective road resurfacing)</li> </ul> | <ul style="list-style-type: none"> <li>- Excessive soil and sediments released into the waterways</li> </ul> | <ul style="list-style-type: none"> <li>- Public complaints</li> <li>- Local media coverage</li> <li>- Poor perception of municipal services and the municipality</li> </ul> |
|   | Operational Functionality | <ul style="list-style-type: none"> <li>- Inappropriate speed limits</li> <li>- Unsuitable road surface material type for traffic volumes, loadings and posted speeds</li> <li>- Insufficient road platform (pavement surface and shoulder width) to accommodate current traffic volumes and posted speeds (not related to capacity)</li> <li>- Inadequate road structural capacity to accommodate traffic volumes and loading</li> <li>- Inadequate elevation and drainage to prevent seasonal and/or reoccurring flooding</li> <li>- Roadway flooding during major storm events exceeds criteria per MOE Stormwater Planning and Design Manual</li> <li>- Inadequate embankment erosion control</li> <li>- Inadequate ditches design and function (not properly graded, clear and free flowing with blockages or erosion)</li> </ul> | <ul style="list-style-type: none"> <li>- Injuries</li> <li>- Possible death</li> </ul> | <ul style="list-style-type: none"> <li>- Hazardous driving conditions</li> <li>- Excessive road flooding and washouts</li> <li>- Undermining of pavement structure</li> <li>- Premature road failure (due to inadequate structural design or flooding)</li> <li>- Travel speeds below posted speeds</li> <li>- Vehicular accidents</li> <li>- Reduced ease of access to the community and business</li> <li>- Driver frustration</li> <li>- Compliance issues</li> </ul> | <ul style="list-style-type: none"> <li>- Lawsuits</li> <li>- Insurance Claims</li> <li>- Higher O&amp;M costs</li> <li>- Capital costs to rectify deficiencies</li> <li>- Reactive repair and/or replacement costs</li> </ul>  | <ul style="list-style-type: none"> <li>- Excessive soil and sediments released into the waterways</li> </ul> | <ul style="list-style-type: none"> <li>- Public complaints</li> <li>- Local media coverage</li> <li>- Poor perception of municipal services and the municipality</li> </ul> |
|   | Capacity to Meet Demands  | <ul style="list-style-type: none"> <li>- Insufficient number of lanes along each road segment to accommodate peak traffic volumes</li> </ul>  | <ul style="list-style-type: none"> <li>- Injuries</li> </ul>                           | <ul style="list-style-type: none"> <li>- Travel delays/longer travel times</li> <li>- Driver frustration</li> <li>- Vehicular accidents</li> <li>- Reduced ease of access to the community and business</li> </ul>   | <ul style="list-style-type: none"> <li>- Insurance claims</li> <li>- Capital costs to expand/rectify the assets</li> <li>- Lost revenues from reduced business and tourism opportunities</li> <li>- Lost opportunities to attract commercial or industrial employment</li> </ul>                       |  | <ul style="list-style-type: none"> <li>- Public complaints</li> <li>- Poor perception of municipal services and the municipality</li> </ul>                                 |
|   | Environmental Resiliency  | <ul style="list-style-type: none"> <li>- Inadequate protection from storms per municipal design requirements or with 5-year return periods (per O.Reg 588/17); whichever is greater</li> <li>- Inadequate erosion protection</li> </ul>   | <ul style="list-style-type: none"> <li>- Injuries</li> </ul>                           | <ul style="list-style-type: none"> <li>- Hazardous driving conditions</li> <li>- Excessive road flooding and washouts</li> <li>- Undermining of pavement structure</li> <li>- Premature road failure</li> <li>- Travel speeds below posted speeds</li> </ul>   | <ul style="list-style-type: none"> <li>- Reactive repair and/or replacement costs</li> <li>- Insurance Claims</li> <li>- Capital costs to rectify deficiencies</li> </ul>  | <ul style="list-style-type: none"> <li>- Excessive soil and sediments released into the waterways</li> </ul> | <ul style="list-style-type: none"> <li>- Public complaints</li> <li>- Poor perception of municipal services and the municipality</li> </ul>                                 |



