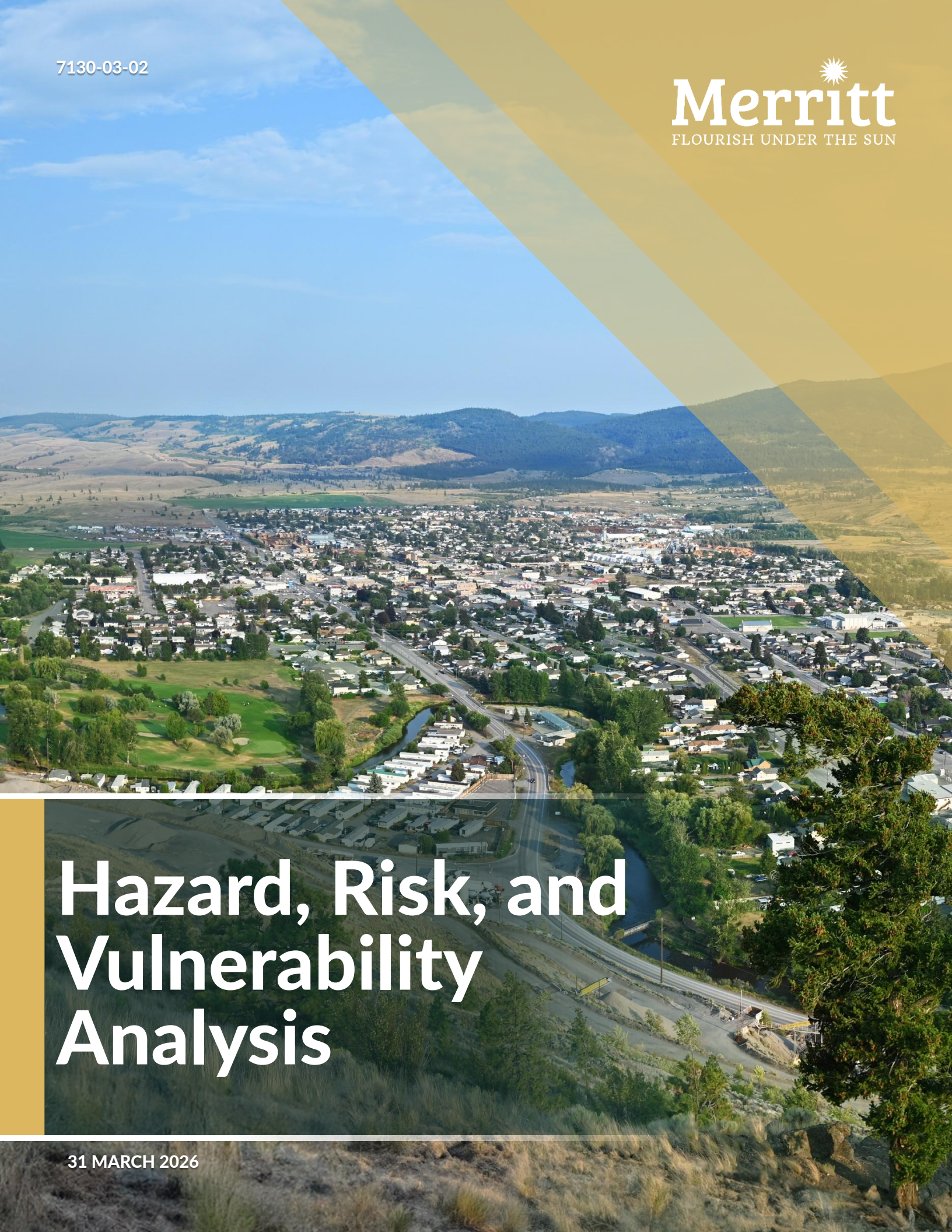
7130-03-02

Merritt
FLOURISH UNDER THE SUN



Hazard, Risk, and Vulnerability Analysis

31 MARCH 2026

Hazard, Risk, and Vulnerability Analysis (HRVA) 2026

Correspondence relating to this document or to the City of Merritt Emergency Program should be directed to emergency@merritt.ca.

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ACKNOWLEDGEMENTS

Land Acknowledgement

The City of Merritt respectfully acknowledges that it is located on the traditional, ancestral and unceded territory of the Nlaka'pamux and Syilx people.

Project Sponsor

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The Hazard, Risk, and Vulnerability Analysis was facilitated by members of Colliers Project Leaders — Climate Readiness and Community Recovery Team.

