

CLIMATE INFRASTRUCTURE VULNERABILITY RISK ASSESSMENT RESULTS

Issue

The Climate Infrastructure Vulnerability Risk Assessment Results will guide planning of climate adaptation measures for Town of Okotoks (Town) infrastructure.

Motion Proposed by Administration

That the Climate Infrastructure Vulnerability Risk Assessment Results be accepted as presented.

Report, Analysis and Financial Implications

The Town has implemented numerous measures to help mitigate the severity of climate change and this progress towards carbon neutrality will continue to remain a priority. However, despite the Town's best efforts, changes to the climate are already noticeable and will require adaptation.

The Climate Infrastructure Vulnerability Risk Assessment (IVRA) was undertaken to action policy decisions to assess and improve the resilience of Town assets to climate change. Section 4.1 of the Municipal Development Plan – "Foster resilience to climate change" includes the following policies:

- 4.1.1 (c) Collaborate with providers to evaluate the resilience of utilities and conduct a vulnerability and impact assessment of community energy, water supplies and communication networks. Identify and develop corporate and community resilience and adaptation measures.
- 4.1.1 (d) Identify and upgrade existing infrastructure that may be affected by climate change impacts including potential impacts on emergency and disaster management and response.
- 4.1.2 (b) Identify and protect natural infrastructure that will be impacted by climate change.

The Environmental Master Plan, adopted in 2018, included climate adaptation and resilience as one of seven major action areas, aiming to "Improve Okotoks' ability to adapt to the impacts of climate change". The community is experiencing hotter and drier summers, and more frequent and extreme weather events. The 2021 Resilient Okotoks – Climate Action Plan identified the following objectives related to adaptation and resiliency of Town assets and infrastructure:

- Guide new construction projects and retrofit existing buildings to enhance resilience to future climate conditions;
- Protect and enhance biologically diverse and resilient ecosystems across the community. Increase, protect, and enhance green and natural assets across Okotoks;
- Mitigate the impact of flooding on buildings, community assets, and infrastructure. Upgrade 80% of all vulnerable infrastructure by 2050;
- Prepare for more limited water supply over time and improve the resilience of the existing water supply infrastructure; and
- Apply a climate lens to municipal asset management.

The purpose of the IVRA is to identify and prioritize potential risks to Town facilities, water and wastewater infrastructure, and natural assets in relation to the anticipated effects of climate change. The IVRA report was completed in November 2023. A grant from the Municipal Climate Change Action Centre (MCCAC) covered the majority of the third-party consultant costs for the project.

Associated Engineering (AE) completed the IVRA through extensive collaboration with municipal staff to identify priorities and severity of consequences for each vulnerable facility. Evaluation of flood risk was a priority, and detailed flood inundation maps generated for various river flooding scenarios identify the estimated depth of water at each Town facility during each flood scenario (Table 7-1). The Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol, developed by Engineers Canada, was used to quantify risk. This approach considers a likelihood score for each climate event as well as the severity of consequences to infrastructure, the environment, and society. Climate hazards such as very hot or very cold temperatures, river flooding, localized flooding, heavy snowfall, hail, freezing rain, drought, lightning, heavy winds, and wildfire smoke were considered. The severity of these climate conditions was modeled from baseline (present) to 2050 and 2080 using a standard climate change projection scenario.

Phase one (1) of the risk assessment considered municipally-owned assets associated with water, wastewater, storm water, waste, facilities, roads, and parks and provided each scenario a risk score out of 25. The highest risks from this initial assessment were identified as:

1. River flooding effects on the wastewater and water treatment plants;
2. Drought and extreme heat effects on water supply wells;
3. Threats to biodiversity and ecosystem health in constructed wetlands/storm water ponds;
4. Increasing die-off and invasive species associated with public trees, parks, and sports fields from drought conditions and ecosystem changes; and
5. River flooding effects on other Town facilities.

Phase two (2) of the risk assessment evaluated Town facilities in more detail. In addition to considering likelihood and consequence, the risk scores attributed to each facility also included criticality, exposure, and vulnerability. Town staff contributed heavily to the development of these risk scores. The report card for each facility lists potential risks and scoring out of 100. Potential risk mitigation actions are listed for each risk, as well as the recommended timeframe for implementation and the estimated cost. Report cards are included in Appendix D of the IVRA report. The highest risks to facilities were generally identified as:

1. Power and communications infrastructure at risk from lightning strikes, hail, high winds and/or flooding;
2. Threats associated with grading and landscaping, such as hot temperatures and drought threatening native species and introducing pests, severe storms damaging trees, and flooding of facilities due to improper site grading;
3. Damage or lack of access to heating, ventilation, and air-conditioning (HVAC) systems from flooding and power outages;

4. Structural vulnerability due to heavier snow loads (e.g., roof); and
5. Inadequacy of exterior building envelopes to resist hail damage and flooding, and to maintain passive cooling capacity during higher temperature conditions.

The IVRA report has been distributed to all appropriate Town staff for consultation. Administration is in the process of facilitating internal workshops with each service team with the following objectives:

- Recognize mitigation measures and practices already in place that address the identified risk;
- Identify asset risks of higher priority that are not currently included in operational or capital planning;
- Assign action items to investigate and select solutions to address higher asset risks in the short term; and
- Develop a plan to incorporate the key findings and recommendations of the IVRA report into future budget cycles for the long term.

The report provided recommended timelines for implementation of the suggested mitigation measures and included cost estimates for planning purposes. These preliminary high-level cost estimates were generated using a construction cost estimating software by the consultant, and are considered by Town staff to be generous. The integration of the IVRA findings into operations will be done on an ongoing basis based on risk priority and budget. Climate adaptation upgrades and modifications will be aligned with scheduled maintenance and replacement activities wherever possible to minimize costs. Risk mitigation actions and upgrades will be tracked with the intention to assess progress annually and update risk scores, where feasible. Future operations and capital project budgets may reference the recommendations from the IVRA report to justify selection of a particular solution or highlight a co-benefit.

Strategic Plan Goals

<input type="checkbox"/>	Responsibly Managed Growth	<input checked="" type="checkbox"/>	Demonstrated Environmental Leadership
<input type="checkbox"/>	Strong Local Economy	<input type="checkbox"/>	Enhanced Culture & Community Health
<input type="checkbox"/>	Organizational Excellence		

Equity/Diversity/Inclusivity Impacts and Strategy

n/a

Environmental Impacts

As above, the implementation of IVRA adaptation actions will primarily serve to protect critical Town infrastructure from the projected effects of climate change; however, environmental co-benefits will include maintenance and enhancement of native species and biodiversity within Town parks, fields, and constructed wetlands / storm ponds while inhibiting invasive species and pests and pro-actively managing storm water. Implementing mitigation actions to protect critical infrastructure may also reduce the amount of waste and debris generated during projected future flooding events, limiting potential pollution to the Sheep River and the need to replace or rebuild damaged facilities and features.

Public Participation Strategy

n/a

Alternatives for Consideration

n/a

Acting CAO Comments

As Climate Change continues to impact Okotoks, understanding the risks to Town infrastructure is an important consideration in adaptation strategies.

Attachment(s)

1. Climate Infrastructure Vulnerability Risk Assessment Report

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