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Building Climate Resilience with Asset Management

Infrastructure Asset Management Alberta (IAMA)

June 16, 2021

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Risk and Opportunity

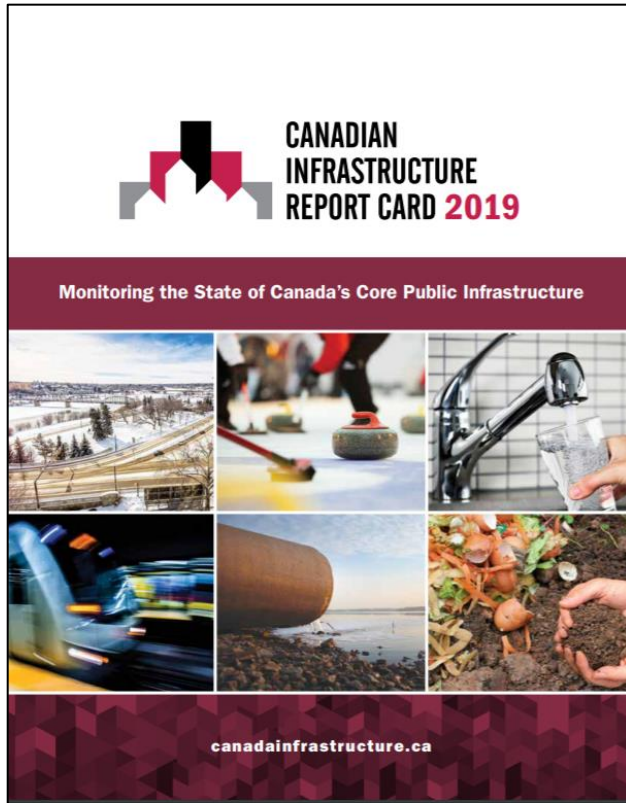
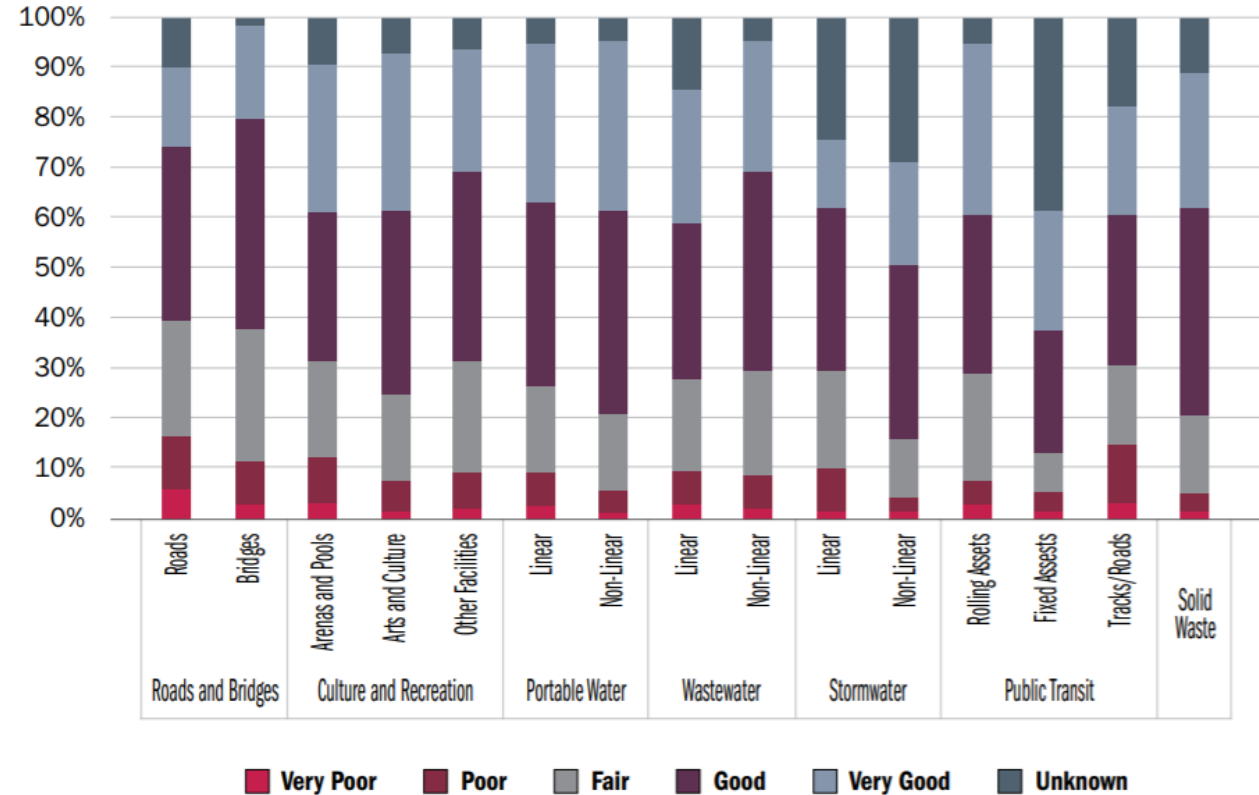
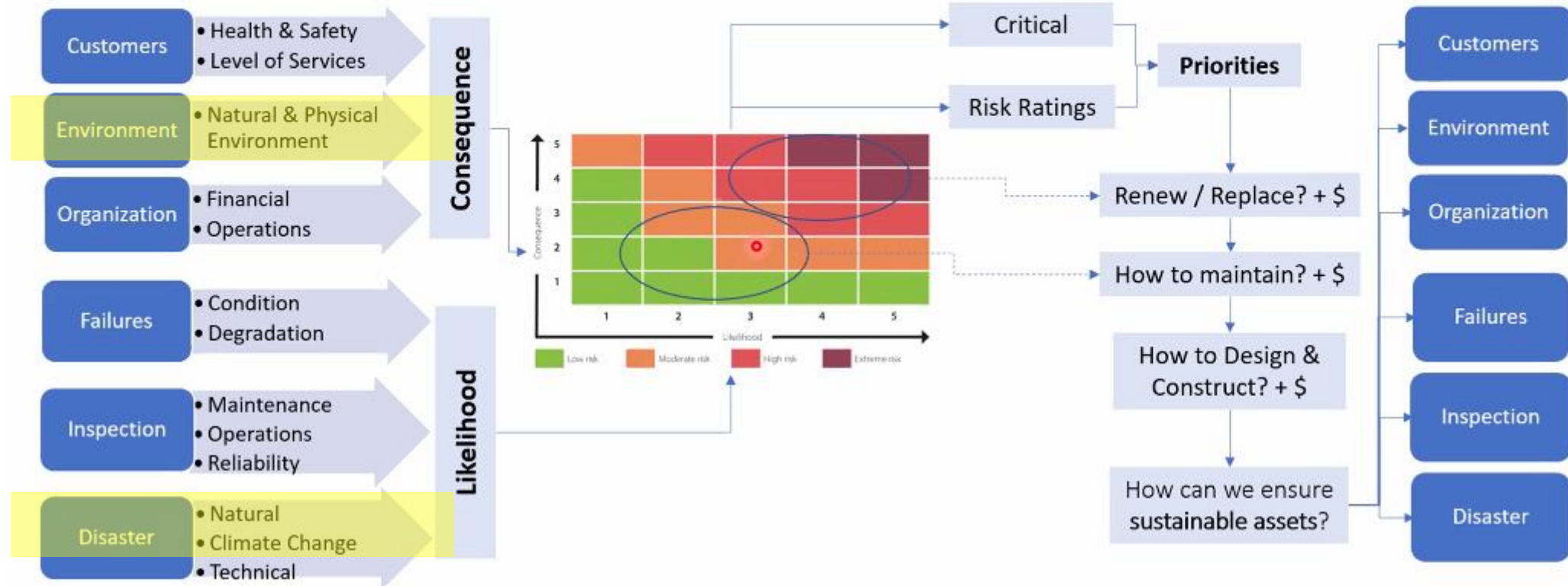


