

Summary of the 2016/2017 City of Calgary Climate Risk Assessment

Climate Change Adaptation Research: Vulnerabilities, Risks, and Adaptation Actions

The understanding of climate risk and adaption has been developing at The City of Calgary for a few years. Beginning in 2016, an in-depth research project was undertaken to provide scientifically robust information within three topic areas:

- 1) Climatic changes in Calgary
- 2) Calgary's climate risks: assessment of the climate change-related risk profile for the city
- 3) Actions for climate resilience: identification of potential adaptation and resiliency actions that could be used to manage climate risks.

Adaptation actions from this work were originally categorized into four areas; Infrastructure and Environment, Health and Wellbeing, Leadership and Strategy, and Economy and Society actions.

Calgary's overall climate risk profile was developed through a combination of literature-based research, analysis of local datasets and engagement with City staff and stakeholders. During this process, climate impact scenarios were developed and named according to major climatic or weather drivers as well as major impacts that can result from multiple weather or climate triggers and are shown in Figure 1.

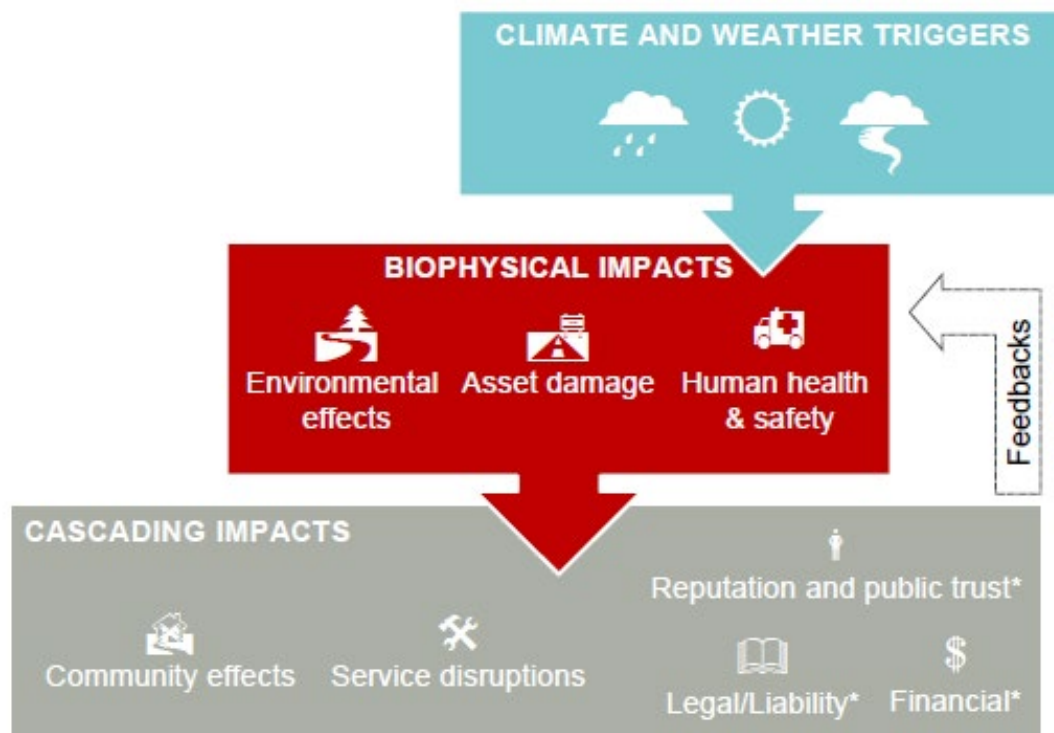


Figure 1: Climate hazards (triggers) lead to climate impacts.

*Denotes higher level impacts that were not considered during the 2016/2017 process.