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The City of Merritt and Colliers Project Team wish to acknowledge the contribution of community partners, agency representatives, and First Nation community representatives who attended engagement sessions and provided their input and expertise to inform the Hazard, Risk, and Vulnerability Analysis. Your partnership and contribution are vital to keeping Merritt and its residents safe.

DISCLAIMER

This document has been prepared in collaboration with the City of Merritt and partner agencies. This document is intended for preparedness and planning purposes and is a living document that will be updated to inform emergency management plans as appropriate. Subsequent studies conducted for the Hazard, Risk, and Vulnerability Analysis may result in analyses and conclusions which differ from those in the report.

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The findings and guidance contained herein are based on information provided, participant engagement, and feedback, non-binding legislative and policy interpretations, and best practices in emergency management.

VERSION HISTORY

Version #	Date Completed	File Name	Comments
1.0	31 March 2026	Hazard, Risk, and Vulnerability Analysis	Colliers Project Leaders Submission
2.0	29 April 2026	Hazard, Risk, and Vulnerability Analysis	Revisions to Initial Submission
3.0	8 May 2026	Hazard, Risk, and Vulnerability Analysis	Various formatting changes; removed duplicate instance of “Electrical Outage” from Risk Matrix; citation list aligned with APA conventions. Changes by EPC Adam Hart.

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EXECUTIVE SUMMARY

The City of Merritt undertook a qualitative refresh of its 2007 Hazard, Risk, and Vulnerability Analysis (HRVA). This was completed through funding obtained from the Disaster Resiliency and Innovation Funding (DRIF) Program. Colliers Project Leaders' Climate Readiness and Community Recovery team was retained to facilitate the process and prepare the updated HRVA (henceforth referred to as "the HRVA") for the City of Merritt. This refresh is intended to meet modern emergency management expectations under the *Emergency and Disaster Management Act* of British Columbia and better reflect the municipality's current hazard and risk landscape.

The HRVA is an integral component of an emergency management program and supports local governments in making risk-based choices to prepare for, respond to, and recover from an emergency event. This report provides a comparison of risk across all applicable natural hazards that impact the City of Merritt. This includes atmospheric, geological, hydrological, and fire hazards that have occurred, could recur, or are likely to occur in the future. Findings from this report will support decisions made pertaining to the four pillars of emergency management: preparedness, mitigation, response, recovery, while also considering business continuity planning.

The approach utilized was adapted from the Emergency Management BC (now the BC Ministry of Emergency Management and Climate Readiness [EMCR]) HRVA Companion Guide. The analysis was informed through a combination of qualitative and quantitative data, technical expertise, and input provided by interested parties. Engagement sessions were held with City of Merritt representatives, partner agencies, and First Nation authorities. A survey was distributed to maximize engagement opportunities for participants.

Using the 2007 HRVA as a foundation, 36 hazards were selected for the analysis. Of these 36, 17 were natural hazards and within the scope of the HRVA refresh. Technological and human-caused hazards were included and updated in the Risk Assessment Matrix for a comprehensive comparison but otherwise excluded from the scope of this project. Hazards were assessed across likelihood of occurrence and the consequence of loss that could occur. Each hazard was awarded a likelihood score from 1–5 and a consequence score from 1–5 for each of four distinct consequence categories. These scores were assigned based on expert advice as well as local engagement and consultation. Using the standard formula of multiplying the likelihood score by the cumulative consequence score, each hazard was assigned a qualitative measure of overall risk.

The report also provides insight into resiliency and vulnerability in the municipality. The vulnerability of a community pertains to all social, physical, or environmental factors that could increase the susceptibility of an individual or community to an emergency. Critical infrastructure assets and systems were considered as part of the vulnerability and resiliency assessment of Merritt; however, this report does not provide site-level analyses of critical assets and services.

Climate change considerations were integral to the development of the report and utilized several data sources and models. British Columbia is facing warmer temperatures and more extreme

weather events at twice the national rate[1]. Based on these studies, communities will continue to face unprecedented climate disasters as experienced with the 2021 heat dome, the 2021 atmospheric river, and record-breaking 2023 wildfire and 2024 drought seasons.

Each hazard that was assessed includes a climate change indicator to show whether climate change is increasing or decreasing its effects. The Hazard Profiles include insights into climate change effects and projections for each high-ranking hazard. High-ranking hazards are events that received high risk scores. This analysis identified the following high-ranking hazards:

Table 1: Risk Assessment Findings

Hazard	Risk (1–250)	Climate Change Impact
Wildland-Urban Interface Fire	136	↑
Wildland Fire	130	↑
Riverine Flooding	128	↑
Extreme Rainfall	100	↑
Drought	95	↑
Ice Jam	93	↑
Extreme Heat	80	↑
Human Disease (Including Pandemic and Epidemic)	78	↑
Snowstorm and Blizzard	76	↑
Plant Disease, Pest Infestation, and Invasive Species	66	↑

This HRVA provides insights into local hazards and how to mitigate dangerous levels of risk, support emergency preparedness, and inform resiliency planning. This HRVA will contribute to the following:

- Provide input for the City of Merritt's Emergency Management Plan.
- Enhance community preparedness and public education information and initiatives.