Figure 1: Core Infrastructure Asset Condition Summary

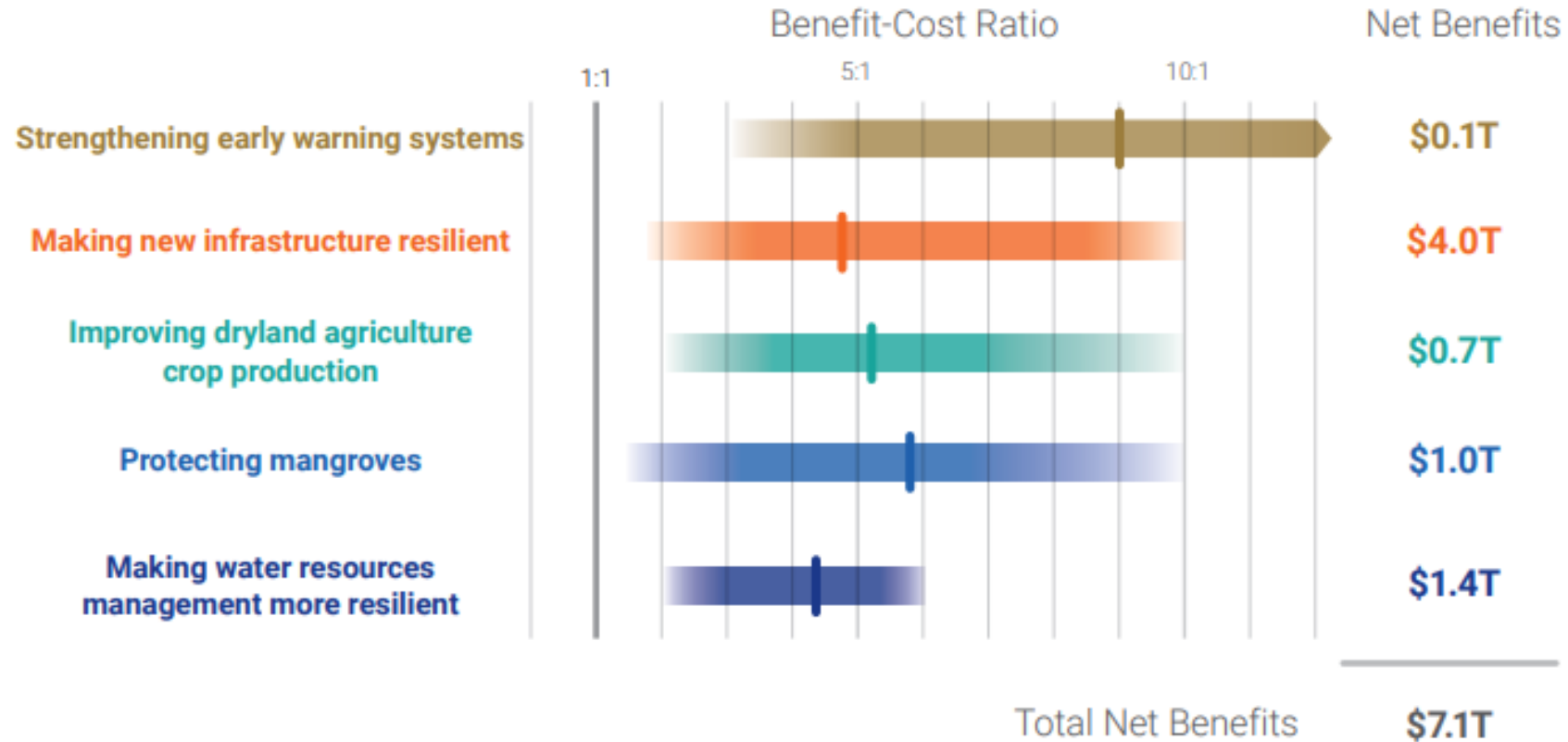


Climate is Part of Enterprise Risk

Risk Assessment Matrix – Sustainable assets



Pay Now, Save Later

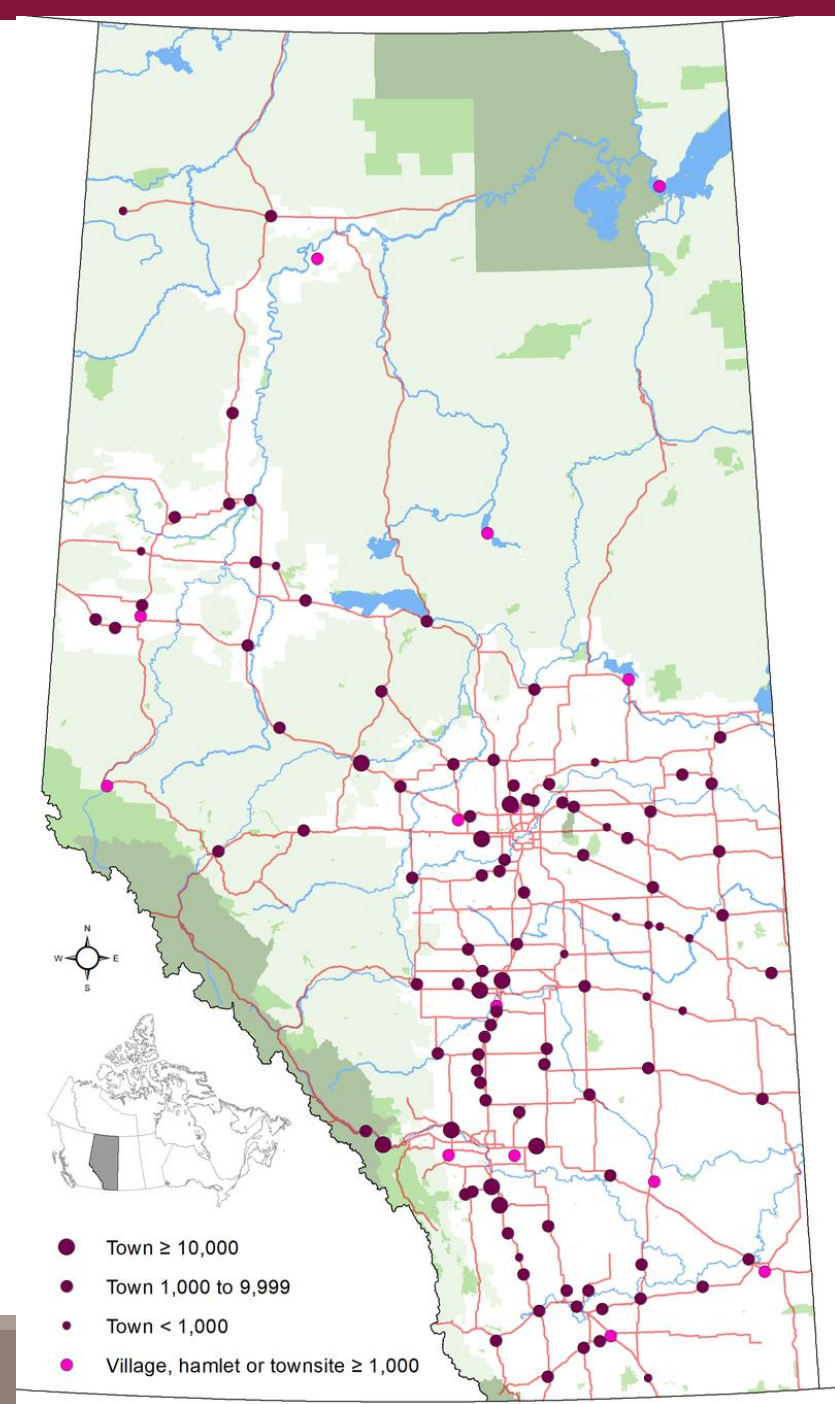


Infrastructure climate resilience investments have an average ROI of between 4:1 to 6:1 compared to paying for recovery

Risk Cannot be Inferred by Condition Alone



“But I don’t live on a river”