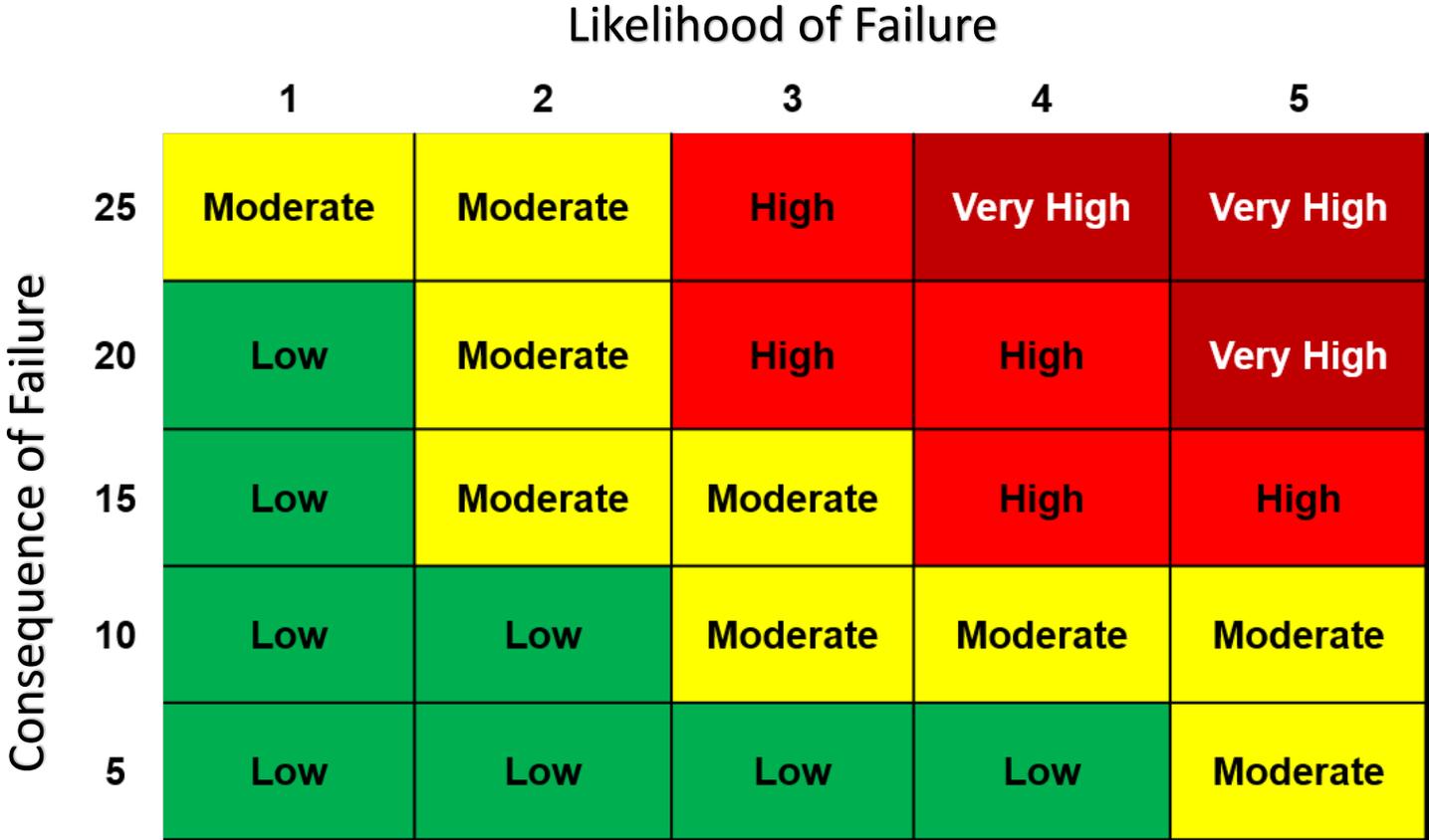
# AMONTario Likelihood Table

| Likelihood             | Score | Asset or Asset Class Conditions <sup>1, 2, 3,</sup>  |
|------------------------|-------|--|
| Very Unlikely<br>< 10% | 1     | <p><b>Condition</b><br/>The assets may be in <b>Very Good</b> or <b>Good</b> condition (depending on asset type).<br/>The estimated useful service life or estimated remaining useful service life is <b>greater than 20 years</b>.</p> <p><b>Performance - Very Good</b><br/><b>Operations:</b><br/>- Operations fully meet or exceed current minimum community service level requirements in a fully efficient and effective manner.<br/>- No operational problems experienced.<br/>- Fully complies with current Regulations and/or Standards<sup>4</sup>.<br/>- No desirable elements are missing, and all required elements are present.<br/>- Technology is state-of-the-art/best available.</p> <p><b>Capacity to Meet Demands:</b><br/>- Capacity fully meets or exceeds current demands and minimum community service level requirements.<br/>- No operational problems related to capacity are experienced.</p> <p><b>Resiliency:</b><br/>- Fully meets or exceeds the minimum emergency or service safeguard requirements for back-up systems, spare capacity, alternative supply or system/asset security.<br/>- Full resiliency/protection from all foreseeable environmental or security threats.</p>  |
|                        |       | <p><b>Condition</b><br/>The assets may be in a <b>Very Good, Good</b> or <b>Fair</b> condition (depending on asset type).<br/>The estimated useful service life or estimated remaining useful service life is <b>11 to 20 years</b>.</p> <p><b>Overall Performance - Good</b><br/><b>Operations:</b><br/>- Operations meet current minimum community service level requirements in an efficient and effective manner.<br/>- Occasional operational problems may be experienced.<br/>- Complies with Regulations and/or Standards<sup>4</sup> with possibly some "grandfathering" where permitted by Regulation for certain standards.<br/>- A few desirable elements may be missing, but all required elements are present.<br/>- Technology is industry standard.</p> <p><b>Capacity to Meet Demands:</b><br/>- Capacity meets current demands and minimum community service level requirements.<br/>- Minor and occasional operational problems related to capacity may be experienced.<br/>- No noticeable affects on overall community service levels and/or stakeholders.</p> <p><b>Resiliency:</b><br/>- Meets the minimum emergency or service safeguard requirements for back-up systems, spare capacity, alternative supply or system/asset security.<br/>- Resiliency/protection from almost all foreseeable environmental or security threats.</p>  |
| Unlikely<br>10% - 30%  | 2     | <p><b>Condition -</b><br/>The assets may be in a <b>Good, Fair</b> or <b>Poor</b> condition (depending on asset type).<br/>The estimated useful service life or estimated remaining useful service life is <b>6 to 10 years</b>.</p> <p><b>Overall Performance - Fair</b><br/><b>Operations:</b><br/>- Operations just meet/essentially satisfy the current minimum community service level requirements with possibly occasional or minor constraints, and/or some inefficiencies and ineffectiveness present.<br/>- Operational problems may occur more frequently.<br/>- There may be some minor or modest affects to community service levels and/or stakeholders.<br/>- Meets essential regulations and/or Standards<sup>4</sup> with "grandfathering" where permitted by Regulation for certain standards.<br/>- A few desirable elements and one or two required elements are missing.<br/>- Technology is adequate but may not be efficient.</p> <p><b>Capacity to Meet Demands:</b><br/>- Capacity just meets/essentially satisfies current demands and minimum community service level requirements, possibly with occasional or minor constraints and/or reduced efficiency.<br/>- Operational problems related to capacity may occur more frequently.<br/>- There may be some minor or modest affects to community service levels and/or stakeholders.</p> <p><b>Resiliency:</b><br/>- Provides acceptable but limited emergency or service safeguard requirements for back-up systems, spare capacity, alternative supply or system/asset security.<br/>- Limited resiliency/protection from many foreseeable environmental or security threats.</p>  |
|                        |       | <p><b>Condition</b><br/>The assets may be in a <b>Poor, Very Poor</b> or <b>Failed</b> condition (depending on asset type).<br/>The estimated useful service life or estimated remaining useful service life is <b>less than 1 year or beyond useful service life</b>.</p> <p><b>Overall Performance - Very Poor</b><br/><b>Operations:</b><br/>- Operational ability to meet current minimum community service level requirements is deficient and unsustainable with performance significantly and continuously below minimum service and efficiency requirements.<br/>- Operational problems are serious and ongoing.<br/>- There are noticeable and possibly significant affects to community service levels and/or stakeholders.<br/>- Does not meet essential or critical Regulations and/or Standards<sup>4</sup>, and "grandfathering" cannot be permitted either by Regulation or due to safety or practical concerns.<br/>- Many desirable and several required elements are missing.<br/>- Technology is obsolete and/or non-functional and replacement parts may be unavailable.</p> <p><b>Capacity to Meet Demands:</b><br/>- Capacity is significantly and continuously below demands and/or minimum community service level requirements.<br/>- Operational problems related to lack of capacity are serious and ongoing.<br/>- There are noticeable and possibly significant affects to community service levels and/or stakeholders.</p> <p><b>Resiliency:</b><br/>- Provides marginal or no emergency or service safeguard requirements for back-up systems, spare capacity, alternative supply or system/asset security.<br/>- Marginal or no resiliency/protection from most or all foreseeable environmental or security threats.</p> |

| Likelihood          | Score | Asset or Asset Class Conditions <sup>1, 2, 3,</sup>  |
|---------------------|-------|--|
| Likely<br>60% - 90% | 4     | <p><b>Condition</b><br/>The assets may be in a <b>Fair, Poor</b> or <b>Very Poor</b> condition (depending on asset type).<br/>The estimated useful service life or estimated remaining useful service life is <b>1 to 5 years</b>.</p> <p><b>Overall Performance - Poor</b><br/><b>Operations:</b><br/>- Operations have limited ability to meet current minimum community service level requirements with performance frequently below minimum service and efficiency requirements.<br/>- Significant operational problems are evident and can occur frequently.<br/>- There are noticeable and possibly moderate affects to community service levels and/or stakeholders.<br/>- May not meet or partially meets essential Regulations and/or Standards<sup>4</sup> which may not be permitted "grandfathering" by Regulation or are unsafe or impractical to continue "grandfathering".<br/>- Several desirable elements and one or two required elements are missing.<br/>- Technology is nearing obsolescence.</p> <p><b>Capacity to Meet Demands:</b><br/>- Capacity is frequently below demands and/or minimum community service level requirements.<br/>- Significant operational problems related to lack of capacity are evident and can occur frequently.<br/>- There are noticeable and possibly moderate affects to community service levels and/or stakeholders.</p> <p><b>Resiliency:</b><br/>- Provides partial but inadequate emergency or service safeguard requirements for back-up systems, spare capacity, alternative supply or system/asset security.<br/>- Partial but inadequate resiliency/protection from most foreseeable environmental or security threats.</p>  |
|                     |       | <p><b>Condition</b><br/>The assets may be in a <b>Good, Fair</b> or <b>Poor</b> condition (depending on asset type).<br/>The estimated useful service life or estimated remaining useful service life is <b>6 to 10 years</b>.</p> <p><b>Overall Performance - Fair</b><br/><b>Operations:</b><br/>- Operations just meet/essentially satisfy the current minimum community service level requirements with possibly occasional or minor constraints, and/or some inefficiencies and ineffectiveness present.<br/>- Operational problems may occur more frequently.<br/>- There may be some minor or modest affects to community service levels and/or stakeholders.<br/>- Meets essential regulations and/or Standards<sup>4</sup> with "grandfathering" where permitted by Regulation for certain standards.<br/>- A few desirable elements and one or two required elements are missing.<br/>- Technology is adequate but may not be efficient.</p> <p><b>Capacity to Meet Demands:</b><br/>- Capacity just meets/essentially satisfies current demands and minimum community service level requirements, possibly with occasional or minor constraints and/or reduced efficiency.<br/>- Operational problems related to capacity may occur more frequently.<br/>- There may be some minor or modest affects to community service levels and/or stakeholders.</p> <p><b>Resiliency:</b><br/>- Provides acceptable but limited emergency or service safeguard requirements for back-up systems, spare capacity, alternative supply or system/asset security.<br/>- Limited resiliency/protection from many foreseeable environmental or security threats.</p>  |
| Very Likely<br>>90% | 5     | <p><b>Condition</b><br/>The assets may be in a <b>Poor, Very Poor</b> or <b>Failed</b> condition (depending on asset type).<br/>The estimated useful service life or estimated remaining useful service life is <b>less than 1 year or beyond useful service life</b>.</p> <p><b>Overall Performance - Very Poor</b><br/><b>Operations:</b><br/>- Operational ability to meet current minimum community service level requirements is deficient and unsustainable with performance significantly and continuously below minimum service and efficiency requirements.<br/>- Operational problems are serious and ongoing.<br/>- There are noticeable and possibly significant affects to community service levels and/or stakeholders.<br/>- Does not meet essential or critical Regulations and/or Standards<sup>4</sup>, and "grandfathering" cannot be permitted either by Regulation or due to safety or practical concerns.<br/>- Many desirable and several required elements are missing.<br/>- Technology is obsolete and/or non-functional and replacement parts may be unavailable.</p> <p><b>Capacity to Meet Demands:</b><br/>- Capacity is significantly and continuously below demands and/or minimum community service level requirements.<br/>- Operational problems related to lack of capacity are serious and ongoing.<br/>- There are noticeable and possibly significant affects to community service levels and/or stakeholders.</p> <p><b>Resiliency:</b><br/>- Provides marginal or no emergency or service safeguard requirements for back-up systems, spare capacity, alternative supply or system/asset security.<br/>- Marginal or no resiliency/protection from most or all foreseeable environmental or security threats.</p> |
|                     |       | <p><b>Condition</b><br/>The assets may be in a <b>Poor, Very Poor</b> or <b>Failed</b> condition (depending on asset type).<br/>The estimated useful service life or estimated remaining useful service life is <b>less than 1 year or beyond useful service life</b>.</p> <p><b>Overall Performance - Very Poor</b><br/><b>Operations:</b><br/>- Operational ability to meet current minimum community service level requirements is deficient and unsustainable with performance significantly and continuously below minimum service and efficiency requirements.<br/>- Operational problems are serious and ongoing.<br/>- There are noticeable and possibly significant affects to community service levels and/or stakeholders.<br/>- Does not meet essential or critical Regulations and/or Standards<sup>4</sup>, and "grandfathering" cannot be permitted either by Regulation or due to safety or practical concerns.<br/>- Many desirable and several required elements are missing.<br/>- Technology is obsolete and/or non-functional and replacement parts may be unavailable.</p> <p><b>Capacity to Meet Demands:</b><br/>- Capacity is significantly and continuously below demands and/or minimum community service level requirements.<br/>- Operational problems related to lack of capacity are serious and ongoing.<br/>- There are noticeable and possibly significant affects to community service levels and/or stakeholders.</p> <p><b>Resiliency:</b><br/>- Provides marginal or no emergency or service safeguard requirements for back-up systems, spare capacity, alternative supply or system/asset security.<br/>- Marginal or no resiliency/protection from most or all foreseeable environmental or security threats.</p> |