1 Aubie Vines, G., Froese, C., Pacholik, C., Blackwell, B., Garratt, C., Pypker, T., Crew, A., Gislason, M., Safaie, S., Crichton, C., Harper, S., Scordo, E., Curry, C., Kennedy, A., Smith, T., Eyzaguirre, J., Lyle, T., Tsakonas, K., Fang, L., Onur, T., & Woo, A. (2025). *British Columbia disaster and climate risk and resilience assessment: Provincial report executive summary*. Government of British Columbia. https://nrs.objectstore.gov.bc.ca/xedyjn/Projects/2025/dcrra/DCRRA_execsummary_oct_2025.pdf

- Support City of Merritt elected leadership and professional staff in decision-making and budgeting relating to emergency preparedness and mitigation.

As the City of Merritt continues to grow and develop, and new analyses are completed, the HRVA should be re-evaluated to reflect new information.

CHAPTER 1 — INTRODUCTION

1.1 SCOPE

This Hazard, Risk, and Vulnerability Analysis (HRVA) considers all natural hazards that could present a risk to Merritt and its residents. Natural hazards are naturally occurring processes that could pose a threat to human health and safety, infrastructure, or the natural environment. These hazards could be geological, hydrological, biological, or meteorological in nature.

The HRVA process explores risk by examining the hazard frequency (likelihood) and the potential impact (consequence) that hazards may have on Merritt, including its people, infrastructure, and economy. The HRVA also provides a comparison of the natural hazards that were selected by the project team.

This HRVA was completed through funding made available under the Government of BC's Disaster Resiliency and Innovation Funding (DRIF) program. Due to grant funding availability, all human-induced and technological hazards are excluded. As such, this analysis is limited to natural hazards. Technological and Human-caused hazards are included in the Risk Assessment Matrix for awareness and comparison but are not a part of this project's analysis scope.

The depth of this analysis is limited to a high-level regional understanding of social vulnerabilities and demographics. The process did not allow for the collection or analysis of data specific to vulnerability at a neighborhood or community level. In addition, all natural hazards were assessed as individual events. Cascading or simultaneous hazard events are considered out-of-scope for this analysis.

This document complements the City of Merritt's Emergency Management Plan and Emergency Support Services Plan.

1.2 PURPOSE

An HRVA is an essential component of an emergency management program. The HRVA is an all-hazards risk assessment and is mandated under the *Emergency and Disaster Management Act* (EDMA) of British Columbia. The HRVA is a process to support local government and communities in making risk-informed choices to prepare for, respond to, and recover from hazardous or emergency events.

The HRVA is meant to provide a comparison of risks associated with hazards that could occur in the City of Merritt across all selected natural hazards. The analysis considers the frequency, or likelihood of an event, and the impact, or potential consequences, to evaluate each hazard. Even if a hazard occurs more frequently, if the consequences are minimal, its overall risk is considered lower compared to a hazard with higher consequences. Using these variables, it is possible to generalize and cross-compare hazards. Coupled with an understanding of climate change considerations and community vulnerability, an informed understanding of risk is possible.

This HRVA is a qualitative refresh of the HRVA completed for the City of Merritt by EmergeX Planning Inc., in 2007. This refresh is intended to align with updated legislative requirements and to better reflect the current hazard landscape of the region. This document will be used as the

foundation for the City of Merritt's Emergency Management Plan and as a source document to inform emergency management priorities.

1.3 LEGISLATIVE AUTHORITY

Section 51 of the *Emergency and Disaster Management Act* (EDMA) states that:

(1) In this section and section 52, "vulnerable", in relation to an individual, animal, place or thing, or a class of individuals, animals, places or things, means the following:

- (a) particularly susceptible, due to physical or geographic location or environmental factors, or other similar factors, to the adverse effects of an emergency;
- (b) having prescribed characteristics.

(2) A risk assessment must be prepared in accordance with this section and the regulations.