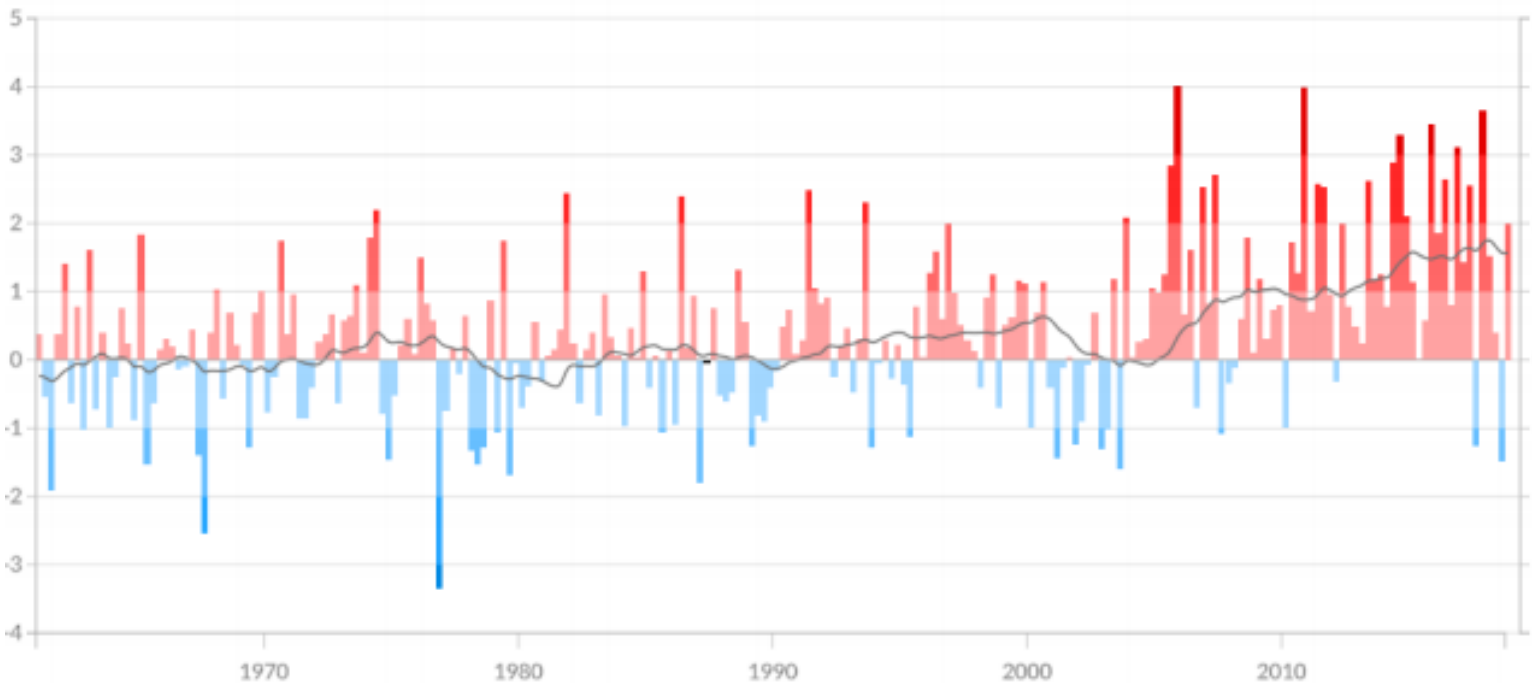


The June 13 Alberta storm that hit Calgary, Airdrie, Rocky View County is now officially the **worst hailstorm in Canadian history**, causing almost **\$1.2 billion in insured damages**, according to Catastrophe Indices and Quantification Inc. (CatIQ).

And on the all-time list of Top 10 disasters, “this event was the **fourth-most-expensive insured natural disaster in Canadian history**,”

Changing Nature of Flood Risk

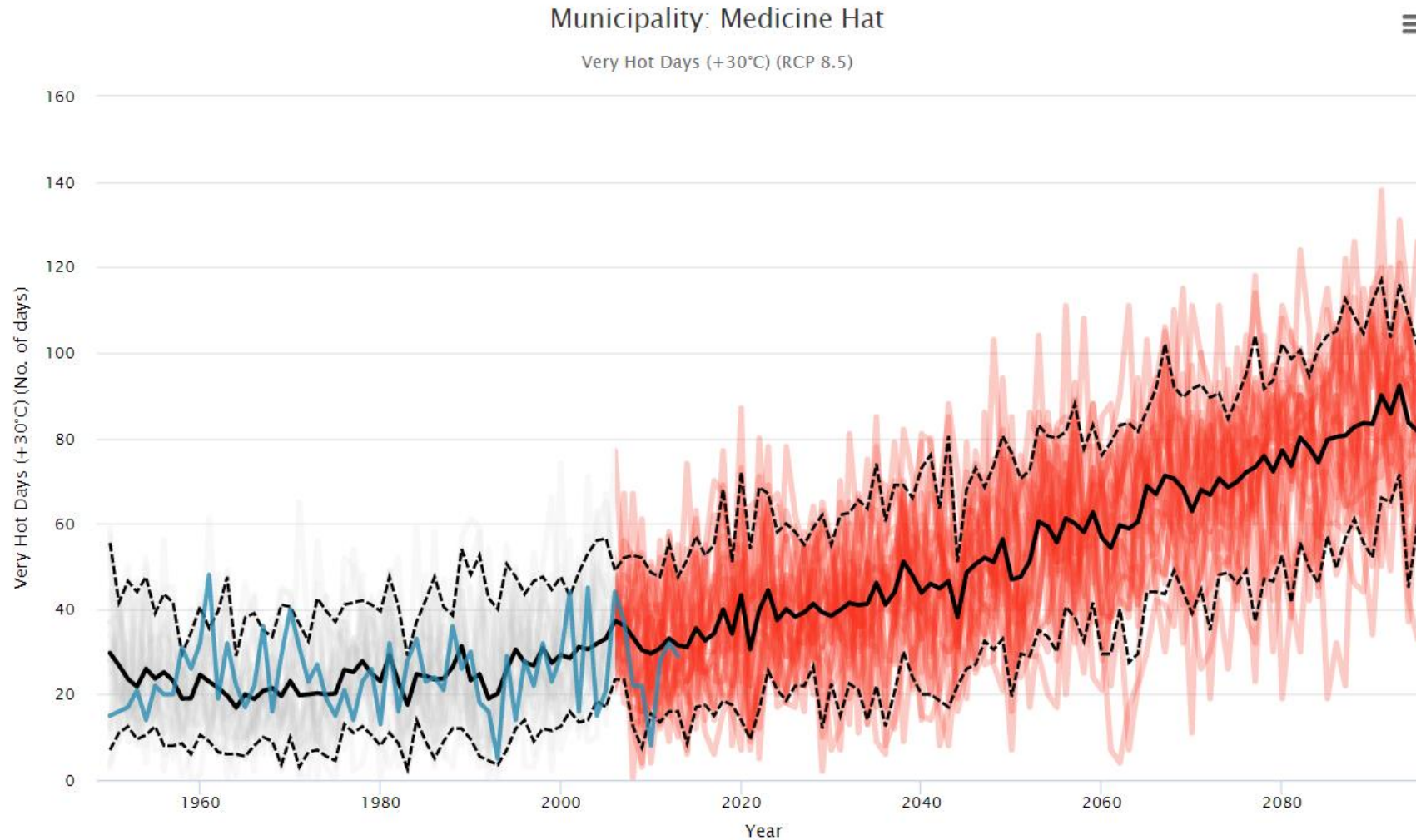
Chart 2 – Extreme Precipitation Index for Canada



