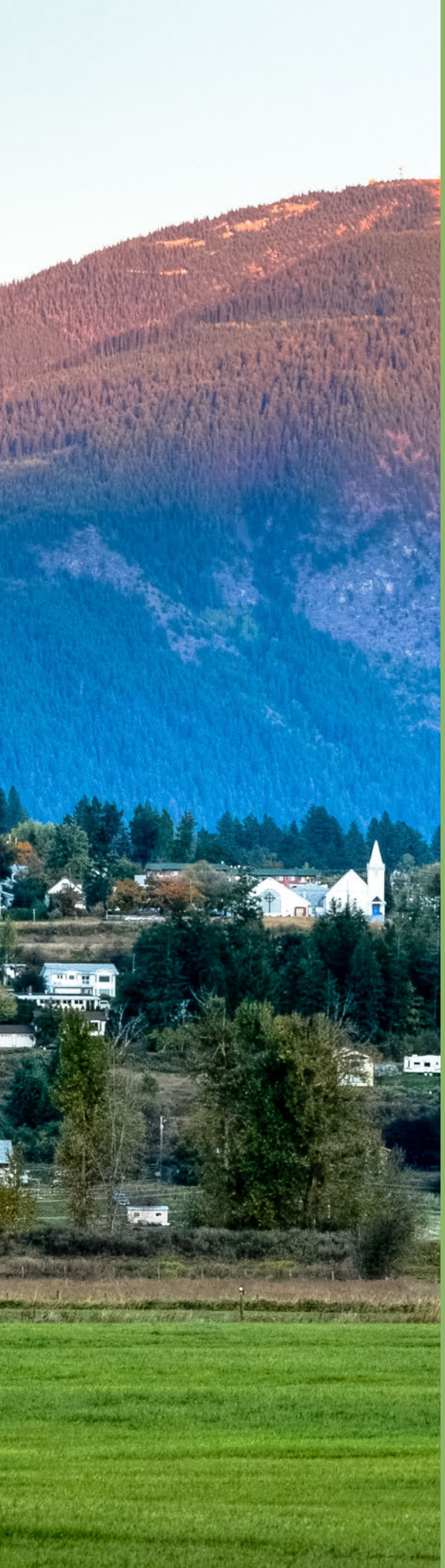

Hazard, Risk, and Vulnerability Assessment

Town of Creston

2026

Acknowledgments

This Hazard, Risk, and Vulnerability Assessment (HRVA) was informed by community representatives from across the Town of Creston, interest holders, provincial and regional governments, and yaqan nu?kiy First Nation. The collective input of all those who call the Town of Creston home contributes valuable and important information to this Assessment.

The Town of Creston recognizes that Creston is located on the unceded traditional territory of the yaqan nu?kiy (Lower Kootenay Band) within the k'tunaxa Nations. The Lower Kootenay Band is traditionally known as yaqan nu?kiy meaning "where the rock stands," in the Ktunaxa language. Creston and yaqan nu?kiy benefit from a positive working relationship and value the deepening connections between their communities. Creston remains dedicated to the shared pursuits of reconciliation and collaborative efforts that benefit the yaqan nu?kiy people, residents of the surrounding rural areas, and residents of the municipality.

The Town of Creston is located within the overlapping traditional territories of six Indigenous Governing Bodies (IGBs): the Shuswap Band, ?aq?am, ?akisq?nuk, the Ktunaxa Nation Council, Yaqit ?a·knuqli'it, and yaqan nu?kiy. Each of these IGBs was invited to engage with Creston to inform the development of this HRVA.

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List of Acronyms

AQHI	Air Quality Health Index
AQI	Air Quality Index
BC	British Columbia
BCEHS	BC Emergency Health System
BCEMS	BC Emergency Management System
CISV	Canadian Index of Social Vulnerability
CMIP5	Coupled Model Intercomparison Project Phase 5
COVID-19	Coronavirus Disease 19
CWD	Chronic Wasting Disease
DPA	Development Permit Area
EHD	Epizootic Hemorrhagic Disease
EOC	Emergency Operations Centre
ESS	Emergency Support Services
FCL	Floods Construction Level
FDOC	Fire Department Operations Centre
GIS	Geographic Information System
H5N1	Highly Pathogenic Avian Influenza subtype H5N1
HRVA	Hazard, Risk and Vulnerability Assessment
IDF	Intensity-Duration-Frequency
IGB	Indigenous Governing Body
IPCC	Intergovernmental Panel on Climate Change
IT	Information Technology
MPE	Major Planned Event
OCP	Official Community Plan
RCMP	Royal Canadian Mounted Police
RCP	Representative Concentration Pathway
RDCK	Regional District of Central Kootenay
SAR	Search and Rescue
SCADA	Supervisory Control and Data Acquisition
WUI	Wildland-Urban Interface

Executive Summary

The Town of Creston (Creston or the Town) Hazard, Risk, and Vulnerability Assessment (HRVA) provides a comprehensive, evidence-based evaluation of the hazards that may impact the community, along with the vulnerabilities and consequences associated with those hazards. It will support informed decision-making for the Town to prepare for, mitigate, respond to, and recover from emergencies. This HRVA also reflects the Town's responsibilities under British Columbia's Emergency and Disaster Management Act (EDMA), which requires local authorities to assess risks and hazards as part of emergency management planning.

This HRVA follows the methodology outlined by the Province of British Columbia and incorporates multiple lines of evidence, including climate data and projections, local and regional studies, engagement with municipal staff and interest holders, Indigenous engagement, public survey input, and professional judgement. Hazards were assessed based on both likelihood and consequence, with risk levels determined using a standardized risk matrix.

Hazards in this report are presented by tier, with Tier One hazards representing those of higher priority or greater concern and Tier Two hazards representing those of lower relative risk. In total, 51 hazards were assessed for Creston, of which 27 were identified as Tier One hazards, including extreme heat, drought, lake, river, and stream flooding, human disease, wildfire, wastewater interruption, rail incidents, stormwater flooding, high wind events, flash flooding, and telecommunications interruption. A key finding of this HRVA is the importance of understanding interconnected risks. Many hazards in Creston do not occur in isolation but can trigger or exacerbate other hazards, resulting in cascading impacts across infrastructure, services, the environment, and the local economy. For example, extreme heat can contribute to drought and increase wildfire risk, while wildfire can disrupt telecommunications, degrade water quality, and increase demand on healthcare services.

Creston's vulnerability profile is shaped by several intersecting factors. The community has a relatively older population, with approximately 39% of residents aged 65 and over, meaning increased sensitivity to hazards such as extreme heat, wildfire smoke, and service disruptions. Economic vulnerability is influenced by lower median household incomes and reliance on sectors such as agriculture, tourism, and small businesses, which are sensitive to climate variability and infrastructure disruptions. Critical infrastructure systems, including water, wastewater, energy, and telecommunications, are interdependent and, in some cases, lack redundancy, increasing the potential for cascading impacts during emergencies.

Climate change is a key driver of risk in Creston, contributing to increases in the frequency and severity of hazards such as extreme heat, drought, wildfire, and intense precipitation events. These changes are expected to amplify both the likelihood and consequences of hazards over time and increase the potential for compounding and cascading impacts.

To address these risks, a range of disaster risk reduction measures have been identified to strengthen emergency planning, coordination, and infrastructure resilience. Priority actions include developing a municipal Business Continuity Plan, implementing a Public Information Plan, updating Evacuation and Emergency Response Plans to align with EDMA requirements, and formalizing coordination protocols with regional partners. Enhancements to emergency

management capacity, such as improved Emergency Operations Centre (EOC) training and volunteer coordination, are also recommended. Infrastructure and resource measures include increasing backup fuel supply, upgrading critical systems (e.g., SCADA and lift station power), improving drainage infrastructure, and reducing wildfire exposure at key facilities. Additional planning and preparedness actions focus on climate-driven risks, including extreme heat and drought response, as well as improved support for vulnerable populations.

Collectively, these measures aim to strengthen operational continuity, reduce system vulnerabilities, and enhance Creston's ability to respond to and recover from both acute and cascading hazard events.

Overall, this HRVA provides a foundation for ongoing risk-informed planning and decision-making. Regular updates and integration with municipal planning processes will help ensure the assessment remains current and responsive to changing conditions.

Section 1: Introduction

1. Introduction

This Hazard, Risk, and Vulnerability Assessment (HRVA) is designed to provide a clear, structured understanding of the hazards, risks, and vulnerabilities affecting the Town of Creston. It is intended to support both high-level review and detailed analysis, enabling a range of users to navigate the report based on their specific interests and needs. The sections below outline how the report is organized and where key information can be found.

Section 1: Introduction outlines the purpose, scope, methodology, and limitations of the assessment.

Section 2: Community Profile describes local geographic, demographic, and economic conditions that influence risk.

Section 3: Vulnerabilities, Climate Risk Drivers, and Existing Measures identifies key factors affecting exposure, sensitivity, and resilience.

Section 4: All-Hazards Risk Assessment presents Tier 1 hazards first, followed by Tier 2 hazards and includes the core analysis, likelihood and consequence ratings, and overall risk levels for each hazard, with detailed information regarding consequences for Tier 1 hazards.

Supporting information is provided in the appendices, including definitions, scoring methods, climate data, maps, critical infrastructure, and detailed recommendations. Terms used throughout this report are defined in Appendix A: Definitions.

1.1 Purpose

The purpose of this HRVA is to identify, assess, and evaluate the hazards that may affect the Town of Creston ("Creston" or "the Town"), and to understand the associated risks, vulnerabilities, and potential consequences to people, animals, property, infrastructure, the environment, and critical services. The findings of this assessment are intended to inform the Town's emergency management program, land use and infrastructure decisions, business continuity planning, risk reduction priorities, climate adaptation planning, and long-term community resilience.

This HRVA supports the Town's responsibilities under BC's *Emergency and Disaster Management Act* (EDMA) section 51 by providing a risk-based foundation for emergency management across four phases: mitigation, preparation, response, and recovery. Consistent with the EDMA, the assessment considers hazard likelihood, consequences, vulnerable individuals, animals, places and things, intersectional disadvantage, Indigenous and local knowledge, climate-related risk drivers, and available information from local and regional sources. The EDMA is supported by associated regulations, including the *Emergency and Disaster Management Regulation* (B.C. Reg. 190/2024), and related Orders in Council, which together provide further direction on roles, responsibilities, and requirements for emergency management planning and implementation. [1]

1.2 Scope

The scope of the HRVA is focused on the impacts of hazards within the boundary of Creston or to residents of Creston. While the primary focus of this HRVA is on hazards occurring within the municipal boundary of the Town of Creston, consideration is also given to hazards occurring outside the boundary where they may have material impacts on the Town, its residents, or its economic and service systems.

1.3 Approach and Data Sources

The BC Ministry of Emergency Management and Climate Readiness Hazard, Risk and Vulnerability Analysis (HRVA) Tool For Local Authorities and First Nations toolkit encourages the use of scientific data and local knowledge in hazard assessments. [2] This HRVA for Creston was completed using observational data and background research, supported and validated through engagement with local experts and community members. The methodology and tools applied are aligned with the standard practices outlined in the provincial HRVA tool, ensuring the Creston HRVA meets provincial requirements. A list of sources references throughout this HRVA is included in Appendix P: Bibliography.

Hazard Identification

This HRVA evaluates 51 of BC's 57 identified hazards that are applicable to Creston, many of which are influenced by the changing climate. Of these, 27 hazards were identified as Tier One, representing the hazards initially identified as having the highest potential risks to the community. Twenty-four hazards were classified as Tier Two, reflecting a preliminary assessment of lower relative significance. While both tiers of hazards were included in this assessment, Tier One hazards were given higher priority in desktop research and engagement. Six hazards were excluded from this assessment as they are not applicable to Creston. Submarine slides, tsunami, storm surge, and coastal flooding were excluded as Creston is not a coastal community, while nuclear incident and volcanic flow were excluded due to the absence of nearby nuclear facilities or volcanoes.

The following Table 1 outlines the Tier One Hazards, Tier Two Hazards, and Excluded Hazards for Creston:

Tier 1 Hazards	Tier 2 Hazards	Excluded Hazards
• Air Quality • Extreme Heat • Extreme Cold • Freezing Rain or Drizzle • High Wind Event • Lightning • Snowstorms and Blizzards • Tornado • Human Disease (including Pandemic and Epidemic) • Public Health Crisis • Wildfire • Landslide / Debris Flow • Hazardous Materials Spill • Drought • Lake, River, Stream Flooding • Storm Water Flooding • Flash Flooding • Dike Failure • Electrical Outage • Food Source Interruption • Telecommunications Interruption • Transportation Route Interruption • Wastewater Interruption • Water Service Interruption • Fuel Source Interruption • Cyber Security Threat • Rail Incident	• Fog • Space Weather • Hail • Animal Disease • Plant Disease and Pest Infestation • Structure Fire • Avalanche • Land Subsidence (and Sinkholes) • Earthquake • Liquefaction • Ash Fall • Explosions • Mine Incident • Oil or Gas Pipeline Spill • Space Debris • Seiche • Dam and Spillways Failure • Structure Failure • National Security Threat • Public Disturbance • Major Planned Event • Aircraft Incident • Marine Vessel Incident • Motor Vehicle Incident	• Submarine Slides • Tsunami (Tectonic and Terrestrial) • Volcanic Flow • Nuclear Incident • Storm Surge • Coastal Flooding

Table 1 Tier 1, 2, and Excluded Hazards for Creston

Hazard Likelihood

For each hazard, current and future likelihoods were rated on a scale of Rare to Almost Certain, using the assessment matrix included in Appendix B: All-Hazard Likelihood Scoring Rubric. Current likelihood refers to the anticipated frequency of hazards in the immediate term,

whereas future likelihood reflects how the frequency of hazards may change by approximately 2050.

For non climate hazards, likelihood assessments considered, among other factors, changes in population (e.g., growth, decline, or increased density), the presence of new or expanding industries, changes in land use and development patterns, infrastructure condition and service demand, and evolving operational or system dependencies.

For hazards influenced by climate change, likelihood assessments were further informed by projected trends and climate data, as outlined in Section 1.3.1:Climate Data and Projections, to account for changing hazard patterns over time.

Consequence Assessment

To understand the potential impacts that each hazard would have on Creston, if it were to occur, a consequence assessment was conducted for each hazard, drawing on multiple qualitative and quantitative inputs, including:

- Partner Engagement Workshop
- Workshop with yaqan nu?kiy First Nation
- Key interest holder interviews
- Public Survey
- Desktop research and documentation review

Consequences were informed by a facilitated workshop with Town staff and representatives from key local organizations, where partners discussed potential impacts across people, infrastructure, essential services, the environment, and the local economy. These discussions were supplemented by follow up interviews with key interest holders who were unable to attend the workshop, allowing for more detailed exploration of specific hazards, local conditions, and critical services in Creston. Public input gathered through an online survey on the Town's Let's Talk Creston platform also informed consequence considerations, particularly for social and economic impacts experienced by residents.

The consequence assessment also incorporated engagement with yaqan nu?kiy and outreach to other First Nations with interests in the area, following an approach aligned with Indigenous consultation and cooperation principles under the EDMA section 53. As part of this process, the Town of Creston conducted outreach to six Indigenous Governing Bodies (IGBs) with potential overlapping traditional territories, including Shuswap Band, ?aq?am, ?akisq?nuk, Ktunaxa Nation Council, Tobacco Plains Indian Band, and yaqan nu?kiy, to invite participation and provide opportunities to inform the HRVA. This approach was intended to support the inclusion of Indigenous knowledge, lived experience, and community-specific perspectives in the assessment of hazard impacts. Of the Nations contacted, yaqan nu?kiy participated directly in the engagement process through a dedicated, in-person session.

Engagement with yaqan nu?kiy was conducted through a facilitated, face-to-face discussion, designed to support open dialogue and knowledge sharing in a setting appropriate to the context. The session was guided by the HRVA framework and included discussion of priority hazards, historic events, cultural and environmental impacts, and community-specific vulnerabilities. Participants shared traditional and local knowledge related to hazard

conditions, impacts on culturally important plants, food sources, and ecosystems, as well as broader considerations related to community wellbeing and connection to place. Insights from this engagement were incorporated into the consequence assessment to ensure that cultural, environmental, and place-based impacts, including those that may not be captured through municipal data or conventional risk assessment approaches, were reflected. Additional details on engagement activities and outcomes, including a summary of outreach to other IGBs, are provided in Appendix N: Consultation Record.

In addition, desktop research and review of available local, and regional data were used to support and validate findings. Professional judgement was applied throughout the process to synthesize inputs, address data gaps, and ensure consistency across hazards. Together, these sources provided a locally informed basis for assessing potential consequences for each hazard evaluated.

Each hazard was then assessed across eleven consequence categories, with impacts rated on a scale from None to Extreme to generate an overall consequence score. Each Tier One hazard has detailed scoring information provided for each consequence category, and each Tier Two hazard provides a general overview of the consequences. The definitions of consequence categories, scoring criteria, and an overview of all hazard scoring are provided in Appendix C: Consequence Category Definitions; Appendix D: Consequence Ranking Definitions; and Appendix E: Consequence Scoring and Ranking. These appendices provide further detail on how consequence rankings were developed and applied.

Risk Scoring

To determine an overall risk rating for each hazard, both the current and future likelihood assessments and consequence assessments were integrated and mapped on a risk matrix to identify and prioritize the highest risk hazards for the Town of Creston. These risk matrices can be found in Appendix F: Risk Matrices.

Recommendations and Hazard Scenarios for Training

This HRVA includes recommendations for the Town of Creston to consider in order to reduce risk to the highest risk hazards identified in this assessment. To develop these recommendations, existing risk reduction measures were first reviewed to establish a baseline of current plans, programs, infrastructure, and emergency management capabilities. These measures are documented in Appendix J: Existing Risk Reduction Measures. Recommendations were then developed to address identified gaps, reduce exposure and vulnerability, strengthen preparedness and response capacity, and enhance long-term resilience, with detailed actions provided in Appendix K: Recommendations to Enhance Resilience.

To support future training and exercising, hazard scenarios were developed for some of the highest priority hazards for the Town of Creston. These scenarios are included in Appendix L: Hazard Scenarios for Exercises.

1.3.1 Climate Data & Projections

For climate-related hazards, climate projections were integrated into the assessment of future likelihoods for the 2051–2080 timeframe. Creston-specific projections from the Climate Resources Consulting (CRC) Creston Climate Report formed the primary dataset, ensuring consistency with previous studies that have applied CMIP5 climate models to the region.

CMIP5 projections simulate future climate conditions under different greenhouse gas concentration scenarios, known as Representative Concentration Pathways (RCPs). Within this assessment, RCP4.5 was used to represent a moderate emissions scenario, in which global emissions are assumed to peak around mid-century and gradually decline, resulting in approximately 2.4°C of warming by the end of the century. Projected changes under RCP4.5 are relatively consistent through approximately 2050, reflecting the warming already built into the climate system from past emissions.

CMIP5 and CMIP6 are international climate modelling initiatives that use computer simulations to understand past climate trends and project future changes. While CMIP6 represents a newer generation of models with updated scenarios, a high-level comparison found that projections for Creston are broadly aligned across both datasets for variables relevant to this assessment. As a result, CMIP5 projections were retained to maintain consistency with earlier analyses. Where needed, supplementary CMIP5 data were obtained from ClimateData.ca. More information on how climate change impacts Creston can be found in Section 3.5: Climate Risk Drivers and an overview of climate trends and projections can be found in Appendix G: Climate Data and Projections

Re-analysis Data Overview

This assessment uses a combination of historical weather data and climate-adjusted simulations to understand how past extreme weather events may change under future climate conditions.

Historical extreme weather events in British Columbia (e.g., heat waves, cold snaps, floods, and wildfires) were first identified and analyzed as real-world examples of conditions that have already affected communities. To support this analysis, the WRF-ClimateEx dataset was used to generate a high-resolution representation of historical weather conditions across the province. This dataset integrates weather station observations with satellite and other data sources, producing a gridded dataset that helps fill gaps in areas with limited monitoring, particularly in regions with complex terrain.

A Pseudo-Global Warming approach was then applied to these historical events. This method adjusts observed weather conditions to reflect a warmer climate (approximately +3°C), while maintaining the same underlying weather patterns. In effect, it provides a way to assess how these same events may have occurred under future climate conditions. These simulations are not forecasts; rather, they provide realistic, event-based scenarios that illustrate how hazard behaviour may change over time.

The results of this analysis were used to assess how the consequences of each hazard may change under future climate conditions, including impacts to:

- people
- infrastructure
- services
- the environment
- the local economy

While each simulation is based on a specific historical event, findings were interpreted more

broadly to understand how similar events could affect the community in the future.

1.3.2 Cascading and Compounding Hazards

Individual hazards that may occur in Creston should not be considered in isolation, as many are interconnected and can trigger or exacerbate one another. Cascading hazards occur when an initial event leads to secondary impacts across infrastructure, services, and environmental systems, while compounding hazards arise when multiple events occur concurrently or in close succession, amplifying overall consequences. [3] In Creston, these dynamics are particularly relevant given the interdependence of critical infrastructure and the influence of climate change on hazard frequency and severity. Cascading and compounding hazard relationships are identified throughout this assessment. Where applicable, these interactions are described within the Hazard Background sections for individual hazards with a link symbol beside it. Understanding these cascading and compounding relationships is essential for effective emergency planning, as it highlights the potential for cross-sector impacts and supports more integrated risk reduction and response strategies.

1.4 Limitations

This HRVA is based on the data, documents, engagement input, and information that were available and reviewed at the time of assessment. Sources included desktop research, existing Town and regional plans, available hazard and climate data, input collected through workshops, interviews and public survey results, and professional judgement. As a result, the assessment reflects the best available understanding of hazards, risks, and vulnerabilities at the time of writing.

1.5 Report Maintenance

The Town's HRVA is intended to support ongoing, risk-informed decision-making and emergency planning. To ensure it remains current and reflective of local conditions, regular review and updating of the report is needed. All monitoring activities, updates, and revisions should be documented, with version control maintained to track changes over time. Updated versions of the HRVA will be shared with relevant interest holders and integrated into municipal planning, emergency management, and risk reduction initiatives.

Reporting Monitoring and Updating

The Town should maintain a regular review cycle consistent with EDMA section 51 and associated Regulations. This includes annual monitoring, targeted updates, and periodic comprehensive review to ensure the HRVA remains current and aligned with changing local conditions, hazards, vulnerabilities, and community priorities.

It is recommended that emergency management staff coordinate an annual review of the HRVA, with input from relevant municipal departments and external partners where appropriate. Findings from the annual monitoring process should be documented and used to determine whether updates to the HRVA are required.

Targeted HRVA updates may be needed when changes affect a specific hazard, geographic

area, infrastructure system, vulnerable population, or operational capability. Examples may include updated hazard mapping, substantial development within hazard-prone areas, infrastructure changes, major emergency events, or new legislative requirements.

A comprehensive review and update of the HRVA should be conducted every five years, or sooner where substantial changes identified through annual monitoring indicate that major aspects of the risk assessment are no longer current.

The following table outlines the recommended review cycle for maintaining the HRVA:

Review Type	Description	Recommended Frequency
Annual Monitoring	High-level review of changes affecting hazards, exposure, vulnerability, infrastructure, response capacity, legislation, and lessons learned.	Annually
Targeted HRVA Update	Update focused on a specific hazard, geographic area, infrastructure system, or issue where substantial changes affect risk ratings.	As Required
Comprehensive HRVA Review	Full reassessment of hazards, risks, vulnerabilities, consequences, and response capabilities across the municipality.	Every 5 Years

Records of updates to this HRVA should be recorded in the Summary of Report Changes table included in Appendix M: Monitoring and Update Considerations. This appendix also includes additional examples of monitoring considerations and potential triggers for targeted or comprehensive HRVA updates.

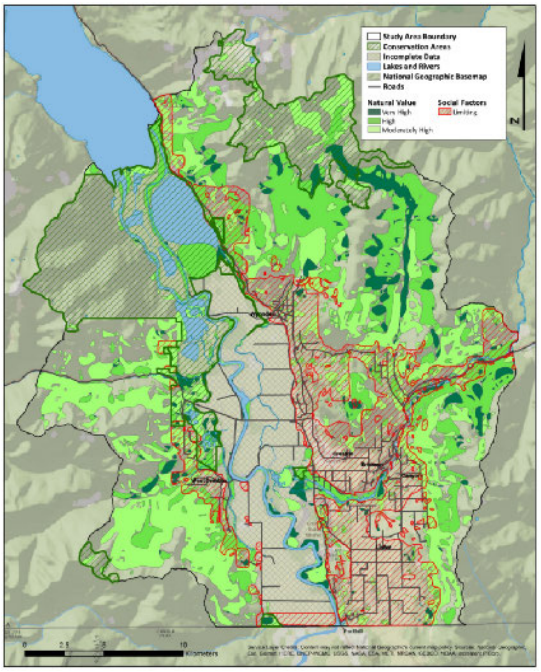
Section 2: Community Profile

2. Community Profile

Section 2 provides a Community Profile to outline the local context for assessing hazard impacts in Creston. Understanding the community's geographic setting, population characteristics, languages spoken, economic conditions, and household composition is essential to interpreting how hazards may affect people, services, and systems. These factors influence hazard exposure, the distribution of impacts, and the community's capacity to prepare for, respond to, and recover from emergencies. Geographic features shape hazard pathways and access constraints, while demographic and household characteristics affect evacuation needs, communication approaches, and demand for support services. Economic conditions help identify sectors most vulnerable to disruption and populations that may require additional consideration. This profile ensures that subsequent hazard and risk analysis reflects Creston's specific social, physical, and economic context.

2.1 Geography

Creston is a town located in the Regional District of Central Kootenay (RDCK) in southeastern British Columbia on the unceded traditional territory of the yaqan nu?kiy within the k'tunaxa Nations. [4] It lies approximately 10 kilometers north of the Canada-US border and about 120 kilometers southwest of Cranbrook. The town is situated on a benchland plateau above the Kootenay River Valley, with approximately 30% of its area extending onto the lower slopes of Arrow Mountain (known locally as Goat Mountain). The town lies between two major mountain ranges: the Selkirk Mountains to the west and the Skimmerhorn range of the Purcell Mountains to the east. These surrounding mountain systems influence local climate and watershed patterns. [5]



Map 1 Creston Valley Green Map
Source: Wildsight

Creston Valley, within which Creston is the largest community, is part of the Purcell Trench; a glacially carved floodplain formed approximately 12,000 years ago. The Kootenay and Goat Rivers define the valley's hydrology, with the Goat River flowing from the Purcells and joining the Kootenay near Creston. These rivers support the 17,000-acre Creston Valley Wildlife Management Area, a protected wetland of ecological significance. [6]

The valley's flat, fertile soils, primarily silt loam, support an agricultural land base in the broader Creston Valley. About 12,000 hectares of land has been developed through diking and drainage, supporting grain, forage, fruit orchards, vineyards, and other agricultural uses. While agricultural land within Town limits is limited, Creston is economically and functionally connected to surrounding agricultural production, processing, wineries, tourism, and related business activity. Rural residential properties are interspersed with farmland, while forested slopes and riparian corridors define the surrounding landscape. [7]

2.2 Demographics

Population Size

According to the 2021 Census, Creston has a population of 5,583, reflecting a 4.1% increase from 2016. The community is compact, covering 8.41 km², with a relatively high population density of approximately 664.2 persons per square kilometre. Creston has an older population profile, with a median age of 57.6 and an average age of 51.7. Residents aged 65 and over make up approximately 39% of the population, while children and youth aged 0 to 14 account for about 12%, indicating a strongly aging demographic. Most households are small, with two-person census families representing the majority and an average family size of 2.0 persons. [8]

Population Numbers by Age	
0 to 14 years	665
15 to 64 years	2,770
65 years and over	2,105
Total Population	5,583

Table 2 Population Numbers by Age. Source: Statistics Canada

Languages Spoken

Creston is predominantly English-speaking: in the 2021 Census, 5,420 residents reported English as their mother tongue, with a small number of reporting French (80) or other languages (390) as their first language. Most residents speak English most often at home, while a minor share use French or non-official languages in daily life. [8]

Economy

Creston's economy is diversified across several sectors. According to the 2021 Census, the labour force in Creston is 2,170 participants, with an employment rate of 43.1% and an unemployment rate around 9.0%, indicating a lower overall labour participation compared with provincial averages. Median household income in Creston is estimated at approximately $58,800, lower than the British Columbia median of $76,000. This underscores the community's relatively smaller economy, prevalence of part-time or seasonal work, and retirees. Census data indicates that employment is spread across traditional and service industries. Retail trade and healthcare/social assistance are among the largest employers, along with manufacturing and construction, as well as agriculture, forestry, fishing, and hunting sectors. Tourism and hospitality also provide seasonal employment. Creston also supports local manufacturing such as brewing and related agribusiness activity. [8]

Family and Household

Households in Creston are primarily smaller households, with one- and two-person households accounting for the majority. Of the 2,670 private households, 990 (37%) are single-person and 1,110 (42%) are two-person households. Larger households are comparatively less common, including 270 three-person households (10%), 180 four-person households (7%), and 115 households (4%) with five or more

Private Households by Household Size	
1 person	990
2 persons	1,110
3 persons	270
4 persons	180
5 or more persons	115

Table 3 Private Households by Household Size. Source: Statistics Canada

persons. Altogether, 5,475 residents live in private households, resulting in a small average household size and reflecting a community structure oriented toward individuals and couples rather than larger family units [8].

Section 3: Vulnerabilities, Climate Risk Drivers, and Existing Risk Reduction Measures

3. Vulnerabilities, Risk Drivers, and Existing Risk Reduction Measures

Section 3 outlines the key vulnerabilities, climate risk drivers, and existing risk reduction measures that shape how hazards may affect the Town of Creston. Understanding these factors is essential to interpreting how and why impacts may vary across people, infrastructure, services, and environments. Vulnerabilities, including those related to critical infrastructure, social and economic conditions, and physical and environmental characteristics, help identify where the community is most exposed or sensitive to hazard impacts. Climate risk drivers provide additional context by describing how changing conditions may influence hazard frequency, intensity, and interaction over time. Existing risk reduction measures, including emergency management programs, infrastructure, and planning initiatives, demonstrate the Town's current capacity to prevent, prepare for, respond to, and recover from emergencies. Together, these components ensure that the subsequent hazard and risk analysis reflects Creston's underlying risk context and resilience capacity.

3.1 Vulnerabilities

Understanding social, economic, infrastructure, physical, and environmental vulnerabilities in Creston is critical to assessing how hazards may affect people, services, environments, and systems. Existing vulnerabilities influence who and what is most affected, the severity of impacts, and where consequences are concentrated. Considering these vulnerabilities alongside climate related risk drivers supports a more accurate assessment of hazard consequences by recognizing how community capacity, essential services, critical infrastructure, and environmental conditions interact during emergencies. This section summarizes key vulnerabilities across critical infrastructure and services, social and economic factors, physical and environmental conditions, and climate related drivers, and identifies existing measures that reduce risk, as well as gaps and opportunities to strengthen resilience.

3.1.1 Critical Infrastructure and Service Vulnerabilities

Critical infrastructure in and around Creston supports public safety, essential services, and overall community well-being. This includes transportation routes, the hospital and health facilities, municipal buildings, water and wastewater systems, energy supply, information technology, telecommunications, vehicles, and emergency response equipment. Many of these systems are closely connected, meaning that disruptions in one area can quickly affect others. During an emergency, this interdependence can impact emergency response capacity, local governance, and the day-to-day functioning of the community.

Throughout both Town-owned and externally operated infrastructure, several key vulnerabilities are evident. These include dependence on continuous power supply with limited backup generation for critical systems; reliance on a small number of transportation routes, fuel supplies, and external service providers; aging or capacity-constrained assets such as the Supervisory Control and Data Acquisition (SCADA) system and emergency services resources; exposure of infrastructure to environmental hazards, particularly wildfire at the urban–wildland

interface; and reliance on systems located outside the Town's control, such as upstream water treatment and regional utilities. Together, these factors create operational risks, particularly during prolonged or cascading events, where disruptions to one system (e.g., power, fuel, or transportation access) may affect multiple services simultaneously, including emergency response, communications, water and wastewater operations, and healthcare delivery.

A full inventory of the Critical Infrastructure and Services in Creston is included in Appendix F: Risk Matrices.

Town-Owned Critical Infrastructure and Services Risk Summary

Town-owned critical infrastructure assets and services are essential to maintaining public safety, core services, and effective governance in Creston. Many of these assets are vulnerable to common hazards such as wildfire, flooding, and utility disruptions, which can damage infrastructure, limit access, and interrupt power, water, and communications needed for day-to-day operations and emergency response. Creston's location within the wildland–urban interface (WUI), in close proximity to surrounding forested areas, further increases exposure of infrastructure and assets to wildfire impacts across the community.

Maps found in Appendix O: Maps identify water distribution and wastewater infrastructure for Creston.

The following Table 4 identifies infrastructure assets and services, their primary functions, and the vulnerabilities that may pose a risk by disrupting operations, impacting the Town's ability to support response, recovery, and service continuity.

Category	Critical Infrastructure	Critical Services	Vulnerabilities
Transportation	Local Roads	Provides essential transportation access for the community and emergency response operations.	Creston's Stormwater Management plan has identified localized issues at roadway sags, making them vulnerable to ponding or diversion of water to private property.
Government Administration	Town Hall	Supports municipal governance, administration, and coordination of Town services. Has a backup generator.	No specific vulnerabilities were identified.
Public Safety and Emergency Management	Creston Emergency Services Building	[redacted] Provides emergency services. Also functions as the Town's Fire Hall. Has a backup generator.	[redacted]
	Fire Trucks	Provides mobile fire suppression and emergency response capability.	Fire truck availability is limited, and units are located near the rail line, which may contribute to vulnerability during rail-related incidents. Fire response is further constrained by reliance on fuel from local gas stations, with no backup fuel supply available.
	RCMP Building	Required to provide effective emergency services.	The RCMP Building is located adjacent to the rail line, increasing exposure to derailments or hazardous material incidents.
Utilities and Public Works	SCADA System	Monitors and controls the water supply, treatment, storage, and distribution facilities across Creston.	Creston's SCADA system is aging and operates on legacy software and services, increasing risks of failure, maintenance challenges and cyber security vulnerabilities. The system also lacks redundancy, creating a single point of failure.
	Water Reservoirs (Crawford Hill, High Zone, Schikurski, and Helen St.)	Stores and supplies potable water while maintaining system pressure for domestic use and fire protection.	Reservoirs are in heavily treed areas, making them more vulnerable to wildfire impacts.

Category	Critical Infrastructure	Critical Services	Vulnerabilities
Utilities and Public Works (cont'd)	Schikurski Booster Pump Station	Pumps water to maintain pressure and move supply through higher-elevation distribution zones.	The Schikurski Booster Pump Station does not have a backup generator, leaving the system dependent on grid power and vulnerable to service disruption during power outages.
	Goat River Aquifer Well No. 2	Groundwater well activated by low water levels in the Crawford Hill Reservoir, boosts water supply in the intermediate and low zones.	Well No. 2 is not supported by a backup generator, leaving the system dependent on grid power and vulnerable to service disruption during power outages.
	Goat River Aquifer Well No. 3	Groundwater well connected to the Goat River Aquifer that provides municipal water supply capacity.	Well No. 3 is limited to emergency use only, as its water quality does not consistently meet approved operational standards. It also does not have a backup generator, leaving it vulnerable to power outages.
	Wastewater Treatment Plant	Treats municipal wastewater and prevents environmental contamination and public health impacts. Has a backup generator.	The Wastewater Treatment Plant must remain continuously operational to prevent the release of untreated sewage into the river system. While it has a backup diesel generator, limited fuel supplies create vulnerability during prolonged outages. Continuous on-site staffing is required to maintain operations, which may be challenging during evacuations.
	Collis Street Lift Station	Conveys wastewater flows within the municipal sewer system to maintain gravity drainage and treatment.	The Collis Street Lift Station does not have a backup generator and is fully dependent on grid power. During a power outage, the station may overflow within approximately eight hours, posing environmental and public health risks.
	Public Works Shop and Offices	Supports the delivery, coordination, and maintenance of public works services and operations.	Located on the interface of Goat Mountain, which has a high density of trees leaving it more vulnerable to wildfire impacts.
	Public Works Trucks & Equipment	Provides mobile equipment and capacity to maintain, repair, and restore municipal infrastructure.	Located on the interface of Goat Mountain, which as a high density of trees, making it more vulnerable to wildfire impacts. They are also reliant on fuel, which is limited in Creston.

Table 4 Creston-Owned Critical Infrastructure Summary

Critical Infrastructure and Services Risk Summary (non-Town owned)

Non-Town owned critical infrastructure supports essential community functions and plays an important role in Creston's overall resilience. Appendix O: Maps show the power distribution network and cellular infrastructure map for Creston. The following Table 5 highlights the main critical infrastructure and services in Creston that are not owned by the Town, identifies the key organizations responsible, and outlines associated vulnerabilities. These findings are based on desktop research and interviews with subject matter experts and may not represent a complete inventory of all infrastructure or vulnerabilities.

Category	Key Organization(s)	Infrastructure	Key Services	Vulnerabilities
Transportation	Ministry of Transportation and Transit	Provincial highways and the Kootenay Lake ferry	Enables regional and inter-provincial movement of people, goods, and resources, and provides evacuation and access routes to and from the community.	The Kootenay Lake ferry is vulnerable to job action and weather, causing delayed or cancelled sailings. Provincial highways intersect forested areas and steep slopes, increasing susceptibility to falling trees, landslides, and wildfire-related disruptions.
Energy Utilities	FortisBC, PetroCanada, Centex, Esso, Tempo	Oil, gas, electricity	Supplies fuel and electrical power required to operate homes, vehicles, businesses, critical infrastructure, emergency services, and backup systems	FortisBC has minimal capacity in Creston and is dependant on crews from other major centres to support if needed. Petro Canada, Centex, Tempo, and Esso have limited stores of fuel , and no backup generators. Many critical services, including emergency vehicles and backup generators, rely on these limited fuel sources.
Water Utilities	Regional District of Central Kootenay	Arrow Creek Water Treatment Plant	Provides potable water treatment and distribution to support drinking water, sanitation, fire suppression, and overall public health.	Reliance on water infrastructure outside the Creston watershed increases exposure to external hazards (like wildfire), while dry conditions can lead to water use exceeding what the Arrow Creek system can replenish. Maintenance of this plant can impact water flows.

Category	Key Organization(s)	Infrastructure	Key Services	Vulnerabilities
IT and Communications	Telus	Aerial and underground fibre cable system	Enables telecommunications, including internet, phone, and emergency communications (e.g., 911), supporting coordination, public information, and service delivery.	If multiple fibre lines are severed in different locations, system redundancy is lost, leading to a complete outage of 911 and communications.
Public Safety and Emergency Management	RCMP	Public safety, police station, fleet and equipment	Provides policing, law enforcement, emergency response support, and public safety operations, including maintaining order and supporting evacuations and incident management.	The RCMP detachment has not had an increase in capacity in almost 40 years despite risk, workload, and population increases, making them vulnerable in an event where surge response capacity is required.
Health	BC Interior Health Authority (IHA); BC Emergency Health Services (BCEHS)	Creston Valley Hospital & Health Centre, Swan Valley Lodge, emergency vehicles	Delivers healthcare services, assisted living facilities, emergency medical response, and patient transport, supporting injury treatment, disease management, and life-saving interventions.	BCEHS operates two ambulances in Creston; however, one is frequently unavailable as it is often dispatched to Cranbrook for patient transfers. If road access is interrupted and supply chains are disrupted, BCEHS has limited ability to obtain additional resources. BCEHS also does not have HazMat suits, limiting its ability to respond to incidents requiring hazardous materials protection.

Table 5 Non-Town Owned Critical Infrastructure Summary

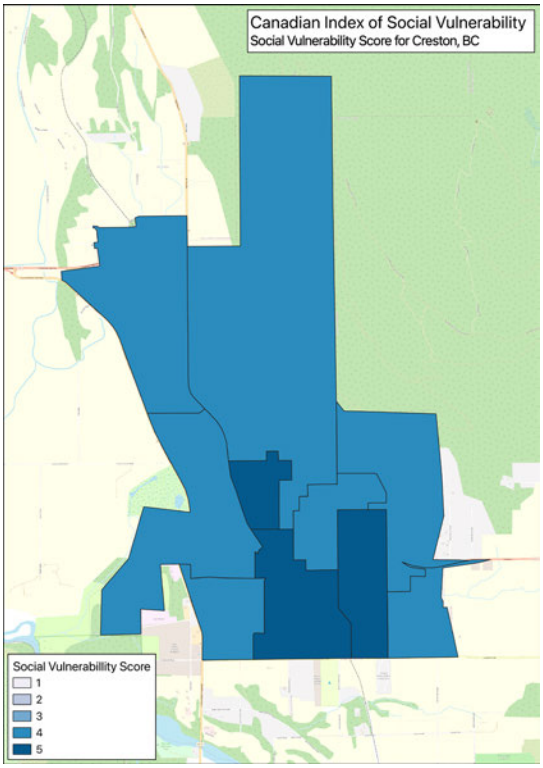
3.1.2 Social and Economic Vulnerabilities

Social and economic vulnerability in Creston is shaped by multiple intersecting factors, rather than a single characteristic alone. Age, income, health, mobility, housing, transportation access, employment type, household composition, and access to services can combine to influence how people prepare for, respond to, and recover from emergencies. These intersecting conditions are especially important in Creston, where the population is older than the provincial average, many households are small, incomes are lower than the provincial median, and the local economy relies on sectors that are sensitive to climate, transportation access, utilities, and seasonal conditions.

Social Vulnerability

Social vulnerability explains how different communities may be affected differently by similar hazard events based on several social factors such as income, age, housing, healthy, and access to services. Understanding these dynamics helps identify communities that may be at higher risk and supports planning efforts to reduce impacts and improve overall resilience.

Statistics Canada developed the Canadian Index of Social Vulnerability (CISV), which provides a social vulnerability score for all dissemination areas (DAs)[1] in Canada. The social vulnerability score is determined based on four characteristic categories, known as dimensions. The four dimensions are as follows:



Map 2 CISV Scores for Creston

- **Dimension 1:** This dimension captures themes related to radicalized identity and immigration, dwelling characteristics, remoteness, and employment.
- **Dimension 2:** The second dimension pertains to income, participation in the labour force, age, activity limitations, and gender.
- **Dimension 3:** Dimension three is focused on education, Indigenous identity, family composition, income, remoteness, and employment factors.
- **Dimension 4:** The fourth dimension includes considerations of activity limitations, residential mobility, income, and dwelling characteristics.

The 10 dissemination areas within Creston and the score for each of the DAs are shown in Map 2. Higher CISV scores (a score of 5) correspond to DAs that are more vulnerable, and low scores (a score of 1) correspond to DAs that are less vulnerable.