# AMONTario Model – Risk Distribution



| Risk Ratings |         |
|--------------|---------|
| Level        | Range   |
| Low          | <21     |
| Medium       | 21 - 59 |
| High         | 60 - 99 |
| Very High    | > 99    |

| Criticality |         |
|-------------|---------|
| Level       | Range   |
| Low         | <11     |
| Medium      | 11 - 15 |
| High        | 16 - 20 |
| Very High   | > 20    |

Heat Map



# The AMONTario Risk Assessment Models

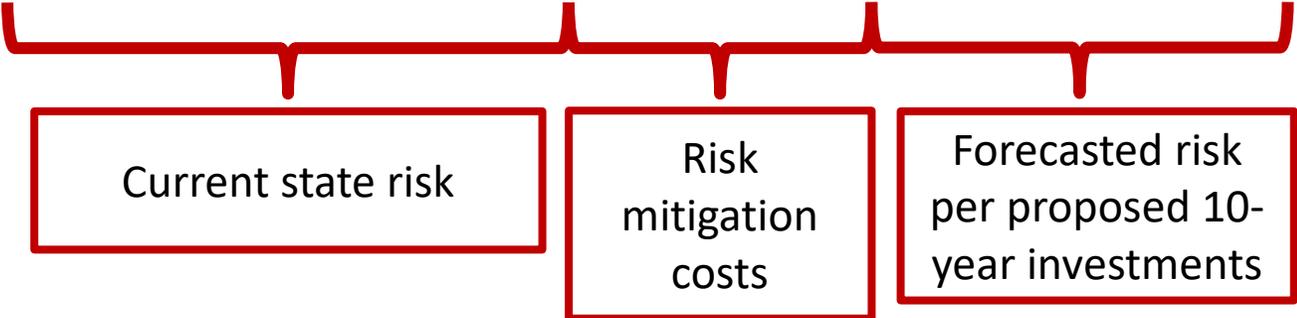


# AMONTario Asset Class & ALOS Risk Assessment Model

| Asset Level of Service Information                                  |                     | Consequences    |                    |           |             |            | Risk Targets      |  | Current State Risk & Financial Analysis |  |  |   |                    | Financial Plan Analysis              |   |   |  |  |   |   |                              |  |
|---|---------------------|-----------------|--------------------|-----------|-------------|------------|-------------------|--|---|--|--|---|--------------------|--------------------------------------|---|---|--|--|---|---|------------------------------|--|
| Analysis Name   |                     | Health & Safety | Community Services | Financial | Environment | Reputation | Total Consequence | Target Likelihood of Failure (Based on ALOS Targets) | Residual (Target) Risk                  | Current Range of Asset Levels of Service | ALOS Distribution within the Asset Class (%) | Current Likelihood of Failure (Based on Current ALOS) | Current State Risk | Variance from Residual (Target) Risk | Estimated Costs to Meet ALOS Targets (Risk Mitigation Costs) (\$,000's) | Risk-Cost Benefit (\$,000's per Risk Point Reduced) | Proposed 10-year Capital Plan Investments (\$,000's) | ALOS Distribution within the Asset Class (%) | Post-Financing Likelihood of Failure (After Proposed Investments) | Estimated Post 10-year Capital Plan Risk (After Proposed Investments) | Risk Reduced by Capital Plan | Net Variance from Residual (Target) Risk |
| Asset Class Name  | Condition ALOS #1   |                 |                    |           |             |            | 0                 |  | 0                                       |  |  | 0   | 0                  |                                      |   |   |  |  | 0   | 0   |                              |  |
| Average Condition ALOS #1 risks and Total Costs                     |                     |                 |                    |           |             |            |                   |  | 0%                                      | 0  |  | \$ -  | \$ -               | 0%                                   | 0   |   |  | 0  | 0   |   |                              |  |
| Asset Class Name  | Performance ALOS #1 |                 |                    |           |             |            | 0                 |  | 0                                       |  |  | 0   | 0                  |                                      |   |   |  |  | 0   | 0   |                              |  |
| ALOS #1 Average Performance Risks and Total Costs                   |                     |                 |                    |           |             |            |                   |  | 0%                                      | 0  |  | \$ -  | \$ -               | 0%                                   | 0   |   |  | 0  | 0   |   |                              |  |
| Overall Average Performance ALOS Risks and Total Costs              |                     |                 |                    |           |             |            | 0.0               |  |   | 0  |  | \$ -  | \$ -               |                                      | \$ -  |   |  | 0  | 0   |   |                              |  |
| Combined Average Condition & Performance ALOS Risks and Total Costs |                     |                 |                    |           |             |            | 0.0               |  |   | 0  |  | \$ -  | \$ -               |                                      | \$ -  |   |  | 0  | 0   |   |                              |  |

Consequence scoring input by staff

Input Likelihood per ALOS targets



# Inputs to the Risk Assessment Modelling

(Roads Example)

Based on condition information and estimated remaining useful service life

AMONTario Asset Class Performance ALOS Evaluation Sheet

Estimated Likelihood of (Service) Failure

| Supporting Asset Classes | Target Asset Levels of Service (by Asset Class) | Current Asset Levels of Service |                              |     |    |    |    |
|--------------------------|---|---------------------------------|------------------------------|-----|----|----|----|
|                          |   | Asset Class Average             | Distribution by Asset Rating |     |    |    |    |
|                          |   |                                 | %                            | %   | %  | %  | %  |
| HCB Collector Roads      | Condition                                       | Condition                       |                              |     |    |    |    |
|                          | Minimum PCI = 70 (Good)                         | PCI = 60 (Fair)                 | 40                           | 30  | 20 | 10 |    |
|                          |   |                                 |                              |     |    |    |    |
|                          | Performance                                     | Performance                     |                              |     |    |    |    |
|                          | Operational Functionality = Good                | Fair                            | 1                            | 59  | 29 | 11 |    |
|                          | Capacity - Good                                 | Good                            |                              | 100 |    |    |    |
|                          | Environmental Resiliency = Good                 | Poor                            |                              |     | 33 | 50 | 17 |
|                          |   |                                 |                              |     |    |    |    |