(Source: Actuaries Climate Index – <http://actuariesclimateindex.org/explore/regional-graphs/>)

- Overland flood risk accelerating more rapidly than riverine flood risk.
- More municipal lawsuits tied to overland flooding and sewer backup.
- Average cost of a flooded basement in Canada: \$43,000.
- Credit rating analysis of municipal bonds likely to reflect local flood resilience initiatives

Warm Days Ahead



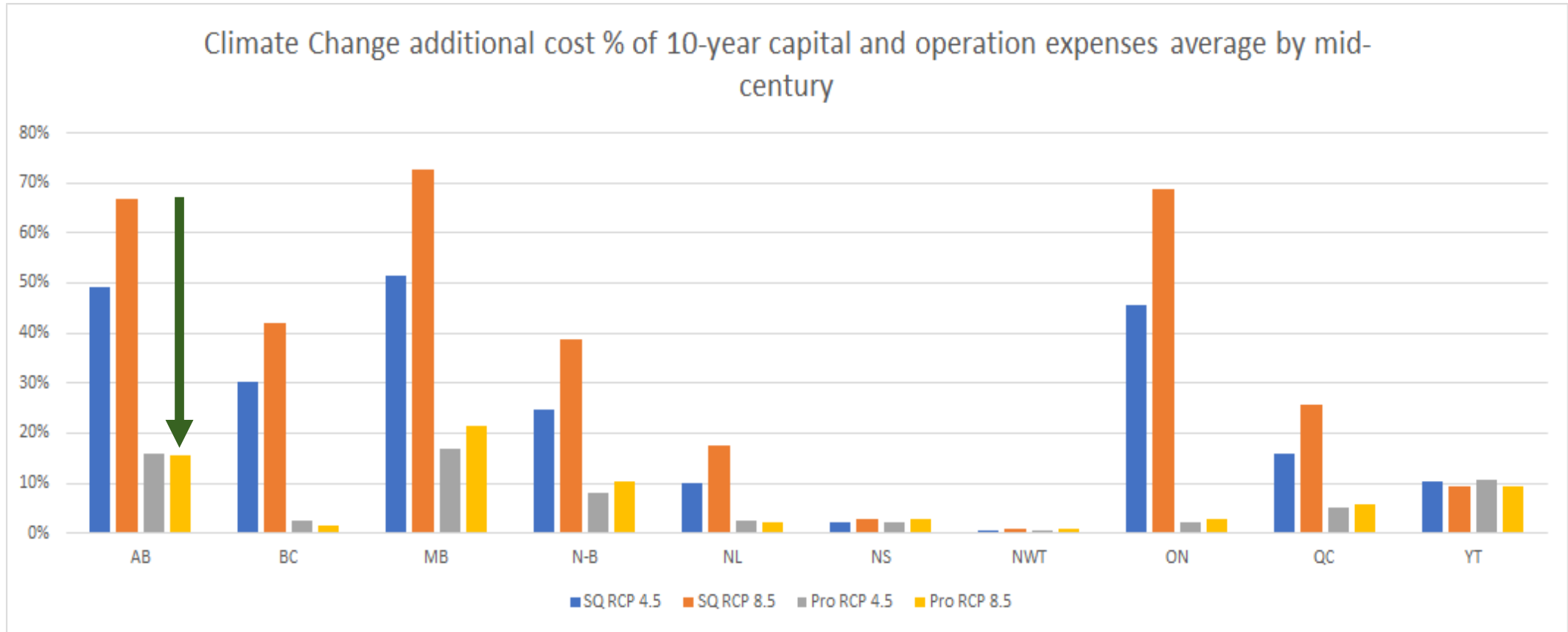
Transport infrastructure - Results

Costs could approach \$5 billion/year in a low emissions future and \$10 billion/year in a high emissions future, doubling the annual investment required to maintain Canada's road network

TABLE 3-19. AVERAGE ANNUAL UNDISCOUNTED CLIMATE CHANGE COSTS FOR ROADS BY PROVINCE/TERRITORY AND ERA (MILLIONS OF 2015 CAD\$)