(3) Subject to Division 2 *[Duties of Regulated Entities]* of this Part and the regulations, a risk assessment must identify all reasonably foreseeable hazards and assess all of the following:

- (a) the extent of the risk that each hazard presents, including
  - (i) the likelihood that an emergency may occur, and
  - (ii) the potential scale and scope of each emergency identified under subparagraph (i);
- (b) the potential consequences for persons or property, or for objects or sites of heritage value, if an emergency occurs, giving special consideration to
  - (i) individuals who may experience intersectional disadvantage, and
  - (ii) vulnerable individuals, animals, places or things;
- (c) any prescribed matters.

(4) A risk assessment must be based on all of the following:

- (a) studies and surveys;
- (b) Indigenous knowledge and local knowledge, if available;
- (c) changes in the local climate or extreme weather events that can reasonably be expected to result from a changing global climate;
- (d) other relevant information that is reasonably available from prescribed sources of information or any other source;
- (e) the results of the actions required under sections 54 *[consultation and coordination with local authorities]* and 55 *[consultation and cooperation with Indigenous peoples]*.

Critical infrastructure assets included in the analysis were identified by the City of Merritt's Emergency Management Program. Only municipal assets were included in the analysis. The analysis is limited to the identification of assets; site-level vulnerability analyses are considered out-of-scope.

The risk scores presented in this document are applicable to the City of Merritt as a whole and thus may not reflect specific risk to an individual, neighborhood, or community. The analysis does present information, informed by engagement findings, of geographic areas that may face higher risk due to infrastructure or geographic limitations.

1.4 APPROACH AND METHODOLOGY

The approach utilized was adapted from the Emergency Management BC (now the BC Ministry of Emergency Management and Climate Readiness (EMCR)) HRVA Companion Guide. The analysis was informed through a combination of qualitative and quantitative data, technical expertise, and input provided by interested parties. Engagement sessions were held with City of Merritt representatives, partner agencies, and First Nation authorities. The HRVA Companion Guide provides the framework and standard guideline for HRVAs through a nine-step process involving engagement and research into qualitative and quantitative sources.

This analysis was informed through a combination of engagement and qualitative research which included a cross jurisdictional analysis, an evaluation of current research, and input from key parties through several engagement avenues. Due to project constraints, engagement opportunities were limited to subject-matter experts, Indigenous Governing Bodies, and response agencies. Public engagement was not included in this iteration of the analysis.

1.4.1 ENGAGEMENT

Engagement is an integral component of the analysis process. Parties are engaged to help shape and inform the Project Team's understanding of the community and hazard landscape. The parties are carefully selected based on their technical expertise, lived experiences, and shared jurisdictional mandates and responsibilities. Several virtual and in-person engagement opportunities were conducted from November 2025 to January 2026. These opportunities provided an avenue for participants to inform the analysis and provide information regarding community vulnerability, hazard consequences, and disaster risk reduction measures in place. Engagement opportunities included an in-person workshop, three group discussions, and a survey. Engagement outcomes informed consequence scoring, risk assessment outcomes, and hazard profiles with a summary included in Appendix G.

1.4.2 HAZARD IDENTIFICATION

The first step in this analysis process was to identify all natural hazards that could pose a threat to health and safety, the local infrastructure, and the environment surrounding the City of Merritt. A hazard list was developed using the 2007 HRVA as a foundation. Updates were made based on information gathered from the BC Ministry of Emergency Management and Climate Readiness, Public Safety Canada, and research into historical emergency events, as well as a review of HRVAs from nearby municipal governments and First Nations.

Table 2: Natural Hazards List

Category	Hazard
Atmospheric	Extreme Heat (Heat Wave and Heat Dome)
	Extreme Cold
	Freezing Rain
	Hail
	Extreme Rainfall
	Severe Thunderstorms
	Snowstorms and Blizzards
Geological	Mass Wasting Events (Slides, falls, flows, creep, and slumps)
	Land Subsidence (and Sinkholes)
	Earthquakes
	Erosion and Sedimentation
	Volcanic Ashfall
Hydrological	Drought
	Riverine Flooding
	Ice Jam
Fire	Wildland Fire
	Wildland-Urban Interface Fire
Disease and Epidemic	Human Disease (including Pandemic and Epidemic)
	Livestock (or Animal) Disease
	Plant Disease and Infestation

Table 3: Technological and Human-Caused Hazards List

Category	Hazard
Hazardous Materials and Explosions	Pipeline Explosion and Leaks
	Hazardous Materials (In Situ)
	Dangerous Goods Accident
Infrastructure Failure	Dam and Spillways Failure
	Structure Failure
	Electrical Outage

Category	Hazard
Interruption to Critical Services	Telecommunications Interruption
	Transportation Route Interruption
	Wastewater Interruption
	Water Service Interruption
Security	Major Planned Event
Transportation	Aircraft Incident
	Motor Vehicle Incident
Fire	Structure Fire

1.4.3 LIKELIHOOD ANALYSIS

Each hazard is evaluated against the likelihood of it occurring and the potential severity of its consequences. Likelihood is defined as the probability of an event occurring within a select timeframe. In this analysis, the timeframe is set to a 1–100-year period following standard emergency management practices and EMCR's HRVA Companion Guide. A five-point scale was created to assess likelihood. Scoring was assigned to each hazard and informed using previous HRVAs, hazard analyses, and historical records.