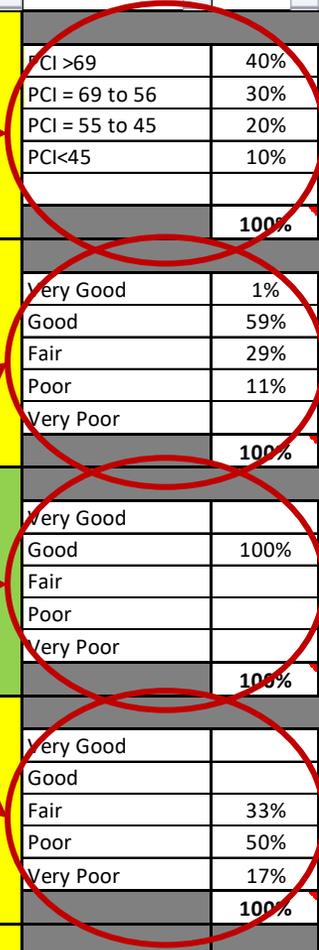
| ALOS | Weightings based on importance to ALOS <sup>4,5</sup> (Optional) | Distribution of Asset Ratings for each ALOS <sup>2,3</sup> |        |        |        |             |      | TOTAL |
|------|--|--|--------|--------|--------|-------------|------|-------|
|      |  | % Very Good  | % Good | % Fair | % Poor | % Very Poor | % NA |       |
| 3    |  | 100  |        |        |        |             |      | 100   |
| 4    |  | 100  |        |        |        |             |      | 100   |
| 5    |  | 50   | 50     |        |        |             |      | 100   |
| 3    |  | 50   | 50     |        |        |             |      | 100   |
| 4    |  |  | 50     | 50     |        |             |      | 100   |
| 2    |  | 40   |        | 60     |        |             |      | 100   |
| 1    |  | 20   | 50     | 30     |        |             |      | 100   |
| 2    |  |  | 100    |        |        |             |      | 100   |
| 5    |  | 50   | 40     | 10     |        |             |      | 100   |
| 3    |  | 100  |        |        |        |             |      | 100   |
| 3    |  | 100  |        |        |        |             |      | 100   |
| 35   |  | 1  | 59     | 29     | 11     | 0           | 0    | 100   |
| 3    |  | Fair   |        |        |        |             |      |       |
| 3    |  | 100  |        |        |        |             |      | 100   |
| 3    |  | 0  | 100    | 0      | 0      | 0           | 0    | 100   |
| 2    |  | Good   |        |        |        |             |      |       |
| 4    |  |  | 20     | 50     | 30     |             |      | 100   |
| 3    |  |  | 50     | 50     |        |             |      | 100   |
| 7    |  |  |        |        |        |             | NA   | N/A   |
| 7    |  | 0  | 0      | 33     | 50     | 17          | 0    | 100   |
| 4    |  |  |        |        |        |             |      | 100   |

# AMONTario Asset Class & ALOS Risk Assessment Model (Roads Example)

| Asset Level of Service Information                     |                                  | Consequences    |                    |           |             |            | Risk Targets      |  | Current State Risk & Financial Analysis |                                |  |   |                    |                                      |   |  |          |
|--|----------------------------------|-----------------|--------------------|-----------|-------------|------------|-------------------|--|---|--------------------------------|--|---|--------------------|--------------------------------------|---|--|----------|
|  |                                  | Health & Safety | Community Services | Financial | Environment | Reputation | Total Consequence | Target Likelihood of Failure (Based on ALOS Targets) | Residual (Target) Risk                  | Current Asset Level of Service | ALOS Distribution within the Asset Class (%) | Current Likelihood of Failure (Based on Current ALOS) | Current State Risk | Variance from Residual (Target) Risk | Estimated Costs to Meet ALOS Targets (Risk Mitigation Costs) (\$,000's) | Risk-Cost Benefit (\$ ,000's per Risk Point Reduced) |          |
| HCB Collector Roads                                    | <b>Condition ALOS #1</b>         | 4               | 3                  | 4         | 2           | 2          | 15                | 2  | 30                                      | PCI >69                        | 40%  | 2   | 30                 | 0.0%                                 |   |  |          |
|  | PCI = 70                         |                 |                    |           |             |            |                   |  |   |                                | PCI = 69 to 56                               | 30%   | 3                  | 45                                   | -33.3%  | \$ 1,000   | \$ 66.67 |
|  | PCI = 70                         |                 |                    |           |             |            |                   |  |   |                                | PCI = 55 to 45                               | 20%   | 4                  | 60                                   | -50.0%  | \$ 2,000   | \$ 67    |
|  | PCI = 70                         |                 |                    |           |             |            |                   |  |   |                                | PCI <45                                      | 10%   | 5                  | 75                                   | -60.0%  | \$ 1,000   | \$ 22    |
|  | PCI = 70                         |                 |                    |           |             |            |                   |  |   |                                |  |   |                    | 0                                    |   |  | \$ -     |
| Average Condition ALOS #1 Risks and Total Costs        |                                  |                 |                    |           |             |            |                   |  |   |                                | 100%   |   | 45                 | -33.3%                               | \$ 4,000  | \$ 267   |          |
| HCB Collector Roads                                    | <b>Performance ALOS #1</b>       | 4               | 4                  | 3         | 1           | 3          | 15                | 2  | 30                                      | Very Good                      | 1%   | 1   | 15                 | 100.0%                               |   | \$ -   |          |
|  | Operational Functionality = Good |                 |                    |           |             |            |                   |  |   |                                | Good   | 59%   | 2                  | 30                                   | 0.0%  |  |          |
|  | Operational Functionality = Good |                 |                    |           |             |            |                   |  |   |                                | Fair   | 29%   | 3                  | 45                                   | -33.3%  | \$ 1,500   | \$ 100   |
|  | Operational Functionality = Good |                 |                    |           |             |            |                   |  |   |                                | Poor   | 11%   | 4                  | 60                                   | -50.0%  | \$ 200   | \$ 7     |
|  | Operational Functionality = Good |                 |                    |           |             |            |                   |  |   |                                | Very Poor                                    |   |                    | 0                                    |   |  | \$ -     |
| ALOS #1 Average Performance Risks and Total Costs      |                                  |                 |                    |           |             |            |                   |  |   |                                | 100%   |   | 38                 | -20.0%                               | \$ 1,700  | \$ 227   |          |
| HCB Collector Roads                                    | <b>Performance ALOS #2</b>       | 2               | 3                  | 2         | 1           | 2          | 10                | 2  | 20                                      | Very Good                      |  |   | 0                  |                                      |   | \$ -   |          |
|  | Capacity = Good                  |                 |                    |           |             |            |                   |  |   |                                | Good   | 100%  | 2                  | 20                                   | 0.0%  |  |          |
|  | Capacity = Good                  |                 |                    |           |             |            |                   |  |   |                                | Fair   |   |                    | 0                                    |   |  | \$ -     |
|  | Capacity = Good                  |                 |                    |           |             |            |                   |  |   |                                | Poor   |   |                    | 0                                    |   |  | \$ -     |
|  | Capacity = Good                  |                 |                    |           |             |            |                   |  |   |                                | Very Poor                                    |   |                    | 0                                    |   |  | \$ -     |
| ALOS #2 Average Performance Risks and Total Costs      |                                  |                 |                    |           |             |            |                   |  |   |                                | 100%   |   | 20                 | 0.0%                                 | \$ -  |  |          |
| HCB Collector Roads                                    | <b>Performance ALOS #3</b>       | 4               | 3                  | 3         | 2           | 3          | 15                | 2  | 30                                      | Very Good                      |  |   | 0                  |                                      |   | \$ -   |          |
|  | Environmental Resiliency = Good  |                 |                    |           |             |            |                   |  |   |                                | Good   |   |                    | 0                                    |   |  | \$ -     |
|  | Environmental Resiliency = Good  |                 |                    |           |             |            |                   |  |   |                                | Fair   | 33%   | 3                  | 45                                   | -33.3%  | \$ 300   | \$ 20    |
|  | Environmental Resiliency = Good  |                 |                    |           |             |            |                   |  |   |                                | Poor   | 50%   | 4                  | 60                                   | -50.0%  | \$ 400   | \$ 13    |
|  | Environmental Resiliency = Good  |                 |                    |           |             |            |                   |  |   |                                | Very Poor                                    | 17%   | 5                  | 75                                   | -60.0%  | \$ 100   | \$ 2     |
| ALOS #3 Average Performance Risks and Total Costs      |                                  |                 |                    |           |             |            |                   |  |   |                                | 100%   |   | 58                 | -47.9%                               | \$ 800  | \$ 29  |          |
| Overall Average Performance ALOS Risks and Total Costs |                                  |                 |                    |           |             |            |                   |  |   |                                |  |   | 38                 | -30.5%                               | \$ 2,500  | \$ 14  |          |