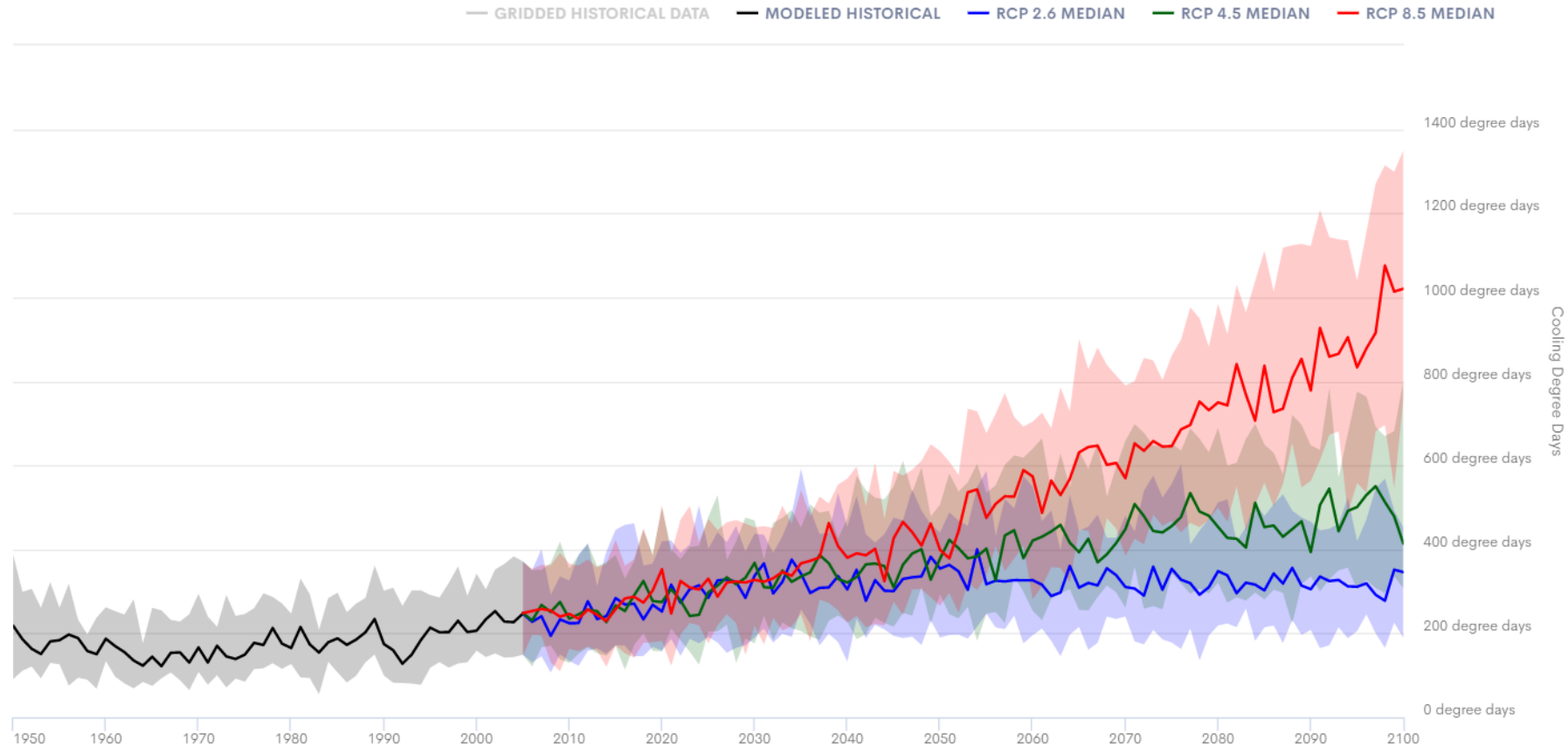
Province/Territory	Status Quo			
	2040-2069		2070-2099	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
Alberta	\$553.4	\$750.3	\$698.9	\$1,580.4
British Columbia	\$295.8	\$412.6	\$420.2	\$915.9
Manitoba	\$162.3	\$228.6	\$253.4	\$582.0
New Brunswick	\$71.5	\$112.2	\$97.6	\$255.8
Newfoundland and Labrador	\$16.0	\$28.3	\$21.1	\$65.7
Northwest Territories	\$6.0	\$8.5	\$9.3	\$20.6
Nova Scotia	\$47.6	\$76.8	\$64.4	\$154.7
Nunavut	\$0.5	\$0.8	\$0.7	\$1.4
Ontario	\$460.0	\$693.0	\$679.1	\$1,509.9
Prince Edward Island	\$45.6	\$60.7	\$56.8	\$103.6
Quebec	\$417.7	\$679.0	\$610.4	\$1,574.2
Saskatchewan	\$160.2	\$214.5	\$202.1	\$447.0
Yukon	\$5.4	\$4.8	\$3.2	\$18.1
TOTAL	\$2,242.0	\$3,270.0	\$3,117.1	\$7,229.3

It Pays to be Proactive



For RCP 8.5, proactive adaptation can reduce average annual costs by \$118 million by 2080s – 98% relative to status quo

Insulation Pays Double



Cooling degree days give an indication of the amount of air conditioning that may be required to maintain comfortable conditions in a building during warmer months. A threshold temperature of 18°C is used and for any day when the mean temperature exceeds this value, cooling degree days are accrued.

Duty of Care



Quebec tends to record heatwave-related deaths most years, while other provinces do not.

The difference isn't Montreal being hotter or having less access to space cooling, it's coroner recording of heat comorbidities.

Infrastructure decisions that mitigate the urban heat island effect can reduce public health risk of heat.

Green is the New Grey

- Natural infrastructure, in certain contexts, can provide services at a lower cost than engineered assets
- A restored and engineered wetland in Manitoba that provides \$3.7 million annually in flood reduction, water quality improvement, carbon sequestration benefits
- A creek and floodplain are in Oshawa valued between \$392 million and \$414 million.



Infrastructure Systems are Interdependent

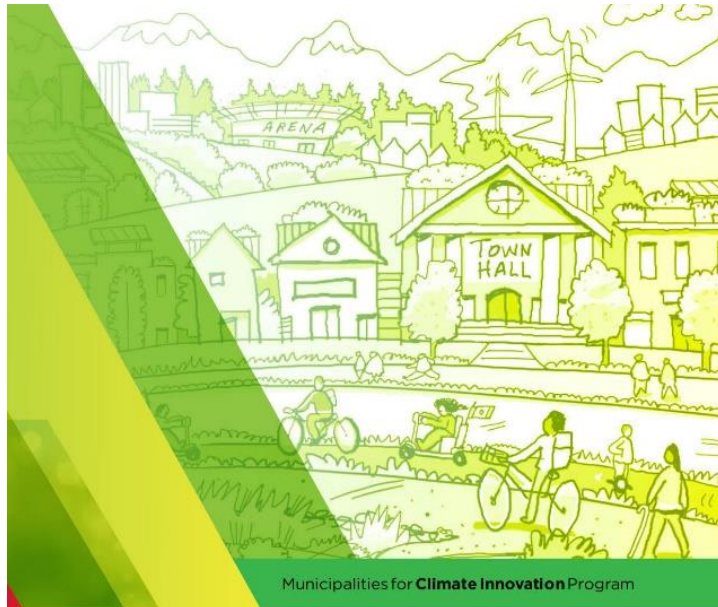


Spring 2017

AECOM



Learning Journey: Climate and Asset Management



Municipalities for Climate Innovation Program

Guide for Integrating Climate Change Considerations into Municipal Asset Management