Table 4: Likelihood Scoring

Likelihood Rating	Scoring	Frequency
Almost Certain	5	Event is expected to occur annually or more frequently.
Likely	4	Event is expected to occur about once every 3–10 years.
Possible	3	Event is expected to occur about once every 11–50 years.
Unlikely	2	Event is expected to occur once about every 51–100 years.
Rare	1	Event is expected to occur less than once every 100 years.

1.4.4 CONSEQUENCE ANALYSIS

Consequences refer to the severity of potential impacts that could occur. This includes any physical, environmental, social or economic outcomes that could result from a hazard event. Understanding the potential consequences is integral to evaluating risk as the type and severity vary between each hazard.

Ten consequence categories were used in the analysis. These categories were informed by Emergency Management BC's HRVA Companion Guide. Modifications were made to the categories and definitions to reflect the local context of the City of Merritt. The ten categories were split into four themes: People, Physical, Financial, and Social. Each consequence was defined for consistency and clear understanding among the Project Team and all engagement participants.

Table 5: Consequence Definitions

Themes	Consequence Categories	Definition
People	Threat to Safety	Potential number of community members that could suffer injury, illness, hospitalization, or loss of life.
	Displacement	Potential disruption to daily routines which could require households, neighbourhoods, or the whole community to evacuate, shelter-in-place, or permanently relocate
Social	Mental Health	Impacts to the emotional and mental well-being of community members, households, and community groups.
	Support System	Loss of access to social support networks, community cooperation, and trust.
	Cultural	Loss of cultural practices, heritage, or identity. This may include the loss of artefacts, places, practices, and ecology that are integral to the history, culture, and collective memory of a community.
Physical	Property Damage	Potential damage, destruction, or repair of primary residences, secondary structures, and other forms of property such as crops, etc.
	Critical Infrastructure Impact	Disruption or damage to critical infrastructure assets and services that may result in direct consequences to the health, safety, security, and economic well-being of community members and the effective functioning of government.
	Environmental Damage	Potential damage, degradation, or loss of an ecological system or the natural environment. This includes impact to the soil, water, air quality, and all living beings.
Financial	Economic	Disruption or loss of ability of individuals, businesses, and governments to generate income. This includes interruptions to the consumption, production, and trade of goods and services.
	Reputational	Negative change, perception, or loss of trust in government in the minds of the community, its partners and others who are vital to its success.

A five-point scale was created for each consequence category. Rankings were clearly defined to improve consistency among scorers and to allow for comparison and consistency across each consequence assessed. Hazards were ranked from 1 to 5 across each category for a total consequence score between 10 to 50.

1.4.5 RISK ANALYSIS

Following the Likelihood and Consequence Analyses described above, risk was evaluated for each hazard. Risk is calculated using a standard formula of likelihood multiplied by cumulative consequence. As a concept, risk considers the likelihood of an occurrence of a hazard and the

potential impact that could occur on people, social wellness, the physical environment, and across financial dimensions.

Hazard	Minimum Likelihood	Minimum Human Impacts	Minimum Social Impacts	Minimum Physical Impacts	Minimum Economic Impacts	Minimum Risk	Climate Change Impact
Hazard Name	1 *	(2 +	3 +	3 +	2)	= 10	↑ Increasing ↓ Decreasing ✕ No Change

Hazard	Maximum Likelihood	Maximum Human Impacts	Maximum Social Impacts	Maximum Physical Impacts	Maximum Economic Impacts	Maximum Risk	Climate Change Impact
Hazard Name	5 *	(10 +	15 +	15 +	10)	= 250	↑ Increasing ↓ Decreasing ✕ No Change

Figure 1. Example risk analysis process

CHAPTER 2 — COMMUNITY OVERVIEW

2.1 GEOGRAPHY

Merritt lies at the confluence of the Nicola and Coldwater rivers and is an area rich in natural landscapes, known for its location along primary transportation routes such as the Coquihalla Highway (Highway 5), the Okanagan Connector (Highway 97C) and Highway 8. It is a regional hub for the Nicola Valley which is the gateway to the Lower Mainland and Okanagan Region. The City of Merritt is a member of the Thompson-Nicola Regional District (TNRD) and comprises eleven neighbourhoods, including the City Centre, Parkdale, Diamond Vale, Middleboro, Collettville, Riverside, Bench, Grandview, Airport and Ranchlands[2].