Climate risk scenarios and consequences by impacts

Throughout the research and assessment process the common driver was a focus on understanding climate change impacts on people and communities. All climate impact scenarios were scored based on their consequences across five categories; human health and safety (including mental health), asset damage, environmental effects, community effects and service disruption. Consequences included a consideration of short-term, recovery phase, and long-term impacts to the community, the corporation, and the environment. Macroeconomic, legal, and reputational consequences were not included in this scoring. The assessed climate risk scenarios were plotted in comparison to one other and in terms of their overall likelihood and consequence scores, as developed by the consultant through workshops with City staff and are shown in Figure 2 (WaterSmart, 2017).

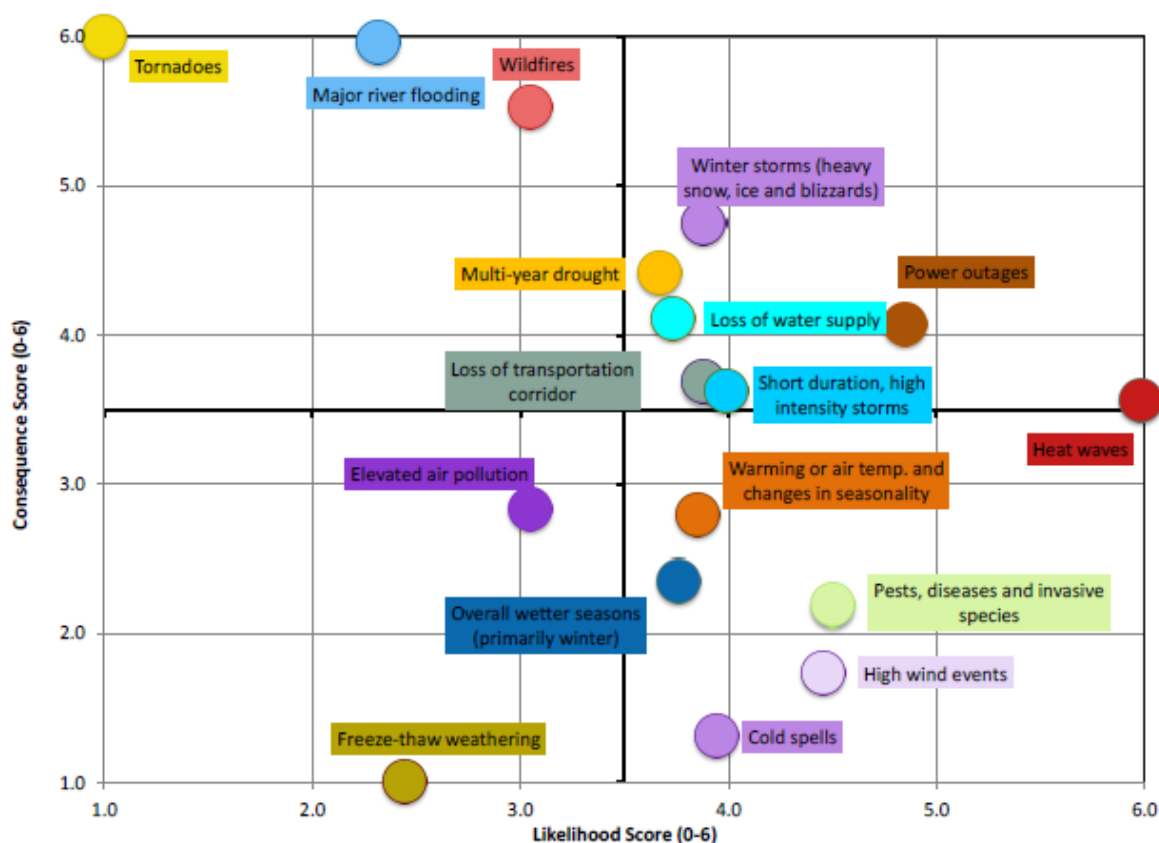


Figure 2: Plot of all climate risk scenarios on the axes of likelihood and consequence.

High climate risk scenarios have potentially severe effects in several consequence categories, with the highest likelihood scores. Critical infrastructure damage, service disruption, health and safety impacts, and environmental impacts may all be attributed to these scenarios. Cascading impacts on the macroeconomy and community are likely to accompany these scenarios.