From Pavement Condition Assessments

From the Asset Class Performance Evaluation Sheets



# AMONTario Asset Risk Assessment Model (Road Example)

| Service and Asset Information   |                                  | Consequences    |                    |           |             |            | Risk Targets      |   | Current State Risk & Financial Analysis |                                |  |                    |                                      |   |   |
|---|----------------------------------|-----------------|--------------------|-----------|-------------|------------|-------------------|---|---|--------------------------------|--|--------------------|--------------------------------------|---|---|
| Roads Analysis  |                                  | Health & Safety | Community Services | Financial | Environment | Reputation | Total Consequence | Target Likelihood of Failure<br>(Based on ALOS Targets) | Residual (Target) Risk                  | Current Asset Level of Service | Current Likelihood of Failure<br>(Based on Current ALOS) | Current State Risk | Variance from Residual (Target) Risk | Estimated Costs to Meet ALOS Targets<br>(Risk Mitigation Costs)<br>(\$,000's) | Risk-Cost Benefit<br>(\$ ,000's per Risk point Reduced) |
| Clothier Street<br>Prescott to Sanders                                | Condition ALOS #1                | 4               | 3                  | 4         | 2           | 2          | 15                |   |   |                                |  |                    |                                      |   |   |
|   | PCI = 70                         |                 |                    |           |             |            |                   | 2   | 30                                      | PCI = 60                       | 3  | 45                 | -33.3%                               | \$ 300  | \$ 20   |
|   | Condition ALOS #1                |                 |                    |           |             |            | 0                 |   |   |                                |  |                    |                                      |   |   |
|   |                                  |                 |                    |           |             |            | 0                 |   |   |                                |  |                    |                                      |   |   |
|   | Average Condition Risk and Costs |                 |                    |           |             |            |                   |   | 30                                      |                                |  | 45                 | -33.3%                               | \$ 300  | \$ 20   |
|   | Performance ALOS #1              | 4               | 4                  | 3         | 1           | 3          | 15                |   |   |                                |  |                    |                                      |   |   |
|   | Operational Functionality = Good |                 |                    |           |             |            |                   | 2   | 30                                      | Fair                           | 3  | 45                 | -33.3%                               | \$ 350  | \$ 23   |
|   | Performance ALOS #2              | 2               | 3                  | 2         | 1           | 2          | 10                |   |   |                                |  |                    |                                      |   |   |
|   | Capacity = Good                  |                 |                    |           |             |            |                   | 2   | 20                                      | Good                           | 2  | 20                 | 0.0%                                 |   |   |
|   | Performance ALOS #3              | 5               | 4                  | 4         | 2           | 3          | 18                |   |   |                                |  |                    |                                      |   |   |
|   | Environmental Resiliency = Good  |                 |                    |           |             |            |                   | 2   | 36                                      | Poor                           | 4  | 72                 | -50.0%                               | \$ 175  | \$ 5  |
|   | Performance ALOS #4              |                 |                    |           |             |            | 0                 |   |   |                                |  |                    |                                      |   |   |
|   |                                  |                 |                    |           |             |            | 0                 |   |   |                                |  |                    |                                      |   |   |
| Average ALOS Performance Risks and Total Costs                        |                                  |                 |                    |           |             |            |                   | 29  |   |                                | 46   | -37.2%             |                                      | \$ -  |   |
| Combined Average Condition and Performance ALOS Risks and Total Costs |                                  |                 |                    |           |             |            |                   | 29  |   |                                | 45   | -35.3%             | \$ 825                               | \$ 52   |   |

Derived from the Asset Performance ALOS Evaluations

Derived from Pavement Condition Assessments



# AMONTario Asset Performance ALOS Evaluation (Partial listing)

Inputs to the AMONTario  
Asset Risk Assessment  
Model

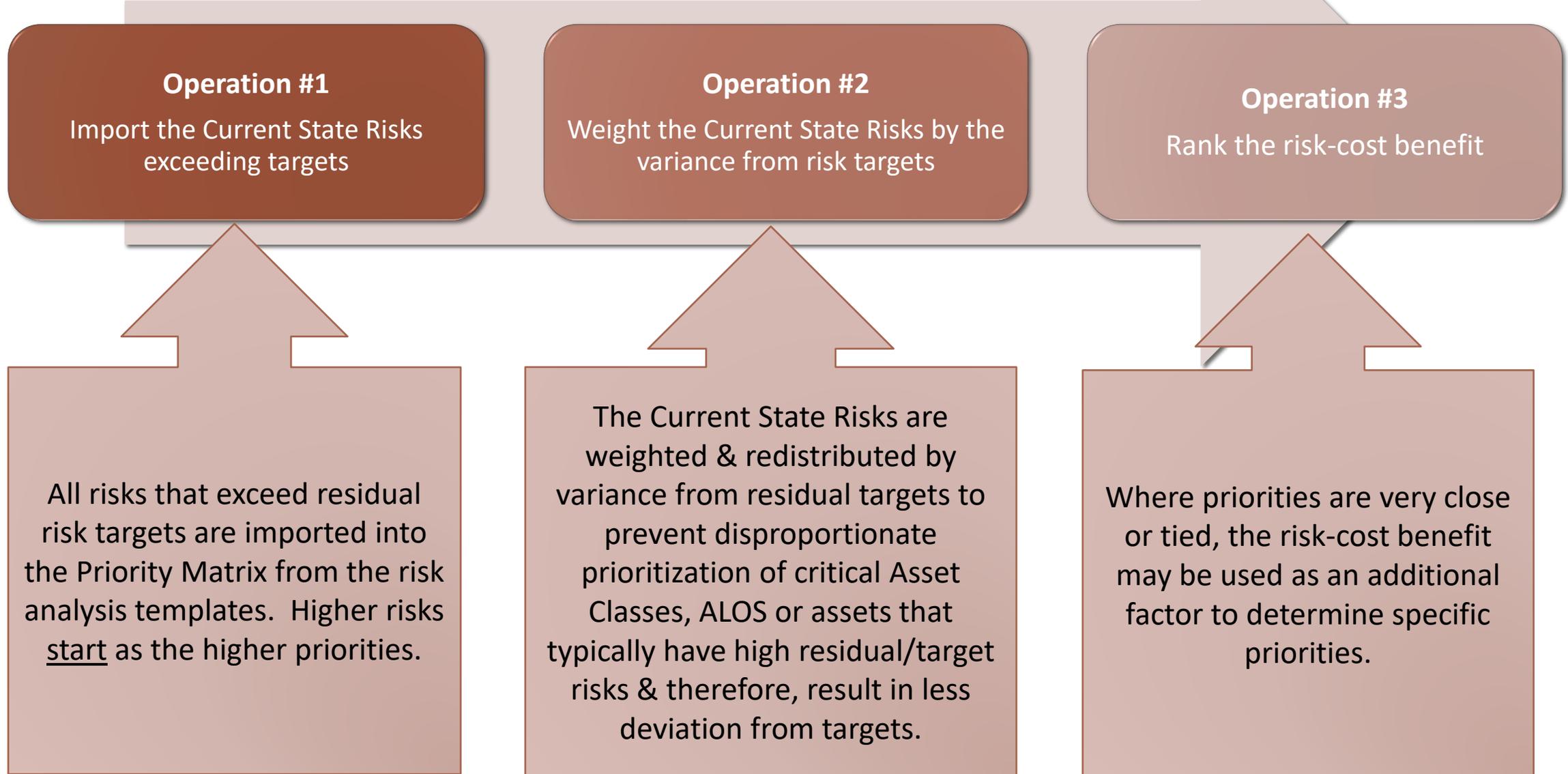
| Asset Types <sup>6</sup>                                   | ALOS   | Context for Evaluating Performance Criteria <sup>1</sup>  | Criteria to Support Proposed ALOS Target <sup>1</sup><br>(where information is available)   | Weightings based on importance to ALOS <sup>2,3</sup><br>(Optional)   | Asset Ratings for each ALOS <sup>4</sup>   | TOTAL    |             |          |
|--|--|---|---|---|--|----------|-------------|----------|
| Roads Sections<br>(All pavement and roadside environments) | Operational Functionality  | <ul style="list-style-type: none"> <li>- Efficiency and effectiveness of service delivery</li> <li>- Ability to meet minimum current design and/or safety requirements</li> <li>- Level of operational problems experienced and whether they affect community services.</li> <li>- Compliance with current Regulations and/or Standards (including the level of "grandfathering")</li> <li>- Whether all required elements are present.</li> <li>- Relevance and effectiveness of technology</li> </ul> | - Appropriate speed limits  | 3   | Good   | 2        |             |          |
|  |  |   | - Suitable road surface material type for traffic volumes, loadings and posted speeds   | 4   | Good   | 2        |             |          |
|  |  |   | - Sufficient road platform (pavement surface and shoulder width) to accommodate current traffic volumes and posted speeds (not related to capacity) | 5   | Fair   | 3        |             |          |
|  |  |   | - Adequate road structural capacity to accommodate traffic volumes and loading  | 3   | Fair   | 3        |             |          |
|  |  |   | - Adequate elevation and drainage to prevent seasonal and/or reoccurring flooding   | 4   | Fair   | 3        |             |          |
|  |  |   | - Roadway flooding during major storm events limited to criteria per MOE Stormwater Planning and Design Manual                                      | 2   | Good   | 2        |             |          |
|  |  |   | - Adequate embankment erosion control   | 1   | Fair   | 3        |             |          |
|  |  |   | - Adequate ditches design and function (properly graded, clear and free flowing with no blockages or erosion problems)                              | 2   | Fair   | 3        |             |          |
|  |  |   | - Appropriate geometric designs and sightlines for posted speeds (vertical and horizontal alignments)   | 5   | Fair   | 3        |             |          |
|  |  |   | - Adequate quantity, design and placement of roadside safety devices/protection   | 3   | Good   | 2        |             |          |
|  |  |   | - Maintenance is fully compliant with the "Minimum Maintenance Standards for Municipal Highways" (O.Reg 388/18)                                     | 3   | Good   | 2        |             |          |
|  |  |   | <b>Average Operational Functionality ALOS Rating</b>  |   |  | <b>3</b> | <b>Fair</b> | <b>3</b> |
|  |  |   | Capacity to Meet Demands  | <ul style="list-style-type: none"> <li>- To what degree capacity satisfies current demands and minimum community service levels</li> <li>- Level of operational problems experienced</li> <li>- Are there noticeable negative affects on community service levels or stakeholders (residents and businesses)</li> </ul> | - Sufficient number of lanes along each road segment to accommodate peak traffic volumes | 3        | Good        | 2        |
|  | - Other  |   |   |   |  |          |             |          |
| <b>Average Capacity to Meet Demands ALOS Rating</b>        |  |   | <b>3</b>  | <b>Good</b>   | <b>2</b>   |          |             |          |
| Environmental Resiliency                                   | <ul style="list-style-type: none"> <li>- To what extent the assets are resilient to environmental stresses; e.g. impacts from wind, fire, flooding, excessive rainfall/snowfall etc..</li> <li>- To what extent the assets are resilient to climate change.</li> </ul> | - Adequate protection from storms per municipal design requirements or with 5-year return periods (per O.Reg 588/17); whichever is greater  | 4   | Poor  | 4  |          |             |          |
|  |  | - Adequate erosion protection   |   |   |  |          |             |          |
| <b>Average Environmental Resiliency ALOS Rating</b>        |  |   | <b>4</b>  | <b>Poor</b>   | <b>4</b>   |          |             |          |