1 "A dissemination area (DA) is a small, relatively stable geographic unit composed of one or more adjacent dissemination blocks with an average population of 400 to 700 persons based on data from the previous Census of Population Program. It is the smallest standard geographic area for which all census data are disseminated. DAs cover all the territory of Canada". Source: Statistics Canada

In addition to the overall scores, the CISV dataset indicates which of the four dimensions of the index contribute the most to social vulnerability for each DA. When examining the CISV score, DAs in Creston exhibit noticeably higher social vulnerability than both the RDCK and British Columbia overall. As seen in Figure 1, all DAs in Creston fall within CISV scores 4 and 5, compared to 50% in RDCK and 43% province-wide. This indicates that social vulnerability is elevated across the entire Town of Creston, particularly when compared to the surrounding region and province.

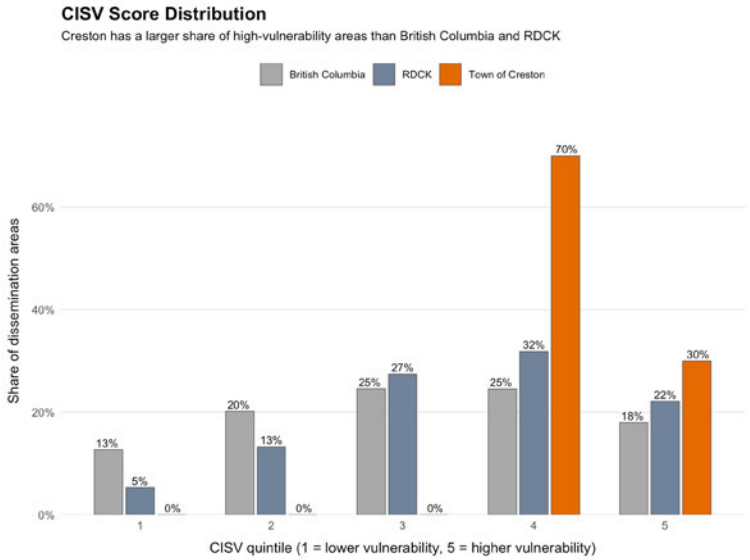


Figure 1 CISV Score Distribution

Notably, none of Creston's DAs fall within the lower vulnerability score. This indicates that Creston does not contain any lower-vulnerability areas that could offset or balance the higher vulnerability present elsewhere in the community. This highly concentrated distribution suggests that vulnerability in Creston is systemic; that the same social challenges affect the whole community, rather than localized to specific neighbourhoods. As a result, a community-wide event has the potential to affect a large proportion of the population because there are no areas with comparatively lower vulnerability scores.

In Creston, the dimension that contributes to social vulnerability the most is Dimension 2, which affects approximately 80% of all DAs. This is highlighted in Figure 2 on the following page, which compares Creston's most vulnerable dimension to RDCK and the province. When compared to RDCK and the province, a higher proportion of Creston's DAs are primarily influenced by this dimension. This indicates that Dimension 2's characteristics, income, labour force participation, age, activity limitations, and gender, are the biggest drivers of social vulnerability in Creston.

Within this set of characteristics, age and functional ability are highlighted as they both have direct implications for emergency preparedness, response, and recovery, especially in relation to evacuation support needs, access to services, and continuity of care. Age is a particularly important consideration in this context, as Creston has a high proportion of older adults, with 39% of the population over the age of 65. Older adults can often experience increased vulnerability to the impacts of hazards, due to potential health challenges compounded

by mobility limitations, which can make it harder for individuals to access services, stay connected, and remain independent.

Many older residents in Creston are aging in place, increasing reliance on personal mobility, informal support networks, and access to transportation. In the event of an evacuation or prolonged disruption, some seniors may be unable to drive, may not have access to a personal vehicle, or may require assistance to leave the community safely. At present, it is not well understood how many older adults would need transportation or other forms of evacuation support. These uncertainties can increase risk during time sensitive events and place additional demands on emergency responders, social services, and community support systems. Age related vulnerability may also affect recovery, as older adults may face greater challenges navigating assistance programs, completing repairs, or temporarily relocating. Together, these factors highlight the importance of understanding the needs of seniors aging in place and ensuring that evacuation planning, communication, and recovery supports are accessible and responsive to this segment of the population.

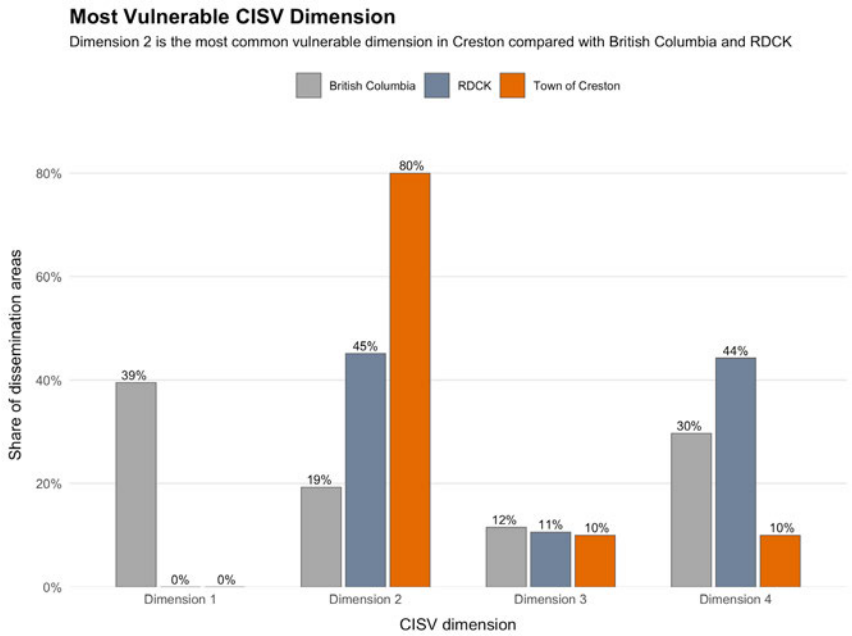


Figure 2 CISV Most Vulnerable Dimension

Economic Vulnerability

Economic vulnerability describes the degree to which households, businesses, and local economic sectors have the financial capacity to prepare for, respond to, and recover from disruptions. It reflects factors such as income levels, income stability, reliance on fixed or non employment income, sectoral concentration, and access to savings or financial buffers. In the context of emergency events, higher economic vulnerability can limit the ability of individuals and businesses to absorb unexpected costs, adapt to disruptions, and recover in a timely way.

As reflected in the CISV results, economic vulnerability is a key consideration for the Town of Creston. Household level vulnerability is shaped by a combination of lower average incomes, income stability, and the structure of the local economy, all of which influence financial flexibility before, during, and after emergencies. Statistics Canada data indicates that

median household incomes in Creston are approximately $17,200 lower than the provincial average. A portion of household income is also derived from government transfers, which can limit financial flexibility for some residents. Lower and fixed incomes may reduce the ability of households to absorb sudden disaster related expenses, such as evacuation costs, temporary accommodation, replacing essential items, or completing repairs. Limited access to discretionary savings can constrain recovery options, increase reliance on external assistance, and extend recovery timelines following prolonged or repeated disruptions.

Housing characteristics further influence economic vulnerability. Creston has a high rate of home ownership, at 76%, which can support longer term housing stability for some residents. However, renters, which account for 24% of Creston's households, may be more sensitive to post event changes in housing availability or costs. While housing costs in Creston are generally lower than in many parts of British Columbia, lower incomes may still limit the ability of households to maintain emergency savings or manage unexpected response and recovery costs. Together, these factors affect overall adaptive capacity and recovery outcomes. [9]

Household-level economic vulnerability in Creston is closely tied to the structure of the local economy. Many residents' income levels and income stability are shaped by a small number of key employment sectors, seasonal work patterns, and reliance on physical access to workplaces, customers, transportation routes, utilities, and supply chains. As a result, disruptions can affect households, workers, and businesses at the same time.

Employment and business activity in Creston are concentrated in tourism and visitor services, manufacturing and processing, brewing, forestry, retail trade, agriculture, accommodation and food services, health care, education, and other public services. Many of these sectors depend on in-person service delivery, seasonal labour, and continuous access to facilities, utilities, and transportation. This makes them sensitive to prolonged interruptions caused by hazards such as wildfire, flooding, extreme heat, smoke, disease outbreaks, power outages, or transportation route closures.

- **Tourism:** Tourism, retail, accommodation, food services, and arts and entertainment are also important to Creston's economy. These sectors rely on visitors, customer access, and peak-season revenue, particularly during the summer. Even temporary closures, reduced visitation, smoke conditions, road closures, or event cancellations can have a disproportionate effect on annual income and business viability.
- **Manufacturing:** Manufacturing, brewing, forestry, and wood product industries also support local employment. These sectors depend on reliable transportation, utilities, supply chains, and workforce availability. When road, rail, power, fuel, or telecommunications systems are disrupted, businesses may have limited short-term alternatives for moving goods, receiving materials, or maintaining operations.
- **Agriculture:** Although agricultural land uses within Town limits are limited, Creston is economically connected to the broader Creston Valley agricultural and agri-food system, including production, processing, wineries, agri-tourism, and supporting services. Agricultural income is highly dependent on seasonal conditions, production and processing timelines, access to water, labour availability, and the ability to move goods to market. Losses during key growing, harvest, or shipping periods can have effects that extend beyond individual farms to related services, suppliers, workers, and local businesses.

Creston's reliance on a limited number of road and rail corridors further increases economic vulnerability. When access is constrained, impacts can cascade across multiple sectors at once,

affecting workers, customers, shipments, emergency services, agriculture, tourism, and local businesses.

The local economy also includes many small and locally owned businesses. These businesses may have limited financial reserves, fewer staff, and less formal business continuity capacity. Prolonged interruptions, workforce shortages, reduced demand, or loss of peak-season revenue can threaten business continuity and slow community-wide recovery. Overall, Creston's economic vulnerability is shaped by the overlap of seasonal employment, lower household incomes, small-business capacity, sector concentration, tourism dependence, economic interdependencies with the surrounding Creston Valley agricultural system, and limited transportation redundancy.

3.1.3 Physical and Environmental Vulnerabilities

Physical and environmental vulnerabilities reflect the natural and built landscape conditions that influence how hazards occur and how impacts are experienced. In Creston, the valley setting, floodplain environment, wetlands, and surrounding land uses play an important role in shaping exposure to flooding, erosion, water quality issues, and environmental stress. While some of these factors can be managed locally, many are influenced by broader watershed conditions and activities outside the Town's jurisdiction.

Creston is adjacent to the Creston Valley Wildlife Management Area (CVWMA), a wetland complex of approximately 7,000 hectares that includes Duck Lake, marshes, sloughs, diked areas, agricultural lands, and river terraces within the broader Kootenay River floodplain. [10] These wetlands and floodplain environments provide important protective functions, including filtering pollutants, buffering flooding and drought, stormwater management, carbon storage, water storage, flood attenuation, runoff moderation, drought buffering, and water-quality improvement. However, when ecosystems are degraded, the services that communities rely on can be reduced. Wetlands represent some of the most threatened ecosystems, facing challenges from urban development and agricultural practices. Effective wetland conservation is essential for maintaining both ecological integrity and socio-economic benefits. Wetland deterioration contributes to negative outcomes for both biodiversity and for interconnected elements such as water availability and quality, food security, and nutrition.

These conditions are reflected in the following physical and environmental factors that contribute to vulnerability in Creston:

- Location within a floodplain-influenced valley where broader watershed conditions can affect local flooding, drainage, and water quality.
- Dependence on wetlands, riparian areas, and managed water-control systems for flood attenuation, water storage, water-quality protection, and drought moderation.
- Land and water management practices in the broader watershed, including agricultural activities, that may contribute to nutrient loading, sedimentation, or contamination of surface and groundwater.
- Ecologically important and floodplain environments located adjacent to developed, agricultural, and community-use areas, increasing the potential for environmental and community impacts when these systems are stressed or disrupted.

- Changes in ecosystem health or diversity, including the loss of natural assets and nature-based services that would otherwise provide protection against certain emergencies.
- Encroachment or development in exposed floodplain areas, which can increase long-term vulnerability even where structural flood-protection measures are in place.
- Land and water management activities outside municipal jurisdiction that may influence runoff, erosion, sedimentation, water quality, or drought conditions within the broader valley.
- Steep terrain and valley side slopes, which can increase the risk of landslides, debris flows, erosion, and sediment movement during heavy rainfall or snowmelt.
- Hazardous industries or activities in the community, such as the Columbia Brewery, which uses large quantities of ammonia.
- Dependence on mountain snowpack and spring snowmelt, where rapid melt or rain on snow events can increase flood and erosion risk.

3.2 Climate Risk Drivers

Climate change is already affecting communities across Canada and British Columbia, including Creston. [11] It is important to understand the difference between natural climate variability and climate change. Natural climate variability refers to short-term changes in weather patterns that can happen from year to year or over several decades, such as warmer or cooler seasons or events like El Niño and La Niña. Climate change, on the other hand, refers to long-term shifts in climate patterns that occur over many decades and are largely driven by human activities, including the burning of fossil fuels. [12]

In the past, Creston has experienced fairly predictable seasonal weather, with cold winters, warm summers, and reliable water from snowpack and spring runoff. Today, climate change is altering these patterns. The Creston Valley is projected to experience hotter summers, drier conditions during the summer months, and more frequent and intense extreme weather events. [13] These changes increase the risk of drought, extreme heat, and flooding, and can place pressure on local water supplies, agriculture, ecosystems, and community health.

Climate change can increase disaster risk by making climate-related hazards more severe and more frequent. For example, hotter and drier summers can increase the likelihood of drought and wildfire, while heavier rainfall events can lead to flooding and erosion. These risks can be compounded when multiple hazards occur close together, such as drought conditions followed by intense rainfall, which can increase runoff and flooding while reducing the land's ability to absorb water. [14]

As an inland community located above and adjacent to a floodplain-influenced valley, Creston is exposed to riverine and overland flooding impacts primarily through surrounding low-lying agricultural areas, dikes, and drainage systems. Climate change is expected to contribute to earlier spring snowmelt and higher peak river flows, increasing flood risk along the Kootenay River and nearby tributaries. More intense rainfall events can also overwhelm drainage systems and contribute to localized flooding. These impacts may place additional stress on existing flood protection infrastructure, including dikes and drainage systems within the Creston Valley. [11]

Throughout this assessment, climate data and projections have been integrated to inform the assessment of likelihood for each hazard impacted by these changes. A summary of the climate data used can be found in Appendix I: Social Vulnerability.

3.3 Existing Risk Reduction Measures

Existing risk reduction measures refer to the policies, programs, infrastructure, and actions already in place within the Town of Creston that help prevent hazards, reduce vulnerabilities, and lessen potential impacts from emergencies. These measures include planning documents, policy and bylaws, capacity development, physical mitigation works, and emergency preparedness initiatives. Identifying and documenting existing measures is helpful component of the HRVA, as it establishes a baseline of current resilience, highlights strengths and gaps, and informs future risk reduction priorities and investments.

The Town of Creston has established a comprehensive set of risk reduction measures across governance, planning, infrastructure, and emergency operations. Core components include a formal emergency management framework supported by the Emergency Management Program Bylaw (2022) and Disaster Response Plan (2023), alongside a centralized Emergency Operations Centre (EOC) operating with an Incident Command System, Emergency Support Services (ESS), and coordinated response from Creston Fire Rescue, RCMP, BC Emergency Health Services, and Search and Rescue. Mutual aid agreements with BC Wildfire Service and neighbouring jurisdictions further strengthen response capacity.

A wide range of hazard-specific plans and technical studies guide mitigation and adaptation efforts, including the Community Wildfire Resiliency Plan (2023), Fuels Management Prescription (2025), flood modelling and floodplain studies, stormwater and infrastructure master plans, and the draft Climate Action Plan (2025). Supporting tools such as the Evacuation Toolkits, Extreme Weather Response Plan, Water and Sewer Master Plans, and Asset Management Plan provide operational and long-term direction for managing risks.

Targeted measures are also in place to reduce vulnerability and support community resilience. These include FireSmart programming and fuel management treatments near Arrow Mountain, climate-informed stormwater design using updated IDF curves, land use controls through floodplain bylaws and Development Permit Areas, building code updates addressing extreme heat, and public education and training initiatives delivered through Emergency Management Creston. Evacuation zone planning, ESS coordination, and integration of critical health infrastructure into emergency planning further support effective response.

A detailed inventory of existing measures is provided in Appendix K: Recommendations to Enhance Resilience.

Section 4: All-Hazards Risk Assessment

4. All-Hazard Risk Assessment

Section 4 presents the results of the Town of Creston's all hazards risk assessment. Hazards were evaluated using a consistent approach that integrates (1) current likelihood (anticipated frequency in the near term, approximately ±10 years), (2) future likelihood (how frequency may change by approximately 2050), and (3) an overall consequence score reflecting potential impacts to people, animals, property, infrastructure, the environment, and critical services. Likelihood ratings use the Rare to Almost Certain scale outlined in Appendix B: All Hazard Likelihood Scoring Rubric, and consequence scoring details are provided in Appendices C–E. Risk levels were then mapped on the risk matrices (see Appendix F) to support hazard prioritization.

4.1 All-Hazard Summary

To support decision making, hazards in Section 4.2 are presented from higher priority risk to lower priority risk, consistent with the hazard priority rankings and the positioning shown in the risk matrix. The highest priority hazards based on this assessment and the hazards of highest concern for Creston – Tier 1 hazards – are presented first and include more detailed analysis, including expanded consequence scoring and supporting evidence related to Appendix D: Consequence Ranking Definitions. Lower priority hazards (generally Tier 2) are presented with more concise summaries, reflecting their lower relative risk while still capturing key considerations. Within each hazard profile, the report summarizes the hazard background, likelihood rationale, key consequence themes, and any notable cascading or compounding relationships identified through research and engagement.

Table 6 provides an all hazards snapshot by plotting hazards by current likelihood (rows; expected frequency in the near term, approximately ±10 years) and consequence score (columns; Very Low to Very High). Likelihood ratings follow the Rare to Almost Certain scale in Appendix B: Likelihood Scoring Rubric, while consequence scoring definitions and results are provided in Appendices C-E. Hazards located further toward the upper right of the matrix reflect higher likelihood and/or higher consequences and therefore represent higher relative priority for planning.

Based on Table 6, the hazards in the higher priority part of the matrix include Wildfire (Likely / High) and hazards assessed as Medium-High consequence with Likely/Possible likelihood, including Extreme Heat; Drought; Lake, River, and Stream Flooding; Stormwater Flooding; Flash Flooding; High Wind Event; Telecommunications Interruption; Wastewater Interruption; Human Disease; and Rail Incident. Maps included in hazard summaries for specific hazards are included in Appendix O: Maps.

Current Likelihood							
	Almost Certain (Every 2 years or more)	Fog Lightning					
	Likely (Every 3-10 years)	Space Weather Seiche Motor Vehicle Incident	Air Quality Freezing Rain or Drizzle Public Health Crisis Electrical Outage Plant Disease	High Wind Event Stormwater Flooding Flash Flooding Lake, River, and Stream Flooding Telecommunications Interruption	Extreme Heat Drought	Wildfire	
	Possible (Every 11-50 years)	Major Planned Event	Snowstorms and Blizzards Animal Disease Structure Fire Oil or Gas Pipeline Spill	Landslide/Debris Flow Transportation Route Interruption Hazardous Materials Spill	Human Disease		
	Unlikely (Every 51-100 years)		Hail Avalanche Earthquake	Extreme Cold		Rail Incident	
	Rare (Less than every 100 years)	Space Debris Dam and Spillways Failure Public Disturbance Aircraft Incident	Food Source Interruption Fuel Source Interruption Cyber Security Threat Ash Fall Land Subsidence Mine Incident Structure Failure Marine Vessel Incident	Tornado Liquefaction National Security Threat Water Service Interruption	Explosions Wastewater Interruption Dike Failure		
		Very Low (0-6)	**Low** (7-14)	**Medium-Low** (15-21)	**Medium-High** (22-29)	**High** (30-37)	**Very High** (38-44)
		Consequences					

Table 6 Hazard Matrix for Creston

4.2 Individual Hazard Risk: Tier 1 Hazards

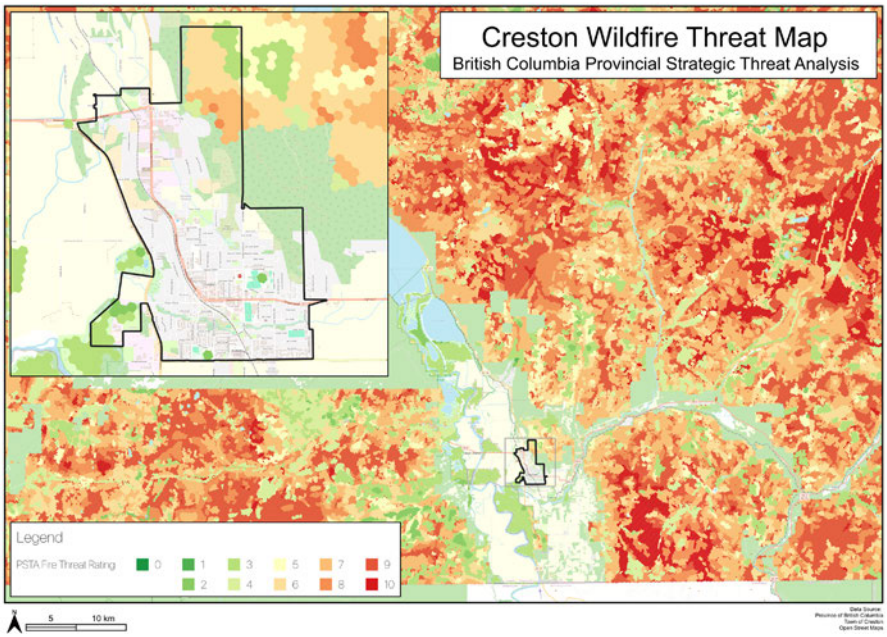
Wildfire

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	High	**Likely / High**	Likely

Hazard Background

A wildfire is unplanned, unauthorized fire that occurs in forest or rangeland and burns vegetation, grass, shrubs, bushes, peat lands, or forests. Vulnerability exists at the Wildland Urban Interface (WUI), an area where combustible forest fuels are found next to built structures. This happens at either a distinct boundary where vegetation meets the built environment, or in a more combined manner where the built environment and forest fuels are intertwined without a well-defined boundary. [15]

Creston is situated within a provincially designated WUI polygon classified as Risk Class 2, representing the second-highest wildfire risk rating in British Columbia. Provincial threat analysis assigns High to Extreme wildfire threat ratings to much of the surrounding area. Local assessments indicate that steep, south-facing slopes in the northeast WUI pose the greatest risk, with hazardous fuel types such as S-1, O-1a/b, and C-7 contributing to rapid fire spread potential. Approximately 73% of Creston's WUI is private land, where low compliance with FireSmart principles elevates hazard levels. Historical data shows that 88% of ignitions are human-caused, and recent years have seen an increase in wildland fire callouts in BC. In addition to forest fuels, homes, vehicles, and other combustible materials within the WUI create additional fire load, making ember transport and structure ignition a critical concern during extreme events. [16] Map 3 shows Creston's wildfire threat based on BC's provincial strategic threat analysis. A larger version of this map is included in Appendix O: Maps.



Map 3 Creston Wildfire Threat Map

Wildfire can act as a cascading hazard by damaging critical infrastructure, degrading air quality, and increasing sediment and turbidity in water sources, which can result in service disruptions such as telecommunications outages and boil water advisories. [17] Wildfires can also increase the risk of landslides, as damage to plants and soil within a burned area can lead to increased runoff after intense rainfall or rapid snowmelt. [111]

Hazard Likelihood

Across British Columbia, there has been an increase in the amount and severity of wildfires in the last 10 years, with the most severe wildfire seasons occurring in 2017, 2018, 2021, 2023 [18]. Land-use change combined with climate change and suppression orientated fire management policies are the main drivers in the increase of fire intensity. [19] Warmer, dryer, and longer fire seasons are predicted to occur more frequently across the province, driven by climate change. [20]

Wildfire likelihood in Creston is shaped by a combination of fuel load, fuel conditions, historic fire management practices, and the accelerating impacts of climate change. The WUI surrounding Creston contains steep slopes and conifer-dominated forests, particularly to the northeast, which create conditions for rapid fire spread. Hazardous fuel types such as dense conifer stands and conifer slash dominate these areas, while mixed stands are gradually shifting toward conifer dominance, increasing flammability over time. Approximately one third of assessable public land in the WUI is classified as High or Extreme fire behavior threat, and roughly half of those areas are close enough to directly impact homes and infrastructure. Without ongoing fuel management, these conditions will persist or worsen as regeneration fills gaps and dead material accumulates. [21] [16]

Historically, Creston's forests experienced frequent, low-intensity fires that maintained open, uneven-aged stands and limited fuel buildup. However, throughout the 20th century, provincial fire suppression policies eliminated these natural and cultural fire regimes, allowing fuels to accumulate and stands to become denser. This legacy of suppression has created a landscape primed for high-intensity fires when ignitions occur. While large fires have been rare in recent decades, with only four BC Wildfire Service-recorded fires within 5 km of Creston's WUI since 1940, the absence of regular fire has increased the potential for severe wildfire behavior today. [22]

Climate change is amplifying the likelihood of wildfires. Hotter, drier summers, prolonged droughts, and more frequent wind events increase fuel drying and ignition potential, increasing the number of high fire weather days. Additionally, bio-climatic zones are expected to shift, with the Interior Cedar Hemlock subzone becoming even drier, further stressing vegetation and increasing flammability. These changes mean that fires once considered rare could become more frequent and severe. The increase in fire weather combined with an increased fuel load can result in larger more consequential wildfires occurring in the future. [16] Overall, wildfire likelihood in Creston will be increasing, however, the increase is not anticipated to impact the overall likelihood rating.

Hazard Consequences

The table below describes the potential consequences of a wildfire in Creston.

Category	Description	Rating
Fatalities	· Direct contact with wildfire can result in fatalities from burns or smoke inhalation.	LOW
Injuries, Disease, or Hospitalization	· Direct contact with wildfire can result in injuries from burns or smoke inhalation. · Wildfire smoke can considerably degrade air quality both near the fire and far downwind, increasing the risk of injury and adverse health outcomes. · Exposure to smoke has been shown to worsen respiratory symptoms, particularly for individuals with pre-existing conditions such as asthma. It can lead to increased respiratory distress requiring medical attention. · Even when fires are not directly adjacent to the community, smoke impacts can persist over multiple days, increasing the likelihood of smoke-related injuries among sensitive populations, outdoor workers, and individuals required to remain active during response and recovery operations. [23]	MEDIUM
Displacement	· Damage to homes and properties, or the threat of potential impacts, can lead to evacuations. If homes are destroyed, this may result in long-term displacement.	HIGH
Psychosocial Impact	· Wildfires have occurred repeatedly in the RDCK. Some of these events have caused evacuations and structural losses, leading to psychosocial impacts related to displacement, loss, and prolonged uncertainty. · Impacts may be amplified for seniors, people living alone, evacuees, residents with health needs, and people whose homes, animals, livelihoods, or community places are threatened.	HIGH
Support Services Impact	· Wildfire events can increase demand on community support services due to evacuations and prolonged exposure to smoke. · Community social services may experience added pressure to provide emergency shelter, food, mental health and psychosocial supports, assistance for seniors and vulnerable populations, and support for individuals requiring help with mobility, medications, or continuity of care during and after the event.	HIGH

Cultural Impact	· Cultural and heritage sites – places of intangible value regarding identity, belonging, and shared cultural memory – may be lost through wildfire, severing ties to cultural roots. [24] · Impacts may also include damage or disruption to Indigenous ceremonial sites, hunting camps, and traplines, and hunting, fishing, and harvesting grounds. [25]	**HIGH**
Property Damage	· Wildfires can damage or destroy homes and businesses through wind-blown embers, radiant heat, and direct flame contact. [24]	**HIGH**
Critical Services Impact	· Wildfires can damage transportation routes and critical infrastructure, limiting evacuation routes and delaying first responder access to critical areas. · Telecommunications infrastructure is particularly vulnerable, as wildfires can cause direct damage to aerial fibre and utility poles and may also trigger precautionary power shut-offs by FortisBC to prevent electrical arcing, resulting in immediate service disruptions. [26] While Telus can typically restore telecommunication service within approximately 10 hours when damage is limited and sites are accessible, restoration timelines may be extended if multiple transport segments are damaged or if access is restricted due to wildfire conditions. [27] · Wildfires can increase turbidity in surface water sources, potentially leading to water use restrictions or boil water advisories, which would further affect households, critical facilities, and emergency response operations. [28] · Creston Valley Hospital & Health Centre may face increased demand from residents who are more vulnerable to the effects of wildfire and wildfire smoke, such as those with pre-existing conditions or older adults.	**EXTREME**
Environmental Damage	· Fire is ecologically necessary in many Canadian forests, and low-intensity fires can support forest health under the right conditions. [29] However, severe and uncontrolled fires can cause biodiversity loss, invasive species establishment, degraded water quality, and increased risk of post-fire debris flows, landslides, and flooding. [30]	**HIGH**

Economic Impact	· Wildfires can disrupt livelihoods and economic activity by affecting forestry operations in the surrounding Creston Valley. [31] · Impacts to community-managed forests, timber harvesting, and local sawmill and wood-product operations can result in production slowdowns, temporary shutdowns, and lost income for workers, contractors, and associated businesses in Creston. · These effects may be compounded by transportation disruptions, increased insurance costs, and reduced tourism and labour productivity during periods of heavy smoke. [32]	**HIGH**
Reputational Impact	· Community trust may be affected by perceptions of preparedness, evacuation effectiveness, and smoke response. · Reputational impacts may extend beyond residents; a wildfire near the Town could also influence how Creston is perceived, as visitors and tourists may associate the community with wildfire risk and be less inclined to return in future years. However, Creston's emergency management website provides guidance on evacuations, FireSmart, and real-time updates, which may help mitigate some reputational impacts through clear communication and visible preparedness. [33]	**MEDIUM**
TOTAL CONSEQUENCE SCORE		**HIGH**

Future Consequence

The potential impacts of climate change on consequences in the future can be assessed by examining the 2023 St. Mary's River wildfire, which resulted in evacuations, property loss, and prolonged disruption in the region. [34] The event was re-evaluated under a +3°C warming scenario to understand how wildfire behaviour and impacts may change. While based on a single event, the findings illustrate how wildfire risk may evolve under warmer conditions. Under a +3°C warmer climate, wildfire is expected to result in greater overall consequences, driven by higher temperatures (~+2°C) and conditions that support more extreme fire behaviour. These changes are expected to increase the potential for rapid fire growth, larger burn areas, and more difficult suppression efforts. As a result, impacts such as evacuations, property loss, infrastructure damage, and prolonged service disruptions are expected to increase. Overall, wildfire is expected to result in more severe and widespread consequences, particularly in and near wildland-urban interfaces, which encompasses the entire Town of Creston.

Rail Incident

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Unlikely	High	**Unlikely / High**	Possible

Hazard Background

A rail incident refers to any situation involving a passenger, cargo, or light rail train that results in damage, bodily injury, or death. These incidents include main-track derailments and collisions, non-main-track derailments, main-track collisions, crossing accidents, and trespasser accidents. [35]

Creston is traversed by a Canadian Pacific (CP) Railway main line that runs through the centre of the community and serves as a vital transportation corridor for commodities such as petroleum products, chemicals, grains, fertilizers, coal, metals, minerals, forest products, and equipment. This regular movement of hazardous materials introduces ongoing risk, even with established safety protocols.

Creston has experienced several notable rail incidents, most notably the 1998 trail derailment which was due to roadbed depression from heavy rainfall, derailing three locomotives and eight gondola cars with 90 cubic meters of silver/lead concentrate release from derailed gondola cars and 21,000 liters of diesel fuel released with no injuries. [36]

Hazard Likelihood

The likelihood of rail incidents in Creston is influenced by infrastructure conditions, terrain, and seasonal weather variability. While maintenance practices keep the probability of major incidents low under normal conditions, periods of heavy rainfall or flooding increase the risk of derailments, particularly those involving hazardous materials. [37] Overall, the likelihood of a consequential rail incident in Creston is considered low to moderate under normal circumstances, rising to moderate during extreme weather events due to soil instability and the presence of dangerous goods.

Hazard Consequences

The table below describes the potential consequences of a rail incident in Creston.

Category	Description	Rating
Fatalities	· Because the railway corridor runs through Creston, a rail incident could cause direct fatalities involving train crews, motorists, pedestrians, or nearby residents and workers. · Impacts could be especially high in the event of a collision, derailment, or fire.	**HIGH**

Injuries, Disease, or Hospitalization	· Serious injuries or hospitalization could occur through crossing collisions, derailment impacts, fire, smoke exposure, or exposure to spilled fuels or other dangerous goods.	**HIGH**
Displacement	· Due to the location of the railway in the core of the Town, a rail car derailment, fire, or dangerous goods release could require temporary evacuation or shelter-in-place orders for homes, businesses, and institutions near the corridor.	**EXTREME**
Psychosocial Impact	· A rail incident in Creston could cause considerable stress, fear, and anxiety, particularly if it leads to fatalities, injuries, or property damage. [38]	**EXTREME**
Support Services Impact	· The rail corridor passes near key social-service providers in Creston, including the Creston Valley Food Bank, Creston & District Society for Community Living, and Valley Community Services. Therefore, a derailment could disrupt community support systems. · Depending on the nature and extent of a spill, fire, or derailment, organizations could be temporarily evacuated, forced to close, relocated, or experience prolonged service disruption, reducing community access to food security, disability supports, counselling, and other community services. [38]	**EXTREME**
Cultural Impact	· A rail incident could disrupt access to important community and cultural assets along the corridor, including the Creston Museum, the public library, the Grain Elevators, and several parks. · A rail incident could also impact cultural and recreational programming, gathering spaces, and community use of these areas. [38]	**HIGH**
Property Damage	· Property damage to adjacent homes and buildings could be considerable and localized if railcars derail, strike moving or parked vehicles, or damage adjacent buildings.	**HIGH**
Critical Services Impact	· A rail incident could block key road crossings, emergency access, municipal movement patterns, and service continuity, while also potentially affecting nearby utilities and delaying access to the hospital and other essential services. [38]	**EXTREME**
Environmental Damage	· Because the CP rail line runs through downtown Creston carrying hazardous materials, a derailment could contaminate soil and nearby rivers/wetlands, requiring complex remediation and monitoring, potentially lasting months or years. [39]	**HIGH**

Economic Impact	· Depending on the location and severity of the incident, impacts could include days- to weeks-long business interruption, loss of customer access, evacuation or closure of affected businesses, and prolonged recovery costs. · In a more severe derailment or dangerous goods spill, these impacts could be compounded as there are many businesses, such as the Columbia Brewery, located near the railway. [38]	**EXTREME**
Reputational Impact	· A rail incident could reduce public confidence in local safety, emergency coordination, and corridor management, especially if communication is unclear or the event disrupts residents and businesses for an extended period. [40] [38]	**HIGH**
TOTAL CONSEQUENCE SCORE		**HIGH**

Extreme Heat

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	High	**Likely / High**	Almost Certain

Hazard Background

Extreme heat refers to temperatures that are remarkably higher than the average for a specific time and location. [41]

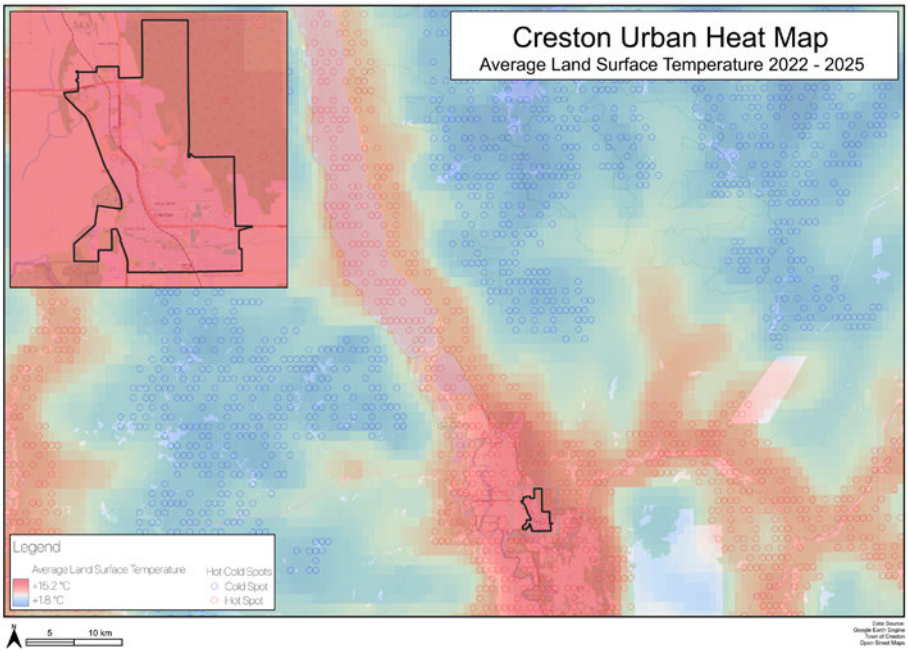
Heat domes are a specific type of extreme heat event that occurs when high-pressure system traps heat near the Earth's surface and remains stationary due to a blocked jet stream. From June 25 to July 1, 2021, much of British Columbia experienced an unprecedented heat dome, resulting in record-breaking temperatures that persisted for several days. This event led to 619 deaths, most of whom were older adults with multiple chronic health conditions who lived alone. [42]

Following this event, the BC Government introduced a two-tier Heat Alert and Response System in June 2022 as part of the BC Provincial Heat Alert and Response System (BC HARS). The system included two alert levels: Heat Warning and Extreme Heat Emergency. The BC HARS was updated again in 2026, moving to a 3-level system to align with Environment and Climate Change Canada. As shown in Figure 3, this updated approach includes Yellow, Orange, and Red heat warning thresholds. [43] In Creston, a Heat Warning is issued when there are two or more consecutive days with forecasted daytime highs of 35°C or above and nighttime lows of 18°C or above. [43] In 2025, Creston broke a 107-year-old daily record for extreme heat, reaching 34.4°C. [44] This extreme heat exposure is partly driven by Creston's geography; located between mountain ranges, it acts as a heat trap. [45]

Warning Level	Yellow Warning - Heat	Orange Warning - Heat	Red Warning - Heat
General Criteria	**Unusually high** daytime and overnight temperatures for **2+ days** (see Figure 4 for temperature ranges and zones)	**Very high** daytime and overnight temperatures for **3+ days** (**exceeding temperature** ranges in Figure 4)	Orange warning conditions with a pattern of **substantive day-over-day temperature increases** for **3+ days**
Expected frequency	Approximately 3 per summer (this is the most common warning)	Approximately 1 per summer (this is an uncommon warning)	Approximately 1 per decade (this is a rare warning)

Figure 3 BC HARS: 2026 Summary Table.
Source: BC Government

Map 4 below shows average land surface temperatures (2022–2025), highlighting areas of higher and lower heat intensity. Urban heat islands, where built surfaces such as buildings, roads, and other infrastructure retain and re-radiate heat more than natural landscapes, are visible as zones of elevated temperature within the map. Warmer temperatures are generally concentrated in developed areas and can exceed recorded daily temperatures, while cooler zones are associated with vegetation and water bodies. A larger version of this map is included in Appendix O: Maps.



Map 4 Creston Urban Heat Map

Extreme heat acts as a cascading hazard by increasing evaporation and drying soils and vegetation, which can contribute to drought conditions and increase the likelihood and severity of wildfire. [46]

Hazard Likelihood

Climate change is driving higher annual summer temperatures and more frequent extreme heat events, with Western Canada already averaging one to two degrees warmer than in the 1940s. Low-lying areas from the West Coast to the Rocky Mountains, including Creston, are projected to be among the most exposed to extreme heat between 2051 and 2080. [41] Under the RCP4.5 emissions scenario, Creston's hottest day is projected to be 38.2°C by the 2051–2080 period, an increase of 3.8°C compared to the 1971–2000 baseline, with an ensemble range of 36.5°C

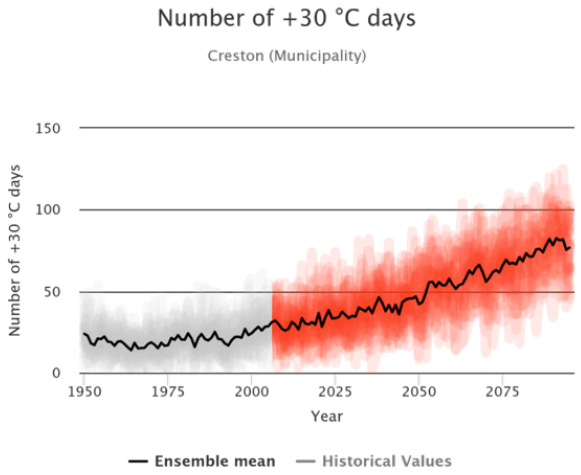


Figure 4 CMIP5 Climate Projections for Days Above 30 °C Annually.
Source: climateatlas.ca

to 38.8°C. Maximum temperature projections are outlined in Figure 6 below. Additionally, the number of days exceeding 30°C annually is expected to average 37, which is 15 more days than the baseline period, with an ensemble range of 23 to 61 days. [13]

Hazard Consequences

The table below describes the potential consequences of extreme heat in Creston.