Within the category of elevated risk are the extreme and potentially catastrophic weather events. These are anticipated to occur at a lower frequency, but with significant impacts and damage across infrastructure, service disruption, health and safety, and the environment. Cascading macroeconomic and community impacts are likely to be experienced, with some consequences lasting long periods of time.

Moderate risk scenarios are all associated with the chronic effects of climate change, having a high likelihood of occurrence with consequences that are not as catastrophically high as in the previous two categories. The resultant risk categories and identified climate hazards of the assessed climate risk scenarios are displayed in Figure 3 (WaterSmart, 2017).

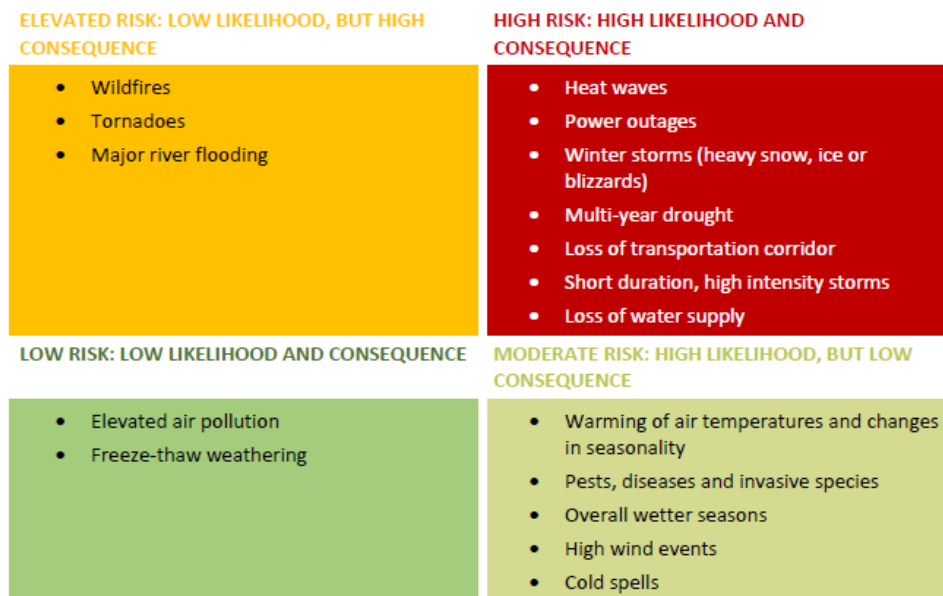


Figure 3: Risk categories of climate risk scenarios from the 2016/2017 assessment

Connection to current work

The above figure displays the originally assessed climate hazards, but our work has since evolved to develop more specific climate hazards and understanding of climate risk. Our current work, including the 2022 Adaptation Plan, is focused on managing risks associated within the high risk and elevated risk categories. The approach has been further streamlined to focus on addressing risk due to climate hazards. In this way, the climate adaptation team is recognizing and managing risk driven by our key climate hazards, which differ from the ones originally identified in the 2016/2017 assessment, and include:

- Extreme heat
- Shifting seasons
- Drought
- Wildfires
- Heavy rainfall
- Severe storms
- River Flooding
- Heavy Snowfall

Recommendations for climate resilience following the risk assessment

Adaptation actions are considered proactive measures that can be taken by The City to leverage opportunities and prepare for both chronic and acute impacts from climate change, thereby enhancing the city's climate resilience. In the context of a modern urban center like Calgary, adaptations can be understood as actions taken to increase resiliency across the natural environment, communities and individuals, critical infrastructure, and City operations and services. Adaptation does not mean the negative impact of climate change can be avoided completely; it means by taking certain actions, climate impacts can be lessened in severity compared to the case if no planning had taken place (Maru et al. 2014; ICLEI, 2010).