# The AMONTario Risk Prioritization Models



# How the AMONTario Risk Prioritization Models Work



# AMONTario Risk Priority Model – Corporate ALOS Priorities (Partial Listing)

| Asset          | ALOS Type | Asset Level of Service Statements & Targets    | Current ALOS   | Current State Risk | Current State Risk Ranking (Higher Risk = Higher Ranking #) | Variance from Residual (Target) Risk | Risk Variance Weightings        |                                       |                                 | Weighted Score | Risk Priority Ranking (Lower Number = Higher Priority) | Estimated Costs to Meet ALOS Targets (Risk Mitigation Costs) (\$,000's) | Risk-Cost Benefit (\$,000's per Risk Point Reduced) | Risk-Cost Benefit Ranking (Lower Number = Higher Benefit) |
|----------------|-----------|--|----------------|--------------------|---|--------------------------------------|---------------------------------|---------------------------------------|---------------------------------|----------------|--|---|---|---|
|                |           |  |                |                    |   |                                      | Risk Variance Weighting: > -50% | Risk Variance Weighting: -50% to -35% | Risk Variance Weighting: < -35% |                |  |   |   |   |
| HCB Pavement   | C         | PCI = 70                                       | PCI = 59 to 40 | 45                 | 23  | -33.3%                               | 0                               | 0                                     | 23                              | 23             | 22   | \$ 3,000  | \$ 200  | 42  |
| HCB Pavement   | P         | Operational Functionality = Good               | Fair           | 45                 | 23  | -33.3%                               | 0                               | 0                                     | 23                              | 23             | 22   | \$ 1,500  | \$ 100  | 39  |
| HCB Pavement   | P         | Operational Functionality = Good               | Poor           | 60                 | 38  | -50.0%                               | 0                               | 38                                    | 0                               | 76             | 6  | \$ 200  | \$ 7  | 20  |
| HCB Pavement   | P         | Environmental Resiliency = Good                | Fair           | 54                 | 35  | -33.3%                               | 0                               | 0                                     | 35                              | 35             | 15   | \$ 300  | \$ 17   | 23  |
| HCB Pavement   | P         | Environmental Resiliency = Good                | Poor           | 72                 | 43  | -50.0%                               | 0                               | 43                                    | 0                               | 86             | 3  | \$ 400  | \$ 11   | 22  |
| HCB Pavement   | P         | Environmental Resiliency = Good                | Very Poor      | 90                 | 45  | -60.0%                               | 45                              | 0                                     | 0                               | 135            | 1  | \$ 100  | \$ 2  | 6   |
| LCB Pavement   | C         | PCI = 70                                       | PCI = 59 to 40 | 42                 | 18  | -33.3%                               | 0                               | 0                                     | 18                              | 18             | 27   | \$ 550  | \$ 39   | 31  |
| LCB Pavement   | P         | Operational Functionality = Good               | Fair           | 39                 | 12  | -33.3%                               | 0                               | 0                                     | 12                              | 12             | 32   | \$ 500  | \$ 38   | 30  |
| LCB Pavement   | P         | Operational Functionality = Good               | Poor           | 52                 | 32  | -50.0%                               | 0                               | 32                                    | 0                               | 64             | 10   | \$ 600  | \$ 23   | 25  |
| LCB Pavement   | P         | Environmental Resiliency = Good                | Fair           | 48                 | 28  | -33.3%                               | 0                               | 0                                     | 28                              | 28             | 19   | \$ 300  | \$ 19   | 24  |
| Gravel         | C         | Surface Score = 70 (GCI)                       | GCI = 59 to 40 | 39                 | 12  | -33.3%                               | 0                               | 0                                     | 12                              | 12             | 32   | \$ 300  | \$ 23   | 25  |
| Gravel         | C         | Surface Score = 70 (GCI)                       | GCI = 59 to 20 | 52                 | 32  | -50.0%                               | 0                               | 32                                    | 0                               | 64             | 10   | \$ 100  | \$ 4  | 15  |
| Gravel         | P         | Operational Functionality = Good               | Fair           | 30                 | 3   | -33.3%                               | 0                               | 0                                     | 3                               | 3              | 38   | \$ 100  | \$ 10   | 21  |
| Gravel         | P         | Operational Functionality = Good               | Poor           | 40                 | 16  | -50.0%                               | 0                               | 16                                    | 0                               | 32             | 16   | \$ 700  | \$ 35   | 29  |
| Gravel         | P         | Environmental Resiliency = Good                | Fair           | 39                 | 12  | -33.3%                               | 0                               | 0                                     | 12                              | 12             | 32   | \$ 50   | \$ 4  | 15  |
| Bridges        | C         | BCI = 70                                       | BCI = 59 to 40 | 63                 | 40  | -33.3%                               | 0                               | 0                                     | 40                              | 40             | 14   | \$ 1,500  | \$ 71   | 38  |
| Bridges        | C         | BCI = 70                                       | BCI = 59 to 20 | 84                 | 44  | -50.0%                               | 0                               | 44                                    | 0                               | 88             | 2  | \$ 2,000  | \$ 40   | 35  |
| Bridges        | P         | Operational Functionality = Good               | Fair           | 48                 | 28  | -33.3%                               | 0                               | 0                                     | 28                              | 28             | 19   | \$ 450  | \$ 28   | 27  |
| Bridges        | P         | Operational Functionality = Good               | Poor           | 64                 | 41  | -50.0%                               | 0                               | 41                                    | 0                               | 82             | 5  | \$ 100  | \$ 3  | 11  |
| Bridges        | P         | Capacity = Good                                | Fair           | 42                 | 18  | -33.3%                               | 0                               | 0                                     | 18                              | 18             | 27   | \$ 600  | \$ 43   | 33  |
| Bridges        | P         | Environmental Resiliency = Good                | Fair           | 48                 | 28  | -33.3%                               | 0                               | 0                                     | 28                              | 28             | 19   | \$ 2,500  | \$ 156  | 40  |
| Major Culverts | C         | BCI = 70                                       | BCI = 59 to 40 | 51                 | 31  | -33.3%                               | 0                               | 0                                     | 31                              | 31             | 18   | \$ 1,000  | \$ 59   | 37  |
| Major Culverts | C         | BCI = 70                                       | BCI = 39 to 20 | 68                 | 42  | -50.0%                               | 0                               | 42                                    | 0                               | 84             | 4  | \$ 1,500  | \$ 44   | 34  |
| Major Culverts | P         | Operational Functionality = Good               | Fair           | 42                 | 18  | -33.3%                               | 0                               | 0                                     | 18                              | 18             | 27   | \$ 550  | \$ 39   | 31  |
| Major Culverts | P         | Operational Functionality = Good               | Poor           | 56                 | 36  | -50.0%                               | 0                               | 36                                    | 0                               | 72             | 8  | \$ 100  | \$ 4  | 14  |
| Major Culverts | P         | Capacity = Good                                | Poor           | 56                 | 36  | -50.0%                               | 0                               | 36                                    | 0                               | 72             | 8  | \$ 1,500  | \$ 54   | 36  |
| Major Culverts | P         | Environmental Resiliency = Good                | Fair           | 45                 | 23  | -33.3%                               | 0                               | 0                                     | 23                              | 23             | 22   | \$ 2,500  | \$ 167  | 41  |
| Major Culverts | P         | Resilient to a 5-year storm = Good (80% - 90%) | Fair           | 45                 | 23  | -33.3%                               | 0                               | 0                                     | 23                              | 23             | 22   |   |   |   |
| Major Culverts | P         | Resilient to a 5-year storm = Good (80% - 90%) | Poor           | 60                 | 38  | -50.0%                               | 0                               | 38                                    | 0                               | 76             | 6  |   |   |   |
| Sidewalks      | C         | "Good"   | Fair           | 33                 | 10  | -33.3%                               | 0                               | 0                                     | 10                              | 10             | 37   | \$ 35   | \$ 3  | 12  |
| Sidewalks      | C         | "Good"   | Poor           | 44                 | 22  | -50.0%                               | 0                               | 22                                    | 0                               | 44             | 13   | \$ 70   | \$ 3  | 12  |