Category	Description	Rating
Fatalities	· Extreme heat can contribute to fatalities, particularly during prolonged heat events when indoor temperatures become unsafe. · Public health reporting in Canada has shown that most heat-related deaths occur indoors, especially among older adults, people with pre-existing health conditions, individuals with lower incomes, and those who live alone or lack access to cooling. [47] · Given that older adults represent a large portion of Creston's population, extreme heat is likely to pose elevated life-safety risks in the community.	**MEDIUM**
Injuries, Disease, or Hospitalization	· Extreme heat can cause dehydration, heat exhaustion, and heat stroke, and can worsen cardiovascular and respiratory conditions. · Health impacts are most severe when people cannot access a cool indoor environment, leading to increased medical visits and hospitalizations. [48]	**MEDIUM**
Displacement	· Lack of cooling infrastructure (central air conditioning, heat pumps, or portable air conditioning units) may cause some people to temporarily seek shelter elsewhere.	**LOW**
Psychosocial Impact	· Extreme heat can directly contribute to mental health stress, worsening psychiatric symptoms, and increased risk of crisis (e.g., anxiety, depression, or acute episodes), particularly among vulnerable populations. Impacts may be heightened in smaller communities like Creston where social isolation, limited services, and housing conditions can reduce the ability to cope with prolonged heat. [49]	**MEDIUM**
Support Services Impact	· Extreme heat can increase demand on social services as more people require wellness checks and access to cooling spaces. [48]	**MEDIUM**

Cultural Impact	· Extreme heat can disrupt harvesting, hunting, fishing, and other land-based cultural practices, including those important to First Nations and other Indigenous communities. [50] · Outdoor cultural activities may be cancelled.	**MEDIUM**
Property Damage	· Direct structural property damage within Town limits is generally limited; however, prolonged heat can damage orchards, vineyards, crops, and other heat-sensitive agricultural assets in the surrounding Creston Valley. [51]	**LOW**
Critical Services Impact	· Demand on hospitals and other essential services could increase. · Strain on physical infrastructure could increase, such as damage to roads and rail lines during heat waves. · Higher energy demand can increase the risk of power outages. [51]	**HIGH**
Environmental Damage	· Extreme heat can harm animals, crops, and traditional food systems, while also intensifying related hazards such as drought and wildfire. These compounding effects can degrade ecosystems, reduce water availability, and worsen air quality. [52]	**HIGH**
Economic Impact	· Extreme heat can affect Creston and the broader Creston Valley's agriculture-based economy by reducing labour productivity, lowering crop yields and product quality, stressing livestock, and increasing operating costs. [51] · The 2021 heat dome in BC demonstrated how prolonged heat can disrupt food production and supply chains, resulting in substantial economic impacts. [53] Crops grown in and around Creston, such as cherry farms and and vineyards are particularly vulnerable; cherries require sufficient winter chill for proper development, [54] and grapevines can experience remarkable reductions in productivity at temperatures above approximately 33°C. [55] · Impacts to agriculture in and around Creston can have cascading effects on the Town, as agricultural losses throughout the Creston Valley may reduce discretionary spending and contribute to declines in tourism revenue. [38]	**HIGH**

Reputational Impact	· Public trust and confidence in the Town may be affected if residents perceive that the Town is not adequately prepared for extreme heat events. · Limited availability of cooling centres, insufficient outreach, or gaps in other heat related risk-reduction measures could contribute to reputational impacts, particularly among vulnerable populations. · Reputational impacts may be exacerbated if extreme heat events result in fatalities or an increase in hospitalizations. [40]	**MEDIUM**
TOTAL CONSEQUENCE SCORE		**MEDIUM - HIGH**

Future Consequence

To understand potential changes in future consequence for extreme heat, an assessment was conducted on the June 2021 heat dome, which resulted in widespread health impacts and fatalities across British Columbia due to prolonged daytime and overnight heat. [43] For this analysis, the event was re-evaluated under a +3°C warming scenario to understand how the consequences of a similar event could change. While based on a single event, the results illustrate how impacts to people, services, and systems may evolve more broadly. Under a +3°C warmer climate, extreme heat events are projected to result in increased overall consequences for Creston, driven by increases in key indicators such as daily maximum humidex (~+2°C), nighttime humidex (~+2°C), and nighttime temperatures (~+1°C). These changes are expected to reduce overnight cooling and extend the duration of heat exposure, particularly in indoor environments. As a result, there may be increased demand on healthcare services, emergency response, and community support programs, with heightened risks for vulnerable populations, including older adults. While direct property damage is expected to remain limited, pressures on infrastructure, agriculture, and ecosystems are likely to increase. Access to cooling and heat mitigation measures is expected to become increasingly important for public health and community resilience. Overall, extreme heat is anticipated to become a more intense and sustained hazard with compounding impacts across multiple sectors.

Drought

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Medium - High	**Likely / Medium - High**	Almost Certain

Hazard Background

Drought is defined as a prolonged period of below-average precipitation over an extended period that leads to insufficient water availability that negatively impacts vegetation, animals, and people. It can occur in any climatic region, including areas typically associated with high rainfall such as BC's west coast. Local water supply can be influenced by multiple factors, including precipitation, topography, geography, microclimates, storage capacity, water utility systems, and population demands. [56] Drought impacts are non-structural but often widespread and cumulative. Severe drought conditions pose risks to people and communities, placing strain on water resources and affecting the local economy, environment, and overall well-being of residents. [57]

British Columbia uses a five-level classification system to assess drought conditions, as shown in Figure 5. This system measures the severity and extent of drought hazards. Each level is determined by key indicators, such as precipitation and natural streamflow, and how these values compare to normal conditions. [57]

Drought Level Classification		
Level	**Impacts**	**General Response Measures**
0	There is sufficient water to meet socio-economic and ecosystem needs	Preparedness
1	Adverse impacts to socio-economic or ecosystem values are **rare**	Conservation
2	Adverse impacts to socio-economic or ecosystem values are **unlikely**	Conservation Local water restrictions where appropriate
3	Adverse impacts to socio-economic or ecosystem values are **possible**	Conservation Local water restrictions likely
4	Adverse impacts to socio-economic or ecosystem values are **likely**	Conservation and local water restrictions Regulatory action possible
5	Adverse impacts to socio-economic or ecosystem values are **almost certain**	Conservation and local water restrictions Regulatory action likely Possible emergency response

Figure 5 Drought Level Classification.
Source: Government of British Columbia

Creston is located in the Kootenay region, which generally receives more moisture than BC's most drought-prone zones in the Okanagan or southern Interior plateaus. The Creston Valley's proximity to Kootenay Lake and its relatively moderate climate tend to reduce the severity of long-term drought compared with arid Interior basins. However, Creston does experience summer dry spells, and the region has seen periodic drought advisories in recent years. In 2024, the Regional District of Central Kootenay reached Level 4 on the provincial drought scale, indicating that negative impacts on socio-economic and ecosystem values were likely. [58]

Hazard Likelihood

Future climate projections for Creston suggest that summer precipitation will decline as seen in Figure 6. increasing the likelihood of seasonal drought. Under a mid-warming scenario (RCP4.5), summer precipitation is projected to decrease by about 4% by 2051–2080, dropping from a baseline of 124 mm (1976–2005) to approximately 119 mm. Ensemble modelling indicates that, in warmer futures, summer precipitation could fall as low as 53 mm. At the same

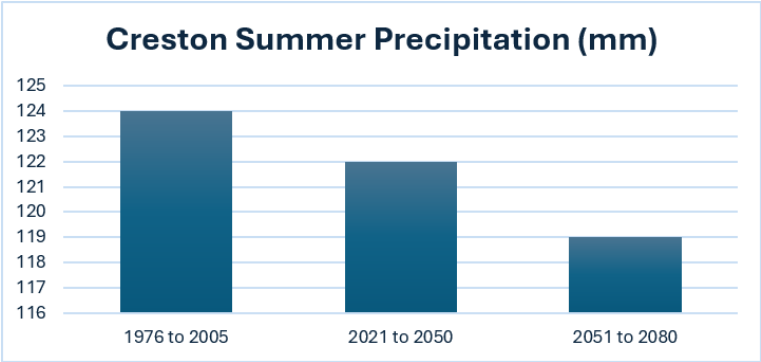


Figure 6 CMIP5 Summer (Jun-Aug) Precipitation Projections for Creston BC. Source: climatedata.ca

Hazard Consequences

The table below describes the potential consequences of drought in Creston.

Category	Description	Rating
Fatalities	· Drought is unlikely to directly cause fatalities.	**NONE**
Injuries, Disease, or Hospitalization	· Drought can contribute to dehydration, heat-related illness, and respiratory or cardiovascular stress, particularly among seniors, outdoor workers, and those with pre-existing conditions. However, these impacts are expected to be localized and minimal.	**LOW**
Displacement	· Severe drought can reduce the reliability of drinking water systems, which could lead to the temporary relocation of some community members.	**LOW**
Psychosocial Impact	· Extended drought can increase stress and anxiety related to water security, agricultural viability in the surrounding valley, and uncertainty around restrictions or livelihood impacts. · Under BC's "first in time, first in right" water-priority system, senior water licence holders may receive water before newer holders, which can heighten tension among neighbouring water users and agricultural producers during prolonged water shortages. [59]	**MEDIUM**
Support Services Impact	· Drought conditions may increase operational strain for support services and increase demand for services such as food banks.	**MEDIUM**

Cultural Impact	· Reduced water availability may limit cultural, recreational, and land-based practices, including those tied to rivers, agriculture, or outdoor community activities. · Drought can also affect the availability of medicinal plants, such as cattail, bullrush, and juniper, and alter the migration patterns of animals, disrupting hunting and gathering. [60]	**HIGH**
Property Damage	· Prolonged drought can damage orchards, vineyards, crops, and other irrigation-dependent agricultural lands in Creston and the Creston Valley through crop loss, soil degradation, stressed perennial plants, and impaired irrigation. While most of these direct losses would occur outside Town boundaries, they can still create secondary economic impacts for Creston. [40]	**MEDIUM**
Critical Services Impact	· Drought may reduce surface and groundwater supplies, placing strain on Creston's drinking water system, irrigation infrastructure, wastewater treatment, and fire suppression. · While the Town has reservoirs and wells, prolonged drought could exceed available supply, particularly when water demand increases during wildfire response and water restrictions are imposed. [28]	**EXTREME**
Environmental Damage	· Drought can lower stream flows, raise water temperatures, degrade aquatic habitat, reduce groundwater recharge, and stress terrestrial ecosystems. Environmental impacts can be major and long-lasting, particularly for fish and sensitive watersheds. [56]	**EXTREME**
Economic Impact	· Drought can negatively affect the broader Creston Valley agri-food system, tourism, and local businesses through crop losses, water restrictions, increased costs, and reduced productivity, particularly as cherries, flowers, and other water-intensive crops are key sources of income. · Although the largest direct agricultural impacts would generally occur outside Town boundaries, they may still affect Creston through reduced producer spending, lower demand for local goods and services, supply-chain disruption, impacts on wineries and agri-tourism, and pressure on businesses linked to agricultural production and processing. [56]	**EXTREME**
Reputational Impact	· Public perceptions of water management, restrictions, and the effectiveness of drought communications and response coordination could impact the Town's reputation.	**HIGH**
TOTAL CONSEQUENCE SCORE		**MEDIUM - HIGH**

Human Disease (including Pandemic and Epidemic)

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Possible	High	**Possible / High**	Likely

Hazard Background

Unlike broader public health crises, which encompass systemic health challenges and climate-driven disruptions, this hazard focuses on the episodic and evolving threat of infectious disease outbreaks that may affect Creston's population and healthcare system. Human diseases are caused by infectious agents that spread through various pathways: directly from person to person, via exposure to animal reservoirs or environmental sources, or through insect or animal vectors. [61] An epidemic refers to an unexpected increase in disease cases within a specific geographic area. A pandemic occurs when a disease spreads exponentially across multiple regions and may have global impacts. The key difference lies in scale; epidemics are regional, while pandemics have widespread geographic reach, though epidemics can escalate into pandemics. [62]

Several factors contribute to infectious disease outbreaks:

- Weather conditions
- Exposure to chemicals or radioactive materials
- Disruptions to normal living conditions following disasters (e.g., displacement, crowding in shelters, reduced access to clean water and healthcare), which can increase person-to-person transmission
- Environmental factors that facilitate pathogen spread

Creston's exposure to human disease is shaped by its proximity to the U.S. border, its role in regional agriculture and tourism, and seasonal movement of workers and visitors. These travel and mobility patterns increase opportunities for pathogen introduction. Vector-borne diseases like West Nile virus also pose a low but persistent risk, particularly during warmer months. [63]

Hazard Likelihood

Human disease remains a moderate likelihood hazard in Creston, primarily due to the potential for localized outbreaks of communicable illnesses. Historical events such as seasonal influenza, norovirus clusters in care facilities, and the COVID-19 pandemic have demonstrated the vulnerability of rural communities to infectious disease spread, especially where healthcare access is limited. [64] Human disease is likely to continue to evolve as climate change may expand the range of disease vectors and alter transmission patterns, while global travel and trade continue to elevate the risk of emerging infectious disease.

Hazard Consequences

The table below describes the potential consequences of human disease in Creston.

Category	Description	Rating
Fatalities	· A human disease outbreak, including a pandemic or epidemic, can cause fatalities from severe infection, especially among vulnerable populations such as the elderly and those who are immunocompromised. [61]	**HIGH**
Injuries, Disease, or Hospitalization	· Those with underlying health conditions are considered to be at greater risk of infection from disease and may experience exacerbated impacts. [65]	**HIGH**
Displacement	· Human disease is unlikely to cause displacement.	**NONE**
Psychosocial Impact	· Human disease spread, including pandemics and epidemics, can cause anxiety and emotional distress, with prior COVID-19 experiences potentially amplifying these impacts during future outbreaks. [66]	**HIGH**
Support Services Impact	· Social supports are likely to become strained due to increased demand and possible staff shortages.	**HIGH**
Cultural Impact	· Pandemics and epidemics can disrupt cultural and social life by limiting community gatherings, traditional events, and Indigenous ceremonies, which may be postponed, modified, or cancelled. This can affect cultural continuity and communal practices. The COVID-19 pandemic demonstrated how public health restrictions, social distancing, and fear of transmission resulted in widespread cancellations of performances and events, leading to substantial impacts on the arts and cultural sector. [67]	**HIGH**
Property Damage	· Human disease is unlikely to cause property damage.	**NONE**
Critical Services Impact	· Workforce shortages due to outbreaks and isolation requirements can compromise the continuity of healthcare delivery, emergency response, utility operations, and transportation systems. · During events of a large magnitude, health care services can be overwhelmed, hospitals may be limited to the provision of critical emergency services, and death care services may be strained. · These impacts may be disproportionate for Indigenous or rural communities that already have limited access to external healthcare support. [68]	**HIGH**
Environmental Damage	· Human disease is unlikely to cause environmental damage.	**NONE**

Economic Impact	· Epidemics and pandemics can disrupt the labour markets through absenteeism, reduced consumer demand, supply chain interruptions, and temporary business closures. [69] · In Creston, many businesses do not have online shops that could maintain operations if physical locations are closed. [38]	**HIGH**
Reputational Impact	· Reputational impacts may arise from heightened public mistrust following COVID-19, including perceptions that governments overall failed to prevent disease and increased expectations that authorities should anticipate and manage future outbreaks. [40]	**HIGH**
TOTAL CONSEQUENCE SCORE		**HIGH**

Wastewater Interruption

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Medium - High	**Rare/Medium - High**	Likely

Hazard Background

Interruptions to wastewater services can occur due to infrastructure failure, natural disasters, or other emergencies, posing public health and environmental risks. Loss of wastewater treatment can lead to contamination of water sources, unsanitary conditions, and increased disease transmission. [70] In Creston, the sanitary sewer system is generally adequate for current and projected growth, but aging infrastructure and limited redundancy create vulnerabilities. Coordination with Public Works and health authorities is essential to address contamination concerns and mobilize resources for repairs. Preparedness measures include maintaining updated asset inventories, planning for emergency bypass systems, and ensuring backup power for wastewater treatment facilities to reduce service disruption risks. [71]

Hazard Likelihood

Creston's sanitary sewer system is generally reliable, with historical data showing minimal incidents of major failures. Between 2016 and 2018, the Town recorded only a handful of sewer main blockages (four in 2016, one in 2017, and three in 2018) and virtually no main breaks, indicating a stable system. Service blockages were primarily due to root intrusion, which the Town has addressed through proactive replacement of aging pipes with PVC materials rather than repeated rodding, reducing recurrence risk. [72]

Despite this historical performance, the risk of wastewater service interruption is elevated due to operational vulnerabilities at key facilities. Notably, the Collis Street lift station does not have a backup generator; in the event of a power outage, the station is expected to overflow within approximately eight hours if electricity is not restored. Given Creston's frequent electrical outages, this creates a realistic and recurring risk of sewage overflows and localized wastewater service interruptions, independent of pipe condition.

Future likelihood considerations also include aging infrastructure, climate related impacts such as increased precipitation intensity and flooding, and continued exposure to power disruptions that could affect pump stations. Climate change projections for the region indicate more frequent extreme rainfall events, which may increase inflow and infiltration pressures on the wastewater system. While mitigation measures such as asset management planning and infrastructure upgrades are identified, these combined factors suggest that, without continued investment, particularly in backup power, the likelihood of wastewater service interruption is higher than historical trends alone would indicate. [11]

Hazard Consequences

The table below describes the potential consequences of a wastewater interruption in Creston.

Category	Description	Rating
Fatalities	· Wastewater interruption is unlikely to cause fatalities.	**NONE**
Injuries, Disease, or Hospitalization	· Wastewater interruption can increase illness risk by reducing access to safe sanitation and increasing exposure to raw sewage through backups or overflows. [73] Sewage exposure can occur through ingestion, skin or eye contact, or inhalation, and older adults and people with weakened immune systems are more vulnerable to severe waterborne illness. [74]	**MEDIUM**
Displacement	· If sewage backs up into homes, business, or public facilities, some residents may have to temporarily leave until restoration is complete.	**LOW**
Psychosocial Impact	· Loss of toilets and sanitation, sewage odours, contamination of homes, and uncertainty about health risks can create stress, fear, and frustration for residents, especially people already more vulnerable to illness or isolation. [38]	**MEDIUM**
Support Services Impact	· Wastewater interruption can reduce access to care, recreation, and community support systems by affecting facilities that depend on functioning sanitation systems.	**MEDIUM**
Cultural Impact	· Wastewater interruption can cause temporary cancellations or delays of cultural events.	**LOW**
Property Damage	· Wastewater interruption can cause sewage backups into buildings, damaging contents, contaminating flooring, drywall, furniture, and equipment, and creating expensive cleanup and restoration needs for homes, businesses, and public facilities. [75]	**MEDIUM**
Critical Services Impact	· Disruption of wastewater services, which themselves are critical services, can cascade into health care, recreation, and other services that rely on safe sanitation. This can trigger broad service degradation across Creston's core facilities and functions. · In particular, the Collis Street Lift Station has been identified as an area of particular concern for Creston as a cause of wastewater interruption, as it does not have a backup generator. [28]	**EXTREME**

Environmental Damage	· Untreated or partially treated sewage can degrade water, impact soil quality, and harm plants and animals. A release or prolonged interruption could cause widespread but generally recoverable damage to sensitive wetlands and aquatic habitat. [76]	**HIGH**
Economic Impact	· Wastewater interruption could force temporary business closures, interrupt public-facing services, and create repair and cleanup costs for both property owners and the Town. [38]	**MEDIUM**
Reputational Impact	· In Creston, a prolonged wastewater interruption, sewage backup, or visible overflow could undermine public confidence in municipal infrastructure management and local government decision-making. · Reputational impacts may be heightened if residents experience health advisories, inadequate communication, or repeated service disruptions. [40]	**HIGH**
TOTAL CONSEQUENCE SCORE		**MEDIUM - HIGH**

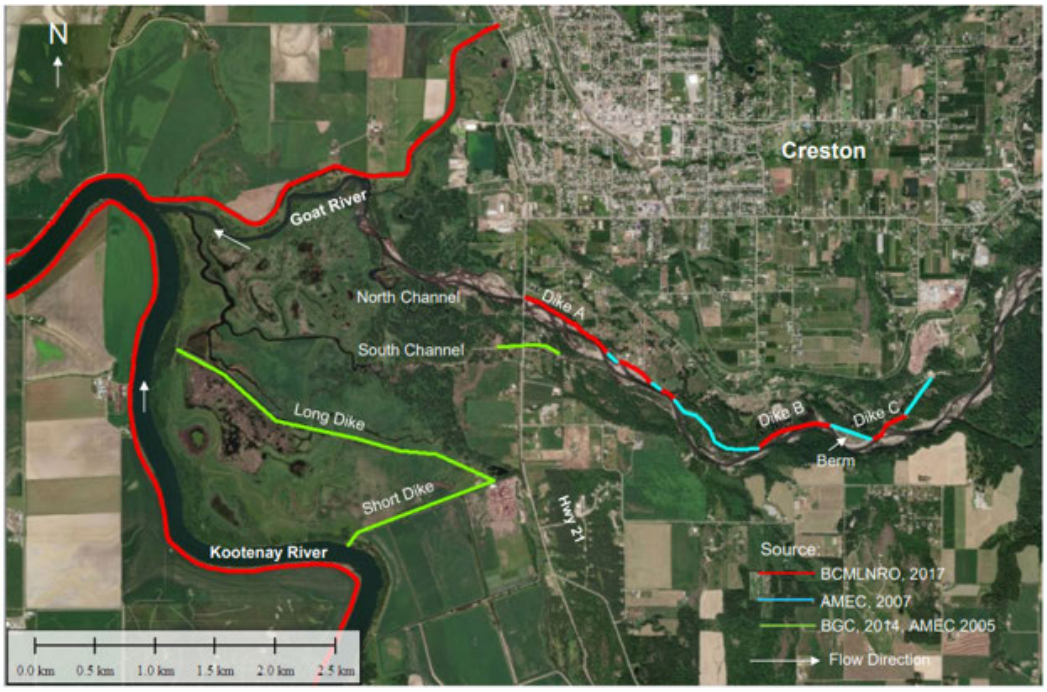
Dike Failure

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Medium - High	**Rare/Medium - High**	Likely

Hazard Background

A dike is an embankment built along a riverbank or coastal shoreline to prevent floodwaters from reaching the land behind it. Dikes are typically designed to withstand a specific level of flooding and must be regularly inspected, maintained, and upgraded to remain effective. Over time or during a flood event, dikes can fail for numerous reasons, including due to erosion, overtopping, seepage, or damage caused by earthquakes. [77]

Creston's flood protection system relies heavily on dikes along the Goat River and Kootenay Lake floodplains, as seen in Map 5. These structures were built to reduce flood risk from seasonal freshet and extreme precipitation events. However, dike failure remains a critical hazard due to aging infrastructure, changing hydrologic conditions, and climate-driven extremes, and could lead to rapid inundation of low-lying floodplain areas, causing severe impacts on regional transportation routes, environmental assets, surrounding agricultural lands, and infrastructure and economic systems relied on by the Town. [45]



Map 5 Summary of Dike and Flood Protection Structures on Goat River.
Source: BCG Engineering Inc

Hazard Likelihood

The likelihood of dike failure in Creston is influenced by aging infrastructure, hydrologic variability, and climate-driven severe weather. Dikes along the Goat River and Kootenay Lake floodplains were originally designed to manage seasonal freshet and high-water events; however, hydraulic modeling shows that during 200-year and 500-year flow events, inundation could occur near Highway 21 and Goat River Bottom Road, with water velocities exceeding 4–8 m/s in some channels [78]. These conditions would rapidly erode dike structures and increase the probability of failure. Climate projections indicate shifts in precipitation patterns and freshet timing, which may increase stress on the dike system during extreme rainfall or snowmelt events. [79] Under normal conditions, the likelihood of dike failure is considered low; however, during extreme weather or high-flow scenarios, the likelihood rises to moderate due to structural vulnerabilities and changing hydrologic conditions.

Hazard Consequences

The table below describes the potential consequences of dike failure in Creston.

Category	Description	Rating
Fatalities	· A dike failure in the Creston Valley could create life-safety risk through rapid inundation of low-lying protected lands, dangerous travel conditions, isolation, and delayed evacuation. It is a particular concern when flooding affects roads or access routes with limited warning, however direct fatalities would likely be minimal and localized. [80]	**LOW**
Injuries, Disease, or Hospitalization	· Dike failure could cause injuries from fast-moving floodwater, debris movement, contaminated water exposure, and interruption to health-related travel or services. [80]	**MEDIUM**
Displacement	· A major dike failure could force evacuation or longer-term displacement of residents, agricultural operations, and businesses in nearby Creston Valley floodplain areas, but is unlikely to cause displacement within the Town of Creston. [7]	**LOW**
Psychosocial Impact	· Dike failure can cause psychosocial harm through sudden evacuation, loss of homes or livelihoods, prolonged uncertainty, loss of property, and the stress of recovery after a high-consequence flood event. [81]	**MEDIUM**
Support Services Impact	· A dike failure could disrupt access to family, neighbours, schools, employers, social services, and community support systems by flooding roads and separating parts of the valley from the Town's service base. [45]	**MEDIUM**

Cultural Impact	· Dike failure may cause events in the Town to be temporarily cancelled or postponed, however these changes would likely be temporary.	**LOW**
Property Damage	· Direct property damage from dike failure would likely be concentrated in low-lying parcels, agricultural lands, and buildings in the surrounding Creston Valley floodplain, rather than across most of the Town itself. However, damage to nearby floodplain lands and facilities could still create secondary impacts for Creston through access disruption, service interruption, and economic loss. [38]	**MEDIUM**
Critical Services Impact	· A dike failure near Creston could disrupt roads, culverts, bridges, utilities, or other infrastructure linking the Town to nearby floodplain areas. · A dike failure could occur near the wastewater treatment plant, flooding it and rendering it out of operation for greater than 72 hours. [38]	**EXTREME**
Environmental Damage	· Around Creston, a dike failure could alter water movement, mobilize sediment or contaminants, and affect nearby wetland and riparian habitat connected to the Kootenay River floodplain and the Creston Valley Wildlife Management Area. [78]	**MEDIUM**
Economic Impact	· Dike failure could disrupt the Town's economy through damage to surrounding Creston Valley agricultural production, interruptions to regional access and freight movement, and reduced business activity in Creston. [38]	**HIGH**
Reputational Impact	· A dike failure affecting areas immediately around Creston could reduce confidence in local flood preparedness and the management of nearby flood protection works. [38]	**MEDIUM**
TOTAL CONSEQUENCE SCORE		**MEDIUM - HIGH**

High Wind Event

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Medium - Low	**Likely/Medium - Low**	Likely

Hazard Background

High wind events refer to damaging winds that exceed 90 km/h. These severe winds can occur independently or in conjunction with thunderstorms, hurricanes, or tornadoes. [82] Creston's physical geography influences its exposure; the valley setting can shield Creston from broad regional winds or, conversely, funnel winds through specific corridors, producing localized gusts that differ from nearby areas. [10] Because Creston is located in British Columbia's interior, it faces no direct hurricane risk; these storms form over warm ocean waters and do not reach the region. [83] Creston has previously experienced damaging high winds, with the most extreme case in recent history in 2007, where a severe windstorm injured ten people and knocked out power across the town due to fallen electrical lines. [84]

High wind events act as a cascading hazard by damaging power lines, poles, and substations, which can trigger electrical outages. [85]

Hazard Likelihood

Future changes in wind condition under climate change remain uncertain. Canadian climate data summaries note that projections of extreme winds are difficult to explicitly quantify because of complex atmospheric dynamics and model limitations. However, planning for the possibility of stronger winds in the future is prudent. [13]

Category	Description	Rating
Fatalities	· High wind events are unlikely to cause fatalities.	**NONE**
Injuries, Disease, or Hospitalization	· High winds may cause limited injuries due to flying objects and debris.	**LOW**
Displacement	· Displacement may occur if wind causes extended power outages or damages homes enough to make them temporarily unsafe.	**LOW**
Psychosocial Impact	· High winds and outages can elevate stress and anxiety, particularly when trees or other debris create immediate safety concerns, and when residents are without power or information. [38]	**LOW**

Support Services Impact	· Wind-driven outages and blocked roads can temporarily disrupt home care, deliveries, communications, and informal support networks, especially for people with mobility or medical needs. [85]	**MEDIUM**
Cultural Impact	· High wind events may cause temporary cancellation of outdoor events.	**LOW**
Property Damage	· High winds can cause roof and siding damage, broken windows, downed trees and limbs, and impacts from flying debris, particularly where trees are near homes and vehicles. [38]	**MEDIUM**
Critical Services Impact	· High winds can knock down trees and power lines, causing power outages and disrupting essential services that depend on electricity and safe access. · If there are several downed power lines, restoration may take longer as FortisBC has only two crews in Creston and would likely require backup from other jurisdictions, resulting in restoration times of up to 72 hours. [26]	**EXTREME**
Environmental Damage	· Environmental impacts are typically related to tree blowdown, debris, and localized habitat disturbance, rather than long-term contamination or damage.	**LOW**
Economic Impact	· High wind events can temporarily disrupt some business operations due to power outages, obstruction of supply chains, and cleanup and repair costs, producing short-term productivity losses. [38]	**LOW**
Reputational Impact	· Public confidence can be affected by how well authorities and partners communicate about outages, road safety, and recovery supports during high wind events. However, these impacts are unlikely to be long term.	**LOW**
TOTAL CONSEQUENCE SCORE		**MEDIUM - LOW**

Future Consequence

This assessment is based on windstorm events observed in 2024 that caused localized damage and power outages. [86] The event was re-evaluated under a +3°C warming scenario to understand how wind hazards may change. While based on a specific case, the results illustrate broader shifts in how wind events may develop in a warmer climate.

Under a +3°C warmer climate, high wind risks are expected to shift in character, with a slight decrease in average wind speeds (~-2 km/h) but an increase in atmospheric instability, leading to potential thunderstorms. This suggests a greater potential for convective, storm-driven wind events that may be more localized but more intense. As a result, there may be an increased likelihood of sudden, high-impact events causing treefall, infrastructure damage, and power outages. These events may be less predictable and more variable, placing additional demands on emergency response and utility services. Overall, wind hazards are expected to become more episodic and volatile, rather than consistently stronger.

Stormwater Flooding (Local Flooding)

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Medium - Low	**Likely/Medium - Low**	Almost Certain

Hazard Background

Stormwater flooding, also known as local flooding, occurs when rainwater cannot drain through existing systems or soak into the ground, causing it to flow over the surface instead. This typically happens during periods of record rainfall or when internal drainage systems become temporarily overwhelmed. [87]

Hazard Likelihood

Heavy downpours are projected to become stronger and more frequent. The maximum rainfall in a single day could increase by 7-8%, and multi-day rain events by up to 10% later this century. [13] For Creston's stormwater system, this means drains and culverts will face more pressure during intense storms. 10-year events could become 6-8 year events by mid-century, and occur more frequently later on. Without upgrades, local flooding on streets and properties will become a growing concern. [11] Creston's Stormwater Management Masterplan notes that while the major overland system performs relatively well during heavy rainfall, the minor system does not reliably meet the 5-year level of service, which increases the risk of surcharging, backpressure at manholes, and overflow at low points. [88]

Hazard Consequences

The table below describes the potential consequences of stormwater flooding in Creston.

Category	Description	Rating
Fatalities	· Stormwater flooding is unlikely to cause fatalities.	**NONE**
Injuries, Disease, or Hospitalization	· Stormwater flooding can cause slips, falls, minor trauma, electrical risks, and illness associated with sewage backups, contaminated standing water, and mold in flooded basements or buildings.	**LOW**
Displacement	· Localized stormwater flooding can make homes temporarily uninhabitable through basement flooding, sewage backup, or access problems, sometimes requiring short-term relocation. [81]	**LOW**
Psychosocial Impact	· Sudden stormwater flooding can cause stress, anxiety, and frustration due to property damage, cleanup, sewage backup, and uncertainty. [81]	**MEDIUM**
Support Services Impact	· Stormwater flooding can increase demands on support services, particularly if evacuations are necessary or there is considerable property damage.	**LOW**

Cultural Impact	· Stormwater flooding can temporarily disrupt access to community spaces, trails, parks, and public gathering areas if low-lying urban locations become waterlogged or unsafe.	**LOW**
Property Damage	· Stormwater flooding can damage private property through basement flooding, sewage backup, and water intrusion when drainage systems are overwhelmed. In Creston, localized ponding in roadway sags can also direct water onto nearby properties, increasing flood damage in those areas. [88]	**MEDIUM**
Critical Services Impact	· Stormwater flooding can overwhelm storm sewers, affect drainage systems, disrupt roads and intersections, and interfere with wastewater or utility operations in localized areas. [88]	**HIGH**
Environmental Damage	· Stormwater flooding can carry sediment, sewage, oil, trash, and other pollutants into the environment, degrading local water quality and urban ecological conditions. However, restoration is expected to be minimal. [89]	**LOW**
Economic Impact	· Stormwater flooding can result in cleanup and repair costs, temporary business interruption, insurance impacts, and municipal expenses for drainage repair and flood mitigation.	**MEDIUM**
Reputational Impact	· Public confidence may be affected if stormwater flooding is perceived as recurring, poorly communicated, or inadequately addressed through drainage maintenance and infrastructure planning. · If suggestions for improvements to infrastructure from Creston's Stormwater Management plan are not implemented and residents experience property damage as a result of stormwater flooding, trust in the local government may be negatively impacted.	**MEDIUM**
TOTAL CONSEQUENCE SCORE		**MEDIUM - LOW**

Flash Flooding

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Medium - Low	**Likely/Medium - Low**	Likely

Hazard Background

A flash flood occurs when excessive rainfall causes a rapid rise in water levels in a stream or a normally dry channel. These events can also result from dam or dike failures or mudslides. Flash floods are most common in regions with dry climates and rocky terrain, where limited soil and vegetation prevent rainwater from soaking into the ground, causing torrential rains to flow quickly overland instead. [90]

Flash flooding is highly localized in both space and time, often leaving little opportunity for advance warning. Effective management of this hazard requires continuous monitoring of soil and surface conditions, hydrological factors, and topographic features. [80]

Flash flooding acts as a cascading hazard by rapidly mobilizing debris and sediment, which can damage infrastructure, block transportation routes, and trigger landslides or erosion.

Hazard Likelihood

Short, intense storms that often occur in the summer, are expected to grow stronger in the future. With projected increases in extreme rainfall, flash floods could happen more frequently and with greater severity. While exact numbers vary, heavier bursts of rain will make flash flooding a bigger risk for Creston in the future. However, this increase in likelihood is not projected to increase enough to change the likelihood rating.

Hazard Consequences

The table below describes the potential consequences of flash flooding in Creston.

Category	Description	Rating
Fatalities	· Flash flooding in Creston can pose life-safety risks when intense rainfall triggers rapid rises in small tributaries and concentrated flow paths. However, these impacts are rare and limited.	**LOW**
Injuries, Disease, or Hospitalization	· Flash flooding can cause injuries through fast-moving water, debris impacts, slips and falls, vehicle incidents, and the sudden isolation of people in homes, vehicles, or outdoor areas with little warning time. These are typically isolated and limited in scale. [80]	**LOW**

Displacement	· A flash-flood event could require short-notice evacuation or temporary shelter-in-place for a limited number of households and businesses located near small tributaries, steep creek outlets, or established flood and debris flow pathways. These impacts would likely be temporary and would likely only impact a limited number of people.	**LOW**
Psychosocial Impact	· Because flash floods develop rapidly and often with little warning, they can cause fear, anxiety, and longer-term stress for residents affected by sudden flooding, debris impacts, or emergency evacuations. [80]	**MEDIUM**
Support Services Impact	· Flash flooding can temporarily isolate residents from their normal support networks by closing roads, damaging crossings, and disrupting access to services and community facilities. [81]	**LOW**
Cultural Impact	· Culturally important spaces and heritage sites may be damaged or temporarily inaccessible due to flash flooding, although impacts are likely to be site-specific rather than widespread.	**LOW**
Property Damage	· Rapid movement of water and debris across properties can cause sudden damage to buildings, vehicles, and personal property, potentially resulting in substantial financial losses. [80]	**MEDIUM**
Critical Services Impact	· Flash flooding can undermine or block roads, culverts, bridges, utilities, and access routes to essential services. · It can also overwhelm stormwater systems, leading to road flooding and impacts to wastewater infrastructure and underground utilities. [80]	**MEDIUM**
Environmental Damage	· Flash flooding can erode streambanks, mobilize sediment and debris, degrade water quality, and damage riparian and wetland-adjacent habitats through sudden, high-energy flows. [80]	**MEDIUM**
Economic Impact	· Flash flooding can disrupt business operations, damage equipment and property, delay workers and customers, and result in substantial cleanup, repair, and emergency response costs. · Because Creston serves as an economic hub for surrounding communities, even localized transportation or property impacts can cause disproportionate short-term economic disruption. [28]	**MEDIUM**
Reputational Impact	· Creston's reputation and public confidence in local preparedness and warning systems could also be affected, particularly if residents perceive flash-flood impacts as foreseeable or insufficiently managed.	**MEDIUM**
TOTAL CONSEQUENCE SCORE		**MEDIUM - LOW**

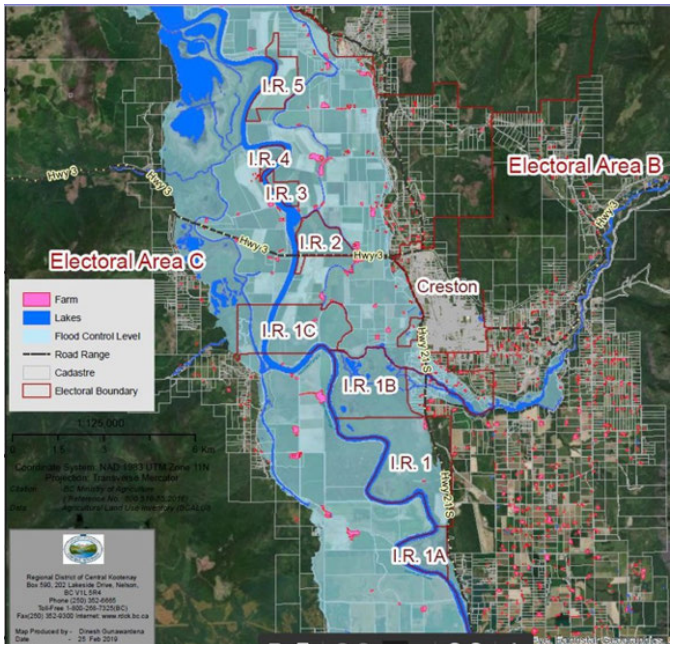
Lake, River, and Stream Flooding

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Medium - Low	**Likely/Medium - Low**	Almost Certain

Hazard Background

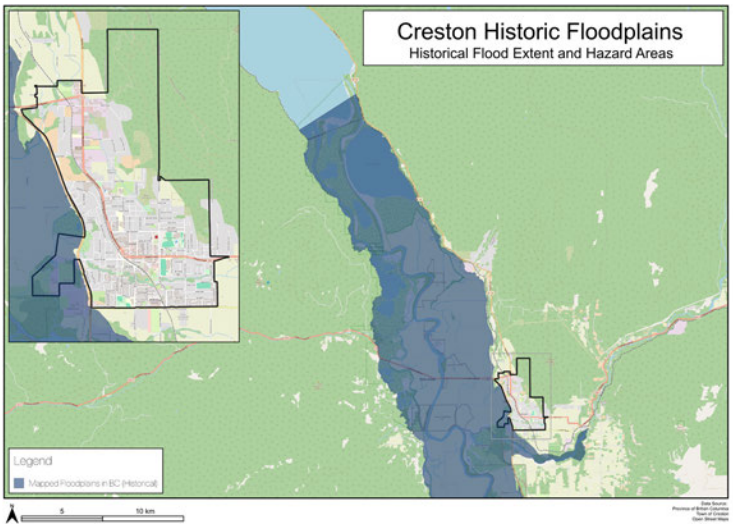
Flooding typically occurs when the amount of water in a river or stream exceeds the capacity of the body of water. There are numerous factors that contribute to the potential for flooding, including precipitation, snowmelt runoff, and rainfall. [91]

In Creston, lake, river, and stream flooding should be understood in relation to the Town's specific geography. Although much of the Town is situated above the floodplain, flooding in surrounding valley areas may still affect Creston through disruptions to transportation routes, surrounding agricultural lands, regional infrastructure, and business activity that support the Town.



Map 6 Map of Kootenay Valley and Creston Valley Floodplain.
Source: Regional Distrtict of Central Kootenay

A comprehensive flood hazard assessment of the Goat River near Creston was completed in 2020 as part of the RDCK Floodplain and Steep Creek Study, prompted by the river's comparatively high flood risk and potential consequences for the community. Map 6 above shows the floodplains for Kootenay Valley and Creston Valley. The Goat River has a long history of damaging floods, with major events recorded in 1894, 1933, 1948, and 2012, each causing notable impacts on infrastructure, agriculture, and transportation routes across the Creston Valley. Map 7 outlines historically mapped floodplain areas and flood extents. Large portions of the Creston Valley, particularly near watercourses, have been subject to past flooding and remain areas of potential flood hazard.



Map 7 Creston Historic Floodplains Map

Flooding acts as a cascading hazard by damaging infrastructure, increasing water turbidity and contamination, and triggering secondary hazards such as landslides and service disruptions.

Hazard Likelihood

At present, Creston faces a moderate risk of flooding from lakes, rivers, streams, stormwater, and flash flooding. This likelihood is expected to increase over time as a result of rising precipitation intensity. Climate projections indicate that more intense rainfall events will lead to higher peak flows in the Goat River and water levels in Kootenay Lake with modelling showing increases of approximately 24% by the 2050s, and up to 36% by the 2080s for typical storm events. These increases mean that events historically considered less frequent (e.g., 100-year storms) may occur more often or be approached by smaller, more frequent storms. As a result, the frequency of river and stream flooding is expected to increase, particularly during periods of heavy rainfall, placing greater pressure on existing infrastructure and increasing the potential for overbank flooding. [79]

Hazard Consequences

The table below describes the potential consequences of lake, river, and stream flooding in Creston.

Category	Description	Rating
Fatalities	· Flooding in lakes, rivers, and streams can result in fatalities, however, they are typically limited and manageable within the scope of normal emergency response operations. [92]	**LOW**

Injuries, Disease, or Hospitalization	· Flooding may result in minor to moderate injuries or illness, including exposure-related impacts or contact with contaminated water, which can be managed within the scope of normal healthcare and emergency response operations. [92]	**LOW**
Displacement	· Lake, river, and stream flooding may result in short-term or localized evacuation affecting a small portion of the population where homes, businesses, agricultural operations, or access routes are inundated or cut off, especially in low-lying surrounding areas. [92]	**LOW**
Psychosocial Impact	· Flood events can cause acute stress, anxiety, and longer-term emotional distress related to evacuation, uncertainty, property loss, and disruption to daily life. · In Creston, these psychosocial impacts may be especially impactful when flooding affects homes, agricultural properties, and community routines, and where recovery periods are prolonged. [81]	**MEDIUM**
Support Services Impact	· Flood events can contribute to strain on social support systems through evacuation assistance, temporary sheltering, and extended recovery and rebuilding needs.	**MEDIUM**
Cultural Impact	· Flooding of lakes, rivers, and streams can damage or erode cultural heritage and archaeological sites, disrupt cultural events and gatherings, and affect traditional plants and landscapes important to Indigenous cultural practices. [60]	**MEDIUM**
Property Damage	· Although Creston's plateau setting may limit widespread structural damage within the Town, severe localized impacts can still occur in low-lying areas, agricultural properties, transportation corridors, and flood-prone roads. [92]	**MEDIUM**
Critical Services Impact	· Lake, river, and stream flooding can increase turbidity and introduce sediment and contaminants into water supplies, reducing the effectiveness of drinking water and wastewater treatment systems. · Flooding can also damage or disrupt roads, bridges, utilities, and emergency access routes, delaying response and recovery operations for greater than 24 hours. [93]	**HIGH**
Environmental Damage	· Flooding can accelerate erosion and sediment transport, degrading water quality and damaging aquatic and riparian habitats. The introduction of sediments, nutrients, and contaminants can negatively affect fish, wildlife, and overall ecosystem health. [94]	**MEDIUM**

Economic Impact	· Flooding can interrupt business operations, damage agricultural production, and result in substantial remediation costs. · Agricultural operations on the Creston Valley flats, including dairy farms and other floodplain-based operations, are particularly exposed. Although the primary agricultural losses would generally occur outside Town boundaries, these losses can still create secondary impacts within Creston through reduced local spending, supply-chain disruption, business interruption, and effects on agri-tourism and related services. [95]	**MEDIUM**
Reputational Impact	· Public confidence in local preparedness and emergency management may be affected by the effectiveness of flood warning, evacuation support, response coordination, and recovery efforts, particularly where impacts are associated with known floodplain or drainage risks.	**MEDIUM**
TOTAL CONSEQUENCE SCORE		**MEDIUM - LOW**

Future Consequence

The potential future impacts of climate change can be assessed by examining the June 2020 flooding event in Fairmont Hot Springs, which was driven by heavy rainfall, snowmelt, and steep terrain, resulting in debris flows and localized evacuations. [96] The event was re-analyzed under a +3°C warming scenario to explore how flood drivers may change. While results are tied to this event, they highlight broader shifts in flood timing and mechanisms.