Figure 2. Photo of City of Merritt signage

2.2 DEMOGRAPHY

With a population of 7,051 as of 2021, Merritt is the second-largest community in the TNRD. Merritt's population declined slightly between 2016 and 2021 but is expected to grow with the rise of development and continued affordability. This affordability will likely attract retirees to the municipality, thus growing the older age cohort. This is slowly being reflected in Merritt's demographics, where the median age of residents has increased from 46.5 to 49.2 from 2016 to 2021[3]. Merritt attracts hundreds of tourists and travellers, particularly during the summer. The high tourism in and around Merritt will result in population surges especially during peak hazard seasons.

[2] City of Merritt. (2022). *Official community plan.* https://www.merritt.ca/wp-content/uploads/2024/10/2336_Official-Community-Plan_with-Amendments_2024_SM.pdf
[3] City of Merritt. (n.d.). *Merritt business & investment.* https://www.merritt.ca/invest/

Merritt's residents are situated on 173 hectares of land which are designated as residential parcels, with a significant portion residing in central areas[2]. Residential land is limited within Merritt, and additional development is required to meet growing population needs. It is estimated that the population will grow by up to 1.8% per year[2]. According to the 2021 Census, homeownership has increased, with up to 2,180 residents owning homes. Most homes in Merritt are classified as single-detached homes.

Merritt's diversity is reflected in its community composition, with approximately 8.6% of the population identifying as a visible minority. Of the visible minority population, more than half identified as South Asian.

Table 6: Summary of Demographics[4]

Demographic	Value
Total Population	7,051
Total Visible Minorities	610
Median Age	49.2
Median Household Income	$70,000
Total Private Dwellings	3,149
Number of Homeowners	2,180
Number of Renters	800

2.3 ECONOMY

Historically, Merritt was a rich resource-based economy comprised of ranching, farming, mining, and logging activities. These industries thrived and triggered rapid growth of businesses, attracting people to the municipality seeking employment opportunities. Population growth, coupled with changing employment trends, modernization and partnership agreements, has diversified the municipality's economy in recent years. Merritt has partnerships with surrounding First Nation communities which strengthens economic partnerships and boosts services between them[5]. Merritt is home to the Nicola Valley Institute of Technology (NVIT), British Columbia's only Indigenous post-secondary institution.

Merritt's economy has grown around recreational and service-based activities. Some known tourism and recreational activities include regional music events, hiking trails, horseback riding, historical museums, ranching sites, and more.

[4] City of Merritt. (n.d.). *Merritt business & investment*. https://www.merritt.ca/invest/
[5] City of Merritt. (2026). *Introduction to Merritt*. https://www.merritt.ca/introduction-to-merritt/

2.4 INDIGENOUS COMMUNITIES

Merritt is located on traditional, ancestral and unceded territory of the Nle?kepmx and Syilx peoples. There are six First Nation communities that are nearby to Merritt and are part of the Citxw Nlaka'pamux Assembly and Scw'exmx Tribal Council. The closest is the Lower Nicola Indian Band to the north which has reserve land located adjacent to municipal boundaries of Merritt[6]. The remaining five Nations are Shackan, Nooaitch, and Cook's Ferry Indian Band located to the west, Upper Nicola to the east and Cold Water to the south.

Collaboration, respect and learning are key factors in working with Indigenous communities towards safeguarding people and environment. As the stewards of this land, Indigenous knowledge transcends generations and maintains communities' connections to the land. Integrating Indigenous knowledge into scientific analyses will embed communities' lived experiences, traditional knowledge and practices validate findings and contribute towards risk reduction.