Weighting Factors

Highest Corporate ALOS Priority

Lowest Corporate ALOS Priority

Includes only the ALOS & Risks not meeting targets



# AMONTario Risk Priority Model – Corporate Asset Class Priorities

| Asset Information |   | Current State Risk | Current State Risk Ranking<br>(Higher Risk = Higher #) | Variance from Residual (Target) Risk | Risk Variance Weightings           |  |                                    | Weighted Score | Risk Priority Ranking<br>(Lower Number = Higher Priority) |
|-------------------|---|--------------------|--|--------------------------------------|------------------------------------|--|------------------------------------|----------------|---|
|                   |   |                    |  |                                      | Risk Variance Weighting:<br>> -50% | Risk Variance Weighting:<br>-50% to -25% | Risk Variance Weighting:<br>< -25% |                |   |
|                   |   |                    |  |                                      | 3                                  | 2  | 1                                  |                |   |
| Bridges           | Combined Average Condition & Performance ALOS Risks and Total Costs | 38                 | 4  | -4.2%                                | 0                                  | 0  | 4                                  | 4              | 2   |
| Major Culverts    | Combined Average Condition & Performance ALOS Risks and Total Costs | 39                 | 5  | -18.9%                               | 0                                  | 0  | 5                                  | 5              | 1   |
| Sidewalks         | Combined Average Condition & Performance ALOS Risks and Total Costs | 30                 | 2  | -29.8%                               | 0                                  | 2  | 0                                  | 4              | 2   |
| Parking Lots      | Combined Average Condition & Performance ALOS Risks and Total Costs | 24                 | 1  | -20.2%                               | 0                                  | 0  | 1                                  | 1              | 5   |
| Street Lights     | Combined Average Condition & Performance ALOS Risks and Total Costs | 31                 | 3  | -8.4%                                | 0                                  | 0  | 3                                  | 3              | 4   |

Includes only the Asset Classes not meeting risk targets

Highest Corporate Asset Class Priority

Lowest Corporate Asset Class Priority



# Questions



# Municipality of North Grenville



# NORTH GRENVILLE

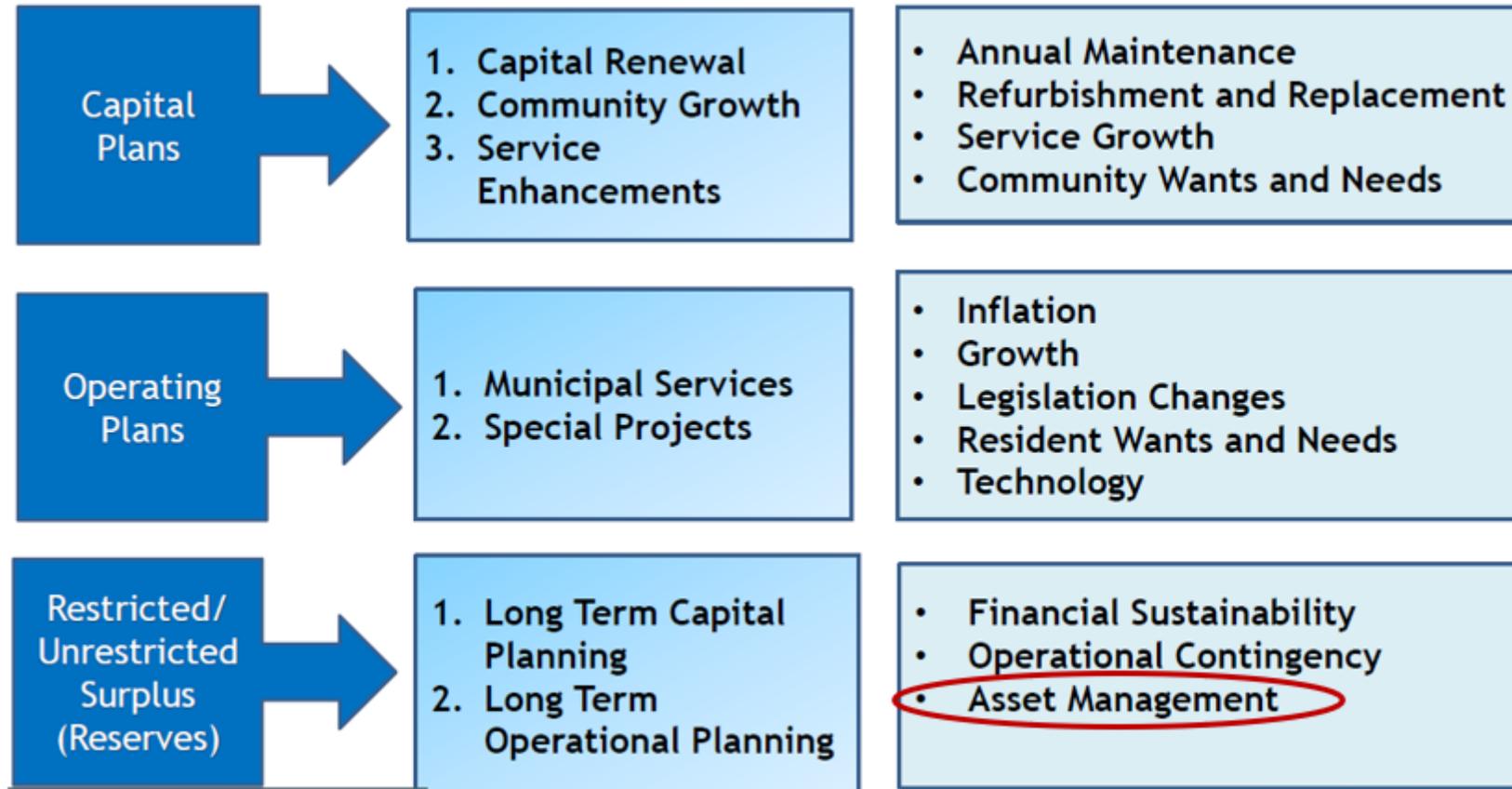


## *Asset Management (AM)*

2021

Brad Brookman,  
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# Municipality of North Grenville Risk Management Domain



# Tangible Capital Assets – Enterprise Level

The TCA process provides important tools for capital planning:

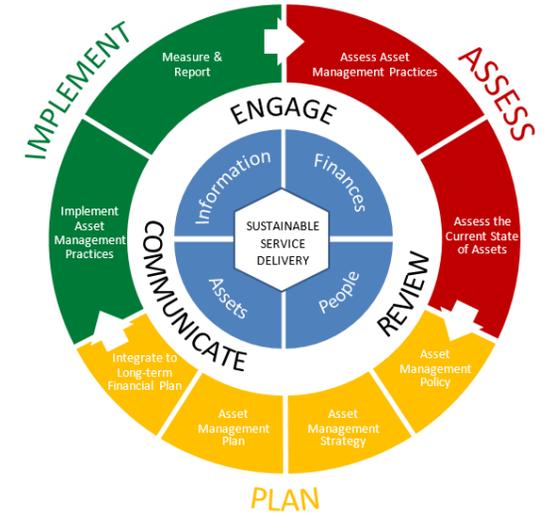
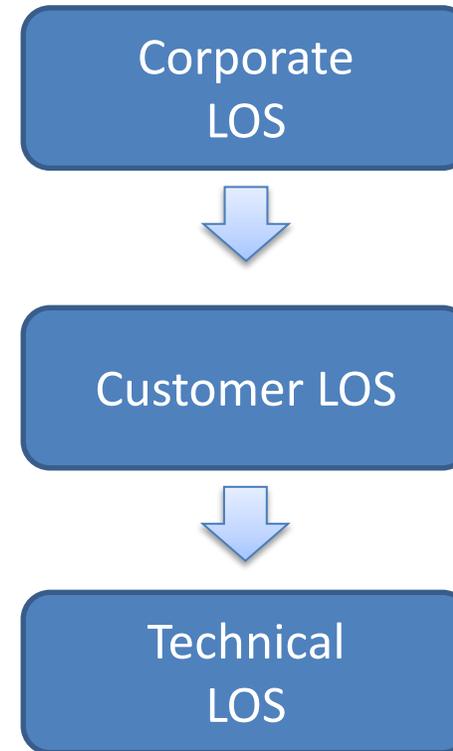
- Identification and Inventory of Assets
- Asset Groupings
- Accumulated Amortization on Assets
  - \*An often-ignored risk indicator
- Planning for Repairs, Maintenance, Replacements, Expansion and Improvements