Under a +3°C warmer climate, the modeled version of this event shows decreases in total rainfall (~-50%) and snowmelt (~-50%), with a slight decrease in peak rainfall intensity (~-3%), resulting in lower overall impacts for this specific scenario. However, these results reflect changes in how this particular event unfolds, rather than a reduction in overall flood risk. Warmer conditions are expected to alter the timing and interaction of flood drivers, including earlier snowmelt and a greater likelihood of intense rainfall events occurring independently or in new combinations. As a result, flood-related consequences, such as debris flows, infrastructure damage, and service disruptions, may occur under different conditions, including earlier in the season or during short-duration, high-intensity rainfall events. Overall, flooding is expected to become more episodic and less predictable, with implications for seasonal preparedness, infrastructure design, and emergency response.

Electrical Outage

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Low	**Likely/Low**	Likely

Hazard Background

Power outages typically occur due to a breakdown in power generation or the distribution grid, or as a result of accidents or disasters that damage the grid. They often happen during severe weather events, such as heavy winds, ice storms, or snowstorms. Extended outages can quickly escalate into public health emergencies when life-safety systems begin to fail. [97]

In Canada, areas most vulnerable to electrical outages include rural regions, densely populated areas, and locations with severe winter conditions. Creston has two major transmission lines nearby, owned by FortisBC, which can pose a fire hazard if vegetation around them is not properly managed. [16]

Hazard Likelihood

Power outages are one of the most common types of utility failure in Creston. [98] They can be caused by heavy winds, ice storms, snowstorms, wildfires, fallen trees or other debris, and vehicle impacts. [99]

The likelihood of electrical outages or service interruptions in Creston is influenced by several factors. Wildfires pose a considerable risk, as large fires can damage electrical distribution systems through direct heat or fallen trees. The local network relies on wood-pole distribution lines, and while most vegetation poses low ignition risk, some areas contain flammable vegetation or unmaintained conifer trees near power poles, increasing vulnerability. Two major transmission lines near Creston, located outside the WUI, can also fail if vegetation contacts conductors, causing high-energy arcs and outages. [16] Human-induced factors, such as limited vegetation management and aging infrastructure, further contribute to the risk. Windstorms are another driver of electrical outage, as strong winds can topple trees or break branches, causing them to fall on power lines and poles. This can lead to widespread outages, particularly in areas where infrastructure is aging. [100] Climate change is expected to increase the frequency and severity of wildfires and extreme storms, which will place additional stress on electrical infrastructure. [101]

Hazard Consequences

The table below describes the potential consequences of electrical outages in Creston.

Category	Description	Rating
Fatalities	· Although fatalities resulting directly from electrical outages are unlikely, prolonged outages could become life-threatening for some medically vulnerable residents who rely on electrically powered medical equipment or essential services. [68]	**LOW**
Injuries, Disease, or Hospitalization	· Extended outages may contribute to injuries or illness related to cold or heat exposure, although widespread impacts are expected to remain limited.	**LOW**

Displacement	· Without backup power, some homes may become temporarily uninhabitable due to the loss of heating, water service, refrigeration, or other essential utilities, increasing the need for temporary accommodation and community support. [38]	**LOW**
Psychosocial Impact	· Prolonged outages can create psychosocial impacts, particularly for seniors and people living alone, due to disruptions in heating, communications, daily routines, and access to reliable information. However, these impacts would likely not require additional emergency support beyond normal operations. [38]	**LOW**
Support Services Impact	· Electrical outages can weaken both formal and informal support networks in Creston by temporarily interrupting communications, limiting residents' ability to contact family members or caregivers, and increasing reliance on neighbours, volunteer networks, and emergency coordination for those requiring additional assistance. [38]	**LOW**
Cultural Impact	· An electrical outage could temporarily disrupt access to community gathering spaces, festivals, markets, and recreation facilities, although lasting cultural impacts are unlikely.	**LOW**
Property Damage	· Direct structural damage caused solely by electrical outages is expected to be limited.	**NONE**
Critical Services Impact	· Creston's water and wastewater systems rely heavily on electrical power, and several critical assets, including Well #2, the Schikurski Park Reservoir, and the Collis Street Lift Station, do not have backup generators. · A power outage lasting eight hours or longer would likely result in overflow at the Collis Street Lift Station (which does not have a backup generator), causing the discharge of untreated effluent into storm drains, ditches, and the flats, while also creating temporary water service disruptions in higher-elevation zones. [28]	**EXTREME**
Environmental Damage	· An overflow event from the Collis Street Lift Station could result in localized environmental impacts, including contamination of surface water and surrounding lands, with cleanup and remediation potentially extending over a prolonged period depending on site conditions and response capacity. [28]	**MEDIUM**
Economic Impact	· Electrical outages can disrupt business operations by affecting refrigeration, point-of-sale systems, communications, and agricultural activities, potentially resulting in product loss and reduced revenue. The Columbia Brewery, which does not have backup generators, would be required to halt operations during an outage, contributing to short-term economic losses. [38]	**MEDIUM**

Reputational Impact	· Because the Town has invested in a dedicated emergency management website and encourages residents to rely on official alerts and guidance during hazards such as power outages, delayed restoration information, inconsistent messaging, or insufficient support during outages could reduce public confidence in local emergency response and preparedness, particularly given the frequency of electrical outages in Creston.	**LOW**
TOTAL CONSEQUENCE SCORE		**LOW**

Telecommunications Interruption

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Medium - Low	**Likely/Medium - Low**	Likely

Hazard Background

Unplanned telecommunications interruptions can result from equipment failures, power outages, construction, severe weather, or network congestion during emergencies. These disruptions pose serious challenges during disasters because communication networks are essential for coordinating emergency operations, broadcasting alerts, and connecting responders with affected communities [97].

In Creston, telecommunications infrastructure includes services from TELUS, Bell, and Rogers, with Bell as the Town's cellular provider. The Town's Disaster Response Plan emphasizes the critical role of accurate and timely communication and recommends using all available methods: cellular, landline, radio (including amateur and commercial), satellite phones, and face-to-face messengers, when systems fail. Interruptions can delay evacuations, hinder resource allocation, and prevent timely public safety messaging, increasing risk to life and property [37].

Hazard Likelihood

Outages of telecommunication systems from major providers are not uncommon. In 2022, Canada experienced a major historic telecommunications interruption when Rogers Communications experienced a nationwide network outage that lasted more than 15 hours, affecting both mobile and internet users. This outage even disrupted access to 911 services in some Canadian cities. [102] Power outages occur regularly, which increases the likelihood of interruptions to telecommunication systems. Additionally, wildfires can damage or disrupt telecommunication infrastructure, further contributing to service interruptions.

Hazard Consequences

The table below describes the potential consequences of a telecommunications interruption in Creston.

Category	Description	Rating
Fatalities	· Telecommunications disruptions can create life-safety risks by delaying access to 911 services, interrupting emergency alerts, and limiting people's ability to contact assistance during an emergency, however the impact is likely to be minimal and localized. [99]	**LOW**
Injuries, Disease, or Hospitalization	· Although the health impacts of telecommunications outages are generally indirect, disruptions can worsen health outcomes by temporarily delaying emergency calls and reducing residents' ability to access urgent care or health-related supports although these would likely be short-term impacts.	**LOW**

Displacement	· Population displacement is unlikely to occur as a direct result of a telecommunications interruption.	**NONE**
Psychosocial Impact	· Telecommunications outages can create anxiety, stress, and isolation, particularly when residents are unable to contact family members, support networks, or receive timely emergency information and updates. [99]	**MEDIUM**
Support Services Impact	· A telecommunications interruption could place strain on support systems that rely on reliable communications, including home-care services, wellness checks, emergency coordination, and other community support functions.	**MEDIUM**
Cultural Impact	· In Creston, telecommunications disruptions could temporarily affect community events, local information sharing, and participation in social and cultural activities, although permanent impacts to heritage, cultural sites, or community identity are unlikely. [38]	**LOW**
Property Damage	· Direct property damage resulting from telecommunications interruptions is expected to be minimal.	**NONE**
Critical Services Impact	· Telecommunications networks are critical to 911 access, emergency alerts, coordination among local authorities, and the operation of essential services. · A sizable disruption could impair emergency response and reduce the effectiveness of multiple interconnected critical infrastructure systems. [27]	**HIGH**
Environmental Damage	· Environmental damage is unlikely to occur from telecommunications interruption.	**NONE**
Economic Impact	· Telecommunications interruptions could disrupt customer service, bookings, business coordination, online transactions, and routine operations across many sectors in Creston. · Businesses that rely heavily on internet or phone-based services, particularly those without alternative sales or communication options, could experience temporary revenue losses and operational delays. [38]	**MEDIUM**
Reputational Impact	· Public confidence in local emergency management and communications systems could decline if residents perceive emergency information during a telecommunications disruption to be delayed, unreliable, or inconsistent.	**LOW**
TOTAL CONSEQUENCE SCORE		**MEDIUM - LOW**

Air Quality

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Low	**Likely/Low**	Likely

Hazard Background

Air quality refers to the concentration of particulates, gases, fumes, and odors in the atmosphere. [65] Fine particulate matter measuring 2.5 microns or smaller is considered the most noteworthy public health concern related to air pollution in British Columbia, largely due to the growing frequency of wildfires. [103]

To help monitor and communicate these risks, the Government of Canada publishes the Air Quality Health Index (AQHI), as seen in Figure 7. This tool measures the impact of specific air pollutants on human health and expresses it on a scale from 1 (low risk) to 10+ (very high risk). [104]

Health Risk	AQHI Index	Health Messages	
		At Risk Population	General Population
Low	1–3	**Enjoy** your usual outdoor activities.	**Ideal** air quality for outdoor activities.
Moderate	4–6	**Consider reducing** or rescheduling strenuous activities outdoors if you are experiencing symptoms.	**No need to modify** your usual outdoor activities unless you experience symptoms such as coughing and throat irritation.
High	7–10	**Reduce** or reschedule strenuous activities outdoors. Children and the elderly should also take it easy.	**Consider reducing** or rescheduling strenuous activities outdoors if you experience symptoms such as coughing and throat irritation.
Very High	Above 10	**Avoid** strenuous activities outdoors. Children and the elderly should also avoid outdoor physical exertion.	**Reduce** or reschedule strenuous activities outdoors, especially if you experience symptoms such as coughing and throat irritation.

Figure 7 Air Quality Health Index.
Source: Environment and Climate Change Canada

Creston lies in a mountain valley within the Kootenay region, which acts as an airshed, trapping pollutants and wildfire smoke during stagnant atmospheric conditions. This geographic feature worsens air quality during wildfire season. [6]

Hazard Likelihood

The likelihood of deteriorating air quality in Creston is high, due to the increased risk of wildfire in all regions of the province. Rising temperatures and shifting precipitation patterns are increasing the frequency and severity of wildfires, resulting in prolonged smoke events that can lead to respiratory and cardiovascular illnesses and exacerbate existing health conditions. [45]

Figure 8 shows historical Air Quality Index (AQI) data from Cranbrook, the nearest monitoring station to Creston. As this data is derived from the nearest monitoring station in Cranbrook, they may not fully reflect local air quality conditions in Creston. Differences in valley topography and local meteorological conditions can influence smoke dispersion and accumulation, highlighting the importance of Creston-specific monitoring data. Orange and red colors indicate PM2.5 levels of 100 or higher, which are classified as poor air quality. The data shows that air quality was rated poor, very poor, or hazardous on four days in 2025, eight days in 2023, five days in 2022, and twelve days in 2021. [105] In 2025, multiple Air Quality Warnings were issued for the West Kootenays due to wildfire smoke, and both the 2021 and 2025 wildfire seasons caused prolonged smoke events that reduced visibility and triggered health advisories across the region. As wildfires become more severe and frequent in the future, air quality will also deteriorate during these events. [106]

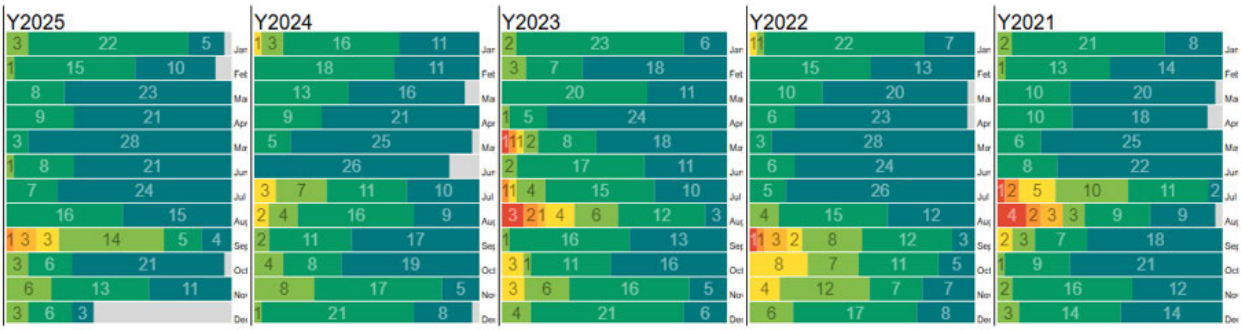


Figure 8 Cranbrook Muriel Baxter Air Quality Monitoring Station Daily Average AQI.
Source: World Air Quality Historical Database

Hazard Consequences

The following table describes the potential consequences of poor air quality in Creston.

Category	Description	Rating
Fatalities	· Although fatalities related to poor air quality are uncommon, serious air quality events could contribute to death among a few individuals with severe pre-existing respiratory or cardiovascular conditions that are exacerbated by degraded air quality. [107]	**LOW**

Injuries, Disease, or Hospitalization	· Poor air quality, particularly during wildfire smoke events containing elevated concentrations of fine particulate matter (PM2.5), primarily affects human health. [107] · Exposure can irritate the eyes, nose, throat, and lungs, worsen asthma and other respiratory illnesses, and aggravate cardiovascular disease. [107]	**MEDIUM**
Displacement	· Poor air quality is unlikely to result in population displacement.	**NONE**
Psychosocial Impact	· Recurring regional smoke events and prolonged periods of degraded air quality can disrupt daily activities, reduce outdoor recreation and community participation, and contribute to cumulative stress, anxiety, and reduced overall well-being. · These impacts are likely to be manageable for those with access to mental health professionals. [108]	**LOW**
Support Services Impact	· Poor air quality and smoke events can reduce the useability of homes, offices, schools, daycares, and other buildings that cannot maintain cleaner indoor air. · Buildings with HEPA filters may face increased usage by residents, and local healthcare supports may see increased demand by elderly people, who are more vulnerable to the effects of poor air quality. [65]	**MEDIUM**
Cultural Impact	· During smoke events, poor visibility and unsafe outdoor conditions can temporarily limit time outdoors and disrupt camps, concerts, festivals, and cultural activities, particularly when air quality alerts require activities to be modified or cancelled.	**LOW**
Property Damage	· Poor air quality is unlikely to cause property damage.	**NONE**
Critical Services Impact	· Poor air quality can increase demand for health care services and public health systems. It can reduce visibility on roads and highways, impacting emergency response and transportation of goods and services. [103]	**MEDIUM**
Environmental Damage	· Environment and Climate Change Canada notes that ground-level ozone can reduce the productivity of some crops, injure flowers and shrubs, and contribute to forest decline, [109] while broader air pollution problems such as smog also threaten biodiversity and damage ecosystems. [110]	**LOW**

Economic Impact	· Economic consequences may include lost productivity due to impacted worker health, interrupted transportation and outdoor operations, and increased health-related costs. [111] · Tourism can also be impacted by air quality, which can last for weeks during peak summer tourism. [38]	**MEDIUM**
Reputational Impact	· Air quality events may contribute to temporary negative perceptions or increased media attention; however, impacts are expected to be short-term, localized, and manageable within normal operational capacity.	**LOW**
TOTAL CONSEQUENCE SCORE		**LOW**

Future Consequence

In order to understand potential future changes in consequences due to the impacts of climate change, an assessment was conducted based on a 2016 wildfire smoke event, where smoke from U.S. wildfires meaningfully affected air quality across southern British Columbia. [112] The event was re-analyzed under a +3°C warming scenario to understand how smoke behaviour and exposure may change. While based on a single event, the results reflect broader trends in wildfire-driven air quality impacts.

Under a +3°C warmer climate, air quality impacts are expected to worsen, despite projected decreases in wind speeds at both upper (~-3%) and lower (~-50%) levels. Reduced wind speeds may contribute to increased smoke stagnation and longer-duration exposure, particularly in valley environments. In addition, larger and more persistent wildfires are expected to increase overall smoke production. As a result, communities may experience more frequent and prolonged periods of poor air quality, with associated health impacts and increased demand on healthcare services. Overall, air quality is expected to become a more consistent seasonal concern, with cumulative effects on public health and quality of life.

Extreme Cold

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Unlikely	Medium - Low	**Unlikely/Medium - Low**	Rare

Hazard Background

Extreme cold refers to air temperatures that are drastically below typical seasonal conditions for a given area, often occurring in winter and sometimes accompanied by wind chill that further lowers perceived temperatures. Extreme Cold Warnings in British Columbia are issued when the temperature or wind chill is expected to reach -35°C or lower for at least two consecutive hours. [113] However, Creston rarely experiences such conditions; the lowest temperature recorded between 1993 and 2025 was -27.2°C. [114] Creston's sheltered valley setting and relatively low elevation reduce its exposure to extreme cold; its proximity to Kootenay Lake, which acts as a heat reservoir, further moderates winter temperatures. [115]

Hazard Likelihood

Climate change is expected to make extreme cold events less frequent in Creston. Under a moderate emissions scenario (RCP4.5), Creston is projected to experience an average of 1.3 days below -15 °C during the 2051-2080 period, a decrease of 4.8 days compared to the 1971-2000 baseline as seen in Figure 9. Additionally, the number of frost days per year is expected to decline to an average of 51 days, which is 79.3 fewer days than the baseline period, under the same moderate emissions scenario. [13]

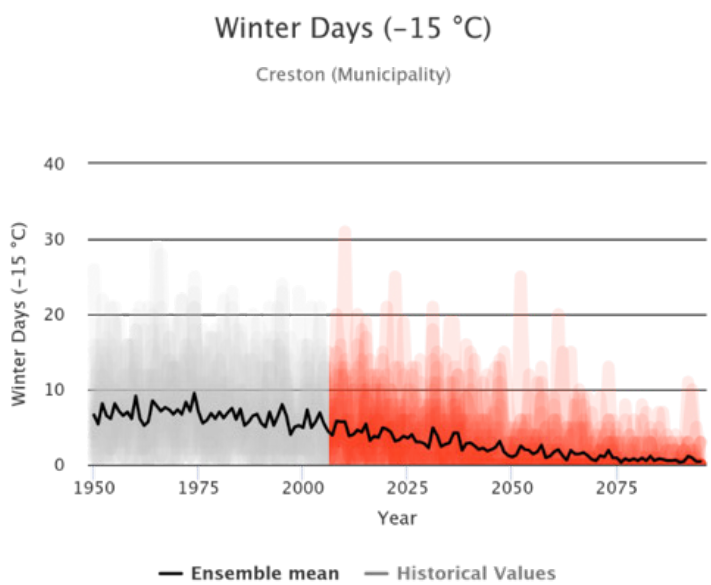


Figure 9 CMIP5 Climate Projections for Days Below -15 °C Annually.
Source: climateatlas.ca

Hazard Consequences

The table below describes the potential consequences of extreme cold in Creston

Category	Description	Rating
Fatalities	· Fatalities in extreme cold are typically linked to cold exposure, particularly if people lack adequate heat or shelter or are stranded outdoors. [116]	**LOW**
Injuries, Disease, or Hospitalization	· Extreme cold can cause hypothermia and frostbite, as well as the exacerbation of cardiovascular and respiratory illnesses, particularly among seniors, infants, people with chronic health conditions, and those experiencing homelessness. [116]	**LOW**
Displacement	· Extreme cold may cause limited displacement when prolonged heat loss makes homes temporarily uninhabitable, requiring warming centres or short-term shelter. [116]	**LOW**
Psychosocial Impact	· There may be limited psychosocial impacts due to stress related to mobility, heating, and access to services, which could affect the mental health of community members.	**LOW**
Support Services Impact	· Extreme cold can strain informal and formal support services, including an increased demand for heating centres, or wellness checks. [116]	**MEDIUM**
Cultural Impact	· Extreme cold may disrupt outdoor cultural practices, community gatherings, and land based activities, including Indigenous community harvesting, travel, and ceremonial practices that depend on predictable seasonal conditions. [50]	**LOW**
Property Damage	· Freezing of concrete and foundations of houses, as well as household waterlines could cause infrastructure and property damage. [117] · Extreme cold may result in property losses for farm owners, particularly due to crop damage and livestock death or sickness.	**MEDIUM**
Critical Services Impact	· Electrical and natural gas systems can experience peak loads as heating demand rises, increasing the likelihood of outages and loss of power for heating. [117] · Water and wastewater infrastructure are also at risk from frozen or burst pipes, potentially resulting in service disruptions and property damage. [117] · Transportation systems may see reduced reliability from mechanical failures or icy conditions, which can delay emergency response and disrupt supply chains. [116]	**MEDIUM**

Environmental Damage	· Environmental impacts may include stress or mortality among wildlife, damage to vegetation during prolonged cold snaps, and altered ecosystems, particularly when extreme cold follows unseasonably mild conditions. [118]	**LOW**
Economic Impact	· Extreme cold events can cause economic impacts by damaging orchards, vineyards, and other frost-sensitive crops in the surrounding Creston Valley. · Local producers have experienced complete losses of soft fruit following frost events, including cases where entire harvests were lost after unseasonably cold conditions. These losses can leave agricultural producers and wineries with reduced or no product to sell for an entire season, creating financial impacts that extend into Creston through reduced producer spending, lower agri-tourism activity, fewer seasonal employment opportunities, and weaker demand for local goods and services. [119]	**HIGH**
Reputational Impact	· The public's confidence in Creston may be lessened if they perceive the Town as not offering enough supports, such as heating centres, or clear communication. If there is a perceived preventable increase in fatalities or injures as a result of an extreme cold event, the Town may suffer some limited reputational impacts.	**MEDIUM**
TOTAL CONSEQUENCE SCORE		**MEDIUM - LOW**

Future Consequence

To understand potential future consequences due to the impacts of the changing climate, an assessment was conducted based on the January 2024 cold weather event, which brought extreme temperatures, wind chill, and infrastructure impacts across western Canada. [120] For this analysis, that event was re-evaluated under a +3°C warming scenario to understand how similar cold outbreaks may behave in a future climate. While based on a single event, the results highlight how cold risk may persist under changing conditions.

Under a +3°C warmer climate, extreme cold events are expected to continue to pose risks, with projected increases in minimum temperatures (~+4°C) and wind chill (~+4°C). While average temperatures may be higher, changes in wind patterns and terrain-driven airflow may sustain or locally intensify exposure conditions. As a result, risks of frostbite, hypothermia, and service disruptions are expected to persist, particularly for vulnerable populations. Infrastructure impacts, including frozen pipes and strain on energy systems, are also expected to continue, as failures occur when critical thresholds are exceeded regardless of average warming. Overall, extreme cold is expected to continue to produce episodic but meaningful consequences, particularly during severe events.

Snowstorms and Blizzards

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Possible	Low	**Possible/Low**	Unlikely

Hazard Background

Snowstorms and blizzards are meteorological events characterized by heavy snowfall, often accompanied by strong winds. Blizzards specifically involve a combination of high winds, blowing snow, and low temperatures. Environment Canada issues a blizzard warning when sustained winds of 40 km/h or more cause widespread reductions in visibility to 400 meters or less, due to blowing snow combined with falling snow, lasting for at least four hours. [113] Blizzards and severe snowstorms are less common in Creston due to the area's geography. Located in a valley between the Selkirk and Purcell mountain ranges, Creston is naturally shielded by these surrounding mountains, which block incoming weather systems. [4]

Snowstorms and blizzards act as cascading hazards by causing transportation interruptions and electrical outages, which can lead to service interruptions and delayed emergency response.

Hazard Likelihood

Under a moderate emissions scenario (RCP4.5) and by the period 2051-2080, winters in Creston, BC are projected to be both wetter and warmer than in the past. Winter precipitation is expected to increase by an average of 10% compared to historical levels, reaching an average of 221mm for the season. However, the mean winter temperature is projected to rise, from -2.0 °C historically to 0.7 °C, a change of 2.7°C. This warming indicates that, even though there will be more moisture in the air, some of it will fall as rain instead of snow. As a result, the classic conditions needed for snowstorms and blizzards, cold air and heavy snowfall, will become less common. While snow events may still occur, the overall likelihood of intense snowstorms and blizzards is expected to decrease by mid-century, with more winter precipitation falling as rain or mixed precipitation. These trends are consistent with broader climate science findings for southern British Columbia, where warming winters are projected to reduce the frequency and severity of snowstorms at lower elevations. [13, 121]to an average of 51 days, which is 79.3 fewer days than the baseline period, under the same moderate emissions scenario. [13]

Hazard Consequences

The potential consequences of snowstorms and blizzards in Creston are described in the table below.

Category	Description	Rating
Fatalities	· Snowstorms and blizzards are generally unlikely to cause direct fatalities, however, prolonged or severe events may increase the risk of death, particularly among Creston's older population and medically vulnerable residents. · Extended disruptions to transportation and access can delay or prevent emergency response, medical care, routine appointments, medication delivery, and wellness checks, potentially leading to serious or fatal health consequences. [122]	**LOW**
Injuries, Disease, or Hospitalization	· In more severe winter storms, households may be temporarily isolated and face delayed access to emergency response and medical care. [122] · Hypothermia and frostbite can also be caused by snowstorms and blizzards, particularly for those experiencing energy poverty or homelessness.	**LOW**
Displacement	· Temporary displacement may occur if homes lose power or heating during severe winter conditions. Shelter and warming support may also be required for vulnerable populations, including people experiencing homelessness. [116]	**LOW**
Psychosocial Impact	· Snowstorms and blizzards can contribute to stress and anxiety related to mobility limitations, heating reliability, isolation, and reduced access to essential services, particularly when combined with prolonged outages or transportation disruptions. [116]	**MEDIUM**
Support Services Impact	· Snow accumulation, drifting, and poor visibility on transportation networks can temporarily disrupt home-care visits, deliveries, emergency response, school transportation, and other essential support services.	**LOW**
Cultural Impact	· Hazardous travel conditions caused by snowstorms and blizzards can temporarily limit access to gathering places, community events, and land-based activities, resulting in temporary social and cultural disruption. [38]	**LOW**
Property Damage	· Property damage from snowstorms and blizzards is generally localized and repairable, but can occur through heavy snow loading on roofs, fallen branches, ice accumulation, and minor structural stress to buildings and infrastructure. [116]	**LOW**

Critical Services Impact	· Severe winter storm conditions can result in road closures, widespread travel delays, prolonged utility outages, roof damage or collapse risk from snow loading, and delayed emergency response due to hazardous travel conditions and reduced accessibility. [122]	**HIGH**
Environmental Damage	· Environment and Climate Change Canada notes that severe winter storms can damage trees and other vegetation, affecting parks, streetscapes, and natural areas, but clean-up and restoration would likely be minimal. [122]	**LOW**
Economic Impact	· Snowstorms and blizzards can temporarily disrupt some business operations by slowing the movement of goods and workers, limiting customer access, and interrupting transportation and supply chains until roads are cleared and essential services are restored. [122]	**LOW**
Reputational Impact	· Reputational impacts may depend on the timeliness and effectiveness of snow clearing, road safety messaging, and public communication regarding outages, closures, and service disruptions.	**LOW**
TOTAL CONSEQUENCE SCORE		**LOW**

Future Consequence

This assessment of potential future consequence is based on the February 2017 snowstorm in southern British Columbia, which resulted in record snowfall, transportation disruptions, and widespread power outages. [123] The event was re-analyzed under a +3°C warming scenario to assess how snowfall intensity and distribution may change. While tied to this specific event, the findings provide insight into how snowstorm impacts may evolve under warmer conditions. Under a +3°C warmer climate, this analysis demonstrates that snowstorms could become more intense, with events seeing potential increases in total snowfall (~+20%) and peak hourly snowfall rates (~+40%). Warmer atmospheric conditions can increase moisture availability, leading to heavier snowfall when temperatures remain below freezing. These changes are expected to increase the consequence of transportation disruptions, power outages, and strain on emergency response and maintenance services. Impacts may also extend across a wider geographic area, including regions that historically experienced less severe snowfall. Overall, snowstorms are expected to result in more disruptive and resource-intensive consequences when they occur.

Freezing Rain or Drizzle

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Low	**Likely/Low**	Likely

Hazard Background

Freezing rain forms when snowflakes fall through a warm layer high in the atmosphere and melt into raindrops, then pass through a shallow layer of subfreezing air near the surface. These supercooled droplets remain liquid until they contact cold surfaces, such as roads, trees, or power lines, instantly freezing and forming a layer of clear, heavy “glaze ice”. [124] Creston and the surrounding southeastern British Columbia Interior can experience freezing rain and wintry mix events during the winter, particularly when warm Pacific air overruns cold valley air, leading to precipitation that can freeze on contact with the ground. [125] Environment Canada routinely issues freezing rain and mixed precipitation warnings for Interior regions in winter, indicating that these events are a recognized, occasional hazard rather than a rare anomaly. [124]

Freezing rain acts as a cascading hazard by causing ice accumulation on power lines and trees, increasing the likelihood of outages and transportation disruptions. [99]

Hazard Likelihood

Climate change is expected to alter winter temperature and precipitation patterns across Canada, which can influence the frequency and distribution of freezing rain events. Warmer winters and higher atmospheric moisture are projected to increase overall winter precipitation in many regions while shifting more precipitation from snow to rain and mixed forms, potentially leading to more freezing rain in some areas or times of year. [13]

Hazard Consequences

The table below describes the potential consequences of freezing rain or drizzle in Creston.

Category	Description	Rating
Fatalities	· Fatalities are primarily indirect and most commonly associated with motor vehicle collisions, falls, exposure, and secondary impacts such as power outages.	**LOW**
Injuries, Disease, or Hospitalization	· Freezing rain and drizzle may result in injuries due to hazardous surface and travel conditions, including motor vehicle collisions on icy roads and slips and falls on untreated or ice-covered surfaces. [124]	**LOW**
Displacement	· Freezing rain is unlikely to cause displacement.	**NONE**

Psychosocial Impact	· Freezing rain is unlikely to cause psychosocial impacts.	**NONE**
Support Services Impact	· Freezing rain and drizzle can disrupt access to essential supports and services by making roads and sidewalks hazardous and by interrupting utilities or transportation networks. · These conditions can affect home-care visits, deliveries, wellness checks, and other formal and informal support systems. [124]	**LOW**
Cultural Impact	· Freezing rain or drizzle is unlikely to cause cultural impacts.	**NONE**
Property Damage	· Ice accumulation can overload trees and utility lines, leading to broken branches, localized power outages, and damage to structures and vehicles, particularly where falling limbs occur near homes, roads, or parked vehicles. [124] · Freezing rain may impact the farms located within Creston as ice accumulation on branches, buds, and trellising systems may break fruiting wood, damage developing crops, and impair farm infrastructure.	**MEDIUM**
Critical Services Impact	· Freezing rain and drizzle can cause localized power outages and transportation disruptions. Ice accumulation on trees and power lines may damage infrastructure, while even light freezing drizzle can create thin ice coatings that affect road safety and transportation operations. [124]	**MEDIUM**
Environmental Damage	· Environmental impacts are generally indirect and localized, including tree damage from ice loading, fallen branches, and temporary debris accumulation, rather than widespread or long-term ecosystem damage. [124]	**LOW**
Economic Impact	· Freezing rain can have broader economic impacts on Creston through the Valley's agricultural sector, particularly for orchards and vineyards located within Creston Valley. The impacts of freezing rain can reduce seasonal yields and, in severe cases, require multi-year recovery and re-establishment efforts. These losses may in turn affect Creston locally through reduced producer revenue, decreased winery and agri-tourism activity, supply-chain disruption, and secondary effects on seasonal employment and local businesses. [119]	**MEDIUM**
Reputational Impact	· Freezing rain is unlikely to cause reputational impacts.	**NONE**
TOTAL CONSEQUENCE SCORE		**LOW**

Public Health Crisis

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Low	**Likely/Low**	Almost Certain

Hazard Background

A public health crisis is an urgent, time limited event that poses a substantial threat to the life, health, or safety of the population and necessitates immediate actions beyond normal operations to prevent or mitigate adverse health outcomes. [131]

The Public Health Act provides a framework for addressing current and emerging public health issues. It outlines the authority of the Minister of Health, public health officials, regional health authorities, local governments, and other interest holders. [132] British Columbia has faced two major public health emergencies in recent years. The first was the 2016 overdose crisis, declared in response to a sharp rise in illicit drug overdoses and related deaths. [133] The second was the COVID-19 pandemic, which was declared a public health emergency from 2020-2024 as cases and fatalities surged across the province. [134]

Hazard Likelihood

While advances in epidemiology, vaccine development, and disease surveillance have reduced the risk of widespread infection from many communicable diseases, the likelihood of public health crises remains moderate to high. This is due to several compounding factors. The ongoing toxic drug crisis continues to strain emergency services and public health resources, with Interior Health reporting some of the highest overdose death rates in the province. [135] Healthcare system challenges, including long wait times for emergency care and specialist services, are particularly acute in rural areas like Creston, where access to primary care is limited and hospital capacity is constrained. [136] These capacity limitations increase the probability that even seasonal surges or sudden outbreaks could overwhelm services and turn manageable events into a public health crisis.

Climate risk drivers are also impacting the likelihood of public health crisis, most directly through hazards caused by extreme weather events such as heat and flooding. The change in distribution of plants and animals, the availability of food and water, and spread of invasive plants and diseases due to a changing climate can also influence the future likelihood of a public health crisis. [137]

Hazard Consequences

The table below describes the potential consequences of a public health crisis in Creston.

Category	Description	Rating
Fatalities	· Fatalities are typically indirect and occur over time from public health crises, rather than as immediate outcomes. · Increased mortality rates resulting from a public health crisis may follow from widespread illness, impacts to vulnerable populations, strain on healthcare systems, or reduced access to timely care.	**LOW**

Injuries, Disease, or Hospitalization	· Impacts are primarily reflected through widespread illness and health complications, which may range from mild to severe. · Increased demand for healthcare services can exacerbate these impacts, particularly for vulnerable populations.	**LOW**
Displacement	· Public health crises are generally unlikely to result in population displacement.	**NONE**
Psychosocial Impact	· Prolonged public health emergencies can create widespread psychosocial impacts, including stress, uncertainty, frustration, fatigue, and reduced community well-being, particularly where response measures are prolonged, messaging is inconsistent, or residents perceive a loss of control or predictability. [138]	**MEDIUM**
Support Services Impact	· Community and social support systems may also experience strain due to prolonged response demands, service reprioritization, staffing shortages, burnout, and coordination challenges across healthcare, government, and community agencies. [139]	**MEDIUM**
Cultural Impact	· Public health directives may limit gatherings, close facilities, or alter community programming, disrupting cultural events, social activities, and community-based practices.	**LOW**
Property Damage	· Public health crises are unlikely to cause direct physical property damage.	**NONE**
Critical Services Impact	· Critical infrastructure systems, particularly healthcare and social services, may face operational continuity challenges because of workforce shortages, increased service demand, or the reprioritization of limited resources during prolonged emergencies. [137]	**MEDIUM**
Environmental Damage	· There are not expected to be environmental impacts resulting directly from public health crises.	**NONE**
Economic Impact	· Public health emergencies can contribute to economic disruption through emergency restrictions, workforce availability challenges, altered consumer behaviour, reduced tourism and business activity, and prolonged uncertainty affecting local economic confidence and recovery. [67]	**MEDIUM**
Reputational Impact	· Public trust and confidence may be influenced by perceptions of emergency decision-making, transparency, consistency of messaging, and the effectiveness of response coordination—particularly in the context of public expectations shaped by experiences during the COVID-19 pandemic and other prolonged or contentious public health emergencies. [40]	**HIGH**
TOTAL CONSEQUENCE SCORE		**LOW**

Landslide/Debris Flow

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Possible	Medium - Low	**Possible/Medium - Low**	Likely

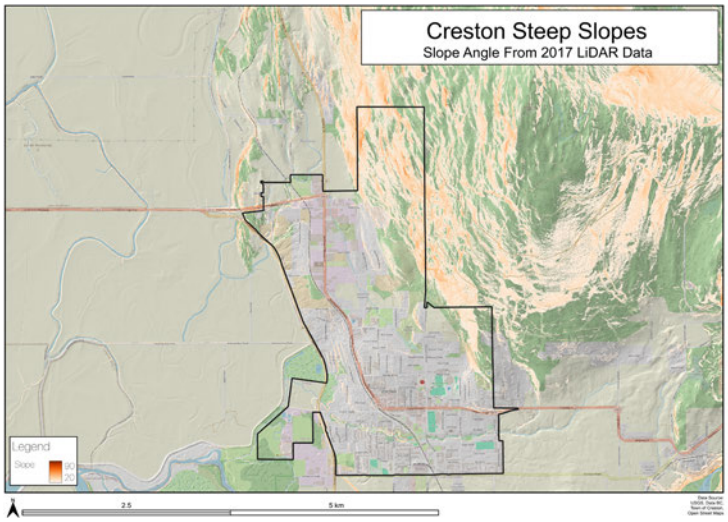
Hazard Background

Landslides and rockslides occur when slope materials move downward and outward under the force of gravity, encompassing a wide range of landforms and processes. In British Columbia, most landslides are relatively small events, typically involving debris flows or rockslides. The material involved in a landslide may consist of natural rock, soil, artificial fill, or a combination of these components. [140] Debris flow occurs when a mass of water and rocks, stones or boulders, flows down a stream, ravine, canyon or gulch. [141]

Landslides are especially concerning in areas zoned as high-risk that intersect with residential, commercial, or critical infrastructure zones essential to public services. Large-scale landslides can also be triggered by heavy rainfall, particularly on steep slopes lacking vegetation, trees, and root systems. Logged hillsides, creek and river ravines, and terrain below rapidly melting snowpacks are especially vulnerable to landslide activity. [142]

The Creston Valley and surrounding RDCK areas face notable geohazard risks, including debris flows and debris floods on steep creek fans and floodplains. Kuskonook Creek (Electoral Area A) is identified as a debris flow hazard zone, while Goat River floodplain processes pose additional risks to Creston. [78] Debris flows in these areas can exhibit sediment concentrations approaching the consistency of wet concrete, making them highly destructive to infrastructure and property. Creston's vulnerability is amplified by its surrounding forested mountains, agricultural lands, and rural residential properties, as well as critical infrastructure such as highways, railroads, pipelines, and water reservoirs within town boundaries. [37] While the urban core of Creston is not widely exposed to large-scale landslide hazards, surrounding slopes, transportation corridors, and rural areas may be affected, which can disrupt access, infrastructure, and services relied upon by the Town.

Map 8 depicts slope gradients based on LiDAR data, identifying areas of steep terrain. Steeper slopes are concentrated on the eastern valley walls, indicating potential areas of instability or slope-related hazards. A larger version of this map is included in Appendix O: Maps.



Map 8 Creston Steep Slopes Map

Hazard Likelihood

The likelihood of landslide and debris flow events in the Creston Valley is considered moderate to high and is expected to increase over time. Hazard mapping conducted by the Regional District of Central Kootenay (RDCK) identifies steep creek fans and floodplains, including Kuskonook Creek and the Goat River floodplain, as areas of concern for debris flows and related geohazard processes. [78] These areas are characterized by steep terrain, unconsolidated soils, and historical evidence of slope movement. Creston itself is situated at the base of surrounding slopes, and while the urban core is not directly exposed to high-magnitude landslide zones, outlying areas and transportation corridors may be affected.

The assessments incorporate climate-adjusted assumptions, including a 20% increase in flood quantiles and consideration of wildfire impacts on watershed response, based on Engineers and Geoscientists BC guidelines and IPCC projections for the 2050s. Climate change is anticipated to amplify triggering factors such as extreme rainfall, rapid snowmelt, and post-wildfire slope instability, all of which contribute to an elevated risk profile for the region. [37]

Hazard Consequences

The following table describes the consequences of landslide/debris flow in Creston.

Category	Description	Rating
Fatalities	· Fast-moving landslides or debris flows can cause fatalities through burial, entrapment, or structural collapse, particularly near steep slopes or confined valleys. However, these impacts are typically localized and minimal. [141]	**LOW**
Injuries, Disease, or Hospitalization	· Potential impacts include traumatic injuries from debris impact, building failure, or vehicle incidents. These impacts are expected to be manageable within normal emergency response operations. [141]	**LOW**
Displacement	· Homes may become unsafe or inaccessible due to slope failure, debris deposition, or blocked access routes, requiring short-term relocation.	**LOW**
Psychosocial Impact	· Community members affected by landslides or debris flow may experience stress and anxiety, particularly if they are required to evacuate or sustain injuries. [38]	**LOW**
Support Services Impact	· Community supports may be temporarily strained by response and recovery efforts.	**LOW**
Cultural Impact	· If landslides occur near culturally important sites or ancestral landscapes, they may damage or restrict access to these areas.	**LOW**

Property Damage	· For homes or buildings in proximity to steep or eroding slopes, debris flows and landslides can destroy structures, undermine foundations, and deposit large volumes of debris on roads, vehicles, and properties. Damage can be substantial, but will likely be localized. [141]	**HIGH**
Critical Services Impact	· Landslides may block roads and bridges, disrupt buried utilities (water, sewer, power, communications), and isolate areas until cleared or repaired. [142]	**MEDIUM**
Environmental Damage	· Slope failure strips vegetation, destabilizes soils, and deposits sediment in waterways, affecting habitats and drainage patterns.	**MEDIUM**
Economic Impact	· Costs may include cleanup, rebuilding, infrastructure repair, business interruption, and emergency response, resulting in financial losses for affected residents and local government. Road closures caused by landslides or debris flows may also temporarily disrupt local businesses. [142]	**MEDIUM**
Reputational Impact	· Public trust may decrease if slope risks are perceived to be unmanaged or if response is slow or under-resourced.	**LOW**
TOTAL CONSEQUENCE SCORE		**MEDIUM - LOW**

Hazardous Materials Spill

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Possible	Medium - Low	**Possible/Medium - Low**	Likely

Hazard Background

A hazardous materials spill refers to any unintentional release of a dangerous or harmful substance into the natural environment. These spills can occur in two main contexts: (1) at fixed sites, such as industrial facilities, where materials are stored, used, or processed; and (2) during transportation, when hazardous materials are moved by truck, ship, rail, or aircraft. Hazardous materials include substances classified as dangerous by Transport Canada, such as toxic gases, radioactive materials, acids, and various chemicals. [143]

Various facilities and transportation networks within Creston possess hazardous materials and chemicals that could potentially threaten the well-being and safety of residents if mishandled. Some of these risks include:

- Fortis BC has a network of low-pressure gas lines and one high-pressure gas line within Creston.
- TC Energy has pipelines east of Creston, transporting crude oil and refined products.
- Local fuelling stations deal with potentially dangerous goods, such as gas, diesel, and propane.
- Wastewater treatment plants manage bio-hazardous waste and chemicals used for processing.
- Pesticides used in agricultural operations pose risk for farm workers, especially if proper protection and safety measures are not taken.
- The Creston & District Community Complex has an ice rink, which uses ammonia as part of their refrigerant system.
- A Canadian Pacific Kansas City Railway rail line transverses through the centre of Creston, transporting petroleum, chemicals, fertilizers, and other potentially hazardous materials.
- Highway 3 runs through Creston, presenting a risk of truck-related spillage during transport.
- The Columbia Brewery utilizes various hazardous materials such as ammonia, corrosives, sanitizers, and toxic gases.