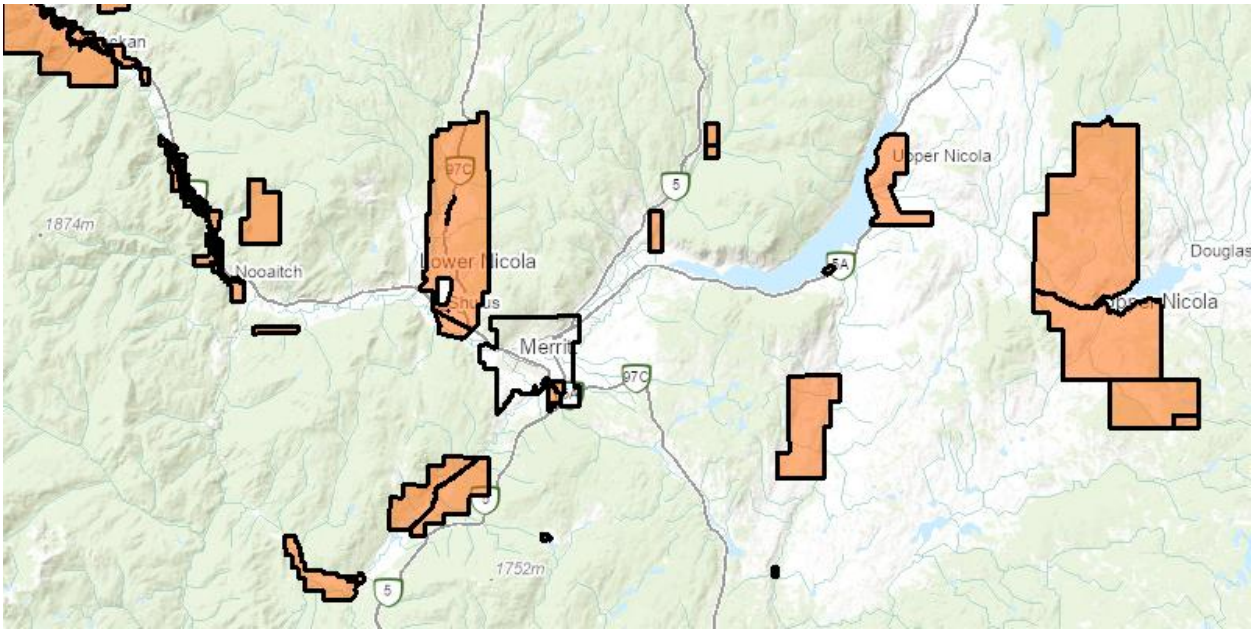

Figure 3. Map of First Nations reserves in the Merritt area[7]

[6] B. A. Blackwell and Associates Ltd. (2025). *Community wildfire resiliency plan*. https://www.merritt.ca/wp-content/uploads/2025/03/Merritt_CWRP_2024_FINAL-06Feb2025.pdf

[7] Government of British Columbia. (n.d.). *B.C. hazard insights tool*. https://bchazardinsightstool-bcgov03.hub.arcgis.com/

CHAPTER 3 — RESILIENCY AND VULNERABILITY

It is essential to consider the factors that may influence a community's vulnerability in the face of a hazard event. These factors can either be physical, social, economic or environmental in nature and increase or decrease a community's susceptibility to impacts. These factors collectively are utilized to define vulnerability and can lead to different outcomes between individuals, neighborhoods, or communities from the same event. These factors exist concurrently for individuals and communities and cannot be thought of in isolation. Looking at all vulnerability factors can help us understand and prioritize risks based on how susceptible these communities may be to specific hazards.

3.1 SOCIAL VULNERABILITY

People living in the same area and experiencing the same emergency can be affected very differently. These differences are often shaped by social, economic, and cultural factors that influence a person's ability to prepare for, respond to, and recover from an event. These conditions are known as social vulnerability and often result from systemic barriers and long-standing inequities. These factors often overlap. The concept of intersectionality explains how aspects of a person's identity such as age, ethnicity, gender, income, or immigration status can combine to increase vulnerability[8]. In an emergency context, individuals facing socio-economic marginalization are often disproportionately impacted. This can include people experiencing homelessness, older adults, children and youth, low-income households, racialized individuals, and newcomers or immigrants.

3.1.1 SENIORS AND YOUTH

Nearly one third of Merritt's population is comprised of seniors. Per the 2021 Census, 27.8% of Merritt's residents are above the age of 65, an increase from previous years. Seniors are more vulnerable to health and mental health impacts arising from emergencies. Natural hazards such as extreme heat or reduced air quality can exacerbate underlying health and mental health conditions. Compounded with the potential for service disruptions (i.e. power outages), their social isolation, or reduced mobility places seniors at higher risk during emergencies.

Youth (0 — 14 years) comprise 15.6% of Merritt's population. Though not a high percentage, youth are particularly vulnerable to health and mental health impacts arising from hazard events.

3.1.2 LOW INCOME HOUSEHOLDS

Approximately 14% of households in Merritt are low income, earning less than 50% of the median income. Households with lower incomes are more susceptible to hazard events, with limited resources affecting their preparedness and recovery. This could occur from financial constraints, the quality of housing, and a lack of spending power or savings.