Adaptation actions were recommended based on literature review, stakeholder engagement, and existing work or initiatives undertaken by The City in 2016/2017 in response to climate hazards, and were not analyzed for cost, feasibility, or effectiveness specific to the Calgary context. The development of adaptation actions was consistent with ICLEI Canada's BARC Framework (WaterSmart, 2017). A total of 54 actions were identified, 27 of which were rated as immediate priority. High priority actions identified were more specific elements of a program to improve climate resilience, following on the initial work recommended as immediate actions. Generalized approaches for climate adaptation to work towards climate is summarized in the Figure 4 (WaterSmart, 2017).

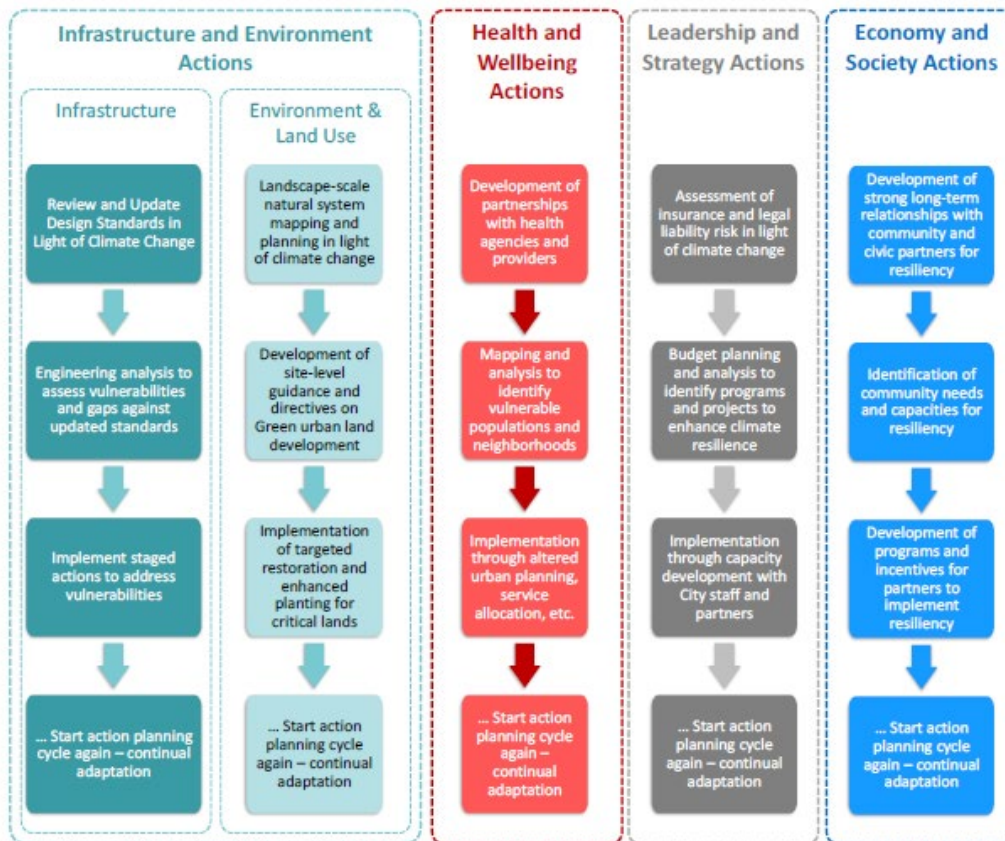


Figure 4: Climate adaptation actions to build municipal resilience

How does this work inform and support the current Adaptation Plan update?

The findings of the 2016/2017 City of Calgary Climate Risk Assessment continues to guide the Climate Adaptation Plan. Many of the recommended actions from this work underly actions within the Climate Adaptation Plan update, with shifts and changes to account for efficacy in the Calgary context. As always, site-specific characteristics, evaluations, legal authority, and a developing understanding of climate adaptation have contributed to inform the current update. Further, since the 2016/2017 assessment, we've improved our understanding of the critical need to fulsomely integrate equity and strive towards reconciliation with Indigenous communities.