Hazard Likelihood

In Creston, a hazardous materials spill is more likely to be caused by regular human activity than from a geophysical trigger. The rail corridor, highway freight traffic, or product transfer at depots, the Columbia Brewery, and farm sites create multiple scenarios where this hazard could happen. [144] In comparison, spills caused by earthquakes, landslides, or other natural hazards are plausible but likely more infrequent. [143] Factors influencing likelihood include

the high level of industrial activity within Creston, particularly the rail corridor that runs directly through the community's centre. Rail and associated heavy transport traffic move hazardous materials through town, increasing the potential release of these substances into the environment. [37] However, regular monitoring of infrastructure used to transport hazardous materials, such as pipelines, rail lines, and transport trucks, can help reduce this risk. [143] The assessments incorporate climate-adjusted assumptions, including a 20% increase in flood quantiles and consideration of wildfire impacts on watershed response, based on Engineers and Geoscientists BC guidelines and IPCC projections for the 2050s. Climate change is anticipated to amplify triggering factors such as extreme rainfall, rapid snowmelt, and post-wildfire slope instability, all of which contribute to an elevated risk profile for the region. [37]

Future likelihood considerations include rising temperatures and more frequent heatwaves, floods, and extreme storm events driven by climate change. These conditions can weaken the structural integrity of infrastructure carrying hazardous materials or damage industrial facilities, potentially leading to the release of hazardous substances from storage sites.

Hazard Consequences

The following table describes the potential consequences of a hazardous materials spill in Creston.

Category	Description	Rating
Fatalities	· Hazardous materials spills can result in fatalities from acute inhalation or direct contact. Creston's proximity to facilities that use hazardous materials (such as the brewery) amplifies potential impacts. However, these impacts would likely be localized and minimal. [145]	**LOW**
Injuries, Disease, or Hospitalization	· Spills can cause respiratory distress, chemical burns, poisoning, or long-term health effects that may lead to hospitalization. [145]	**MEDIUM**
Displacement	· Hazardous materials incidents may require short-term evacuation or temporary shelter-in-place orders for nearby homes, businesses, or public facilities. [143]	**LOW**
Psychosocial Impact	· Chemical incidents can cause fear, anxiety, and stress related to perceived toxicity, long-term health concerns, and contamination of local places, particularly if the incident results in injuries or fatalities. [145]	**MEDIUM**
Support Services Impact	· Spill response can increase demand on local support services due to evacuations or injuries. [145]	**LOW**
Cultural Impact	· Access to community spaces, agricultural lands, or culturally important areas may be temporarily restricted due to contamination or safety concerns.	**LOW**

Property Damage	· Hazardous materials can contaminate buildings, vehicles, equipment, soil, and infrastructure, requiring specialized cleanup or replacement. [143]	**MEDIUM**
Critical Services Impact	· Spills may impact transportation routes (Highway 3, the railway), utilities (gas lines, lift stations or pump stations), or facility operations (brewery, recreation facilities, wastewater treatment plant). · They may also increase demand on the healthcare system and emergency response. [68]	**HIGH**
Environmental Damage	· Spills may run off into soil, waterways, or stormwater systems, harming aquatic life, contaminating the soil, and requiring long-term remediation. [146]	**MEDIUM**
Economic Impact	· Economic impacts may include business interruption, agricultural losses, cleanup and remediation costs, regulatory compliance expenses, and transportation disruptions. A spill at the brewery could result in more severe and longer-term economic impacts, given its role as a major local employer and industry. [38]	**HIGH**
Reputational Impact	· Public confidence may be affected by perceptions of preparedness, oversight of hazardous materials, and effectiveness of response and communication.	**MEDIUM**
TOTAL CONSEQUENCE SCORE		**MEDIUM - LOW**

Lightning

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Almost Certain	Very Low	**Almost Certain/Very Low**	Rare

Hazard Background

Lightning is a type of severe weather that can occur during thunderstorms, dust storms, and forest fires. There are several types of lightning, with cloud-to-ground strikes being the most dangerous and damaging, responsible for about 60% of lightning-related injuries and deaths. In Canada, the highest number of cloud-to-ground lightning flashes occur in July. [159]

Lightning acts as a cascading hazard by serving as a primary ignition source for wildfires; approximately 45% of wildfires in Canada are caused by lightning strikes, particularly during hot and dry conditions. [160]

Hazard Likelihood

Creston lies within a region of British Columbia that regularly sees summer thunderstorms and associated lightning during the warm season, although lightning density in the Interior is generally lower than in the Prairie provinces. National lightning data show millions of lightning flashes occur across Canada each year, with a season that peaks in July in parts of Western Canada, including areas near the Kootenays, experiencing lightning flashes on numerous summer days. [161]

In the future, climate change is expected to greatly influence lightning activity, with research linking warmer temperatures to increased thunderstorm activity and a higher frequency of lightning and lightning-ignited wildfires. Warmer, drier conditions tend to create ideal conditions for stronger storms, which can lead to more frequent or intense lightning events in some regions. [162]

Hazard Consequences

The following table describes the potential consequences of lightning in Creston.

Category	Description	Rating
Fatalities	· Lightning is unlikely to cause fatalities.	**NONE**
Injuries, Disease, or Hospitalization	· Lightning is unlikely to cause injuries or hospitalization.	**NONE**
Displacement	· Lightning is unlikely to cause displacement.	**NONE**
Psychosocial Impact	· Lightning is unlikely to cause psychosocial impacts.	**NONE**

Support Services Impact	· Lightning is unlikely to affect support services.	**NONE**
Cultural Impact	· Temporary suspension of outdoor or cultural activities may occur during thunderstorms due to lightning safety concerns. [159]	**LOW**
Property Damage	· Direct lightning strikes can cause localized damage to buildings, roofs, wiring, or electronics, including burn or shock damage at the point of impact. [109]	**LOW**
Critical Services Impact	· Lightning can directly damage equipment or infrastructure components, such as antennas or exposed electrical systems, at the strike location. [161]	**LOW**
Environmental Damage	· Environmental impacts are generally limited to the immediate strike area and are unlikely to require substantial cleanup or remediation efforts. [159]	**LOW**
Economic Impact	· Lightning is unlikely to cause economic impacts.	**NONE**
Reputational Impact	· Lightning is unlikely to cause reputational impacts.	**NONE**
TOTAL CONSEQUENCE SCORE		**VERY LOW**

Food Source Interruption

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Medium - Low	**Rare/Medium - Low**	Rare

Hazard Background

Food shortages occur when there is insufficient availability of food due to various factors, including natural disasters, inadequate labor, and lack of suitable land. Disasters can disrupt supply chains, leading to shortages within a community. [147]

Food supply systems are designed for efficiency through production, distribution, and inventory, and are particularly vulnerable to disruptions caused by disasters. During such events, companies responsible for transporting food and other essential goods face time pressures and rapidly changing conditions, making reliable and secure food distribution highly complex. [148]

Hazard Likelihood

Creston is well connected to rail and ground transportation networks, which lowers the likelihood that an emergency event, such as a wildfire, would disrupt access to the community or interrupt critical supply chains, including food delivery. [37] However, electrical power outages caused by severe weather events, such as windstorms and wildfire, are common across British Columbia and can affect Creston. These outages have the potential to disrupt food storage, distribution, and retail operations, increasing the risk of short-term food supply interruptions.

Hazard Consequences

The table below describes the potential consequences of a food source interruption in Creston.

Category	Description	Rating
Fatalities	· A food supply interruption in Creston would not typically result in immediate fatalities. However, a prolonged disruption could create serious health risks for some medically vulnerable residents, low-income households, and older adults. · Severe food insecurity in Canada has been associated with increased rates of premature mortality, and these risks may be heightened in Creston, where approximately 38.5% of the population is aged 65 or older and local food programs report serving many seniors. [149]	**LOW**

Injuries, Disease, or Hospitalization	· A prolonged disruption to food supplies could worsen nutrition, exacerbate chronic health conditions, and increase illness or hospitalization among vulnerable residents, as food insecurity is strongly associated with negative health outcomes. · In Creston, where food banks and community food-sharing programs already support high demand, food source disruption would likely intensify existing needs and further increase health impacts among low-income households, seniors, and other vulnerable populations. [149]	**MEDIUM**
Displacement	· A food source interruption is unlikely to cause displacement.	**NONE**
Psychosocial Impact	· Interruptions to food sources can cause stress, anxiety, and uncertainty among residents, particularly where households are already experiencing food insecurity and local food banks and food-sharing programs are facing increased demand. [149] · Creston is limited in their food stores, so a prolonged interruption would have negative psychosocial impacts on its residents.	**MEDIUM**
Support Services Impact	· Food source interruption would place noticeable strain on Creston's support systems as the Creston Valley Gleaners Food Bank is already responding to growing needs. [149]	**HIGH**
Cultural Impact	· Events could be temporarily cancelled or postponed because of food source interruption.	**LOW**
Property Damage	· Property damage is unlikely to occur because of food source interruption.	**NONE**
Critical Services Impact	· Critical services are unlikely to be impacted because of food source interruption.	**NONE**
Environmental Damage	· Environmental damage is unlikely to occur because of food shortage interruption.	**NONE**
Economic Impact	· A food source interruption could disrupt agricultural production, farm income, grocery sales, food processing, restaurants, and household spending patterns, resulting in localized economic losses. However, most impacts would likely be temporary and recoverable unless disruptions were prolonged, widespread, or repeated over multiple seasons. [119]	**MEDIUM**
Reputational Impact	· Public confidence could be affected if residents perceive that local authorities, suppliers, or community support organizations are unable to maintain reliable access to food, coordinate assistance effectively, or communicate clearly during a prolonged disruption. [28]	**LOW**
TOTAL CONSEQUENCE SCORE		**MEDIUM - LOW**

Water Service Interruption

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Medium - Low	**Rare/Medium - Low**	Unlikely

Hazard Background

Interruptions to the local water supply can contribute to many challenges in Creston. These challenges can range from a limited capacity for fire suppression to the potential for water and fuel to combine due to leakage, which can exacerbate fire spread. Hospitals and clinics, which require a reliable and clean water source to function effectively, may face operational challenges, especially during times when the number of in-patients or casualties exceeds the daily average. Additionally, downed power lines and live wiring can pose a hazard when introduced to pooling water, endangering the lives of anyone in the vicinity, including first responders. [97] To create 'disaster resilient communities', it is recommended that residents maintain a fresh, three-day supply of drinking water, per person, in their homes. [154]

Creston's water supply comes from three sources: Arrow Creek, Goat River Aquifer Well No. 2, and Goat River Aquifer Well No. 3, with Arrow Creek providing over 99% of the Town's drinking water. Each of the two wells can independently meet the Town's water demand, even during peak summer consumption. The system includes four closed reservoirs and a booster pumping station, supported by 63 kilometers of water mains that connect the reservoirs to the community. In total, there are approximately 3,056 residential connections and 239 commercial or industrial connections. [155]

Hazard Likelihood

Creston's established water infrastructure and ongoing maintenance programs contributes to a lower likelihood of water service interruption. [155]

Future climate impacts, such as increased precipitation intensity and extreme weather events may strain water systems and elevate risks of service disruption due to peak flow events and system overload [11]. Wildfire-related risks could also affect water availability for fire suppression, particularly in areas outside municipal boundaries where hydrants are absent and water shuttling is required. [156]

Hazard Consequences

The following table describes the potential consequences of a water service interruption in Creston.

Category	Description	Rating
Fatalities	· A water service interruption is unlikely to cause fatalities.	**NONE**
Injuries, Disease, or Hospitalization	· A water service interruption can increase the risk of illness if drinking water becomes unsafe or unavailable for drinking, cooking, and hygiene. Untreated or non-disinfected water may contain pathogens such as bacteria, viruses, and parasites, which can contribute to waterborne illness and other public health concerns. [157]	**LOW**

Displacement	· A temporary drinking water service interruption would not typically result in community displacement, as Creston emergency planning emphasizes maintaining or facilitating potable water supply during emergencies rather than evacuation. [37]	**LOW**
Psychosocial Impact	· A water service interruption would likely disrupt daily life across Creston and contribute to stress and anxiety among residents, particularly older adults who may face greater challenges accessing safe drinking water. [38]	**LOW**
Support Services Impact	· Water service interruptions could also disrupt support systems by affecting services that rely on accessible drinking water supplies, such as food support programs. [38]	**MEDIUM**
Cultural Impact	· Direct cultural impacts during a water service interruption would likely be limited to postponed events; water service interruptions are unlikely to damage cultural assets. [38]	**LOW**
Property Damage	· Property damage is unlikely to occur as a direct result of a water service interruption.	**NONE**
Critical Services Impact	· A community-scale water service interruption would directly impair a core municipal utility and could create cascading impacts on healthcare, emergency response, and other infrastructure-dependent services. · Although the Town has backup wells, these wells do not have backup generators and remain dependent on continuous electrical power, limiting their effectiveness during power outages. [28]	**EXTREME**
Environmental Damage	· Water service interruptions may have environmental consequences if emergency operations or reduced system reliability affect the Arrow Creek or Goat River system, although impacts would likely be minimal. [28]	**LOW**
Economic Impact	· A prolonged interruption could disrupt businesses, accommodations, restaurants, public facilities, and agriculture-related activities in Creston, particularly as the limited number of farms in Creston are focused on water-intensive crops. [119]	**HIGH**
Reputational Impact	· A water service interruption could reduce public confidence in the Town and water suppliers if restrictions, advisories, or restoration efforts are prolonged or poorly communicated.	**LOW**
TOTAL CONSEQUENCE SCORE		**MEDIUM - LOW**

Fuel Source Interruption

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Low	**Rare/Low**	Rare

Hazard Background

A fuel service interruption is defined as a shortage or failure of fuel systems, supplies, and related services. Causes may include pipeline damage, transportation delays due to severe weather or shipping infrastructure damage, general shortages caused by market supply issues, or panic-driven fuel hoarding during emergencies. [158]

FortisBC supplies natural gas to homes within Creston. During and after an emergency event (e.g., an earthquake), the natural gas transmission network may be temporarily shut down to reduce the risk of gas leaks, helping to prevent secondary disasters such as fires and explosions. [37]

Hazard Likelihood

Fuel source interruptions are generally rare but can be more likely during major emergencies or transportation disruptions. [158] Creston relies on regional supply chains for fuel delivery, primarily via highway and rail networks. [37] These networks are generally robust, reducing the risk of prolonged shortages. However, severe weather events, such as snowstorms or flooding, could temporarily impede transportation routes, delaying fuel deliveries.

Impacts stemming from climate change may increase the frequency of extreme weather events and wildfires, potentially disrupting transportation corridors. Additionally, population growth and increased commercial activity could amplify fuel demand, making supply chains more sensitive to interruptions.

Hazard Consequences

The following table describes the potential consequences of a fuel source interruption in Creston.

Category	Description	Rating
Fatalities	· A fuel source interruption in Creston is more likely to create indirect life-safety risks, such as delayed emergency response and reduced healthcare transportation, rather than direct fatalities. [68]	**LOW**
Injuries, Disease, or Hospitalization	· A prolonged fuel shortage may contribute indirectly to injury or illness by making it more difficult for residents to access medical care; however, it is unlikely to cause widespread injury or hospitalization. [68]	**LOW**
Displacement	· A fuel source interruption is unlikely to cause displacement.	**NONE**

Psychosocial Impact	· A fuel shortage would likely cause stress, frustration, and anxiety for residents and businesses, particularly if it led to uncertainty, lineups, reduced mobility, or concerns about access to work, medical care, and essential supplies.	**LOW**
Support Services Impact	· Fuel source interruptions can affect both informal and formal support networks by limiting travel for caregivers, volunteers, home-support workers, and deliveries to residents and support services. [38] · Residents who rely on personal vehicles may face transportation barriers in accessing support services.	**MEDIUM**
Cultural Impact	· Fuel shortages can temporarily disrupt access to gatherings, events, and community spaces, but impacts would likely not be widespread or long-term.	**LOW**
Property Damage	· Property damage is unlikely to occur as a direct result of a fuel source interruption.	**NONE**
Critical Services Impact	· Fuel shortages can quickly impair emergency response, healthcare transportation, commercial transport, and infrastructure repair operations. · A sustained interruption could degrade several interconnected services simultaneously and reduce the effectiveness of critical services that support Creston. · Creston's fuel supply may be limited to approximately 72 hours, increasing the Town's vulnerability during prolonged events. [38] [28]	**EXTREME**
Environmental Damage	· Environmental damage is unlikely to occur as a direct result of a fuel source interruption.	**NONE**
Economic Impact	· Economic impacts may result from fuel shortages across multiple sectors, disrupting includingdisruption of freight movement, commuting, tourism, farm operations, and day-to-day business activity. · This would limit the movement of these sectors and increase operating costs, resulting in broader economic impacts across the community. [28]	**HIGH**
Reputational Impact	· A visible fuel shortage could reduce public confidence in emergency management and service continuity if residents experience lineups, inconsistent messaging, or frustration regarding access to limited fuel supplies.	**LOW**
TOTAL CONSEQUENCE SCORE		**LOW**

Tornado

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Medium - Low	**Rare/Medium - Low**	Rare

Hazard Background

A tornado is a violently rotating column of air with extremely high wind speeds, lasting anywhere from a few minutes to several hours. Tornadoes can range in width from 10 meters to over 1 kilometer, typically traveling at speeds between 15 and 30 km/h, though wind speeds within the tornado can reach up to 500 km/h. The most powerful tornadoes are usually associated with severe thunderstorms and are often accompanied by heavy rain or hail. In Canada, they most commonly occur between May and August. [82] Environment Canada uses the Enhanced Fujita (EF) scale to classify tornado intensity based on wind damage, as shown in Figure 10. Tornadoes rated EF2 and EF3 are considered strong, with wind speeds ranging from 180 to 265 km/h. EF4 and EF5 tornadoes are classified as violent, with wind speeds between 270 and over 315 km/h. [126]

Enhanced Fujita (EF) Scale

Rating	Wind Speed (mph)	Damage Intensity
EF-0	65-85	Gale/minor
EF-1	86-110	Moderate
EF-2	111-135	Significant
EF-3	136-165	Severe
EF-4	166-200	Devastating
EF-5	>200	Incredible

Figure 10 Enhanced Fujita Scale.
Source: Rainbow Restoration

Hazard Likelihood

National datasets show that British Columbia has a very low tornado frequency compared with Canada's primary tornado regions (southern Prairies and Southern Ontario/Quebec). [127] Creston lies within mountainous topography, which is not conducive to tornado formation. Steep valley walls and uneven surfaces break up storm rotation, making it difficult for tornadoes to form or persist. [128] Given this low baseline and Creston's valley terrain, it is highly unlikely that a tornado should affect Creston. Even so, historical records show that rare exceptions have occurred. In 1910, an unrated tornado hit Creston, resulting in damage to homes and businesses in the community, with debris being thrown up to 150 yards. [129] Furthermore, climate-change effects on regional tornado likelihood are uncertain and should be reviewed periodically. [130]

Hazard Consequences

The following table describes the potential consequences of a tornado in Creston.

Category	Description	Rating
Fatalities	· Tornadoes can cause fatalities due to extreme wind speeds, structural failure, and flying debris, particularly affecting people who are outdoors or located in non-reinforced structures. [163]	LOW
Injuries, Disease, or Hospitalization	· Injuries may result from flying debris, collapsing structures, and broken glass. [163]	MEDIUM
Displacement	· Structural damage to homes or buildings from a tornado may make them temporarily uninhabitable, requiring short-term sheltering.	LOW
Psychosocial Impact	· Tornado warnings and impacts can cause acute fear, stress, and anxiety because of the sudden onset and violent nature of the hazard.	MEDIUM
Support Services Impact	· Support systems may experience increased demand due to potential injuries and displacement, and safety checks may be required within affected areas. [82]	LOW
Cultural Impact	· Cultural events and gatherings may be temporarily interrupted during or following tornado events.	LOW
Property Damage	· Tornadoes can cause severe but localized damage to buildings, roofs, and other property through extreme winds and windborne debris. [163]	MEDIUM
Critical Services Impact	· Critical infrastructure within the direct path of a tornado may also be damaged, including power lines and utility facilities. · Where damage to critical services is widespread, restoration efforts may require an extended period of time. [82]	HIGH
Environmental Damage	· Environmental impacts may include tree loss, vegetation damage, and debris accumulation within the immediate impact area; however, these impacts are not expected to require long-term remediation.	LOW
Economic Impact	· Tornadoes may cause short-term business interruption and uninsured losses within affected areas.	LOW
Reputational Impact	· Tornadoes are generally understood as unpredictable natural hazards and are therefore associated with limited reputational risk for local authorities. However, public perception may still be influenced by warning communications, shelter guidance, and the effectiveness of immediate post-event response efforts.	LOW
TOTAL CONSEQUENCE SCORE		MEDIUM - LOW

Cyber Security Threat

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Low	**Rare/Low**	Rare

Hazard Background

A cyber security threat is any circumstance or event that could disrupt or negatively impact an organization's operations, assets, or individuals, including its mission, functions, image, or reputation. Cyber threats typically occur through information systems and may involve unauthorized access, destruction, disclosure, modification of information, or denial of service. They also include the potential for a threat actor to exploit a specific vulnerability within an information system. [164]

Critical infrastructure is a primary target for cyber security threats. However, Creston's exposure to cybersecurity threats is currently mitigated by recent investments in IT infrastructure and managed services. The Town operates on a newly established standalone network, reducing vulnerabilities associated with legacy systems and inherited configurations. Sea to Sky Technologies provides ongoing IT management, including off-site backups, hourly on-site data backups with daily replication, and managed detection and response services to identify and address potential breaches. These measures support rapid containment and recovery in the event of an incident, including the ability to restore systems through cloud-based servers.

Hazard Likelihood

Cyber security threats are expected to become an increasing source of terrorism over time. The Canadian Centre for Cyber Security has reported more than 100 incidents targeting Canadian municipalities since 2020. Most of these involve social engineering, unauthorized network access, or the deployment of malicious code such as ransomware. [165] The growing availability of artificial intelligence (AI) tools may further increase cyber risk by enabling cyber criminals to conduct attacks more efficiently, tailor malicious content to specific targets, and automate aspects of cyber operations. [166] Given current trends, it is likely that cyber security threats will continue to rise in frequency and sophistication.

Hazard Consequences

The following table describes the potential consequences of a cyber security threat in Creston.

Category	Description	Rating
Fatalities	· A cyber security incident is unlikely to cause fatalities.	**NONE**
Injuries, Disease, or Hospitalization	· A cyber security incident is unlikely to cause injuries, disease, or hospitalization.	**NONE**
Displacement	· A cyber security incident is unlikely to cause displacement.	**NONE**

Psychosocial Impact	· A cyber security incident could contribute to stress and anxiety, particularly if personal data is compromised or essential services are disrupted. [40]	**LOW**
Support Services Impact	· Cyber-attacks can interrupt the digital systems that support coordination, communication, and access to support services in Creston. [165]	**MEDIUM**
Cultural Impact	· The most likely cultural consequence would be temporary disruption to community programming, local events, communications, or access to public-facing information systems, rather than direct damage to cultural sites or heritage assets.	**LOW**
Property Damage	· Property damage is unlikely to occur as a result of a cyber security incident.	**NONE**
Critical Services Impact	· Cybercrime and ransomware are identified by the Canadian Centre for Cyber Security as major threats to critical infrastructure and all levels of government. [166] · Creston depends on digital systems for municipal services, emergency information, regional GIS and 9-1-1 civic addressing, and healthcare service delivery, potentially contributing to heightened impacts on critical services in the event of a cybersecurity incident or prolonged systems disruption. [167] · Creston maintains an on-site backup system for IT communications that performs hourly data backups and replicates data daily to a remote cloud-based server. These measures help minimize service disruption and support system restoration within approximately 24 hours following an incident. [168]	**HIGH**
Environmental Damage	· Environmental damage is unlikely to occur as a result of a cyber security incident.	**NONE**
Economic Impact	· Economic impacts could be sizeable in Creston if a cyber incident disrupted municipal payments, business operations, local commerce, tourism activity, or regional service delivery. · Prolonged outages or recovery efforts could also increase operational costs and reduce productivity for both public and private sector organizations. [165]	**HIGH**
Reputational Impact	· A cyber incident could also have a meaningful reputational impact on local institutions if residents lose confidence in the Town, regional service providers, or healthcare organizations to protect sensitive information and maintain reliable services.	**MEDIUM**
TOTAL CONSEQUENCE SCORE		**LOW**

4.2 Individual Hazard Risk: Tier 2 Hazards

Fog

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Almost Certain	Low	**Almost Certain/Low**	Almost Certain

Hazard Background

Fog forms when air near the ground cools enough for water vapor to condense into tiny droplets, reducing visibility at or near ground level. This typically occurs when the air temperature and dew point are nearly identical. [169] Creston lies in a valley bottom at a relatively low elevation (about 600 m), surrounded by higher terrain. [170] At night, cooler, heavier air sinks into the valley and becomes trapped beneath warmer air aloft, creating a temperature inversion. Moisture from the Creston Valley wetlands and the nearby Kootenay River adds ample water vapor to this trapped air. When the air cools to its dew point, fog readily forms at ground level. [171]

Hazard Likelihood

As winters in Creston continue to grow warmer, the overall likelihood of traditional radiation fog (a layer of thin fog that develops overnight under clear skies) may gradually decline, as fewer cold, clear nights will allow air to cool to the dew point. However, changes in temperature do not translate proportionally into changes in fog occurrence. Warmer air can hold more moisture and shifts toward wetter winter conditions or more frequent valley inversions could maintain, or even locally increase, episodes of low-level fog or mist. Overall, Creston may see fewer classic dense fog events, but foggy mornings are likely to persist due to changing humidity and inversion patterns. [172]

Hazard Consequences

The primary impact of fog in Creston is reduced visibility, making it difficult for drivers to see road signs, pedestrians, and other vehicles. [173] In colder conditions, freezing fog can contribute to the formation of black ice on roads, increasing the risk of vehicle collisions, injuries, fatalities, and disruptions to transportation and emergency response. [174]

Space Weather

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Very Low	**Likely/Very Low**	Likely

Hazard Background

Space weather refers to a set of physical processes that originate at the Sun and ultimately influence human activities on Earth and in space. It is commonly associated with solar flares, during which the Sun releases energy in the form of electromagnetic radiation and highly charged particles through coronal mass ejections and plasma streams. These particles and radiation interact with Earth's geomagnetic field and atmosphere, causing geomagnetic disturbances and phenomena such as auroras. [175] The Government of Canada issues current regional magnetic conditions across seven regions of Canada, including Southwestern Canada, as seen in Figure 8. The hourly level of magnetic disturbance is measured by the Khr index. [176]

Hazard Likelihood

Scientists estimate the likelihood of space weather by analyzing data from 14 magnetic observatories located across Canada. The likelihood can change rapidly, over hours or days, depending on solar emissions and interactions with Earth's magnetic field. [175] Longer-term likelihood is influenced by the Sun's approximately 11-year solar cycle, during which solar activity gradually increases to a solar maximum before declining. Higher frequencies of solar flares, coronal mass ejections, and geomagnetic storms consistently occur during solar maximum years compared with solar minimum years. [177]

At Creston's mid-latitude location in Southwestern Canada, operational impacts become increasingly likely when the regional Khr index reaches about 6-7+, which indicates stormy to major storm level activity [178]. These storms occur intermittently, with activity increasing near the solar maximum; however, the frequency with which they affect Creston varies from event to event.

Hazard Consequences

Space weather primarily affects critical services and the economy rather than posing a direct threat to life safety. Geomagnetic storms can interfere with electrical power systems by overloading or damaging equipment, potentially causing power outages. These disturbances may also reduce the accuracy and reliability of satellite navigation systems such as GPS. In addition, solar flares can disrupt radio communications by weakening or blocking certain radio signals, particularly those used for long-distance communication. [179]

Hail

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Unlikely	Low	**Unlikely/Low**	Possible

Hazard Background

Hail is a type of precipitation that forms in thunderstorms as solid ice, which can fall to the ground at speeds of up to 100 km/h or more. Its size can range from a pea to a grapefruit and can occur anywhere in Canada. [180] Severe Thunderstorm Warnings are issued for anticipated severe hail events where the hail is 25mm in diameter or greater. [181] They have been issued in the past for the Kootenays, however, there is no record of noteworthy hailstorms in Creston. [182]

Hazard Likelihood

Future projections suggest that while Creston may not see a large increase in the number of hail events, the hail that does occur could become more intense. Warmer temperatures associated with climate change increase atmospheric moisture and instability, which can strengthen the updrafts inside thunderstorms, the key factor for forming larger hailstones. [183]

Hazard Consequences

Hail can result in considerable impacts because it combines the risk of injury with damage to property and agriculture. Large hail may damage vehicles, roofs, windows, and other structures, and can cause injuries to people caught outdoors. Even smaller hailstones may damage crops such as fruit, vegetables, and grains, leading to financial losses for farmers and broader impacts on the local economy. Widespread hail damage can also disrupt businesses and public services, strain insurance and repair systems, and delay recovery following a storm event. [180]

Animal Disease

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Possible	Low	**Possible/Low**	Likely

Hazard Background

Animal diseases are illnesses that affect domestic or wild animals, caused by infectious agents such as viruses, bacteria, parasites, and prions, or by non-infectious factors like genetics, toxins, and environmental stressors. Some animal diseases are zoonotic, meaning they can spread to humans, creating additional public health risks. [184]

The Creston Valley's geography and land use increases its exposure to animal disease. The town is immediately adjacent to the Creston Valley Wildlife Management Area, which attracts large numbers of migratory waterfowl and creates a natural reservoir for avian influenza. [185] Additionally, while smaller than the Fraser Valley, Creston's livestock and poultry operations still present amplification risks. Backyard flocks are common and susceptible to wild bird transmission. [186] Cattle ranching also raises the possibility of diseases like bovine tuberculosis, which was confirmed in the broader interior in 2018. Proximity to Idaho and Montana increases risk from transboundary wildlife and livestock movement. Deer and elk migrate across borders, and trade or importation can introduce pathogens. The 2018 bovine tuberculosis case was linked to U.S. cattle strains, and chronic wasting disease's (CWD) long-standing presence in neighbouring jurisdictions likely contributed to its arrival in BC [187]

Hazard Likelihood

Animal disease outbreaks have occurred province-wide nearly every year, and the Kootenay/Creston region has experienced multiple distinct events. Highly pathogenic avian influenza (H5N1) has caused recurring outbreaks in the poultry sector since 2022, resulting in the culling of approximately 8.7 million birds across hundreds of farms. [188] In 2024, CWD was detected in the Kootenay region among deer, prompting mandatory testing and targeted culls in Cranbrook and Kimberley. [189] Other notable outbreaks include bovine tuberculosis in 2018 and epizootic hemorrhagic disease (EHD) in 2025, which killed nearly 100 deer near Grand Forks. [190]

Seasonality and environmental triggers influence the probability of specific diseases. For H5N1, risk to domestic birds, such as poultry, is typically higher during spring and fall migrations, when virus circulation in wild birds and environmental contamination increases. [191] The 2025 EHD outbreak in Grand Forks was linked to late-season warmth, and similar conditions could affect Creston. [192]

In the future, animal diseases are expected to persist and may intensify. Climate change is shifting environmental conditions in ways that favour disease transmission. Warmer temperatures and milder winters extend the season for disease vectors like biting flies and mosquitoes. At the same time, pathogens are also evolving: the H5N1 avian influenza virus has mutated over time, with the current strain causing larger outbreaks and higher mortality. [193] Even if frequency remains stable, severity may increase.

Hazard Consequences

The impacts of animal disease in Creston are expected to be more limited in scale, primarily affecting agricultural operations through livestock losses and related economic impacts. Outbreaks may also result in localized disruptions to food supply chains and agricultural activities. However, broader ecosystem impacts and widespread food security concerns are considered less likely. [190]

Plant Disease and Pest Infestation

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Low	**Likely/Low**	Likely

Hazard Background

Plant diseases include invasive pests such as insects and mites, as well as plant pathogens like fungi, bacteria, and viruses, which impact crops, forests, and urban environments. An insect pest infestation refers to a newly detected insect population, whether through an incursion or a sudden increase of an established insect, disease agent, or weed population, that causes damage to plants in production fields, forests, or natural habitats, resulting in substantial harm to productivity, biodiversity, or natural resources [194]. The Central Kootenay Invasive Species Society lists over 100 species on its priority list for Creston under the categories “prevent,” “eradicate,” or “contain,” with the goal of eradication or containment. [195]

Hazard Likelihood

Current likelihood considers the ongoing and real threat of pests and plant disease to the agricultural sector in the region. Climate change may present possibilities of pest and plant infestation, such as increase in annual temperatures and decrease in cold days that may shorten pathogen incubation periods or increase their abundance over a growing season. [196] However, the increase in future likelihood is not meaningful enough to change the likelihood rating.

Hazard Consequences

Plant disease is most harmful when it reduces crop yields and leads to long-term restrictions on land use, planting, or the movement of plants and related materials. In natural areas, plant disease can alter species composition, reduce biodiversity, and disrupt important ecological processes such as nutrient cycling and forest regeneration. [197] In agricultural and forestry settings, plant disease may result in economic impacts through reduced crop quantity and quality, increased reliance on control measures, and higher production costs. In forested areas, disease can also affect tree health, forest productivity, and long-term ecosystem resilience over time. [197] In Creston, where agriculture is part of the local economy, plant disease would primarily result in localized economic impacts to farm operations and related agricultural activities. Broader impacts to ecosystems, long-term food security, or the general economy are considered less likely.

Structure Fire

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Possible	Low	**Possible/Low**	Likely

Hazard Background

Structural or urban fires occur within residential, commercial, or industrial communities, and occur frequently across the province. Of greatest concern are fires that result in loss of life or injury, exceed the capacity of local resources to manage, or cause severe economic damage. Major urban fires can be triggered by various factors, including faulty electrical systems, improper handling of smoking materials, or deliberate acts of arson. [198]

Buildings constructed primarily of wood are generally more vulnerable to fire because wood ignites and allows fire to spread more readily than many other construction materials. However, buildings constructed from materials such as concrete or brick can also experience structural weakening or failure when exposed to high temperatures over extended periods. [199]

Hazard Likelihood

While wildfires are a growing concern in the region due to longer and more extreme fire seasons driven by climate change, structure fires present a distinct and persistent hazard within the built environment of Creston. Several areas in the surrounding region have high or extreme interface fire hazard ratings, indicating elevated risk where urban development meets forested areas. Without adequate fuel management programs, the potential for interface and forest fires increases, which can indirectly threaten structures through ember transport and evacuation pressure. [200]

Structure fires occur regularly in Creston, with 35 incidents reported in 2024 and two fire-related fatalities over the past two years. [200] Aging buildings, wood heating systems, and outdated electrical infrastructure contribute to the risk in BC. [201] Climate change is expected to intensify fire risk through hotter, drier summers and more frequent extreme weather events.

Hazard Consequences

A fire in a residential, commercial, institutional, or industrial building can produce toxic smoke, release hazardous substances into the environment, cause extensive property damage, and potentially result in injuries or fatalities. [201] Impacts are generally localized and would primarily affect individual buildings or small areas, rather than causing widespread damage. Damage to residential buildings may result in short-term displacement and the need for temporary support services. Larger or more complex incidents may place additional demand on local emergency services during response and recovery, though impacts are expected to be manageable within Creston's existing capacity. [202]

Explosions

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Medium - High	**Rare/Medium - High**	Rare

Hazard Background

Explosions can occur at any time and in a variety of locations. They may happen during motor vehicle accidents (e.g., involving transport trucks carrying explosive materials), train derailments (where rail cars contain explosive substances) or marine incidents, both in residential areas due to natural gas leaks, or in industrial facilities. Gas leaks and explosions typically occur when natural gas, gasoline, or oil pipelines rupture, often due to poor design or corrosion. They can also result from natural hazards such as earthquakes or landslides, as well as human error. [219]

FortisBC owns and operates both low-pressure and high-pressure pipelines that deliver natural gas to homes and businesses in Creston. In addition, FortisBC maintains a large gas compression facility and a main natural gas transmission line located in Kitchener, approximately 25 km east of Creston. TC Energy operates pipelines east of Creston, through the community of Yahk, which transport crude oil and refined petroleum products. [72] Other hazardous products present in Creston that pose explosion risks include diesel, methanol, petroleum crude oil, anhydrous ammonia, ammonium nitrate, liquefied petroleum gas, and styrene monomer. [220]

Hazard Likelihood

The likelihood of an explosion is difficult to determine due to the many factors that may contribute to an explosion. Explosions caused by natural hazards (landslides, earthquakes) which cause damage or injury within Creston have a lower likelihood occurrence than those caused by human error (excavation, accident, poor maintenance). However, likelihood can be reduced with regular monitoring of infrastructure used to transport explosive materials (e.g., pipelines, rail lines, transport trucks). Temperature extremes may influence the likelihood of explosions. Rising temperatures and more frequent heatwaves that are anticipated under high emission scenarios can weaken the structural integrity of infrastructure carrying explosive materials and cause the thermal expansion of explosive chemicals and materials. Additionally, severe storms, floods, and heatwaves can impact industrial processes, which could lead to incidents involving fires and explosions. [143]

Hazard Consequences

Explosions can combine a high risk of fatal injury with sudden and widespread damage. They may cause serious injuries or death, affect mental health, and result in large scale displacement of residents. Explosions can destroy buildings and infrastructure within the affected area, leading to the loss of homes, critical infrastructure, essential services, and community facilities. [221]. Recovery from major explosion events can be costly and prolonged, particularly in populated or highly developed areas. In Creston, explosions occurring along transportation corridors or near developed areas could have disproportionate impacts due to the community's size and the proximity of critical services, housing, and businesses.

Oil or Gas Pipeline Spill

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Possible	Low	**Possible/Low**	Likely

Hazard Background

Pipeline and gas spills occur when pipelines carrying gas or liquid petroleum products, valves or components rupture by accident, mechanical failure, corrosion, or from natural disasters like earthquakes or landslides. [143] To lessen the risk of human-caused accidents, BC has a system called BC 1 Call that helps locate buried pipelines at construction or excavation sites. This system is designed to limit the occurrence of accidental rupture of buried pipelines during construction or excavation activities. WorkSafe BC, Technical Safety BC, and the BC Energy Regulator require hand digging to expose buried pipelines before digging with powered excavation equipment. [225] Additionally, pipeline companies in Canada must meet federal, provincial and local requirements. The Canada Energy Regulator requires each pipeline company to have an emergency management program that includes detailed emergency procedure manuals to guide its response in an emergency. [226]

Hazard Likelihood

Several factors influence the likelihood of an oil or gas pipeline spill or release in Creston. Industrial activity, such as the CP Rail line, increases the potential for incidents involving pipelines or transported petroleum products. [37] While natural hazards are less likely than human error to trigger a spill, they remain possible, particularly in the case of landslides and earthquakes. Rising temperatures, heatwaves, floods, and extreme storm events can weaken infrastructure or damage industrial facilities, further increasing the risk of future spills or releases. Human error is the most probable cause, with excavation activities, accidents, and poor maintenance contributing to pipeline failures. [143] Both natural and human-induced factors play a role in determining the current likelihood rating of an oil and gas pipeline incident in this region.

Hazard Consequences

The most detrimental impacts of pipeline incidents are often related to environmental damage. If a pipeline ruptures or corrodes, oil or petroleum products may be released into surrounding soil or enter nearby rivers, lakes, or groundwater. This can introduce toxic substances into terrestrial and aquatic ecosystems, harm wildlife, and pose risks to human health. In agricultural areas, contamination of soil or groundwater may also affect irrigation systems, crops, and livestock. Both oil and gas pipeline incidents can also require evacuation of nearby communities.

Pipeline incidents may also result in cultural impacts for Indigenous communities. Contamination of land and water can affect areas of cultural significance, including traditional food harvesting areas, medicinal plant sites, and culturally important waterways. In addition, cleanup, remediation, and long-term monitoring efforts may be complex and costly, contributing to prolonged environmental, cultural, and economic impacts for affected communities. [227]

Motor Vehicle Incident

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Very Low	**Likely/Very Low**	Likely

Hazard Background

A motor vehicle incident is an event involving a truck, car, bus, farm vehicle, or any other motorized or person-powered vehicle that results in damage, bodily injury, or death. Motor vehicle crashes can occur anywhere and at any time, causing interruptions to transportation routes and requiring coordinated emergency response, especially when accidents involve large numbers of casualties in a single incident. [249]

Initial responders are often overwhelmed, necessitating support from multiple agencies, including Fire Services, RCMP, Public Works, and BC Ambulance. Such incidents typically occur suddenly and without warning. [221] Crashes may involve animals, cyclists, heavy vehicles, hit-and-run situations, motorcycles, and pedestrians. Passenger vehicles account for approximately 71% of road users in Creston. [247]

Hazard Likelihood

Creston's transportation network is heavily reliant on Highway 3, which serves as the primary east-west corridor through the community and connects to major regional routes and the U.S. border. Traffic data from the BC Traffic Data Program indicates an annual average daily traffic of approximately 5,000 vehicles, with seasonal fluctuations ranging from 2,000 in January to 5,000 in July. Passenger vehicles account for roughly 71% of traffic volume, while commercial vehicles and agricultural transport make up the remainder. This level of traffic density, combined with seasonal tourism and agricultural activity, creates a consistent baseline risk for motor vehicle incidents. [247]

Geography, road design, and seasonal variability all influence the likelihood of motor vehicle incidents. Highway 3 crosses mountainous terrain with curves and elevation changes, increasing accident potential during adverse weather conditions. Summer months see higher traffic volumes due to tourism and events, while winter introduces hazards such as snow and ice. Under normal conditions, the likelihood of severe multi-vehicle incidents is moderate, given the steady traffic flow and reliance on a single major corridor.