CONSIDERING CLIMATE CHANGE IN RISK MANAGEMENT

Our communities are becoming increasingly vulnerable from the hazards posed by a changing climate. The ways in which a community is vulnerable depend on factors such as the services provided, local industry, population, historical planning decisions, community health, area, and geographic location. Municipalities provide a wide variety of services that support the people, the future, and the environmental health of communities. New hazards as a result of changes to our climate have begun impacting the way municipalities deliver services.

So, how can we improve your community's resilience? Consider integrating climate change with asset management, through a risk assessment process.

Hazards are physical events or phenomenon that may have a negative impact, such as habitat damage, injury or loss of life, economic disruption. Climate-related hazards include, but are not limited to:



Flooding
Sea level Rise
Coastal Erosion



Extreme Temp
Permafrost Deg
Hailstorms



Wildfire
Drought
High Winds

Benefits of climate integration

Communities become more resilient by assessing and managing risk with a climate change lens. Benefits include:

- Ensuring that the most critical services in the community will be available when needed in the future;
- Prioritizing limited resources (staff, time, money) to achieve the highest value at the lowest cost;
- Making decisions grounded in evidence; and,
- Enabling proactive versus reactive decisions over the lifecycle of assets.

It's a balancing act

One way that you can increase your community's resilience to climate change is by documenting and managing infrastructure related risks. This needs to be balanced with levels of service, costs, and time.



What is risk?

Risk is the potential for undesirable outcomes resulting from an incident, event, or occurrence. It is commonly evaluated as a combination of the consequence and likelihood of an event, such as a service disruption or asset failure.

Assessing climate-related risks to infrastructure services involves understanding how natural and built systems are affected when exposed to hazards, where systems are most vulnerable, and the associated impacts or consequences.¹

¹ Evison, Sustainable Infrastructure Framework Guidance Manual 3rd edition (Washington DC: Institute for Sustainable Infrastructure, 2019), 170-171.



CONSIDERING CLIMATE CHANGE IN LEVELS OF SERVICE

The climate influences almost everything about how we design, build, and live in our cities. Communities are facing unprecedented impacts from climate change, which is affecting how municipalities deliver services. Infrastructure assets are the foundation upon which we deliver these services.

The level at which we can reliably deliver services now, and into the future, is dependent on the capacity and condition of our municipal infrastructure. The effects of severe storms, flooding and other unexpected events strain the capacity of our infrastructure in ways that could not have been predicted when it was designed.

So, how can services be delivered sustainably into the future? Consider integrating climate change with asset management, through levels of service.

Benefits of climate integration

We can take key steps towards becoming more resilient by integrating climate change considerations into our decision-making processes. Benefits include:

- Clearly articulating what community members can and can't expect the municipality to do;
- Focusing public spending in the areas where the best value can be provided; and
- Ensuring both short- and long-term needs can be met.

It is a balancing act

One way that we can increase a community's resilience to climate change is by documenting and managing levels of service. This needs to be balanced with risks, costs, and time.



What are levels of service?