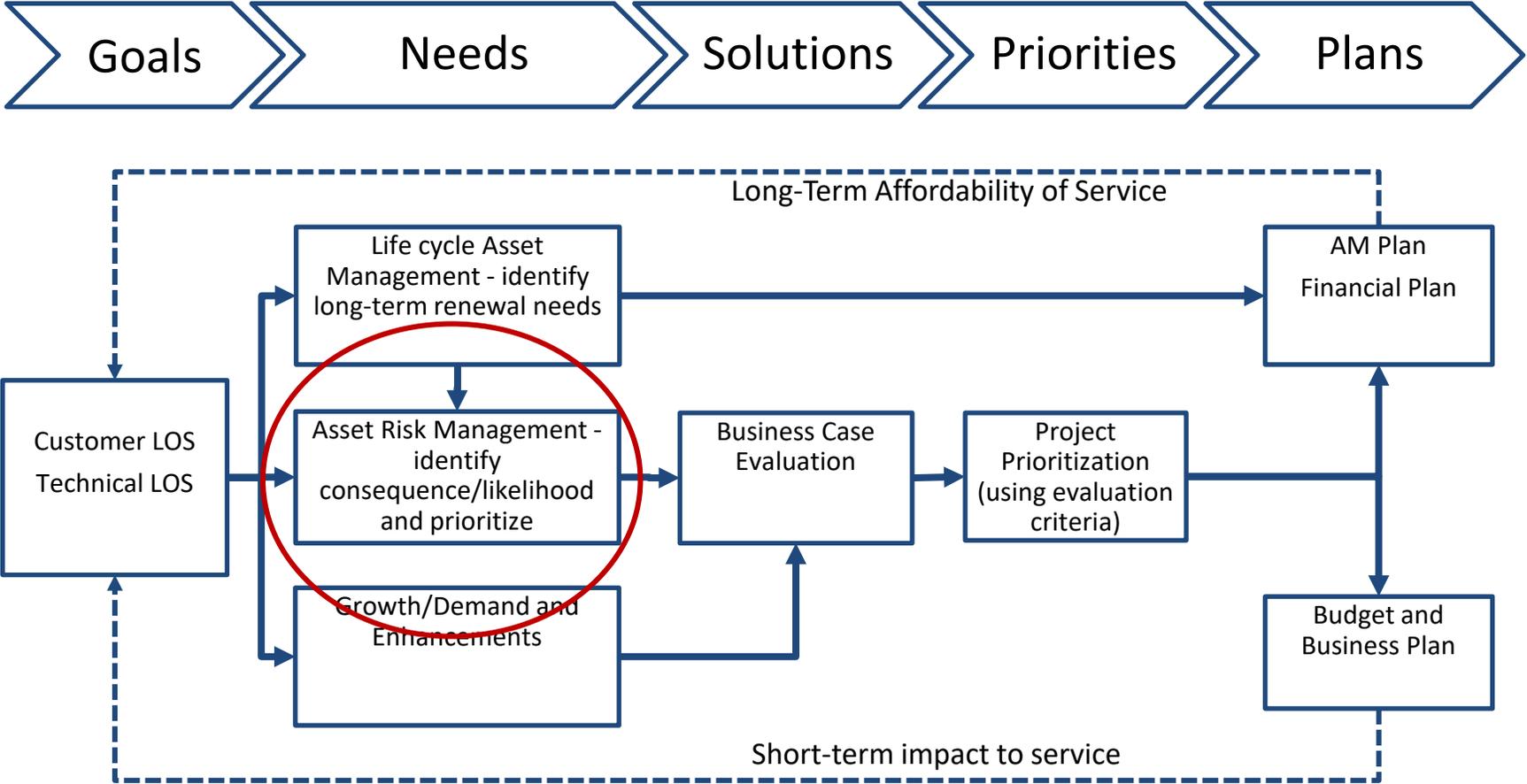
# Levels of Service

*Service Delivery to Customers* is a key principle and requires a definition of Levels of Service at different levels:

- Corporate LOS = ‘why we’re here’
  - High-level, statements
  
- Customer LOS = ‘what the customer gets’
  - Written in language that the customer understands
  
- Technical LOS = ‘what we do’
  - Things about assets / activities we measure



# Decision Making Process



# Application of Consequence Criteria

Municipality of North Grenville

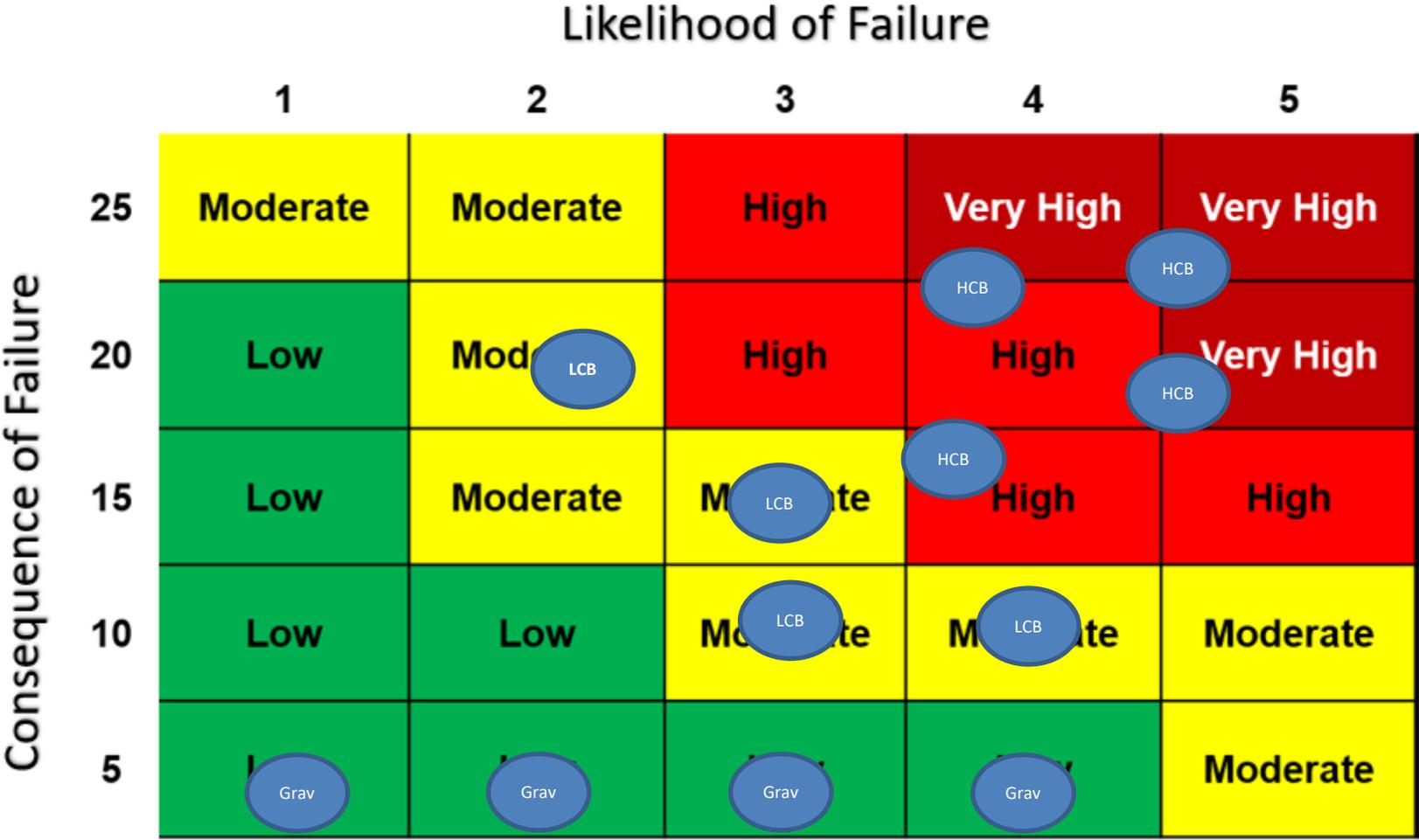
## 4.4.2.4 Roads

The consequence of failure for roads is based on the road classification as this is directly related to traffic volumes and number of people affected (Table 71).

Table 71: Consequence of failure – Roads

| Type of road | Consequence of failure |
|--------------|------------------------|
| Gravel       | Score of 1             |
| LCB          | Score of 3             |
| HCB          | Score of 5             |

# Importance of defining your criteria when applying your risk model



| Risk Ratings |         |
|--------------|---------|
| Level        | Range   |
| Low          | <21     |
| Medium       | 21 - 59 |
| High         | 60 - 99 |
| Very High    | > 99    |
| Criticality  |         |
| Level        | Range   |
| Low          | <11     |
| Medium       | 11 - 15 |
| High         | 16 - 20 |
| Very High    | > 20    |

# Questions?

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