Hazard Consequences

Motor vehicle incidents can pose risks to life safety and result in property damage and associated economic costs. While collisions can lead to injuries, impacts in Creston are generally localized to the immediate area of the incident. [250] In some cases, incidents may temporarily disrupt transportation routes and require a response from emergency and medical services. However, these impacts are typically short term and manageable within existing capacity. [251]

Avalanche

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Unlikely	Low	**Unlikely/Low**	Unlikely

Hazard Background

Avalanches occur when a mass of snow breaks free from a slope and rushes downhill. They are a natural part of mountainous environments, with hundreds of thousands of avalanches occurring in Canada each year. Avalanches are closely linked to terrain, particularly steep slopes, but once in motion, they can travel across flat ground and even uphill. [203] Common avalanche triggers include heavy snowfall, rain, strong winds, or sudden warming. However, an estimated 90% of avalanche incidents are caused by human activities. In Canada, avalanches claim an average of eleven lives annually. [204] Avalanche Canada provides daily avalanche forecasts for mountain regions during wintertime; the best avalanche mitigation is to check forecasts, never travel alone, and be prepared. [204]

Hazard Likelihood

Avalanches have a low likelihood in Creston but may pose minor risk in the surrounding mountainous terrain. Creston is situated in the valley at approximately 600 meters elevation and is not directly adjacent to steep alpine slopes where large-scale avalanches typically occur. However, the Selkirk and Purcell mountain ranges surrounding the Creston Valley contain avalanche terrain, and seasonal risk exists for backcountry recreation, forestry operations, and transportation corridors such as Highway 3 east of Creston. Avalanche Canada does not include Creston in its primary forecast zones, but nearby areas such as the Kootenay Boundary and the Purcell Mountains are regularly monitored for avalanche activity. [205] While climate change may alter snowpack stability and increase freeze-thaw cycles, this is more relevant to alpine zones than to Creston's urban footprint.

Hazard Consequences

Avalanches can pose risks to life and safety, including burial, injury, or disruption to transportation routes. They may also affect access along highways or in mountainous areas, potentially impacting travel and emergency response. In more severe cases, avalanches can damage infrastructure located within their direct path. [206] However, due to Creston's valley location and surrounding terrain, which are not conducive to large scale avalanche activity, any impacts would likely be localized and limited, resulting in low overall consequences.

Land Subsidence (Sinkholes)

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Low	**Rare/Low**	Unlikely

Hazard Background

Land subsidence occurs when the ground surface sinks or collapses due to the removal or displacement of subsurface earth materials, resulting in deformation and ground movement. Subsidence can be triggered by a variety of factors, including mining of rocks, minerals, and ores; subsurface excavations; extraction of underground liquids such as water, oil, or gas; and natural processes like groundwater dissolving soluble rock or limestone. However, it primarily results from the mobilization of solids or fluids beneath the surface. [142]

Creston has no documented history of sizeable sinkholes or land subsidence, indicating that such occurrences are extremely infrequent in the area. The town lies on a glacially formed floodplain with stable, non-karst soil geology, and it lacks the soluble limestone or extensive underground mining that typically cause natural or human-induced sinkholes. [6]

Hazard Likelihood

Climate change projections suggest more extreme rainfall events which could heighten the risk of ground saturation and infrastructure washouts that trigger sinkholes. Even so, with Creston's geology and infrastructure, any future subsidence events are expected to remain infrequent.

Hazard Consequences

Subsidence can cause serious impacts. It can reduce underground water storage, create ground cracks, damage buildings and infrastructure, and increase the risk of flooding. [207] Much of the damage from subsidence occurs when the ground shifts beneath buildings, roads, and buried infrastructure such as water, wastewater, and drainage systems. This ground movement can lead to structural damage, service disruptions, and transportation interruptions. In severe cases, subsidence may require evacuation of affected areas and, in rare circumstances, can result in injury or death. [208] However, given the low underlying susceptibility described in the hazard background, any subsidence or sinkhole event in Creston would likely be limited in scale and severity, resulting in comparatively low overall consequences.

Earthquake

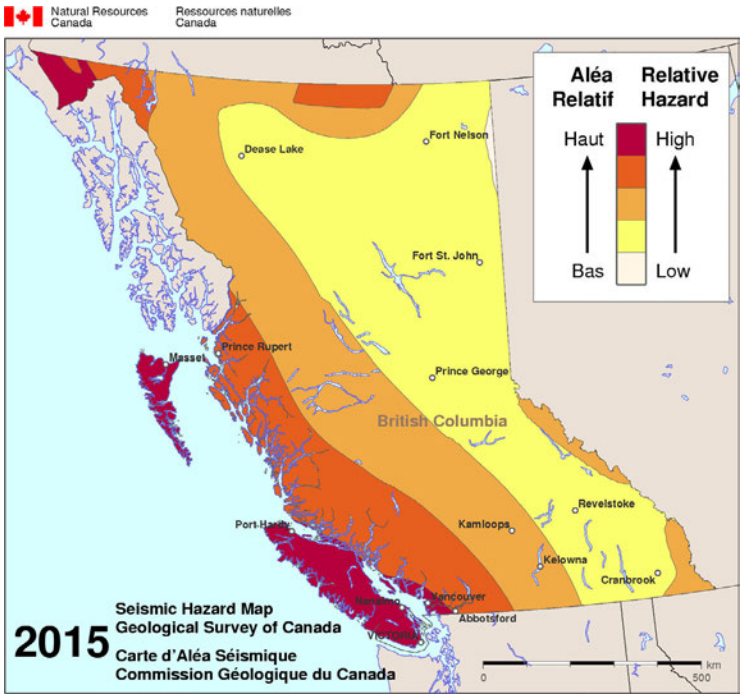
Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Unlikely	Low	**Unlikely/Low**	Unlikely

Hazard Background

Earthquakes occur when rocks fracture and slip along a fault within the Earth's crust. This sudden movement releases energy in several forms, generating seismic waves that radiate outward in all directions and cause the ground to shake. Earthquakes result from the slow deformation of the Earth's tectonic plates.

Earthquakes can also trigger numerous secondary hazards that persist over a much longer time frame than most other disasters, except for droughts and epidemics. After the initial shock, aftershocks often occur, potentially causing more damage than the original event due to weakened structures. The situation becomes even more dangerous when critical systems are disrupted—water, gas, and oil pipelines may rupture, and roads, ports, and essential infrastructure can become unusable. In such cases, repairs may take years rather than months. [209]

Western Canada experiences over 2500 earthquakes each year, as the Pacific Coast is one of the most earthquake-prone regions in Canada. However, moving inland from the coast results in lower frequency and size of earthquakes. As seen in Map 9, Creston is in an area of relatively low seismic hazard. [210]



Map 9 BC Seismic Hazard Map.
Source: Geological Survey of Canada

Historically, no major earthquakes have struck Creston or its immediate surroundings, and only minor tremors have been recorded in the area. For example, a magnitude 4.3 quake occurred near Cranbrook (about 60 km away) in February 2023, which was widely felt but caused no damage [211]. The most notable seismic events affecting the region have been distant ones: a magnitude 5.8 earthquake in western Montana in 2017 was felt in Creston and across southern BC and caused no damage locally. [212]

Hazard Likelihood

Creston is located far from British Columbia's major active fault zones (such as the Cascadia subduction zone off the coast). As a result, Natural Resources Canada classifies the Creston area's seismic hazard as "low", with less than a 2% chance of potentially damaging ground shaking in the next 50 years. [213] There are no indications this will change in the foreseeable future: climate change does not influence earthquakes, and no new human activities in the region are expected to induce seismicity. The geological conditions will remain stable, so even over the next 50 years the probability of a major earthquake remains low.

Hazard Consequences

Earthquakes have the potential to cause severe damage to buildings, infrastructure, and the environment. Consequences may include people being trapped, injured, or killed by falling debris, as well as cascading hazards such as tsunamis, landslides, and fires. Structural damage typically begins to occur during earthquakes of approximately magnitude six, while earthquakes exceeding magnitude seven can become major disasters, particularly when they occur near densely populated areas or vulnerable infrastructure. [212] However, given the absence of historically momentous seismic events in Creston and the low seismic hazard context outlined in the hazard background, earthquake impacts within the Town would likely be limited in severity and geographic extent, resulting in comparatively low overall consequences.

Seiche

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Likely	Very Low	**Likely/Very Low**	Likely

Hazard Background

A seiche is a standing wave that occurs in a fully or partially enclosed body of water when wind or rapid atmospheric-pressure changes displace the water surface, resulting in water oscillation. These oscillations produce measurable rises and falls in lake level and can persist for minutes to hours (and sometimes longer), depending on the body of water geometry and damping. Long, narrow lakes are particularly prone to seiches because their shape allows water to build momentum along their length. [233] Kootenay Lake, which stretches for more than 100 kilometres through the Kootenays, has the size and shape that can support these oscillations, meaning that under the right weather conditions, especially strong, sustained winds, seiche activity is possible. [234]

Hazard Likelihood

Because Kootenay Lake is a long, narrow, fjord-like lake between steep mountain ranges, it will remain capable of seiche events in the future. Seiche activity has been well documented in Kootenay Lake. Seiches are mainly triggered by strong winds and rapid changes in atmospheric pressure that push water to one end of the lake and then allow it to slosh back and forth, so any change in the frequency or intensity of such storms can influence seiche likelihood. Climate projections for large lakes elsewhere (for example, Lake Erie) suggest that more frequent windstorms and less winter ice under climate change may worsen seiche impacts and make them more common, highlighting storminess and ice cover as key controls. [235] Future projections for wind and storm activity carry great uncertainty, however, projections for Creston indicated a potential 10% increase in winter precipitation rates which could marginally increase the likelihood of seiche events, but not enough to increase the future likelihood rating.

Hazard Consequences

Seiches can cause rapid water level fluctuations in lakes, affecting aquatic habitats by redistributing sediments and nutrients and altering water temperature or oxygen levels. These fluctuations may also create hazardous navigation conditions. In large lake systems, seiches have been shown to disrupt boating and marine transportation, and nearby Creston, similar water level changes on Kootenay Lake could temporarily affect ferry operations and local transportation connectivity. [236]

Liquefaction

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Medium - Low	**Rare/Medium - Low**	Rare

Hazard Background

Liquefaction occurs when saturated, loose, granular soil temporarily loses its strength and behaves like a liquid due to intense earthquake shaking. During a low- to moderate-magnitude earthquake, minor liquefaction may occur in highly susceptible areas with loose, saturated soils. Larger structures built on poor foundations might experience differential settlement or tilting. In a moderate- to large-magnitude earthquake, the risk of liquefaction in susceptible areas is substantial. Potential effects include ground cracking, sand boils, and substantial settlement. Structures lacking deep foundations may tilt, settle, or even collapse. Liquefaction most commonly occurs in landforms such as marshlands, riverbanks, beaches, and floodplains. [214]

Hazard Likelihood

Creston's risk of earthquake-induced liquefaction is low, due to its location away from active fault zones with minimal historic seismic activity. However, liquefaction could occur in specific areas, especially along the Goat River and Kootenay Lake floodplains, where dikes are built on loose, saturated alluvial soils. [78] These soils are vulnerable to liquefaction, potentially destabilizing flood protection infrastructure. High groundwater levels and unconsolidated sediments increase susceptibility, but without a major earthquake, the current and future likelihood of liquefaction is unlikely. [210]

Hazard Consequences

Liquefaction may result in localized impacts such as ground settlement, tilting of buildings, damage to roads and bridges, and disruption of underground utilities including water, wastewater, and gas lines. Buildings and infrastructure may be affected in areas where soils are particularly susceptible to liquefaction during strong ground shaking. [215] In Creston, these impacts could be widespread in the event of a severe earthquake. However, given the overall hazard context and localized nature of susceptible soils, liquefaction would likely result in comparatively moderate overall consequences.

Ash Fall

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Low	**Rare/Low**	Rare

Hazard Background

Volcanic ash is produced by the fragmentation of magma and rock during a volcanic explosion. As ash is ejected, the eruption heats the surrounding air, causing ash to disperse up to thousands of kilometers from a volcano. The extent of volcanic ash dispersion depends on several factors: the height of the eruption column, the composition of magma, eruption duration, and wind and weather conditions. These multiple variables can make predicting ash dispersal difficult. In Canada, there are at least 13 volcanos with the potential for producing ash fall, and neighboring states such as Alaska, Washington, and Oregon have potential for depositing ash in Canadian territory. [216]

Hazard Likelihood

The likelihood of ash fall in Creston is rare, due to the town's distance from any active volcano and typical impact zones. Historically, only one major eruption has resulted in ash fall in Creston: the 1980 Mount St. Helens eruption. Favorable winds carried ash approximately 450 km from the volcano, depositing just 1–2 mm in the area. [217] Winter storms or strong jet stream conditions could slightly increase ash transport potential, but overall the current and future likelihood remains low.

Hazard Consequences

Ash fall can affect visibility, air quality, and agricultural activity, particularly through minor impacts to crops and livestock health. However, in Creston, any ash fall is expected to be minimal, which would limit the severity and extent of these impacts. Under light ash accumulation, effects on buildings and infrastructure would likely be minor and generally manageable. [217] Fine ash particles may also interfere with equipment, transportation, and utility systems; however, these impacts would likely be short-term and localized under low accumulation conditions. While ash may contain substances that can affect soil, water, or human health, considerable contamination or long-term disruption is unlikely at such low volumes. Cleanup requirements would therefore be minor and temporary. [218]

Mine Incident

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Low	**Rare/Low**	Rare

Hazard Background

The most common mining-related incidents include ground collapse, subsidence, fault reactivation, fissures, mine water rebound, acid mine drainage, tailings dam failure, toxic gas/dust release, and explosion risks. These incidents vary depending on the type of resource being mined and the mining method used. For example, underground coal mining is particularly prone to subsidence, landslides, fissures, and cascading hazard chains. [222]

Major multi-hazard risks associated with mining operations include ground collapse, subsidence, sinkholes, mine flooding, water contamination, toxic gas leaks, and explosion hazards. Natural events such as earthquakes and floods can amplify these risks by destabilizing mine structures and triggering secondary hazards. [222]

Hazard Likelihood

In the Creston region, historical and legacy mining activity has left behind environmental and geotechnical concerns. While Creston itself is not a major active mining hub, it is situated near several historic mining sites and tailings areas and is hydrologically connected to the Kootenay River system. [78] This means that mine-related hazards such as water pollution, acid mine drainage, and sediment transport could affect the region indirectly. Additionally, the area's mountainous terrain and proximity to fault zones increase the potential for ground movement and subsidence, especially in areas with past underground mining.

Hazard Consequences

Mine incidents can result in a range of impacts, including injury, environmental contamination, and localized damage to infrastructure. [223] While Creston does not have active mining operations, the area may be indirectly affected by historic mining activities or tailings within the broader watershed. In such cases, potential impacts could include localized contamination of land or water and associated environmental or economic effects. However, these impacts would likely be limited in extent and severity and are not expected to result in major disruption to the community. [224]

Space Debris

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Very Low	**Rare/Very Low**	Rare

Hazard Background

Space debris consists of human-made objects such as inoperative satellites, spacecraft components, rocket parts, and fragments resulting from collisions or explosions in orbit. [228] Since 1957, more than 2,500 satellites, space stations, and other objects have been launched into space, orbiting Earth at speeds exceeding 27,000 km per hour. Because of this high velocity, even small pieces of debris pose a risk to operational satellites and other space assets. Eventually, some debris re-enters Earth's atmosphere. NASA estimates that, on average, one piece of space debris falls to Earth each day; however, there have been no recorded fatalities caused by space debris. [228]

While most debris burn up upon re-entry into the atmosphere, there is a risk that certain objects, particularly those containing radioactive material, could survive and impact communities on Earth. For example, in 1978, a Soviet satellite carrying radioactive material crashed near Great Slave Lake in Canada, raising concerns about contamination and environmental hazards. [229]

Hazard Likelihood

There are no recorded incidents of space debris damage in Creston. Most re-entering objects burn up in the atmosphere, so the chance of a large fragment hitting infrastructure or people in Creston is negligible. While satellite launches are increasing, the future risk is expected to rise only slightly and remains very low overall. [230]

Hazard Consequences

While space debris does not pose a direct ground level hazard, collisions in space can disrupt satellite based services that communities rely on. [231] Loss or degradation of satellite navigation, communications, or weather monitoring systems could impair emergency response coordination, transportation, and agricultural decision making. In a smaller community such as Creston, where reliance on external communication and navigation systems is high and redundancy may be limited, these disruptions could have exacerbated operational and economic impacts. [232]

Dam and Spillway Failure

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Very Low	**Rare/Very Low**	Rare

Hazard Background

A dam breach occurs when there is a failure in the dam's structure, foundation, abutments, or spillway. Such a breach releases large, uncontrolled volumes of water from the lake or reservoir behind the dam, often very rapidly. Common causes include erosion, increased seepage, earthquakes, or flooding. Dams may be constructed from concrete, earth, steel, or timber. While most dams are human-made, beavers also build dams in nature. In Canada, dam failures are most often linked to ice-related effects, and large dams typically have an average lifespan of about 40 years. [237]

In the Creston region, Kootenay Lake levels and flood risk are strongly influenced by upstream regulation from Duncan and Libby dams. These dams altered flood dynamics by reducing the magnitude of annual peak lake levels associated with spring freshet. Although outflow at Grohman Narrows and downstream hydro dams do not regulate annual maximum lake levels, upstream dams impact flood hazard scenarios. This means that any structural failure or operational issue at these dams could amplify flood risks for Creston and surrounding areas. [45]

Hazard Likelihood

No dam failures have occurred in Creston or the Kootenay Lake region in recorded history. The area's major control structure, the Duncan Dam (built 1967) upstream, has operated for decades without incident. The Duncan dams, now approximately ~60 years old, is inspected, maintained, and upgraded to modern safety standards. [238] Key structural factors (dam integrity, foundations, spillway condition) are closely managed to prevent erosion or seepage issues. Hydrologically, even with climate change bringing more extreme spring runoff or storm events, the Duncan dam has sizeable spillway capacity and operational protocols to safely handle high inflows. [238] The region's low seismicity also makes earthquake-triggered dam failure highly improbable.

Hazard Consequences

Dam or spillway failures are typically sudden and uncontrolled events that can result in severe consequences for communities located within the immediate inundation zone, including rapid flooding, loss of life or injury, damage to homes and infrastructure, and disruption of critical services such as transportation and utilities. Failures involving large reservoirs may also cause environmental impacts downstream, including erosion, habitat loss, and water quality degradation. [239]

However, Creston is located far downstream of Duncan Dam, and the Town is well outside the primary flood inundation area associated with a potential dam or spillway failure. As a result, severe or catastrophic consequences in Creston are unlikely, and any impacts would be expected to be attenuated by distance and interim river and floodplain dynamics. Potential effects, if any, would more likely be indirect or limited in scale compared to communities closer to the dam.

Structure Failure

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Low	**Rare/Low**	Rare

Hazard Background

Structural collapse refers to the failure or severe damage of a building, bridge, or other structure and can happen at any time, and may affect bridges, highway overpasses, silos, reservoirs, tanks, and towers. It typically occurs when a structure gives way due to engineering or construction deficiencies and is often associated with events such as earthquakes or heavy snowfall. Older or poorly maintained buildings are at the greatest risk, and the concern is heightened when the structure accommodates a large number of people. [237]

Hazard Likelihood

Structural failure in Creston is considered to be highly unlikely. The town has no history of collapses, and its seismic hazard is low. Buildings are generally well maintained, and older structures are proactively closed or upgraded when risks are identified. [72] Climate change may bring heavier snow or rain events, but these are rare and unlikely to exceed design tolerances. With updated building codes and regular inspections, the risk of collapse from engineering flaws, overload, or environmental stress remains minimal.

Hazard Consequences

Building collapse can result in localized damage to structures and surrounding infrastructure, including potential impacts to utilities such as gas, electrical, water, wastewater, and communication systems. [237] Injuries may occur, and in rare cases, loss of life is possible, particularly within or immediately adjacent to the affected structure. Property damage may be considerable at the site of collapse, but impacts are expected to remain contained in a limited area. Damage to nearby infrastructure could result in short term service disruptions, though recovery is expected to be manageable given the condition of buildings in Creston and the ability to anticipate and respond to structural risks. [240]

National Security Threat

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Medium - Low	**Rare/Medium - Low**	Rare

Hazard Background

National security threats are defined as threats directed at the safety and security of Canada and Canadians. They primarily involve concerns related to counterterrorism, cybersecurity, counter-proliferation, and the protection of critical infrastructure. [221]

Hazard Likelihood

Creston has no history of politically motivated violence, terrorism, or espionage activity. It is a small, rural community with limited strategic infrastructure and low population density, making it an improbable target. While national security threats are theoretically possible anywhere, Creston's geographic and demographic profile places it well outside typical risk zones. No indicators suggest this hazard is increasing, and it remains a minimal concern.

Hazard Consequences

National security threats may disrupt critical infrastructure and essential services, with potential impacts on public safety, economic stability, and public trust. Public Safety Canada notes that such disruptions can result in loss of life, adverse economic effects, and substantial harm to public confidence and trust in government. [241]

Public Disturbance

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Medium - Low	**Rare/Medium - Low**	Rare

Hazard Background

A public disturbance is defined as “an act or interruption that interferes with the operation of society and the ability of people to function efficiently” [221]. Examples include riots and demonstrations. [221]

Hazard Likelihood

Public disturbance is considered a low-likelihood hazard in Creston. The town has a history of peaceful civic life, with no notable incidents of riots, mass unrest, or politically charged gatherings turning disruptive. Its small population and rural setting reduce the probability of large-scale demonstrations or unrest. While isolated disputes or minor disruptions can occur anywhere, they are typically resolved quickly and without escalation. Overall, public disturbance poses minimal risk to community safety or infrastructure and is of a low likelihood of occurrence.

Hazard Consequences

Public disturbance becomes most consequential when it extends beyond a policing issue to disrupt local businesses, municipal services, or community operations. In smaller communities like Creston, public disturbances can have outsized reputational impacts if response actions are seen as ineffective or inconsistent. Disruptions to businesses or services, combined with negative public perception, can erode trust in local leadership and governance. [221]

Major Planned Event

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Possible	Very Low	**Possible/Very Low**	Possible

Hazard Background

A Major Planned Event (MPE) is any planned event whose nature, expected attendance level, duration, or location challenges the normal response capability of a community and requires special planning by one or more agencies to reduce the impact on public health and safety. [242] What qualifies as an MPE depends on the size of the location where the event is held and the number of people attending. Creston requires a special event permit for events with an anticipated attendance of more than 500 people. [243]

Hazard Likelihood

Creston hosts several major planned events annually, primarily between May and September, which is also the community's peak tourism and outdoor activity season. [244] These events increase the temporary population within the community and can place additional demands on emergency and protective services. While specific attendance figures are often unavailable, anecdotal evidence and committee reporting indicate that attendance for some events has increased in recent years. [245] The regional draw of these events increases vehicular traffic and pedestrian activity, particularly along Highway 3 and within Creston. As a result, the likelihood of incidents requiring coordinated response is considered to be higher during MPEs compared to baseline conditions.

There are several major planned events in Creston that occur annually:

- The Blossom Festival: takes place every Victoria Day Weekend over four days, unknown attendance.
- Creston Valley Fall Fair: Creston Flats Stables, held annually on the first weekend of September. Unknown attendance numbers, but it was noted in the 2024 Creston Valley Services Committee Open Meeting 2025 that attendance and participation of the Fall Fair has increased over previous years [245].
- Canada Day: Creston & District Community Complex; Canyon Park; Yahk-Kingsgate Community Hall. Held annually on July 1st. Unknown attendance numbers.
- Creston Valley Bird Festival: held in early May throughout Creston, unknown attendance.

Hazard Consequences

Because MPEs are highly visible, the effectiveness of planning, response, and communication can also influence public confidence in local government, with poorly managed incidents potentially resulting in reputational impacts. [246]

Aircraft Incident

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Low	**Rare/Low**	Rare

Hazard Background

An aircraft incident includes any incident involving one or more aircraft that results in damage, bodily injury, or death. Most crashes occur near airports, but they can also occur anywhere across Creston [221]. Several airports are in or near the vicinity of Creston: Creston Valley Regional Airport, Canadian Rockies International Airport, West Kootenay Regional Airport, and Trail Regional Airport. [247]

Hazard Likelihood

Though the likelihood of an aircraft incident is low for Creston, there is a possibility of an incident at the local civilian airport, Creston Valley Regional Airport. Given the airport's size and the nature of its operations, the likelihood of a major aircraft disaster (such as a large commercial airliner crash) is low. However, the probability of smaller-scale incidents, such as accidents involving light aircraft, charter planes, or remotely piloted systems, is moderate, primarily due to regular use for emergency services and private aviation. Seasonal factors, such as wildfire response periods, may temporarily increase aviation traffic and associated risk. [37]

Hazard Consequences

Aircraft incidents can result in injuries or fatalities to occupants and, in rare cases, people on the ground. Impacts may include localized damage to nearby property, infrastructure, or agricultural land, as well as temporary disruption to transportation routes or emergency services in the surrounding area. [221] However, given the limited scale of potential impacts of an aircraft incident in Creston, effects would likely remain contained and not result in widespread or severe disruption to the community.

Marine Vessel Incident

Current Likelihood	Consequence Score	Risk Level	Future Likelihood
Rare	Low	**Rare/Low**	Rare

Hazard Background

Marine vessel incidents involve an incident with a boat or ship that results in damage, bodily injury or death. The Transportation Safety Board of Canada investigates all marine transportation incidents. [221]

While Creston does not have major commercial marine infrastructure, the Kootenay Lake ferry represents a critical transportation link for residents, including those who rely on it to commute to work, access services, or move goods. [248] Small scale marine activity also occurs on the Kootenay River and Goat River, primarily for recreation, agricultural access, and emergency operations during flood events. As a result, marine vessel incidents in the area have the potential to disrupt ferry operations and local mobility, with associated economic and service implications for the community. [45]

Hazard Likelihood

Although climate projections suggest a declining trend in peak flows and lake levels over time, short-term variability and extreme precipitation events still pose risks for localized flooding and strong currents. These conditions can create hazardous navigation environments for small vessels during freshet or flood response operations.

Hazard Consequences

Marine vessel incidents can result in injuries or fatalities and damage to vessels or shoreline property. [221] In the context of Kootenay Lake, incidents that disrupt ferry operations may also affect residents who rely on the ferry for commuting to work, accessing services, or transporting goods, resulting in short term economic and service disruptions. [248]

Appendix A: Definitions

Business Continuity Plan (BCP)	A plan that allows an organization or service to maintain or quickly resume essential functions during disruption.
Canadian Index of Social Vulnerability (CISV)	A Statistics Canada index that measures relative social vulnerability at the dissemination area level using census data.
Cascading Hazard / Cascading Impact	A situation where one hazard or failure triggers another impact, such as a lightning strike causing a wildfire.
Climate Change	Long-term changes in temperature, precipitation, and weather patterns, largely driven by human activities such as greenhouse gas emissions.
Climate Projection	An estimate of future climate conditions based on climate models and emissions scenarios.
Climate Risk Driver	A climate-related factor (e.g., rising temperatures, changing precipitation) that influences the likelihood or severity of hazards.
Climate Variability	Short-term fluctuations in climate patterns occurring over seasons or years, distinct from long-term climate change.
CMIP5/CMIP6	Phases of the Coupled Model Intercomparison Project that provide standardized climate model simulations used internationally for climate research and projections.
Consequence	The potential impacts of a hazard, including effects on life and health, displacement, critical services, the environment, the economy, and community well-being.
Critical Infrastructure	Systems and assets essential to the health, safety, security, and economic well-being of the community, including transportation, utilities, health services, communications, and emergency services.
Critical Services	Essential services required to maintain public safety and community functioning, such as water, wastewater, power, healthcare, emergency response, and transportation.
Development Permit Area (DPA)	A designated area where special development conditions apply due to environmental, hazard, or community considerations.

Dimensions (CISV)	Grouped sets of social and economic indicators used to calculate social vulnerability scores within the CISV.
Dissemination Area (DA)	The smallest standard geographic unit used by Statistics Canada for publishing census data, typically containing 400–700 people.
Emergency Management	The organized approach to mitigating, preparing for, responding to, and recovering from emergencies and disasters.
Emergency Operations Centre	A coordination centre that supports site-level response, resource management, public information, and policy direction during emergencies.
Emergency Support Services	Short-term support, such as food, lodging, clothing, registration, and family reunification, for people affected by emergencies.
Flood Construction Level (FCL)	The minimum elevation required for building construction to reduce flood risk.
Geographic Information System (GIS)	A system for mapping and analyzing geographic data to support planning and risk assessment.
Hazard	A circumstance, condition, process, phenomenon, activity or thing, whether natural or human-caused, that may give rise to an emergency.
Hazard, Risk, and Vulnerability Assessment (HRVA)	A structured assessment used to identify hazards, assess risk, and understand vulnerabilities to inform emergency management planning.
Indigenous Governing Body (IGB)	An Indigenous government or authority with governance responsibilities relevant to emergency management and community planning.
Intensity- Duration-Frequency (IDF) Curves	Engineering tools that describe the relationship between rainfall intensity, duration, and frequency, used to design stormwater and flood infrastructure.
Intergovernmental Panel on Climate Change (IPCC)	A United Nations body that assesses and synthesizes global scientific research on climate change to inform policy, planning, and risk management.
Likelihood	The estimated probability that a hazard will occur within a specified time period, based on historical data, scientific evidence, and professional judgment.

Mutual Aid Agreement	A formal agreement between organizations or jurisdictions to share resources and assistance during emergencies.
Official Community Plan (OCP)	A statutory land-use planning document that guides growth and development within a municipality.
Redundancy	The presence of backup systems or alternate resources that allow services to continue if primary systems fail.
Representative Concentration Pathway (RCP)	A greenhouse gas concentration scenario used in climate modelling to represent possible future emissions trajectories (e.g., RCP4.5).
Risk	The combination of the likelihood of a hazard occurring and the severity of its consequences.
Service Interruption	A temporary or prolonged loss or degradation of a critical service due to a hazard event.
Social Vulnerability	The degree to which social factors such as age, income, health, housing, and access to services affect a population's ability to prepare for, respond to, and recover from hazards.
Vulnerability	The characteristics and circumstances of a community, system, or population that make it more susceptible to the impacts of hazards, including social, economic, physical, environmental, and institutional factors.
Wildland Urban Interface (WUI)	Areas where buildings and infrastructure are located adjacent to or intermixed with forested or vegetated lands, increasing wildfire risk.
Zoonotic Disease	A disease that can be transmitted between animals and humans.

Appendix B: Likelihood Scoring Rubric

The following table outlines the criteria used to score likelihood for all hazards.

Likelihood	Criteria
Almost Certain	Event has a greater than 50% chance of occurring in any given year (may occur multiple times within a short period; on average occurs about once every 2 years or more frequently).
Likely	Event has a 10% to 50% chance of occurring in any given year (on average occurs about once every 3 to 10 years).
Possible	Event has a 2% to 10% chance of occurring in any given year (on average occurs about once every 11 to 50 years).
Unlikely	Event has a 1% to 2% chance of occurring in any given year (on average occurs about once every 51 to 100 years).
Rare	Event has less than a 1% chance of occurring in any given year (on average occurs less frequently than once every 100 years).

Appendix C: Consequence Category Definitions

The following table includes definitions for each of the 11 consequence categories, as defined by the Government of BC.

Consequence Category	Definition
Fatalities	Potential number of people killed as a result of the hazard.
Injuries, Disease, or Hospitalization	Potential number of people injured or ill because of the hazard.
Displacement	Disruption to regular living situations, requiring people to either leave their home or be confined to their home without access to regular services. This includes short-term evacuation orders, self-evacuation, shelter-in-place as well as long term or permanent relocation of individuals, families or communities.
Psychosocial Impact	Impacts to the emotional and social well-being of an individual, family group and/or community.
Support Services Impact	Loss of accessibility to support services provided by community organizations that contribute to the wellbeing of community members.
Cultural Impact	Loss of cultural heritage and/or identity. May include loss of works, objects, places, practices, and ecology that are directly associated with an important aspect or aspects of human history and culture.
Property Damage	The direct negative consequences of a hazard on buildings, structures and other forms of property, such as crops and livestock.
Critical Services Impact	Disruption to the delivery of critical services, including the delivery of water, deployment of first responders, and other critical services that impact the health, safety, security or economic well-being of community members and the effective functioning of government.
Environmental Damage	The negative consequences of a hazard on the environment, including the soil, water, air and/or plants and animals.
Economic Impact	Disruption or loss of ability for individuals, businesses and governments to generate income. This includes interruptions to the consumption, production, and trade of goods and services.
Reputational Impact	A negative change in the perception of the government or organization, in the minds of the community, its partners and others who are vital to its success. This can result in socioeconomic damage or disruption such as loss of community or partners trust and an increase in negative media attention.

Appendix D: Consequence Ranking Definitions

The following table contains a matrix and definitions for ranking consequences across the 11 Consequence Categories. Based on this matrix for each hazard, a score is given for level of consequence for each category: None = 0, Low = 1, Medium= 2, High = 3, and Extreme = 4. This table was taken from the BC Government.

Rank	None (0)	Low (1)	Medium (2)	High (3)	Extreme (4)
Fatalities	No directly related fatalities.	Loss of life that is manageable within the scope of normal operations.	Loss of life that is beyond the scope of normal operations and may require overtime and/or additional resources, and/or the activation of response systems and emergency plans.	Loss of life severe enough for mass fatality procedures to be activated.	Fatalities exceed the capacity of existing plans and capabilities. Provincial, Federal, and International resources may be required.
Injury/Illness	No directly related illness or injury.	Illness or injury that is manageable within the scope of normal operations.	Illness or injury that is beyond the scope of normal operations and may require additional capacity and/ or resources, and/or the activation of response systems and emergency plans.	Extensive mass illness or injury requiring extra capacity and/or resources across multiple facilities in a health region and potentially specialized care from other health regions. Health authority response systems and emergency plans activated.	Extraordinary mass illness or injury. Provincial, Federal, and International resources may be required. Multiple health region response systems are active.
Displacement	No evacuation orders or self-evacuation.	Low percentage of the population evacuated, self-evacuated, or sheltering in place. Supports are provided within community.	Enough of the population is evacuated, self-evacuated, or sheltering in place to require external supports to be brought in.	10-30% of the population is evacuated or displaced, requiring external supports extending beyond regional emergency support services.	High percentage of residents are displaced for years or permanently, requiring external supports across multiple sectors.
Psychosocial Impact	Event is unlikely to result in any short- or long-term trauma.	Direct impacts to a few individuals. Psychosocial impacts can be primarily addressed by Psychological First Aid. Additional supports to those directly impacted and their families can be provided by local mental health professionals.	Localized loss of property and/or fatalities or serious injuries. Those directly impacted are likely to experience both short- and long-term psychosocial impacts. Local and outside mental health professionals will be needed to provide support and treatment.	Wide-spread loss of property and/or multiple fatalities or persons with serious injuries. Those directly impacted are likely to experience both short- and long-term psychosocial impacts. Local and outside mental health professionals will be needed to provide support and treatment.	Widespread and long-term psychosocial impacts beyond those who are directly affected by property loss or fatalities. Extensive external supports required.

Support Services Impact	Not likely to disrupt support services.	Low percentage of the population impacted by few support service disruptions. Disruptions last hours to days.	Either a high % of the population impacted by a few support services OR a low % of the population impacted by a major or multiple support service disruptions.	High % of the population impacted by a major or multiple support service disruptions.	High percentage of the population is impacted by long-term support service disruption.
Cultural Impact	Little to no impact.	Recovery from cultural impacts will take days to weeks.	Recovery from cultural impacts will take months.	Recovery from cultural impacts will take years.	Recovery from cultural impacts will not be possible; destruction is permanent and irreversible (i.e. Destruction of irreplaceable knowledge or artifacts).
Property Damage	Not likely to result in property damage.	Minor, mostly non-structural damage.	Localized, but significant structural damage.	Widespread structural damage across multiple areas. Repair may take months to years.	Widespread irreparable damage.
Critical Services Impact	Not likely to impact the ability to deliver critical services.	Disruption of up to 3 hours in the ability to deliver critical services.	Disruption of 3-24 hours in the ability to deliver critical services.	Disruption of 24-72 hours in the ability to deliver critical services.	Disruption of more than 72 hours in the ability to deliver critical services.
Environmental Damage	Not likely to result in environmental damage.	Localized and reversible damage. Hours to days-long clean-up possible.	Full clean up possible, but may take weeks.	Major but reversible damage. Full clean up difficult and could take months or years.	Severe or irreversible damage. Full clean up not possible or could take decades.
Economic Impact	Not likely to disrupt business or financial activities.	Days-long disruptions to few businesses, financial activities, or livelihoods.	Weeks-long losses to businesses, industry, or livelihoods.	Months-long losses to business, industry, or livelihoods	Widespread or long-term loss of businesses, industry, or livelihoods.
Reputational Impact	Not likely to result in political or reputational impacts.	Limited or short-term political or reputational impacts.	Some significant or long-term political or reputational impacts.	Significant and long term political or reputational impacts.	Significant and irreparable political or reputational impacts

Appendix E: Consequence Scoring and Ranking

This appendix presents the detailed consequence scoring for each hazard, providing the evidence base behind the risk rankings. For each hazard, a score is given for level of consequence for each category: None = 0, Low = 1, Medium = 2, High = 3, and Extreme = 4. Total Consequence Scores are developed by adding these scores across the 11 consequence categories for each hazard. Total Consequence Scores are ranked as follows:

Very Low	Low	Medium-Low	Medium-High	High	Very High
(0-6)	(7-14)	(15-21)	(22-29)	(30-37)	(38-44)

The following table outlines the Consequence Scores across all Consequence Categories and Total Consequence Ranking for each hazard.

	Fatalities	Injury/ Illness	Displacement	Psychosocial Impact	Support Services Impact	Cultural Impact	Property Damage	Critical Services Impact	Environmental Impact	Economic Impact	Reputational Impact	Total Consequence Score (/44)	**Total Consequence Ranking**
Tier 1 Hazards													
Air Quality	1	2	0	1	2	1	0	2	1	2	1	13	**Low**
Extreme Heat	2	2	1	2	2	2	2	3	3	3	2	23	**Medium - High**
Extreme Cold	1	1	1	1	2	2	2	2	1	3	2	17	**Medium - Low**
Freezing Rain or Drizzle	0	1	0	0	1	0	2	2	1	2	0	10	**Low**
High Wind Event	0	1	1	1	2	1	2	4	1	1	1	15	**Medium - Low**
Lightning	0	0	0	0	0	1	1	1	0	0	0	3	**Very Low**
Snowstorms and Blizzards	1	1	1	2	1	1	1	3	1	1	1	14	**Low**
Tornado	1	2	1	2	1	1	3	2	1	2	1	17	**Medium - Low**
Human Disease	3	3	0	3	3	3	0	3	0	3	3	24	**Medium - High**
Public Health Crisis	0	0	0	2	2	1	0	2	0	2	3	14	**Low**
Wildfire	1	2	3	3	3	3	3	4	3	3	3	30	**High**
Landslide / Debris Flow	1	1	1	1	1	1	2	2	2	2	1	16	**Medium - Low**
Hazardous Materials Spill	1	2	1	2	1	1	2	3	2	3	2	20	**Medium - Low**
Drought	0	1	1	2	2	3	3	3	4	3	3	25	**Medium - High**
Lake, River, and Stream Flooding	1	1	1	2	2	2	2	3	2	2	2	20	**Medium - Low**
Stormwater Flooding	0	1	1	2	1	1	2	3	1	2	2	16	**Medium - Low**
Flash Flooding	1	1	1	2	1	1	2	2	2	2	2	17	**Medium - Low**
Dike Failure	1	2	2	2	2	1	3	3	2	3	2	23	**Medium - High**
Electrical Outage	1	1	1	1	1	0	0	4	2	2	1	14	**Low**

Food Source Interruption	1	2	0	2	3	1	0	0	0	2	1	12	**Low**
Tele-communications Interruption	1	1	0	2	3	1	0	3	0	2	2	15	**Medium - Low**
Transportation Route Interruption	1	2	0	1	2	1	0	4	0	3	1	15	**Medium - Low**
Wastewater Interruption	0	2	1	2	2	1	2	4	3	2	3	22	**Medium - High**
Water Service Interruption	0	1	0	1	2	1	0	4	1	3	1	15	**Medium - Low**
Fuel Source Interruption	1	1	0	1	2	1	0	4	0	3	1	12	**Low**
Cyber Security Threat	0	0	0	1	2	1	0	3	0	3	2	12	**Low**
Rail Incident	3	3	3	4	4	3	3	4	3	4	3	35	**High**
Tier 2 Hazards													
Fog	0	1	0	0	0	0	0	0	0	0	0	1	**Very Low**
Space Weather	0	0	0	0	0	0	0	1	1	0	0	2	**Very Low**
Hail	0	0	0	0	0	0	3	1	0	3	0	7	**Low**
Animal Disease	0	1	0	0	0	0	2	0	2	3	0	8	**Low**
Plant Disease and Pest Infestation	0	0	0	0	0	2	2	0	2	3	0	9	**Low**
Structure Fire	1	1	0	0	2	0	3	1	0	0	0	8	**Low**
Avalanche	1	1	0	0	0	0	2	2	0	2	0	8	**Low**
Land Subsidence	1	1	1	1	1	0	2	2	0	1	0	10	**Low**
Earthquake	1	1	1	1	1	0	2	2	0	2	0	11	**Low**
Liquefaction	1	1	1	3	2	1	4	3	0	2	0	18	**Medium - Low**
Ash Fall	1	1	1	1	1	0	2	3	1	2	0	13	**Low**
Explosions	2	2	1	3	2	1	3	3	1	4	2	24	**Medium - High**
Mine Incident	1	1	0	1	0	0	0	0	3	3	0	9	**Low**
Oil or Gas Pipeline Spill	0	0	0	0	0	4	0	0	4	3	0	11	**Low**
Space Debris	0	0	0	0	0	0	0	2	0	2	0	4	**Very Low**
Seiche	0	0	0	0	0	0	0	0	0	1	0	1	**Very Low**
Dam and Spillways Failure	0	0	0	1	0	0	0	0	1	0	0	2	**Very Low**
Structure Failure	0	1	1	1	0	0	3	2	2	2	1	13	**Low**
National Security Threat	2	2	0	3	0	0	0	3	0	2	3	15	**Medium - Low**

Public Disturbance	0	0	0	0	0	0	0	1	0	0	3	4	**Very Low**
Major Planned Event	0	0	0	0	1	0	0	0	0	0	2	3	**Very Low**
Aircraft Incident	1	1	0	0	0	0	1	1	1	1	0	6	**Very Low**
Marine Vessel Incident	1	1	0	1	1	1	0	1	1	2	0	9	**Very Low**
Motor Vehicle Incident	1	1	0	0	1	0	1	1	0	0	0	5	**Very Low**

Appendix F: Risk Matrices

This appendix provides a risk matrix for both current and future likelihood, combining likelihood and consequence scores. It is a critical tool for determining overall risk levels and prioritizing hazards for action.