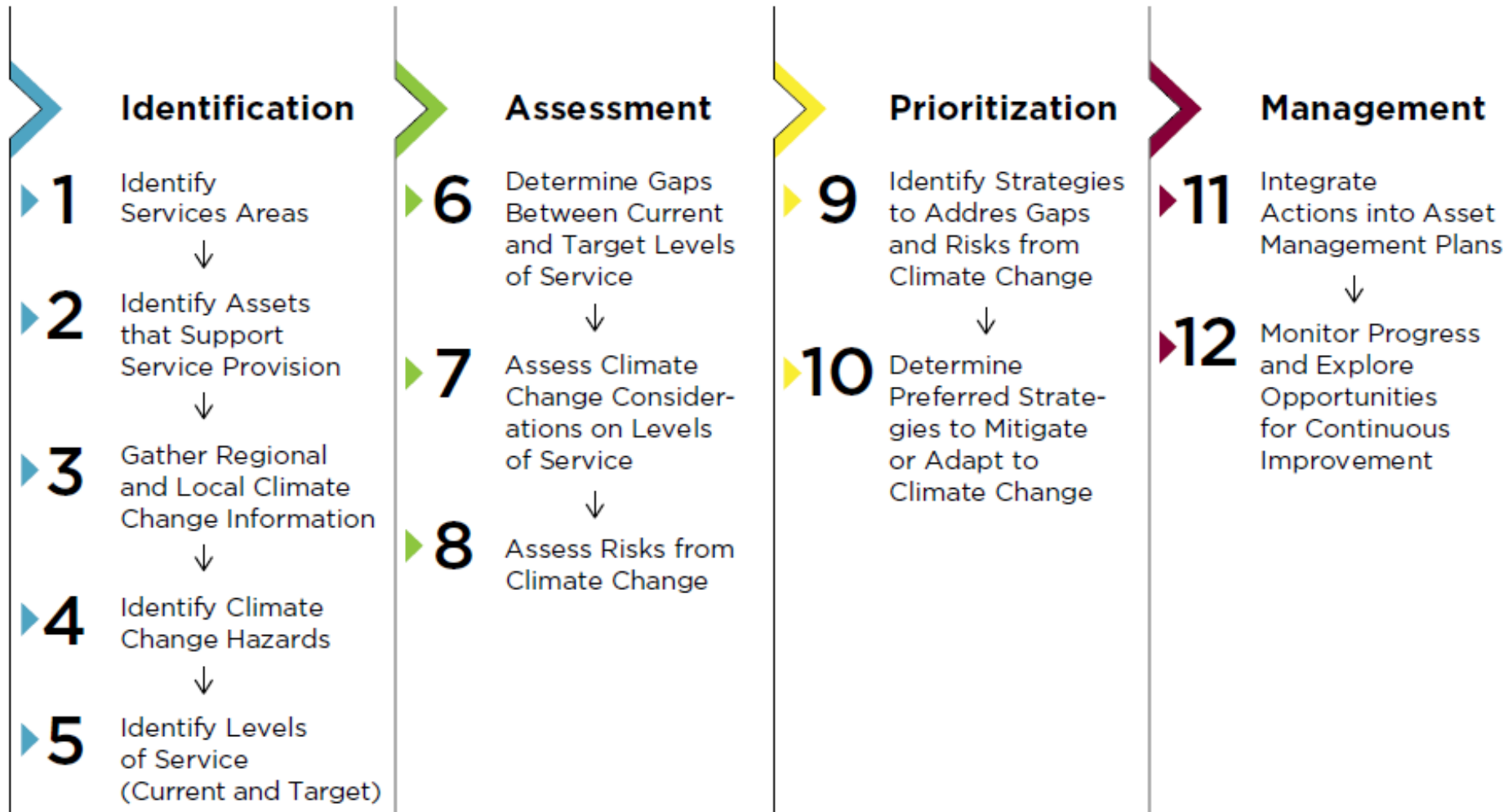
Levels of service are specific parameters that describe the extent and quality of services that the municipality provides to users. Levels of service largely dictate the need for infrastructure, resources (e.g. staff time, funding, or materials), and ultimately the costs of providing a service. Factors that influence levels of service include local conditions, priorities of decision makers, and customer expectations. Levels of service can be described in terms of the following characteristics:

- **Regulatory** - Does the service comply with applicable laws?
- **Capacity/availability** - Is there adequate capacity to meet the needs of users?
- **Safety** - Is the system safe for workers and the public?
- **Quality** - Does the service meet quality standards? How good is it?
- **Reliability** - Is the service reliable? How often is it interrupted?
- **Sustainability** - How does the service provide for quality of life, leadership, resource use, natural environment, and resiliency?



fcm.ca/climateinnovation

The Framework



The purpose of this process is to answer:

1. How will climate change impact our municipality?
2. How will it affect our ability to deliver municipal services?
3. How do we prepare for the future?

Entry Points



 Begin from the ground up



 Start with levels of service



 Focus on risk management



 Adapt an existing framework

Figure 2: Levels of Service Pyramid

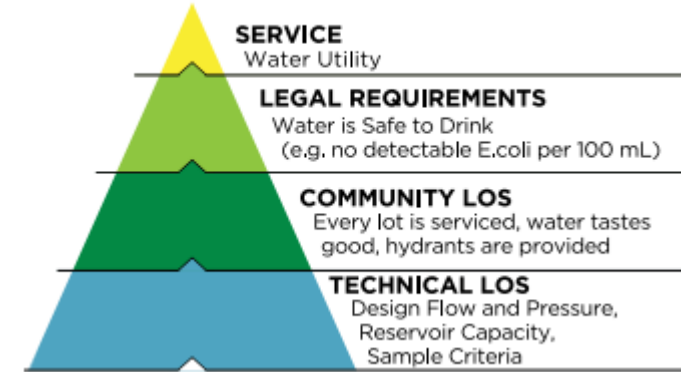
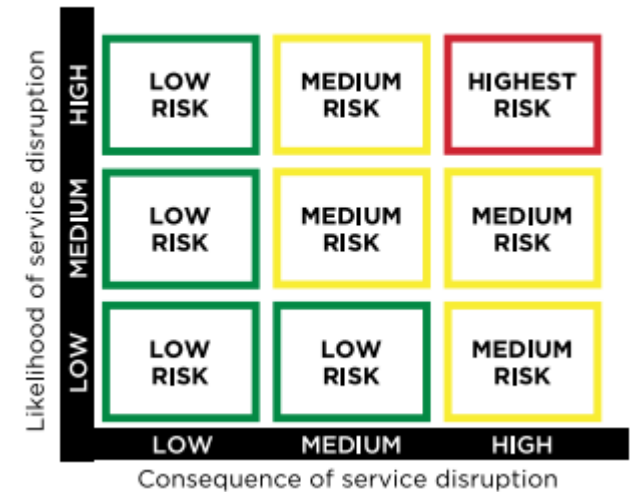


Figure 1: Risk Matrix



Hazards are physical events or phenomenon that may have a negative impact, such as habitat damage, injury or loss of life, economic disruption. Climate-related hazards include:



Erosion



Landslides



Drought



Flooding



Sea Level Rise



Storm Surges



Permafrost Degradation



Extreme Temperatures



Wildfire



Hailstorms



High Winds



Severe Weather

Hazard-oriented rather than asset- oriented perspective of risk

New Learning Opportunities

A six-module online course tied to the 12 steps in the Guide's framework.

Management

▶ **11** Integrate Actions into Asset Management Plans



▶ **12** Monitor Progress and Explore Opportunities for Continuous Improvement



Registration Re-Launches this Autumn

- Initial synchronous learning cohort ongoing
- Signed Certificate of Completion by President of FCM
- 2nd offering planned for Autumn 2021
- Asynchronous availability planned





Thank you

Questions?

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