Current Risk (Based on Current Likelihood)

Current Likelihood						
Almost Certain (Every 2 years or more)	Fog Lightning					
Likely (Every 3-10 years)	Space Weather Seiche Motor Vehicle Incident	Air Quality Freezing Rain or Drizzle Public Health Crisis Electrical Outage Plant Disease	High Wind Event Stormwater Flooding Flash Flooding Lake, River, and Stream Flooding Telecommunications Interruption	Drought Extreme Heat	Wildfire	
Possible (Every 11-50 years)	Major Planned Event	Snowstorms and Blizzards Animal Disease Structure Fire Oil or Gas Pipeline Spill	Landslide/Debris Flow Transportation Route Interruption Hazardous Materials Spill	Human Disease		
Unlikely (Every 51-100 years)		Hail Avalanche Earthquake	Extreme Cold		Rail Incident	
Rare (Less than every 100 years)	Space Debris Dam and Spillways Failure Public Disturbance Aircraft Incident	Food Source Interruption Fuel Source Interruption Cyber Security Threat Ash Fall Land Subsidence Mine Incident Structure Failure Marine Vessel Incident	Tornado Liquefaction National Security Threat Water Service Interruption	Explosions Wastewater Interruption Dike Failure		
	Very Low (0-6)	**Low** (7-14)	**Medium-Low** (15-21)	**Medium-High** (22-29)	**High** (30-37)	**Very High** (38-44)
	Consequences					

Future Risk (Based on Future Likelihood)

Future Likelihood	Very Low (0-6)	Low (7-14)	Medium-Low (15-21)	Medium-High (22-29)	High (30-37)	Very High (38-44)
Almost Certain (Every 2 years or more)	Fog Lightning	Air Quality Public Health Crisis	Stormwater Flooding Lake, River, and Stream Flooding	Extreme Heat Drought		
Likely (Every 3-10 years)	Space Weather Seiche Motor Vehicle Incident	Freezing Rain or Drizzle Electrical Outage Animal Disease Plant Disease Structure Fire Oil or Gas Pipeline Spill	High Wind Event Landslide/Debris Flow Hazardous Materials Spill Flash Flooding Telecommunications Interruption Transportation Route Interruption	Human Disease	Wildfire Wastewater Interruption	
Possible (Every 11-50 years)	Major Planned Event	Hail				Rail Incident
Unlikely (Every 51-100 years)	Avalanche Land Subsidence	Snowstorms and Blizzards Water Service Interruption Cyber Security Threat			Dike Failure	
Rare (Less than every 100 years)	Space Debris Dam and Spillways Failure Public Disturbance Aircraft Incident	Fuel Source Interruption Ash Fall Mine Incident Structure Failure Marine Vessel Incident	Tornado Extreme Cold Food Source Interruption Liquefaction National Security Threat	Explosions		

Consequences

Appendix G: Climate Data and Projections

This appendix presents climate data and projections relevant to Creston used in the analysis of hazards. It is important for understanding how changing climate conditions may influence hazard frequency, severity, and future risk.

RCP4.5		1976 to 2005	2021 to 2050			2051 to 2080			2021 to 2050	2051 to 2080
Variable	Period	Mean	10 %ile	Mean	90 %ile	10 %ile	Mean	90 %ile	Change	Change
Max 1-day Precipitation (mm)	Annual	**24.1**	24	**25.8**	27.1	24	**26.1**	28	7.1%	8.3%
Max 3-day Precipitation (mm)	Annual	**34.9**	34.6	**36.9**	39.1	35	**38.2**	42	5.7%	9.5%
Precipitation (mm)	Annual	**610.0**	502	**641**	792	500	**647**	806	5.1%	6.1%
Precipitation (mm)	Spring	**135**	92	**147**	207	94	**149**	212	8.9%	10.4%
Precipitation (mm)	Summer	**124**	54	**122**	199	53	**119**	191	-1.6%	-4.0%
Precipitation (mm)	Fall	**150**	94	**159**	223	93	**161**	234	6.0%	7.3%
Precipitation (mm)	Winter	**201**	133	**214**	300	137	**221**	307	6.5%	10.0%
Mean Temperature (°C)	Annual	**8.3**	8.5	**9.5**	10.6	9.4	**10.7**	12.1	1.2	2.4
Mean Temperature (°C)	Spring	**7.9**	7.7	**9.8**	11.8	8.8	**10.7**	12.7	1.9	2.8
Mean Temperature (°C)	Summer	**18.2**	18.5	**20.1**	21.8	19.2	**21.2**	23.2	1.9	3
Mean Temperature (°C)	Fall	**7.7**	7.7	**9.3**	10.6	8.5	**10.1**	11.8	1.6	2.4
Mean Temperature (°C)	Winter	**-2**	-2.7	**-0.4**	1.7	-1.6	**0.7**	2.8	1.6	2.7
Tropical Nights	Annual	**0**	0	**0**	0	2	**2**	6	0	2
Very hot days (+30°C)	Annual	**22**	20	**36**	55	23	**37**	61	14	15
Cold days (-15°C)	Annual	**5.1**	1	**0.2**	0.3	0	**1.5**	2.4	-4.9	-3.6
Date of Last Spring Frost	Annual	**Apr. 19**	Feb. 27	**Mar. 29**	Apr. 28	Feb. 12	**Mar. 18**	Apr. 21	-21.0 days	-32.0 days
Date of First Fall Frost	Annual	**Oct. 8**	Sep. 28	**Oct. 20**	Nov. 11	Oct. 5	**Oct. 29**	Nov. 29	+12.0 days	+21.0 days
Frost-Free Season (days)	Annual	**169**	165	**202**	239	180	**222**	264	33	53

Appendix H: Critical Infrastructure Inventory

Creston-Owned Critical Infrastructure

Public Buildings
Municipal Office Building – Town Hall
Town Hall Backup Generator
Creston Emergency Services Building
Creston Emergency Services Building Backup Generator
Public Works Yard
RCMP Police Station
Water
Well No. 2
Well No. 3
Crawford Hill Reservoir + High Zone Reservoir
Schikurski Park Reservoir + Helen St. Reservoir
Schikurski Booster Pump Station
Water Mains
Fire Hydrant Network
Backup Water Power Generation
SCADA
Chlorine Injection Systems (2 locations)
Wastewater
Sewer Mains
Wastewater Treatment Plant
Wastewater Treatment Plant Backup Generator
Collis St. Lift Station

Non Town-Owned Critical Infrastructure

Public Buildings	Owner
Creston Valley Public Library	RDCK; Creston
Creston Valley Hospital	BC Interior Health
Creston & District Community Complex	RDCK
Water	**Owner**
Arrow Creek Water Treatment Plant	RDCK
Water Supply (Regional)	RDCK
Energy & Utilities	**Owner**
Powerlines and poles	BC Hydro
Hydro Substations	BC Hydro
Natural Gas Lines	FortisBC
Compressor Stations	FortisBC
Gasoline / Diesel Storage and Retail	PetroCanada, Centrex, Esso
CNG / LNG Storage	FortisBC

Appendix I: Social Vulnerability

Background on the CISV Index

The CISV dataset, produced by Statistics Canada using 2021 Census information, provides a Canada-wide measure of relative community vulnerability at the Census dissemination area (DA) level. [8][1] The dataset summarizes multiple community characteristics into an overall social vulnerability score for each DA.[2] The overall vulnerability score is determined based on four characteristic categories, known as dimensions. The dataset further identifies the most vulnerable dimension to provide an understanding of which characteristics are driving the overall vulnerability score. [8]

Dimensions of the CISV

Dimension 1	Dimension 2	Dimension 3	Dimension 4
• Radicalized identity • Housing deemed not acceptable • Recent immigrants • No knowledge of official languages • Relatively more remote [I] • Dwellings with five or more stories • Unemployed • Relatively lower median value of dwellings [II]	• Government pension • Not in labour forces • Older adults living alone • More difficulties with activities of daily living because of physical problems • Women • Low income	• No high school diploma (or equivalent) • One-parent families with more than three children • Employment insurance recipients • Relatively more remote • Unemployed • Low income • Social assistance	• More difficulties with activities of daily living because of psychological problems • Recent movers • Social assistances • Relatively lower median values of dwellings • Relatively lower median household income • More difficulties with activities of daily living because of physical problems • Dwellings with five or more stories • Low income • Housing deemed not acceptable • No knowledge of official languages [III]

This indicator was negatively associated with Dimension 1, such that being relatively more remote contributed to lower social vulnerability in this dimension.

This indicator was negatively associated with Dimension 1, such that a relatively lower median value of dwelling contributed to lower social vulnerability in this dimension.

This indicator was negatively associated with Dimension 4, such that having no knowledge of either official language contributed to lower social vulnerability in this dimension

Notes: The dimensions are ordered such that the dimension on the left explains the highest percentage of variance of the data and the dimension on the right explains the lowest percentage. Similarly, the indicators below each dimension are ordered such that the first indicator explains the highest percentage of the variance in the dimension and the last indicator explains the lowest percentage. Indicators contribute to higher social vulnerability unless otherwise specified. Certain indicators contributed to more than one dimension.

Source: 2021 Canada Index of Social Vulnerability, based on 2021 Census population long-from questionnaire.

1 "A dissemination area (DA) is a small, relatively stable geographic unit composed of one or more adjacent dissemination blocks with an average population of 400 to 700 persons based on data from the previous Census of Population Program. It is the smallest standard geographic area for which all census data are disseminated. DAs cover all the territory of Canada".
2"For ease of use, CISV quintiles were also derived by ordering CISV scores from smallest to largest and then dividing them into five equally sized groups, or quintiles. Quintiles are categorized from 1 to 5. A value of 5 corresponds to the DAs that were the most vulnerable, and a value of 1 corresponds to the DAs that were the least vulnerable."

Limitations of the CISV Index

The CISV is based on census information that describes neighbourhoods rather than the experiences of individual people. This means that even in areas that appear less vulnerable, some residents may still face challenges. The index uses common social and economic characteristics to help understand where communities may be more affected by emergencies or disasters. These characteristics do not inherently cause vulnerability on their own, but they are linked to broader social conditions that can influence the degree to which people are impacted. The CISV focuses on social factors and does not include information about infrastructure such as emergency services, transportation, or utilities, which are considered elsewhere in the HRVA. Because the data comes from the national census, it reflects conditions at a specific point in time and may not capture recent changes or sudden events. Additionally, the CISV is produced and scaled at a national level and designed to help provide comparison on vulnerability across the country. Because of this, some local level details may not be prevalent within the results. Despite these limitations, the CISV provides a useful and consistent way to compare communities and better understand where extra support may be needed during and after hazard events.

Appendix J: Existing Risk Reduction Measures

Overview of Emergency Management Organization

Creston's Emergency Management Organization is governed by the Emergency Management Program Bylaw No. 1960 (2022) and the Disaster Response Plan (2023), which together facilitate mitigation, preparedness, response, and recovery for the municipality. The Town operates a centralized Emergency Operations Centre (EOC) which is supported by trained volunteers and mutual aid agreements.

Fire and emergency services are provided by Creston Fire Rescue, which also houses the Fire Department Operations Centre (FDOC) and coordinates with the EOC during major incidents. All policing is provided by the RCMP, which collaborates on evacuation, traffic control, and security operations. The Town maintains a comprehensive emergency preparedness framework aligned with BC Emergency Management System (BCEMS) principles and supported by quarterly planning committee reviews and interagency coordination. [71]

Emergency Management Team: Emergency management in Creston is coordinated through the Emergency Operations Centre (EOC), which serves as the central hub for response and coordination. Responsibility for emergency planning and implementation is distributed across municipal departments and led by the EOC Management Team, Emergency Management Coordinator, and municipal leadership. [37]

Emergency Operations Centre (EOC): The EOC is a centralized facility activated during emergencies to coordinate response and recovery. It supports on-site Incident Command by managing resources, providing jurisdictional direction, and ensuring public communication. [redacted]

Emergency Support Services (ESS): To ensure the wellbeing of the population in case of an emergency, RDCK manages an ESS program. The program provides essential support for evacuees in the first 72 hours of an event, such as food, clothing, temporary lodging, emotional support, and family reunification. ESS also coordinates reception centres and works with volunteers to deliver these services during incidents like fires, floods, or other disasters. [37]

Fire and Emergency Services: Creston Fire Rescue provides fire suppression, rescue operations, and hazardous materials response, along with emergency preparedness and training. The department consists of more than 30 members, including a full-time Fire Chief, Assistant Fire Chief, and Fire Service Support Supervisors, with the remaining members serving in a paid on-call capacity. The department operates under a mandate of 24/7 readiness and maintains a FDOC along with backup dispatch capabilities to ensure continuity during major incidents. The FDOC is located at 1505 Cook Street, Creston, BC, and serves as the hub for operational coordination during emergencies. [37] Creston Fire Rescue firefighters are also trained to a National Fire Protection Association 472: Professional Competence of Responders to Hazardous Materials Incidents, Operations Level and are trained to provide basic medical treatment to residents. [252] Appendix O: Maps provides a map of response times from the CESB building.

Ambulance Services: BC Emergency Health Services operates the BC Ambulance Service in Creston, providing prehospital care and emergency medical response. Ambulance crews work closely with other emergency agencies during incidents requiring medical assistance or evacuation. [37] Appendix O: Maps provides a map of response times from the CESB building.

Police: Policing in the Creston Valley is provided by the RCMP's Creston Detachment, headquartered at 421 16th Avenue South, with 24/7 response via the provincial call taking system. [253] The detachment maintains continuous readiness to support evacuations and ESS, contribute personnel to the Town's Emergency Operations Centre (EOC), and operationally establish traffic control points, conduct evacuations and welfare checks, enforce evacuation orders, and secure critical infrastructure while liaising directly with the EOC for situational awareness, resource requests, and planning. Surge capacity is available through neighbouring detachments and specialized RCMP units (e.g., the Emergency Response Team and the provincial Explosive Disposal/Chemical, Biological, Radiological, and Nuclear capability) when required. [254] Traffic safety and corridor control during evacuations and major events are reinforced by BC Highway Patrol and the Integrated Road Safety Unit, which provide strategic enforcement across jurisdictions to address high risk driving behaviours and keep critical routes moving. Post event, the RCMP conducts investigations, participates in after action reviews, and updates emergency plans. Victim Services staff provide Level 1–3, trauma informed support to affected residents. Public facing services include online non emergency crime reporting, criminal record checks, fingerprinting, and firearms enquiries; after hours calls are routed through the provincial operations centre to sustain 24 hour coverage. [253]

Search and Rescue: Creston Search and Rescue (SAR) is a volunteer organization that conducts wilderness safety education, remote area searches, and medical aid. SAR teams assist with evacuations and provide specialized support during emergencies, often working under the direction of police or other agencies. [37]

Mutual Aid Agreements: Creston maintains mutual aid agreements with BC Wildfire Service and surrounding fire protection areas. These agreements enable resource sharing and coordinated response during large-scale emergencies, such as wildfires or multi-jurisdictional incidents.

Existing Plans & Reports

Creston maintains comprehensive plans and resources to address hazards that may pose risks to residents and property within its jurisdiction. A range of programs, plans, and guiding documents that cover various topics are in place to support community preparedness and ensure an effective response to emergencies and disasters. Publicly available documents are linked where possible.

Wildfire

- Town of Creston Fuels Management Prescription 2025
- Town of Creston Community Wildfire Resiliency Plan 2023
- Creston Valley Fire Service Fire Master Plan 2025

Flood Mitigation

- Goat River HEC-RAS 2D Model Results Summary 2020
- RDCK Floodplain and Steep Creek Study

Climate Change

- Town of Creston Development of IDF Curves Under a Changing Climate 2015

Emergency Response

- Creston Surrounding Area Evacuation Plan
- Creston Evacuation Toolkit 1, 2, 3, & 4
- Emergency Management Creston
- Town of Creston Extreme Weather Response Plan 2025

Critical Infrastructure Management

- Town of Creston Water Master Plan 2010
- Town of Creston Sanitary Sewer Master Plan 2011
- Creston Asset Management Plan 2019
- Stormwater Management Master Plan 2026

Housing and Population

- Town of Creston Housing Needs Assessment 2024
- Creston Housing Action Plan
- Zoning Bylaw
- Creston's Accessibility Plan

Creston has introduced several initiatives to increase resilience to climate change impacts, including a water conservation strategy in conjunction with RDCK and the Columbia Basin Trust, developed an Extreme Weather Response Plan, and is currently implementing the Community Wildfire Resiliency Plan created in 2023.

Other Measures Contributing to Community Resilience

Other measures also contribute to Creston's overall community resilience by strengthening preparedness, reducing risk, and supporting coordinated response across multiple systems. These include public education initiatives, trained response personnel, regulatory tools such as building codes and zoning bylaws, and targeted programs addressing priority hazards such as extreme weather, wildfire, and flooding. Together, these measures enhance the Town's ability to anticipate, withstand, and recover from emergencies and disasters.

Public Education: Creston's Emergency Management program (Emergency Management Creston) promotes public preparedness by providing resources and real-time information. Its webpage offers links to local hazard information, personal emergency planning guides, real-time updates, Emergency Support Services (ESS), FireSmart resources, and Creston's Disaster Response Plan and Wildfire Resiliency Plan [167]. In addition, the Creston Valley FireSmart Resiliency Committee organizes FireSmart events focused on wildfire preparedness, including community open houses, home assessments, and educational workshops. [33]

Training and Capabilities of Response Personnel: Creston Fire Rescue and other emergency agencies maintain robust training programs to ensure operational readiness. Training opportunities include Incident Command System, FireSmart101, BC Structure Protection Program, and discussion and operations-based emergency management training.

Building Code Enforcements: Updated BC Building and Plumbing Codes took effect March 8, 2024, across the province and are based on the National Codes with BC-specific changes.

Notably, they adopt cooling requirements so at least one living space in each new dwelling unit is designed not to exceed 26 °C at the outside summer design temperature. [255]

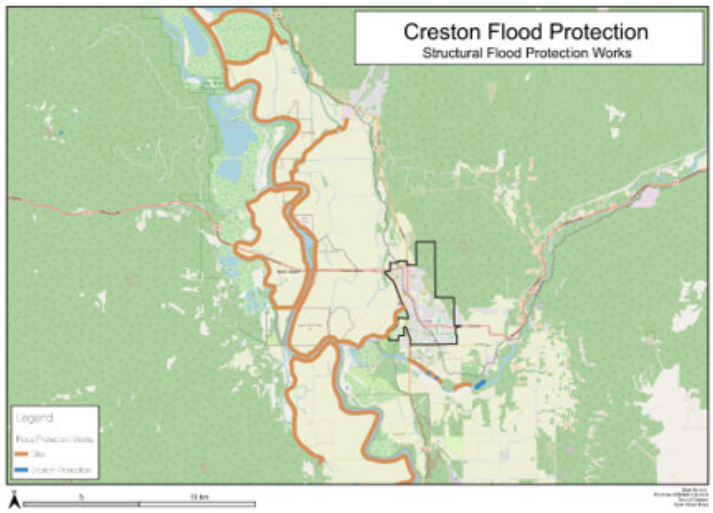
Zoning By-laws Around Hazardous Areas: Development in flood and riparian hazard locations is regulated in several ways. The RDCK Floodplain Management Bylaw No. 2080 sets flood construction levels (FCLs) and minimum setbacks (including ~30 m from the Kootenay River's natural boundary and 7.5 m from dikes) for new construction, and Creston OCP's Development Permit Areas (DPA) require a Development Permit for environmentally sensitive/riparian sites before a building permit is issued. Permit submissions must show title/covenants and the proposed FCL, and local rules are applied with reference to provincial Flood Hazard Area Land Use Management Guidelines. [256]

Extreme Temperatures: Creston has created an Extreme Weather Response Plan under the Emergency Management Program, which supports issuance or cancellations of extreme weather alerts, followed by the activation of an extreme warming or cooling centre. [114] As part of seasonal preparedness, the Town works with local agencies and community partners to raise awareness about the risks of extreme heat and cold, particularly for vulnerable populations. Outreach efforts include providing resources and information on heat stress and cold exposure and encouraging participation in resilience-building activities [79].

Wildfire Protection: Creston has implemented wildfire risk reduction measures through the Community Wildfire Resiliency Plan (2023), which provides a framework for assessing high-risk areas and guiding FireSmart home assessments and education, vegetation management, interagency coordination, and treatment of high-risk interface areas near Arrow Mountain and Billy Goat Bluffs. Fuel management prescriptions have been developed for priority areas near Arrow Mountain, using manual and mechanical thinning, pile burning, and prescribed fire to reduce surface and ladder fuels and maintain wildfire intensity below 2,000 kW/m. [16] These treatments aim to lower wildfire intensity and create defensible spaces anchored to roads and natural breaks, with maintenance scheduled every 10–15 years. [16]

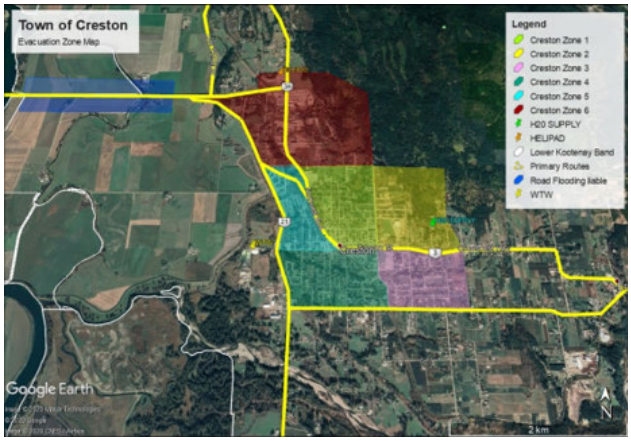
Flooding Protection: Creston is addressing flood risk through climate-adaptive stormwater planning and dike system reinforcement. Updated Intensity-Duration-Frequency (IDF) curves account for projected rainfall increases of up to 42% by the 2080s, guiding the design of stormwater infrastructure to handle future peak flows. Recommendations include detention ponds, infiltration systems, and wetlands to reduce flooding impacts. Climate modeling also highlights the need to periodically reassess dike integrity as extreme precipitation events become more frequent, with projections showing up to 30% higher rainfall during 100-year storms by the 2070s. These measures aim to protect critical infrastructure and reduce vulnerability to high-water events in the Creston Valley. [11]

Map 10 highlights structural flood protection works, including dikes



Map 10 Creston Flood Protection

and erosion protection features. These measures are primarily located along major watercourses to reduce flood risk to agricultural lands and the community. A larger version of this map is included in Appendix O: Maps.



Map 11 Creston Evacuaton Zones.
Source: Town of Creston

Evacuation Planning: To support emergency planning in the event of an evacuation, Creston has developed several evacuation toolkits that provide an evacuation framework, operational checklists and procedures, zone-specific operational tools, and reference guides. As shown in Map 11, the 6 evacuation zones in Creston are designed to support phased evacuations during emergencies. Zone planning follows operational guidance outlined in Creston Evacuation Plan Toolkit 3, which emphasizes mapping boundaries, designating safe access and egress routes, and identifying reception centres and assembly points. [220] Criteria for establishing zones include assessing hazard risk areas, ensuring route safety in coordination with RCMP and the Ministry of Transportation and Infrastructure, and accounting for vulnerable populations and transportation needs such as those without vehicles or requiring special assistance. Each zone's operational checklist is reviewed during activation to confirm timing, resource allocation, and communication strategies. These measures ensure that evacuations are carried out in a structured, coordinated manner with support from Emergency Support Services and partner agencies. [257] Other regional and provincial agencies maintain their own emergency plans and are expected to coordinate with Creston's framework as appropriate.

Hospitals and Health Service Providers: Hospitals and health service providers play a critical role in disaster response and recovery. Accordingly, the Creston Valley Hospital and Health Centre (312 15th Avenue North) is considered to be critical infrastructure and falls under the jurisdiction of the Interior Health Authority. The hospital provides 24/7 emergency services, inpatient care, and outpatient programs, and is supported by long-term care facilities such as Swan Valley Lodge (90-bed capacity) and Crestview Village (23-bed capacity). These facilities are integrated into evacuation planning and identified as vulnerable populations in Creston's zone-specific operational guidance. [247]

Appendix K: Recommendations to Enhance Resilience

The recommendations on the following pages are intended to enhance resilience by reducing exposure, vulnerability, and consequences associated with Creston's priority hazards. Measures are organized by hazard, and the associated emergency management phase is indicated: mitigation, preparedness, response, and recovery. Where application, recommendations are linked to specific vulnerabilities identified in the HRVA, including social vulnerability, critical infrastructure dependencies, climate risk drivers, emergency response constraints, and economic exposure.

The first set of recommendations is overarching and aims to reduce risk across multiple hazards. These include critical infrastructure continuity planning, backup power and fuel resilience, vulnerable-population planning, hazard-specific communications, alternate EOC readiness, redundant communications, ESS and reception-centre readiness, partner agreements, and recovery planning. The following set of recommendations are specific to the highest priority hazards based on current risk, as identified in this HRVA. These hazards include Extreme Heat; Drought; Lake, River, and Stream Flooding; Human Disease; Wildfire; Wastewater Interruption; Rail Incident; Stormwater Flooding; Flash Flooding; High Wind Event; and Telecommunications Interruption. The last set of recommendations are regarding hazards that will shift to a higher priority in the future: Air Quality, Public Health Crisis, and Transportation Route Interruption.

Recommendations are intended to complement existing plans and programs, not duplicate them. Existing measures such as the Disaster Response Plan, Community Wildfire Resiliency Plan, Extreme Weather Response Plan, evacuation toolkits, Stormwater Management Master Plan, Water Master Plan, and Sanitary Sewer Master Plan provide an important foundation. The measures suggested below focus on identified gaps, operational improvements, and practical actions that can reduce risk for Creston.

Recommendations for Higher Priority Hazards Based on Current Risk

Hazard	Vulnerability Factor	Measures	Preparedness	Mitigation	Response	Recovery
Overarching/All-Hazard	No business continuity planning for maintaining essential municipal services during prolonged or cascading emergencies.	• Develop a municipal Business Continuity Plan for all departments, in alignment with EDMA section 53 to be reviewed every five years as per OIC 186. The plan should address the following specific considerations: ○ Public Works continuity and relocation procedures; ○ Identification of priority critical infrastructure for power restoration; ○ Continuity staffing strategies; ○ Redundant communications package: acquire and maintain backup communication tools for the EOC, Fire, Public Works, ESS, and key facilities, such as satellite internet, satellite phones, VHF radios, spare batteries, chargers, printed maps, and hard-copy contact lists.	X			
	The Disaster Response Plan needs updating to ensure alignment with OIC 186.	• Review and update the 2023 Disaster Response Plan to ensure alignment with EDMA requirements and OIC 186. This includes ensuring the plan is updated every seven years, addresses the four phases of emergency management, and includes a record of consultation with First Nations.	X			
	No completed climate adaptation plan to prioritize actions that reduce climate-driven risks to public safety, critical infrastructure, water supply, ecosystems, and vulnerable residents.	• Develop a Town of Creston Climate Adaptation Plan that uses the HRVA as the foundation to prioritize hazard risk.	X			

	The evacuation toolkit requires updating to align with EDMA regulations and to include additional evacuation considerations to ensure it considers the needs of Creston's residents.	• Update the evacuation plan toolkits to include an Evacuation Support Annex for vulnerable residents and animals/livestock. This may include: ○ Privacy-conscious mapping of residents with medical equipment, mobility, and transportation needs; ○ Identification of accessible evacuation resources; priority farms and livestock areas; ○ Animal reception and host-farm options; ○ Veterinary and welfare contacts; and ○ Decision protocols for sheltering, relocation, or humane management when evacuation is not feasible. • Work with the Canadian Border Services Agency and the U.S. Customs and Border Protection, as well as nearby U.S. municipalities to develop cross-border evacuation plans. • Engage with local healthcare facilities to better understand their emergency preparedness and evacuation procedures and establish coordination protocols to support evacuation planning and response. • Coordinate with RDCK ESS to better understand operating policies and procedures, emergency shelter plans, and mutual aid agreements.	X			
	No plan to guide public communications to support more coordinated and accessible messaging during hazard events.	• Develop an all-hazards Public Information Plan with pre-approved hazard-specific message templates, clear approval roles, multi-channel delivery procedures, and accessible messaging for seniors, people with disabilities, residents without internet/cell service, and other groups with different communication needs.	X			
	Lacking complete operational inventory and map of critical infrastructure, emergency resources, partner-owned assets, vendor capabilities, and equipment that may be needed during response and recovery.	• Develop and maintain a confidential Critical Infrastructure Plan and Emergency Resource Inventory that maps priority Town, partner, and private-sector assets. • Consider developing MoUs with vendors to address gaps identified in the Critical Infrastructure Inventory.	X			

	EOC staff have limited response training and need additional equipment and supplies to support recovery operations.	• Develop and implement an EOC training plan that includes regular targeted staff training. • Develop an inventory of existing supplies and equipment to support EOC operations, and procure additional supplies and equipment as needed. • Test evacuation and emergency plans annually using scenarios such as wildfire near Goat Mountain, telecommunications outage, power outage, high absenteeism, or loss of access to the Public Works yard.	X			
	Limited supply of stored fuel to use for backup generators and equipment.	• Maintain at least 72 hours of safe, code-compliant backup fuel or priority refuelling arrangements for generator-dependent critical infrastructure and Public Works equipment, including water, wastewater, Public Works, communications, reception and cooling facilities.	X			
	Businesses may not have the plans or information needed to prepare for the impacts of hazard events.	• Work with the Creston Valley Chamber of Commerce to ensure that businesses have access to the information they may need in the event of emergencies. This may include online sales, digital payments, customer contact lists, remote service options, backup generators, and communication planning.	X			
	No formalized policies or procedures for coordinated response with the RDCK or yaqan nu?kiy.	• Develop and formalize coordination protocols with the RDCK and yaqan nu?kiy, including defined roles, communication processes, and resource-sharing arrangement, to support a more integrated response.	X			
	No established plan for managing volunteers and donated goods during emergencies.	• Establish a volunteer and donations management framework, including procedures for registering, coordinating, and supervising volunteers, and for directing and distributing donated goods through appropriate organizations.	X			

Wildfire Current Risk: Likely / High Consequence	Public Works shop and equipment are located at the Goat Mountain interface, creating a risk that critical municipal equipment, vehicles, tools, and staff access could be damaged, evacuated, or unavailable during a wildfire response.	• Reduce wildfire exposure at the Public Works site by maintaining defensible space, separating combustible materials and fuel from key equipment, identifying priority equipment to protect or move, and confirming secondary staging locations outside the interface area.	X			
	Creston is in a high-risk WUI setting and requires a high level of FireSmart compliance.	• Conduct FireSmart assessments for all Town-owned critical infrastructure.	X			
Extreme Heat Current Risk: Likely / Medium – High Consequence	Extreme heat procedures can be strengthened to address heat-related health impacts, vulnerable populations, and response measures.	• Develop and implement an Extreme Heat Response Plan to reduce health and safety risks during extreme heat and smoke events, particularly for seniors and medically vulnerable residents. The plan should define activation thresholds, roles and coordination with the EOC and ESS, map heat-vulnerable households, seniors, care facilities, and buildings without cooling, identify cooling centres and public messaging protocols, coordinate transportation methods to the cooling centre, and adopt heat and smoke thresholds for outdoor events, recreation programming, and municipal work, with criteria to modify, relocate, postpone, or cancel activities. • Arrange wellness checks for vulnerable populations, such as seniors and individuals who live alone. • Ensure public education initiatives clearly communicate the risks of extreme heat, and how to read and understand the provincial heat alert response system (HARS).	X			
	Limited access to cooling sites.	• Expand cooling-centre network beyond one site with accessibility, transport, backup power, staffing, and pet considerations. • Develop a plan for night-time cooling centre location(s), with staffing requirements and cooling resources. • Work with BC Transit or other pre-determined transportation methods to provide public transportation to cooling centres. • Use Voyent Alert to announce cooling centres. • Extend hours of cooling facilities as extreme heat events evolve.	X		X	

Drought Current Risk: Likely / Medium – High Consequence	No Drought-specific Response Plan.	• Develop a Creston drought-and water-specific emergency response plan, including triggers, roles, public messaging, emergency water distribution, well activation, fire-flow priorities, potable water distribution plan, and partner contacts.	X			
	Long-term water demand may increase with heat, development, and climate change, increasing the likelihood of drought.	• Strengthen integration of drought risk into land use, landscaping, and asset management decisions by requiring or incentivizing low-water landscaping for municipal projects and new development, incorporating drought resilience into infrastructure renewal and capital planning, and using water-demand, climate, and fire-flow considerations to guide future growth and asset investment.		X		
	Water is needed for both domestic use and fire suppression, which can be greatly limited by drought conditions.	• Review fire-flow and emergency water supply capacity under drought conditions. Identify hydrant pressure constraints, reservoir drawdown thresholds, water shuttle needs, and priority areas where suppression water may be limited.		X		
	Drought and extreme heat can negatively impact water-intensive crops.	• Encourage farmers with water-intensive and heat-sensitive crops (grapes, cherries, etc.) to sign up for Production Insurance from the BC Ministry of Agriculture and Food.				X
Lake, River, and Stream Flooding Current Risk: Likely / Medium Low Consequence	Properties in low lying areas may be at greater risk of flooding.	• Promote low-cost property level flood protection for exposed properties, including backflow valves, sump sumps, clearing gutters/storm rains, downspout extensions.		X		
Human Disease Current Risk: Possible / Medium-High Consequence	Critical and support services staffing for the Town may be at risk from human disease due to workforce absenteeism.	• Ensure business continuity planning and emergency planning includes pandemic scenarios that address staffing continuity.	X			

Wastewater Interruption Current Risk: Possible / Medium-High Consequence	The Collis St. Lift Station does not have a backup generator, leaving it vulnerable to overflow during electrical outages.	• Install fixed backup power or, at minimum, a generator quick-connect and transfer switch at Collis Street Lift Station. Include generator sizing, fuel supply, load testing, maintenance, and deployment procedures.	X			
	Creston's SCADA system is outdated and has no redundancy, creating a risk that water and wastewater operators may lose remote monitoring, alarms, and control functions during hazard events.	• Upgrade the Town's SCADA system for water and wastewater assets to include backup communications, backup power, alarm escalation, cybersecurity protections, and tested manual operating procedures if remote monitoring or control is lost.	X			
Rail Incident Current Risk: Unlikely / High Consequence	[redacted]	• Establish a rail emergency planning protocol with CPKC to clarify 24/7 contacts, dangerous goods information access, notification procedures, unified command expectations, blocked-crossing impacts, protective action zones, [redacted], public information coordination, and opportunities for joint training or exercises. • Consider obtaining and maintaining AskRail app access for Fire Rescue, EOC staff, dispatch/ECC partners, and other authorized emergency responders.	X			
Stormwater Flooding Current Risk: Likely / Medium-Low Consequence	The Stormwater Management Plan identifies local roadway sags, undersized culverts, and needed drainage enhancements, which increase risk of stormwater flooding and damage.	• Prioritize low-cost drainage fixes at known roadway sags: catch-basin cleaning, culvert clearing, minor regrading, inlet improvements, downspout redirection, and backflow valve promotion. • In advance of heavy rainfall, pre-position barricades at known low points in roadways. • Create a pre-storm inspection checklist for catch basins, culverts, manholes, low points, and known ponding areas.	X	X	X	
High Wind Event Current Risk: Likely / Medium-Low Consequence	Trees often fall during high wind events, creating risk of power outages and property damage.	• Conduct seasonal tree/debris management near priority roads, Town facilities, and overhead utility corridors. • Develop a rapid damage assessment process for high wind events, including trained personnel, standardized reporting tools, and coordination with utilities and public works to support timely response and recovery.	X	X		

		• Create a wind and power outage event checklist as an appendix to the Disaster Response Plan, covering generator readiness, fuel, road-clearing priorities, contractor callouts, downed-wire messaging, welfare-check partners, and communications.				
Flash Flooding Current Risk: Likely / Medium-Low Consequence	Creston has low-lying roads and steep creek outlets.	• Create rainfall-triggered inspection and closure thresholds for known low crossings, steep creek outlets, and historically problematic drainage routes.	X			
Telecommunications Interruption Current Risk: Likely / Medium-Low Consequence	Residents may be unable to receive alerts or contact support services during a telecommunications interruption.	• Create a telecommunications interruption plan with radio procedures, public notice boards, door-knocking routes, and priority contacts for care facilities, seniors' supports, the hospital, and community organizations.	X			
	Telecommunications are dependent on landline, internet, and cellular service. Cuts to the fibre lines in multiple locations would cause a complete communications outage.	• Exercise a no-cell / no-internet scenario annually, including paper forms, radio communications, door knocking, and public information posting.	X			

Recommendations for Higher Priority Hazards Based on Future Risk

Hazard	Vulnerability Factor	Measures	Preparedness	Mitigation	Response	Recovery
Air Quality Future Risk: Almost Certain / Low Consequence	Creston has a high percentage of elderly population, who are more vulnerable to the impacts of poor air quality.	• Install HEPA filters in priority high traffic public buildings that may serve as cleaner air spaces.	X			
Public Health Crisis Future Risk: Almost Certain / Low Consequence	Creston's aging population is more at risk of human disease transmission and more severe impacts.	• Support seasonal vaccination and respiratory illness prevention messaging for older adults, care facilities, municipal staff, responders, schools, and public-facing businesses.	X			
Transportation Route Interruption Future Risk: Likely / Medium-Low Consequence	Creston has limited transportation route redundancy, including reliance on a cross-border route through the United States, which may be constrained by border requirements.	• Develop and document cross-border and regional transportation continuity arrangements with CBSA, U.S. emergency management counterparts, and RDCK to manage potential access, mobility, and service disruptions when key transportation routes are constrained or unavailable.	X			

Appendix L: Hazard Scenarios for Exercises

The following Hazard Scenarios are intended to support emergency management training and exercising.

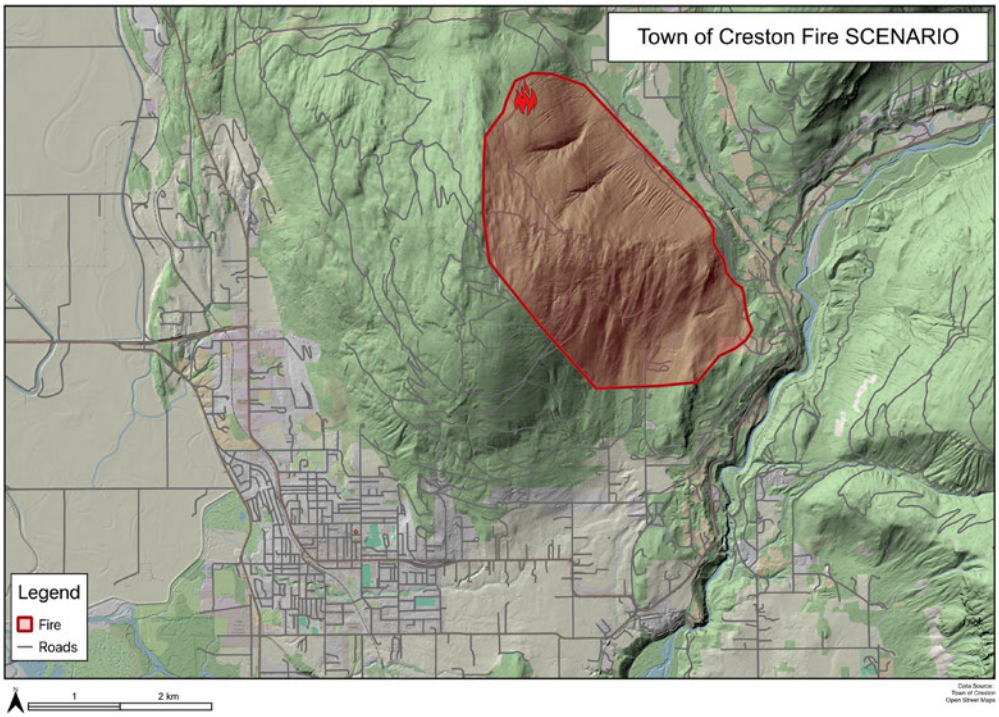
Hazard Scenario #1 - Wildfire

Triggering Event: A lightning storm in Creston Valley.

Scenario Description: It is August 14th at 10:00pm. The night warm with a temperature of 30oC and a low humidity of 20%. A winter snow drought has led to historically low snowpack; this has been followed by an above average warm June and July. A dry lightning storm rolls through the valley. There are several trees hit across the valley with a concentration of lightning strikes to the Northeast of the Town on the backside of Goat Mountain. There are several ignitions resulting from the lightning in this area. The following morning a small amount of smoke is visible from the Town.

The following day (15th) brings strong Southwest winds with the fire spreading over the mountain and into the Wildland Urban Interface, driven by the wind moving towards Highway 3. An evacuation order has been issued by the Town of Creston at the request of BC Wildfire for an area of 1 km2 around the fire zone.

Map of Wildfire Scenario Initial Event



Inject 1 - Interface Fire and Evacuation Pressure

BC Wildfire Service advises that wind-driven fire growth may threaten interface

neighbourhoods within the next operational period. RCMP requests support for traffic control. Several residents report they may need help evacuating because of mobility limitations, lack of transportation, pets, or medical needs.

Key Considerations:

- Evacuation alert/order decision-making and coordination with BC Wildfire Service.
- Evacuation zone confirmation, route safety, traffic control, and public instructions.
- Support for seniors, people living alone, people without vehicles, and residents with mobility or medical needs.
- Coordination with RDCK for ESS activation, reception centre readiness, pet considerations, and transportation support.
- Messaging for residents on what to take, where to go, and when not to delay evacuation.

Inject 2 - Public Works Access and Critical Infrastructure Impacts

During the afternoon, the fire spots across a control line and moves downslope toward the Public Works shop and equipment yard at the Goat Mountain interface. Smoke, falling embers, and increased fire activity begin to threaten the access road. Public Works reports that several trucks, pumps, radios, barricades, generators, fuel, and critical tools remain on site, but it may soon be unsafe to access or remove them. At the same time, FortisBC reports that power infrastructure near the interface may be affected, TELUS advises that aerial fibre routes could be at risk if fire reaches nearby poles, and water operators advise that reservoirs in treed areas may require monitoring.

Key Considerations:

- Public Works continuity: whether to relocate priority vehicles, equipment, fuel, radios, generators, barricades, and tools to a secondary staging area before access is lost.
- Staff safety, access control, traffic management, and decision triggers for limiting or closing access to the Public Works area.
- Impacts if Public Works equipment becomes inaccessible, including reduced capacity for road closures, water/wastewater support, debris clearing, barricade deployment, and EOC logistics.
- Priority protection or monitoring of reservoirs, water assets, roads, telecommunications, and power infrastructure near the interface.
- Need for backup communications, public smoke-health messaging, cleaner-air/cooling spaces, water-quality messaging, post-fire debris flow/flooding awareness, and recovery documentation.

Hazard Scenario #2 – Drought

Triggering Event: Prolonged dry conditions and below-average snowpack.

Scenario Context: It is mid-August following an unusually dry winter and spring, with snowpack in the Kootenay region measuring well below seasonal norms. The Town of Creston has experienced several consecutive weeks of hot, dry weather with daytime temperatures consistently above 30°C and minimal precipitation. Stream flows in local creeks are substantially reduced, and groundwater levels continue to decline. Stage 3 water restrictions are implemented, limiting outdoor water use and placing pressure on agricultural operations in and around Creston Valley.

Vegetation becomes increasingly dry, elevating wildfire risk in the wildland–urban interface. Residents who are reliant on private wells report reduced water supply, and concerns grow around water availability for firefighting, public health, and essential services. Drought conditions are forecast to persist into early fall, increasing stress on ecosystems, infrastructure, and the local economy.

Inject 1 - Increasing Pressure on Municipal Water Supply

The Town's Public Works Department reports that water demand has remained consistently high despite Stage 3 restrictions. Reservoir levels are declining more quickly than anticipated, and staff identify several instances of non-compliance with outdoor watering restrictions. Local media begin reporting on concerns about the community's water supply, while residents question whether additional restrictions will be necessary. The Town begins evaluating use of secondary well sources and potential pumping from natural water sources such as the Kootenay River; however, concerns arise regarding treatment capacity, logistics, and long-term sustainability.

Key Considerations

- Sustainability of the municipal water supply during prolonged drought
- Monitoring water consumption and enforcing water restrictions
- Prioritization of water use for essential services and critical infrastructure
- Public communications regarding conservation measures and compliance
- Planning for potential escalation to higher-level water restrictions
- Feasibility and logistics of alternative water sourcing (e.g., wells, river extraction, pumping capacity, staffing)
- Water treatment capacity and quality considerations when using alternative sources

Inject 2 – Heat, Smoke, and Community Health Impacts

Extended drought conditions coincide with a prolonged heat event and increasing wildfire smoke affecting air quality across the region. Local health providers report increased presentations related to heat stress and respiratory issues, particularly among seniors, individuals experiencing homelessness, and people living with chronic health conditions. Community organizations request additional municipal support for vulnerable populations.

Key Considerations

- Protection of vulnerable populations during prolonged heat and poor air quality
- Operation of cooling centres and public information services
- Continuity of municipal services during extended environmental stress
- Coordination with Interior Health, community organizations, and regional partners
- Public messaging regarding heat safety, smoke exposure, and water conservation
- Staff health and safety considerations for outdoor municipal operations

Inject 3 – Elevated Wildfire Risk Near Community

BC Wildfire Service advises that extreme drought conditions and dry vegetation have increased wildfire risk near the wildland–urban interface outside Creston. Residents begin contacting the Town requesting information on preparedness measures and potential evacuation planning.

Key Considerations:

- Wildfire preparedness, evacuation planning for residents and animals, and public safety messaging
- Availability of water supply and infrastructure to support firefighting operations
- Coordination with BC Wildfire Service, Fire Rescue, and regional emergency partners
- Risks to critical infrastructure, homes, and surrounding rural properties
- Public concern and expectations regarding municipal preparedness and response
- Environmental and ecosystem impacts from prolonged drought and wildfire conditions

Hazard Scenario #3 – Hazardous Materials Spill

Triggering Event: Corrosion failure in an ammonia refrigeration condenser.

Scenario Description: At 2:30pm, a failure due to corrosion occurred in an ammonia refrigeration condenser at the Labatt-owned Columbia Brewery on Erickson St. The failure led to the release of ammonia inside the brewery property.

Inject 1 – Immediate Public Safety and Protective Actions

Following the ammonia release at the Columbia Brewery, nearby businesses report a strong chemical odour and several individuals experience eye, throat, and breathing irritation. Fire Rescue advises that ammonia levels within the affected area remain unsafe for entry without specialized hazardous materials protection, limiting BCEHS access to exposed patients near the release site. RCMP requests municipal support for traffic control, public messaging, and determining whether nearby areas should shelter-in-place or evacuate.

Key Considerations:

- Health impacts from ammonia exposure and responder safety requirements
- Protective action decisions, including shelter-in-place, evacuation, and perimeter control
- Coordination between Fire Rescue, RCMP, BCEHS, Interior Health, municipal staff, and brewery representatives
- Traffic disruptions, business impacts, and restricted access in the surrounding area
- Public information coordination and management of public concern and misinformation

Inject 2 – Environmental and Operational Impacts

As response operations continue, responders advise there are concerns that contaminated runoff from suppression and containment efforts could enter nearby stormwater systems. Businesses in the surrounding industrial area begin asking when access will be restored, while media requests information about environmental impacts and public safety.

Key Considerations:

- Potential environmental contamination and impacts to stormwater systems or nearby waterways
- Coordination with environmental agencies and technical specialists regarding containment and monitoring
- Impacts to businesses, industrial operations, and transportation access in the affected area
- Public confidence, media relations, and communication of environmental and public safety risks
- Recovery, cleanup, and financial implications for the municipality and affected businesses

Hazard Scenario #4 – High Wind Event

Triggering Event: Sudden storm cell.

Scenario Description: It is Friday, July 19 in the late afternoon. Hot and unstable weather causes a sudden storm to form in the Creston Valley. The temperature is 32°C with low humidity. Strong winds blow over 100 km/hr, along with heavy rain and lightning for a short time. Trees fall across Highway 3, blocking traffic. Power lines are knocked down, leaving about 2,000 customers without electricity. Flying debris damages roofs and vehicles. The storm lasts about 25 minutes, but cleanup and power repairs are expected to take several days. No one is injured, but there is major property damage and travel disruptions.

Inject 1 - Roads, Power, and Public Safety

Public Works reports multiple blocked roads and downed trees. FortisBC advises that several power lines are down, resulting in widespread outages across Town. RCMP requests municipal support for road closures and traffic control, while residents begin reporting damaged roofs, debris, blocked neighbourhood access, and concerns about downed power lines.

Key Considerations:

- Public safety risks from downed power lines, unstable trees, and debris
- Priority road clearing and access for emergency responders and utilities
- Coordination with FortisBC, Public Works, Fire Rescue, RCMP, and highway maintenance partners
- Public information and emergency messaging regarding closures, outages, and safety
- Debris management and impacts to municipal infrastructure and services

Inject 2 - Extended Power Outage and Community Impacts

FortisBC advises that widespread power outages caused by downed lines and damaged infrastructure may continue into the weekend for some areas of Creston. Several businesses have closed due to lack of power, traffic signals are not functioning in parts of Town, and residents begin contacting the Town regarding spoiled food, charging needs, and concerns for vulnerable family members during the outage.

Key Considerations:

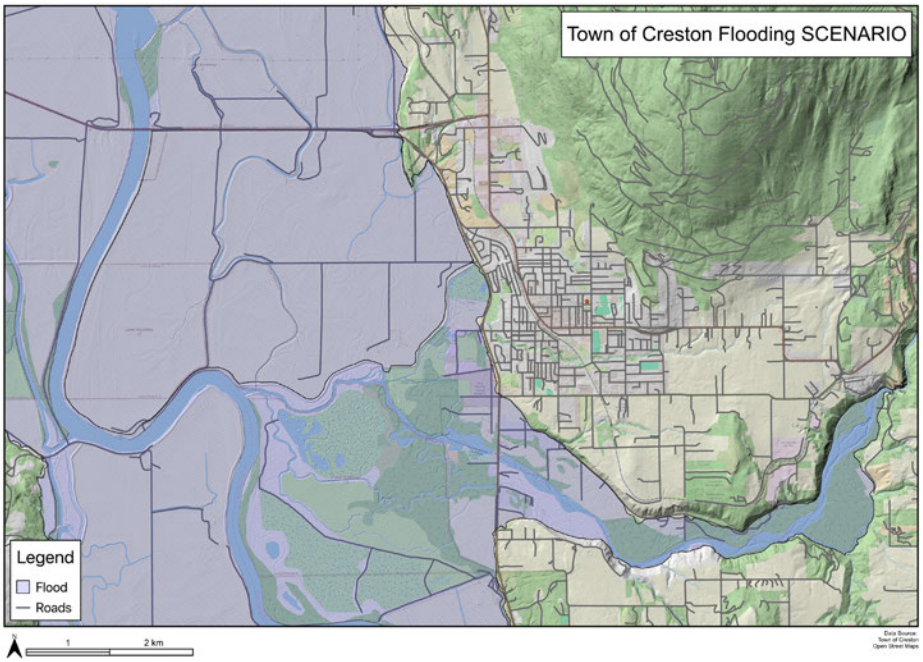
- Support for vulnerable populations and continuity of essential municipal services
- Traffic control and public safety at intersections with non-functioning signals
- Coordination with FortisBC and partner agencies regarding restoration priorities and public updates
- Public information regarding food safety, generator safety, and outage preparedness
- Business disruptions, economic impacts, and recovery considerations

Hazard Scenario #5 – Flooding

Triggering Event: Heavy rainfall in the Creston Valley.

Scenario Description: On a Monday morning, following a wet fall, the Creston Valley region was hit by an atmospheric river, with heavy rain totaling 110mm over 36 hours. Flooding has affected Creston and nearby areas, with clogged culverts and ditches, and reports of basement flooding throughout the community. The Kootenay River is flooding, and Highway 3 to the north of the Town is underwater, making travel difficult. Erosion along the banks of the Goat River is beginning to occur.

Map of Flooding Scenario



Inject 1 – Urban Flooding and Access Impacts

As flooding continues across Creston, the Town receives a large increase in requests for sandbags, drainage assistance, and information on road closures and safe travel routes. Public Works advises that crews are becoming stretched responding to multiple incidents, including flooded streets, blocked storm drains, and reports of localized infrastructure damage. Public Works also reports that sections of the stormwater system are exceeding capacity, with water backing up through drains and localized surcharging occurring.

Key Considerations

- Prioritization of Public Works resources and flood response operations
- Coordination of sandbag distribution and drainage support
- Public information regarding road closures, travel safety, and flood preparedness
- Maintaining access for emergency responders and utility crews
- Potential impacts to homes, businesses, and municipal infrastructure

- Escalation considerations if heavy rainfall continues
- Understanding and communicating limitations of the stormwater system when capacity is exceeded

Inject 2 – Escalating Erosion Threats Along the Goat River

Municipal staff report that erosion along the Goat River is accelerating near developed areas, with concerns growing about impacts to nearby roads, utilities, and riverbank stability. Residents in nearby areas begin contacting the Town requesting information on potential risks and protective measures.

Key Considerations:

- Risks to transportation routes, utilities, and nearby properties
- Coordination with provincial agencies and emergency management partners
- Public safety concerns related to unstable riverbanks and fast-moving water
- Potential need for protective measures, monitoring, or restricted access
- Public information and preparedness messaging for affected residents
- Long-term mitigation and recovery considerations related to erosion damage

Inject 3 – Transportation and Community Service Disruptions

Flooding along Highway 3 and several secondary roads limits access into and out of Creston, disrupting deliveries, commuter travel, and access to community services. Local businesses report supply chain delays, while some municipal facilities experience minor flooding and operational disruptions. Community organizations request assistance supporting residents affected by prolonged road closures and localized flooding.

Key Considerations

- Impacts of transportation disruptions on residents, businesses, and essential services
- Continuity of municipal operations and critical infrastructure
- Coordination with the Ministry of Transportation and Transit, Regional District of Central Kootenay, Emergency Management BC, and utility providers
- Public messaging regarding travel restrictions, alternate routes, and available supports
- Coordination with RDCK regarding the potential need for Emergency Support Services (ESS) for displaced residents or stranded travelers
- Damage assessment, documentation, and recovery planning for municipal infrastructure and community impacts

Appendix M: Monitoring and Update Considerations

The following Summary of Report Changes is to be used to document updates to the Assessment.

Summary of Report Changes

Date	Amendments	Lead

This appendix provides examples of considerations that may be reviewed through annual HRVA monitoring and identifies circumstances that may warrant either a targeted HRVA update or a comprehensive review.

The examples are intended to support ongoing maintenance of the HRVA and assist municipal staff in identifying changes that could materially affect hazard likelihood, exposure, vulnerability, consequences, or emergency response capability. The table should be applied using professional judgment and is not intended to represent exhaustive or mandatory thresholds.

At a high level:

- **Annual Monitoring** supports ongoing awareness of changing conditions and emerging issues.
- **Targeted HRVA Updates** may be appropriate where changes materially affect a specific hazard, geographic area, infrastructure system, vulnerable population, or operational issue.
- **Comprehensive HRVA Reviews** are intended to reassess hazards, risks, vulnerabilities, and response assumptions across the municipality as a whole.

The following table provides examples of monitoring considerations and potential triggers for different levels of HRVA review:

Category	Description/ Examples	Annual Monitoring	Targeted HRVA Update	Comprehensive HRVA Review
Growth and Development	Changes in population, housing, major subdivisions, or development in hazard-prone or previously undeveloped areas.	Review development trends, permits, and population growth annually.	New subdivision, critical facility, or major development within a hazard area.	Significant regional growth or urban expansion materially changes community-wide exposure.
Land Use and Planning	Rezoning, updates to the Official Community Plan, or shifts in land use patterns.	Review OCP amendments and rezoning activity annually.	Land use changes increase density or intensity within a hazard-prone area.	Broad land use or growth strategy changes alter community-wide risk patterns.
Population and Vulnerability	Demographic changes, including aging populations, new care facilities, or shifts affecting evacuation and access to services.	Review demographic and vulnerable population trends annually.	New institutional, care, or vulnerable population facility in a hazard area.	Major demographic shifts substantially affect evacuation, sheltering, or services.
Hazard Information	New or updated flood, wildfire, seismic, slope, or climate hazard data, modelling, and mapping.	Review updated hazard studies, mapping, and modelling annually.	New mapping or modelling changes the extent or severity of a specific hazard.	Major revisions to hazard science or regional assessments require re-evaluation of multiple hazards.
Climate and Environmental Change	Emerging trends affecting hazard frequency, intensity, or seasonality.	Review climate trends and environmental indicators annually.	Emerging trends materially affect assumptions for a specific hazard or season.	Climate-driven changes alter overall hazard likelihood or risk methodology.
Critical Infrastructure	Development, upgrades, or loss of redundancy in key systems (water, wastewater, transportation, energy).	Review infrastructure changes and dependencies annually.	Loss, upgrade, or addition of infrastructure affecting a specific hazard consequence assessment.	Major infrastructure system changes alter regional resilience or cascading risk potential.

Response Capacity	Changes in emergency response resources, staffing, capabilities, or service levels.	Review emergency response capabilities and resources annually.	Notable changes to staffing, equipment, response coverage, or emergency coordination capabilities.	Major organizational or structural changes require reassessment across multiple hazards.
Policy and Legislation	Updates to provincial or federal legislation, regulations, or emergency management policy.	Review applicable legislation and policy updates annually.	Legislative or policy changes require revisions to a specific HRVA section or methodology component.	New provincial or federal frameworks require substantial HRVA redesign or re-alignment.
Emergency Events and Near Misses	Occurrence of emergencies, disasters, or near misses that reveal new impacts or gaps.	Review incidents and near misses annually.	Event reveals new vulnerabilities, impacts, or gaps related to a specific hazard or area.	Major disasters or repeated events demonstrate that overall risk assumptions are no longer valid.
Exercises and After-Action Reviews	Lessons learned from training exercises or post-incident evaluations.	Review exercise outcomes and corrective actions annually.	Findings identify material gaps affecting a specific hazard, function, or operational area.	Repeated or systemic findings indicate widespread deficiencies in HRVA assumptions or preparedness.
Administrative Guidance	Ongoing program governance and review cycle.	Conduct annual monitoring as part of the emergency management program cycle.	Conduct focused updates when changes materially affect a specific hazard, area, or issue.	Conduct a full HRVA reassessment every 5 years or sooner if notable changes occur across multiple risk areas.

Appendix N: Consultation Record

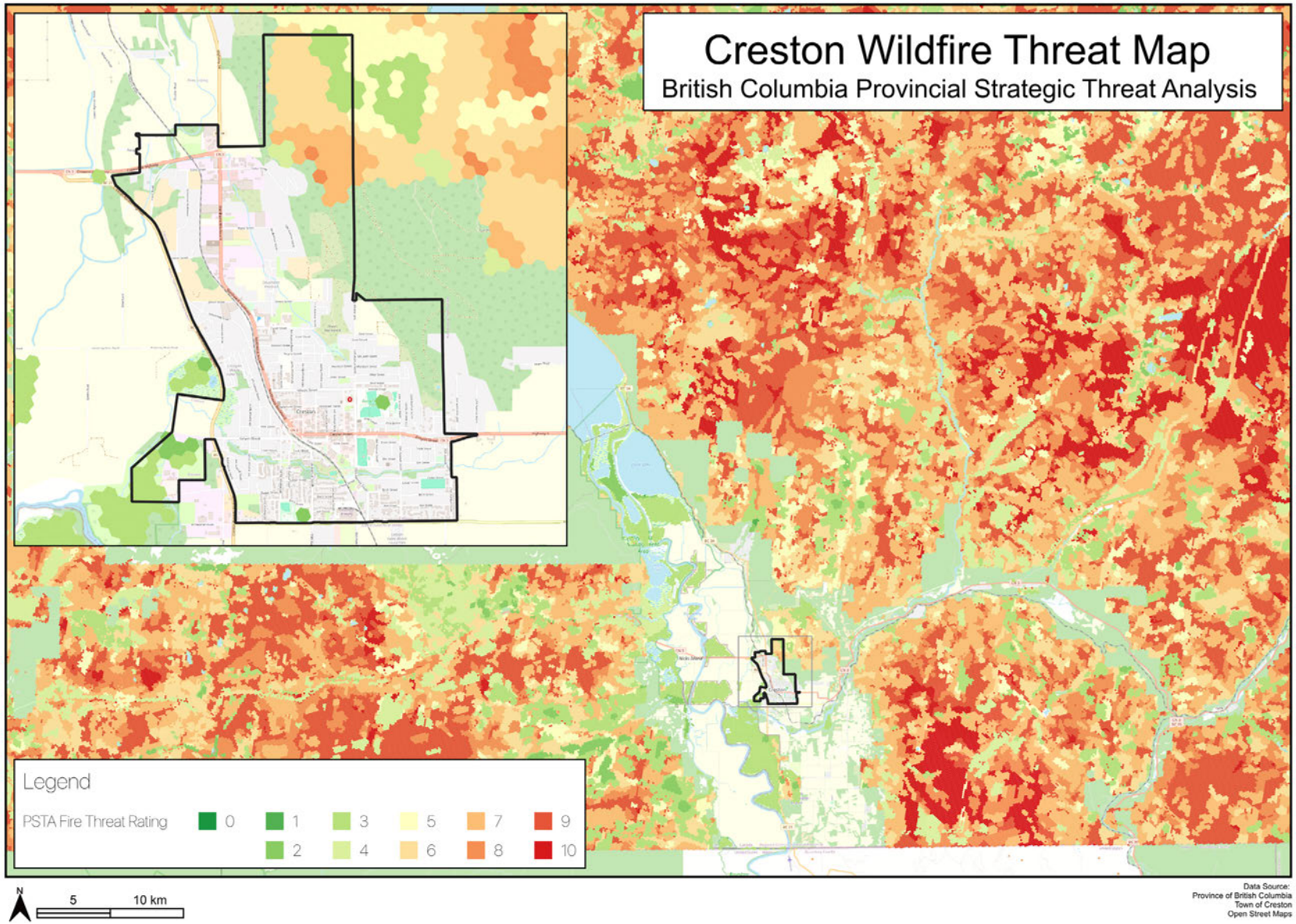
The Town of Creston conducted outreach out to six Indigenous Governing Bodies to invite them to engage to inform the development of the HRVA. These IGBs include: Shuswap Band, ?aq?am, ?akisq?nuk, Ktunaxa Nation Council, Tobacco Plains Indian Band, and yaqan nu?kiy. Below is a summary of engagement with these IGB:

Nation	Date	Method	Summary
Shuswap Band	6-Nov-25	Email	IGB is contacted.
	15-Dec-25	Email	Follow-up email is sent to IGB.
?aq?am	6-Nov-25	Email	IGB is contacted.
	15-Dec-25	Email	Follow-up email is sent to IGB.
	16-Dec-25	Email	IGB acknowledges invitation. Availability dependent on staff schedules.
	22-Dec-25	Email	Response to IGB saying there will be a follow up in the new year to discuss potential engagement dates.
	15-Jan-26	Email	Request to IGB for a phone call or video call to discuss engagement details. Inquiry about separate or joint meeting with yaqan nu?kiy.
	19-Feb-26	Email	Follow-up with ?aq?am - invitation to meet on March 6th, 2026.
	19-Feb-26	Email	Response from ?aq?am – unable to participate due to capacity constraints.
?akisq?nuk	6-Nov-25	Email	IGB is contacted.
	15-Dec-25	Email	Follow-up email is sent.
Ktunaxa Nation Council	6-Nov-25	Email	IGB is contacted.
	6-Nov-25	Email	IGB refers Creston to a yaqan nu?ki contact.
Tobacco Plains Indian Band	12-Nov-25	Email	IGB is contacted.
	15-Dec-25	Email	Follow-up email is sent.
yaqan nu?kiy	19-Jan-26	Email	yaqan nu?kiy is contacted.
	20-Jan-26	Email	yaqan nu?kiy responds confirming early March for a meeting.
	20-Jan-26	Phone call	Discussion about timing to engage with IGB. IGB requested more information on the HRVA process.
	28-Jan-26	Email	Slide deck on the HRVA process is sent to yaqan nu?kiy; meeting morning on March 5th, 2026.
	30-Jan-26	Email	yaqan nu?kiy responds, cc'ing staff so they can be involved.
	30-Jan-26	Email	yaqan nu?kiy is asked if they have any questions and to confirm the suggested meeting date.
	10-Feb-26	Email	Follow up with yaqan nu?kiy regarding meeting date, location, and meeting type.
	12-Feb-26	Email	yaqan nu?kiy responds confirming date and time.
	12-Feb-26	Outlook meeting invitation	Meeting invitation sent to yaqan nu?kiy with date, time, and location.
	24-Feb-26	Email	Creston inquires about/offers honorarium for yaqan nu?kiy. No response is received.
	5-Mar-26	In-person meeting	Discussion with yaqan nu?kiy staff (Curtis, Isaac, and Carter).
	11-Mar-26	Email	yaqan nu?kiy emails Creston with reports mentioned during the March 5th discussion.
	12-Mar-26	Email	yaqan nu?kiy is provided a link to the HRVA survey.

Appendix O: Maps

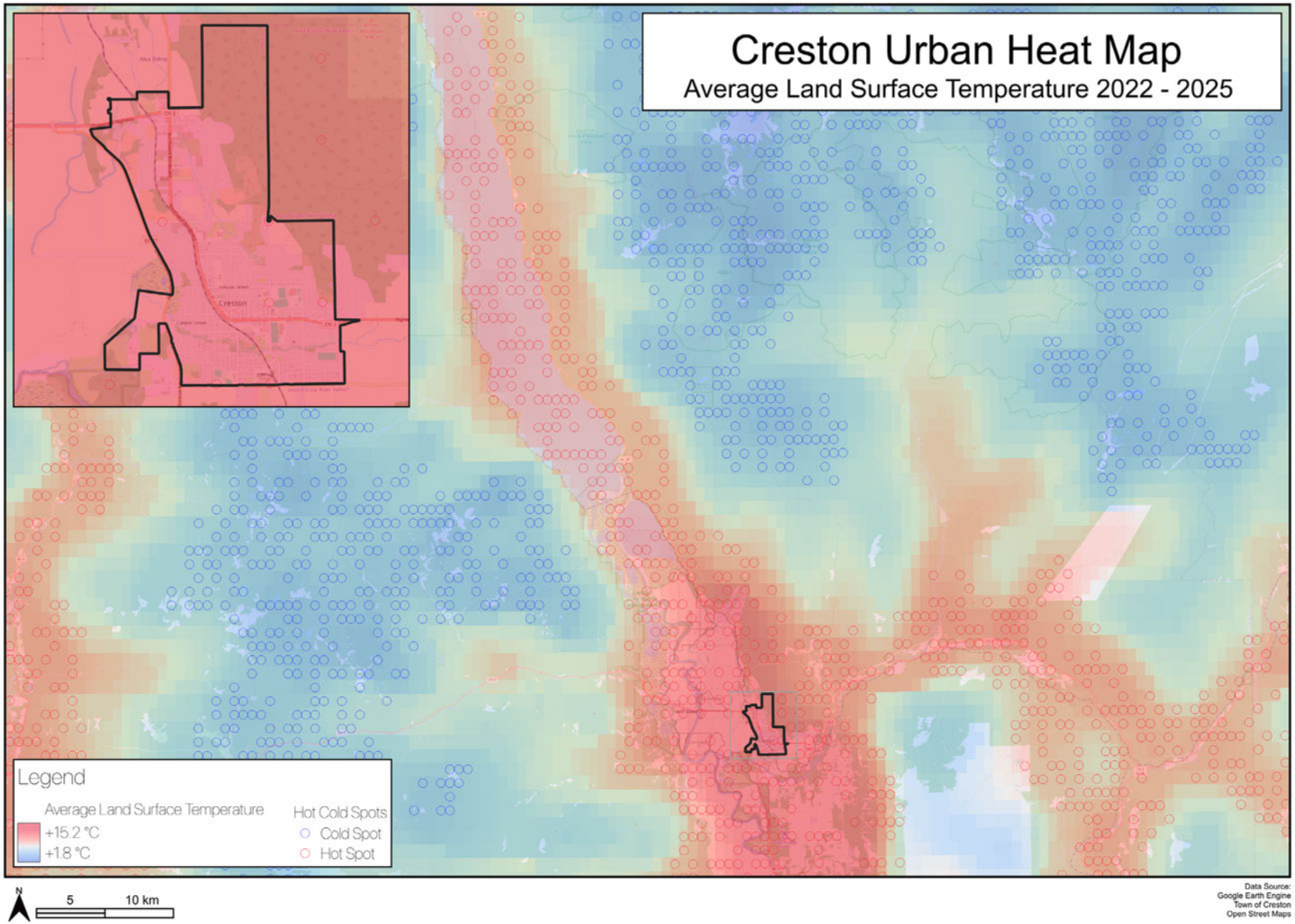
Wildfire Threat Map

This map shows the Provincial Strategic Threat Analysis (PSTA) wildfire risk ratings across the Creston area. Higher threat levels are concentrated in surrounding forested and mountainous areas, while the urban core has comparatively lower wildfire risk.



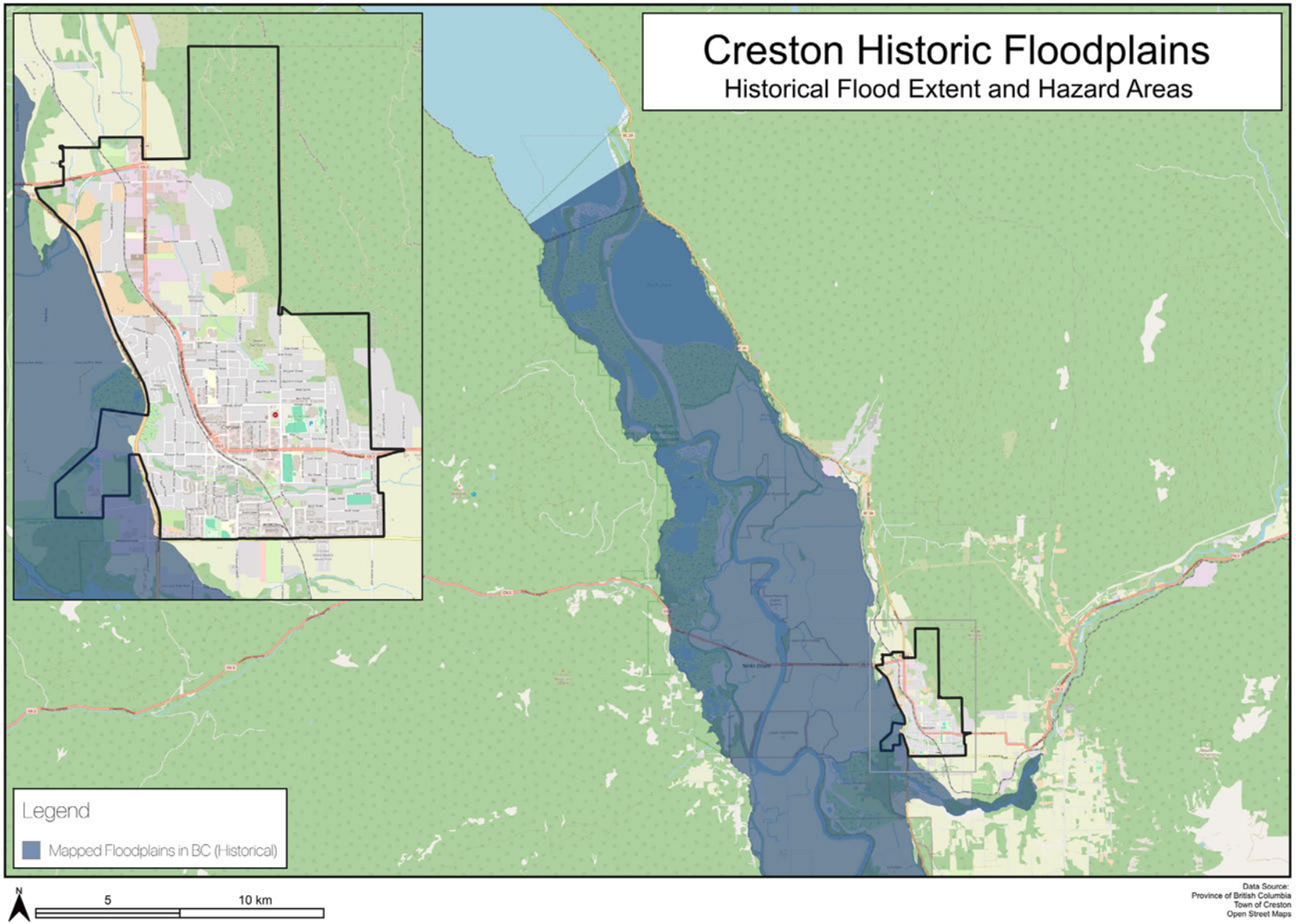
Urban Heat Island Map

This map shows average land surface temperatures (2022–2025), highlighting areas of higher and lower heat intensity. Warmer temperatures are generally concentrated in developed areas, while cooler zones are associated with vegetation and water bodies.



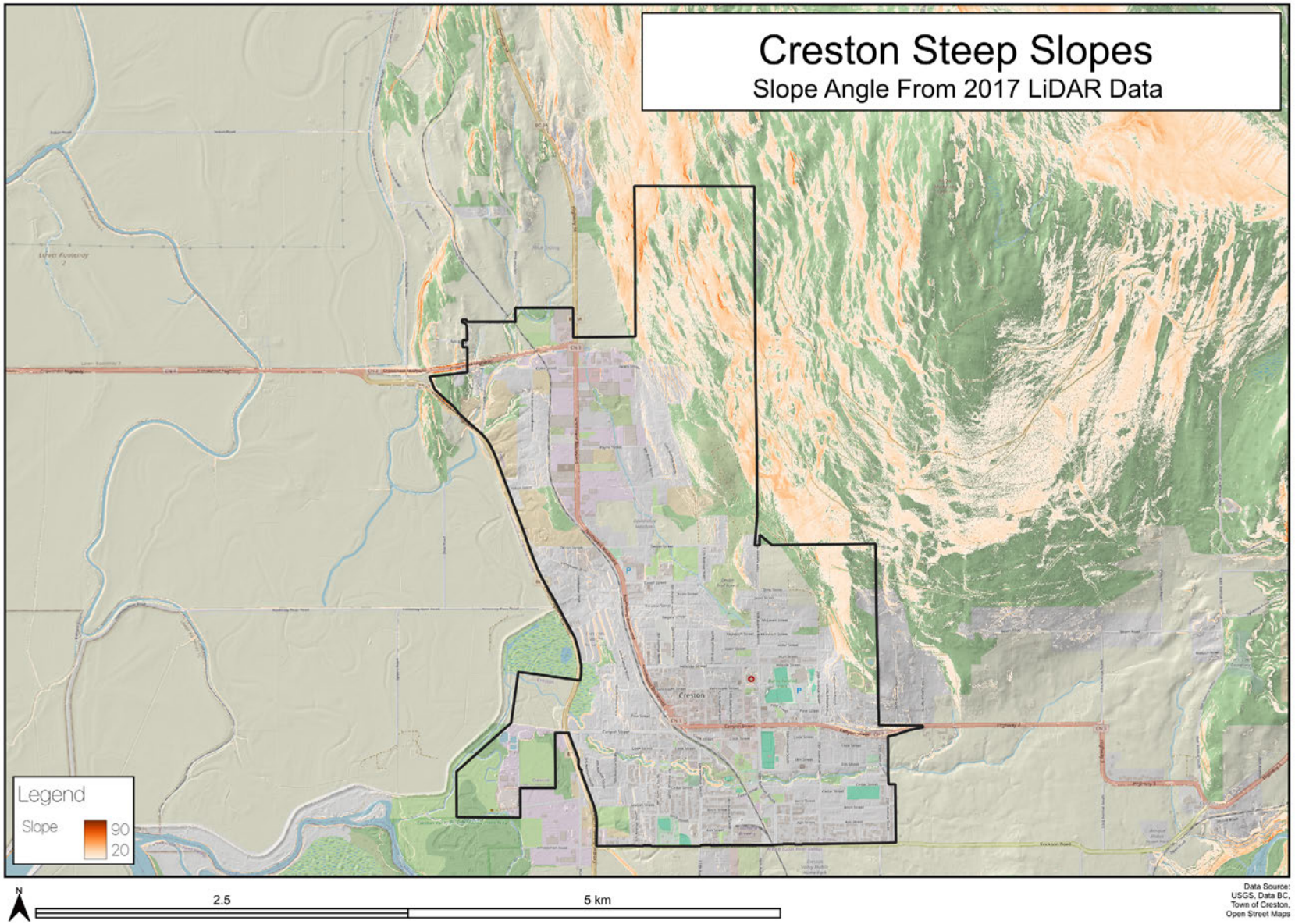
Historic Floodplains Map

This map outlines historically mapped floodplain areas and flood extents. Large portions of the Creston Valley, particularly near watercourses, have been subject to past flooding and remain areas of potential flood hazard.



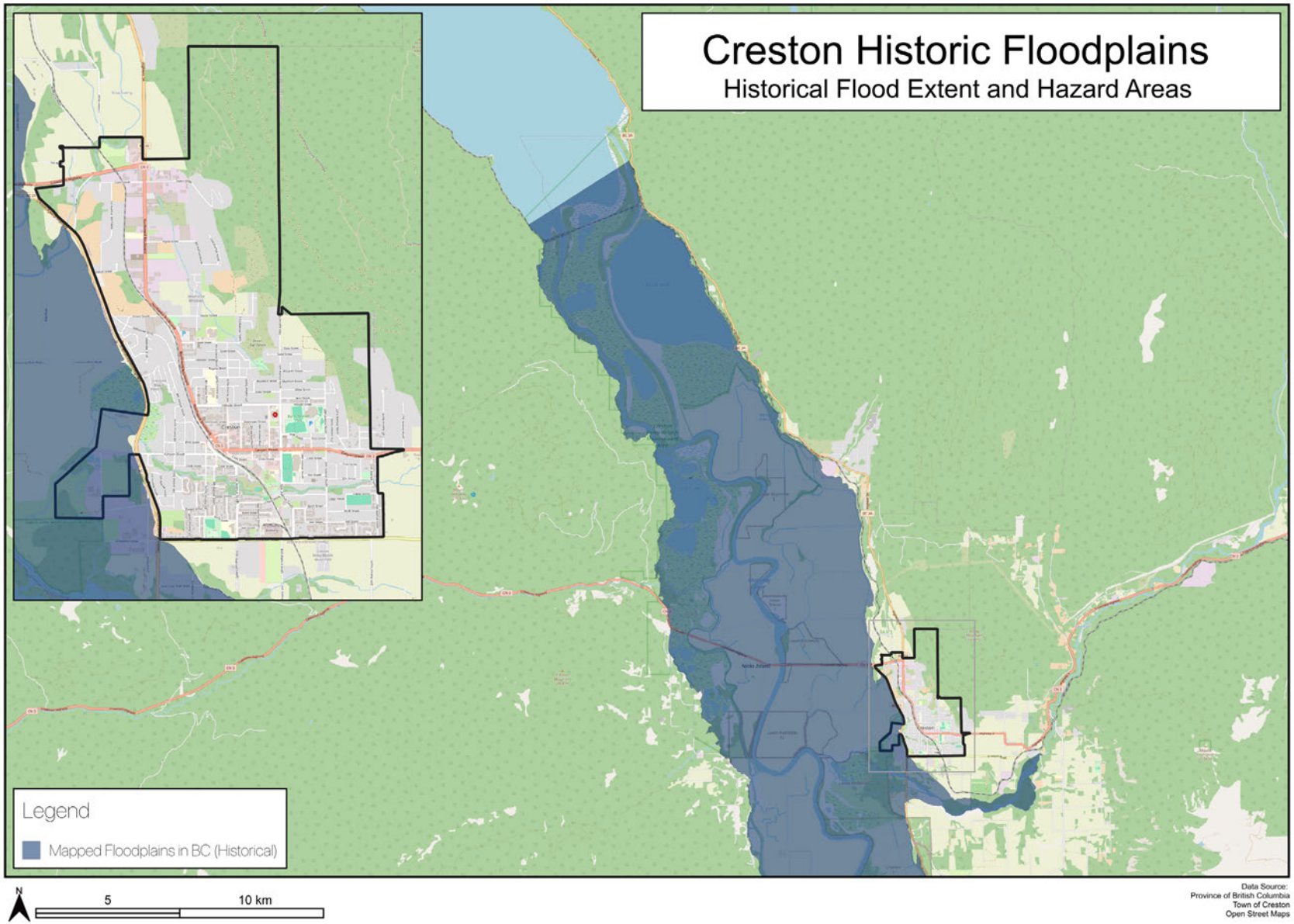
Steep Slopes Map

This map depicts slope gradients based on LiDAR data, identifying areas of steep terrain. Steeper slopes are concentrated on the eastern valley walls, indicating potential areas of instability or slope-related hazards such as landslides and avalanches.



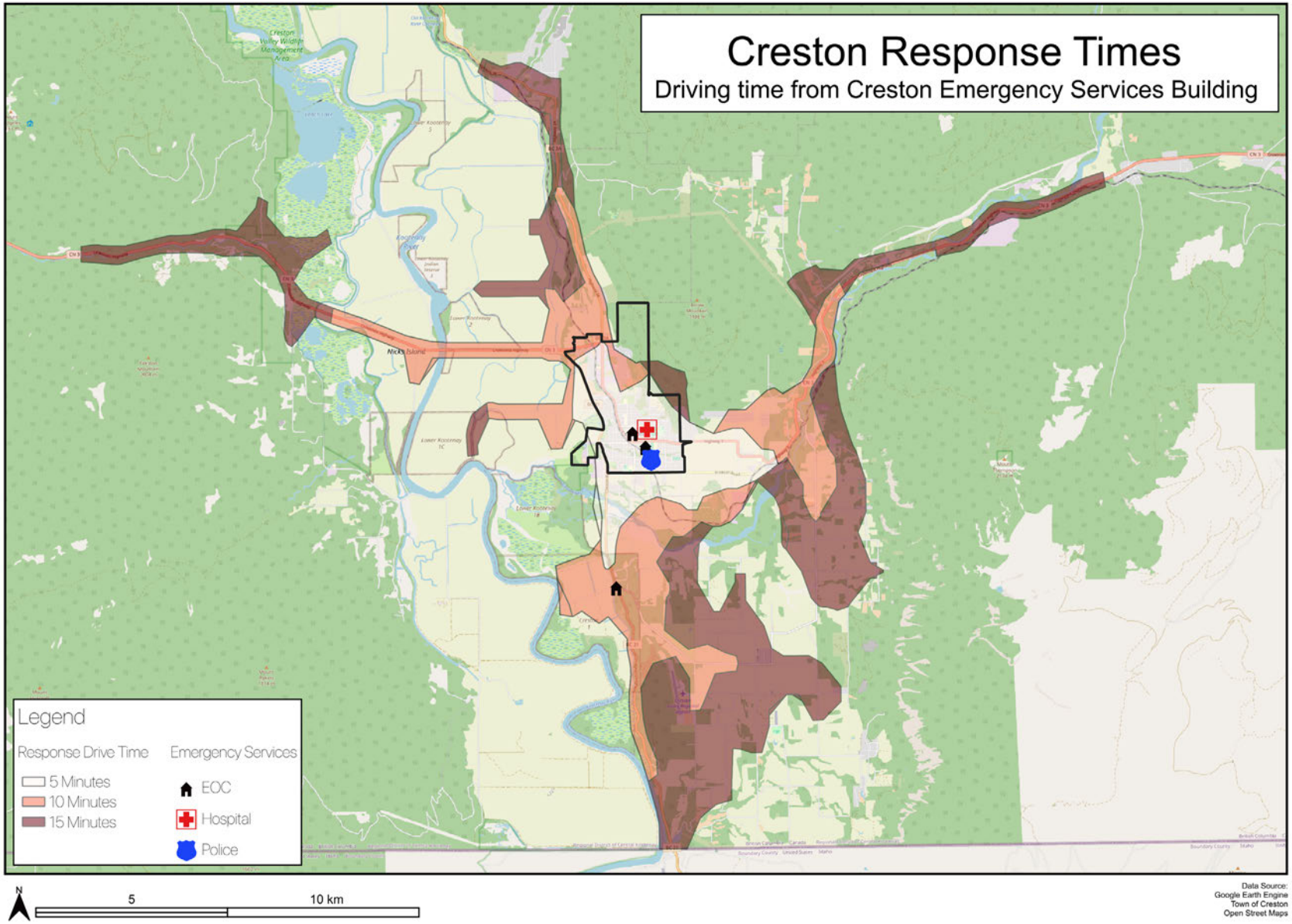
Flood Protection Map

This map highlights structural flood protection works, including dikes and erosion protection features. These measures are primarily located along major watercourses to reduce flood risk to agricultural lands and the community.



Response Time Map

This map illustrates estimated emergency response times from the Creston Emergency Services building. Most of the urban area is within 5–10 minutes, with longer response times in more rural and outlying areas.



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