[8] Crenshaw, K. (1991). Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color. *Stanford Law Review*, *43*(6), 1241–1299. https://doi.org/10.2307/1229039

3.1.3 INDIGENOUS POPULATIONS

Approximately 22% of the population identify as Indigenous[9] in Merritt. Due to the historic and structural barriers, violence and marginalization, Indigenous peoples are more susceptible to impacts from hazard events. The ongoing racism, colonial practices and intergenerational trauma have perpetuated health, social and economic inequities that reduce overall resiliency and autonomy. Coupled with resource inequalities, potential displacement, or damage of traditional lands can exacerbate impacts from hazards and cause further disenfranchising and mental health impacts.

3.1.4 RESIDENTS EXPERIENCING HOMELESSNESS

There has been a steady increase in residents experiencing homelessness in the municipality. A Point-in-Time (PiT) count conducted by the Homelessness Services Association of BC provides an estimate of 94 residents in Merritt in 2025 who are experiencing homelessness. A PiT is a snapshot of community members who are experiencing homelessness within a 24-hour period[10]. A PiT serves as a best estimate and at most can be considered the minimum estimated number as some residents experiencing homelessness may be temporarily housed with friends, relatives, etc. or residing in non-visible locations (referred to as "unsheltered homelessness").

There are disproportionate rates of Indigenous people experiencing homelessness which is rooted in historical and ongoing barriers, structural violence, and intergenerational trauma. These factors can limit resources and housing options that are available making it harder to acquire safer and stable housing[10]. There are several factors that can contribute to barriers to housing including higher rents and mortgages, lower income, mental health issues, disabilities, trauma and more. In Merritt, over 70% of residents experiencing homelessness face challenges with mental health and substance use with 63% experiencing both[10].

Residents who may experience homelessness are more vulnerable to emergency events, especially extreme weather events such as winter storms, extreme cold or extreme heat. This is primarily due to their increased exposure to the elements and limited sheltering options. In the case of extreme weather events, the City of Merritt and BC Housing will coordinate the implementation of warming or cooling centres, operated by non-profit groups, to provide sheltering options for residents.

3.1.5 TRANSIENT GROUPS

Merritt attracts countless visitors every year for nature and recreation opportunities, cultural and music events. It is also the regional hub for the Nicola Valley with residents visiting for services, employment, and healthcare. Tourists, particularly those not familiar with specific hazards, are more vulnerable due to their unfamiliarity with the region, limited supports or financial resources, and access to preparedness information.

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[9] Statistics Canada. (2025, December 9). *Focus on geography series, 2021 census of population*. Government of Canada. https://www12.statcan.gc.ca/census-recensement/2021/as-sa/fogs-spg/page.cfm?topic=8&lang=E&dguid=2021A00055933006

[10] Homeless Services Association of BC. (2025, April 3). *Merritt — 2025 homeless count*. https://www.bchousing.org/sites/default/files/media/documents/Homeless-Count-Merritt-2025.pdf

3.2 CRITICAL INFRASTRUCTURE

Critical Infrastructure, as defined by Public Safety Canada, is the "processes, systems, assets, and services essential to the health, safety, security or economic well-being of Canadians and the effective functioning of Government." Critical Infrastructure spans ten sectors:

1. Energy and Utilities (e.g. natural gas, transmission lines and systems, and electrical power)
2. Finance (e.g. banking)
3. Food (e.g. food industry including distribution and storage, and agriculture)
4. Government (e.g. services, facilities, and historical sites)
5. Health (e.g. hospitals, pharmacies, and healthcare and blood supply facilities)
6. Information and Communication Technology (e.g. telecommunications, software, hardware or networks including internet)
7. Manufacturing
8. Safety (e.g. emergency services, search and rescue services, and dams)
9. Transportation (e.g. air, marine, and rail or road networks and assets)
10. Water (e.g. water and wastewater management systems, and assets and technologies)

Critical infrastructure assets falling within the energy and utilities, transportation, and water sectors are detailed below. Due to the project's scope, further discussions are recommended with critical infrastructure operators within the remaining sectors to understand their vulnerability and resiliency of these assets.

3.2.1 ENERGY AND UTILITIES INFRASTRUCTURE

The City of Merritt is supplied with all electrical power via BC Hydro which is distributed via the substation located at 3420 Voght Street that connects through the BC Hydro transmission grid through overhead lines and the Merritt Green Energy Plant. In the event of sustained damage to the substation or transmission line, the City could experience significant power outages. While not a major concern, if prolonged, sustained power outages could impact critical services such as water and wastewater systems or affect vulnerable residents during extreme weather events or those requiring electricity for medical needs.

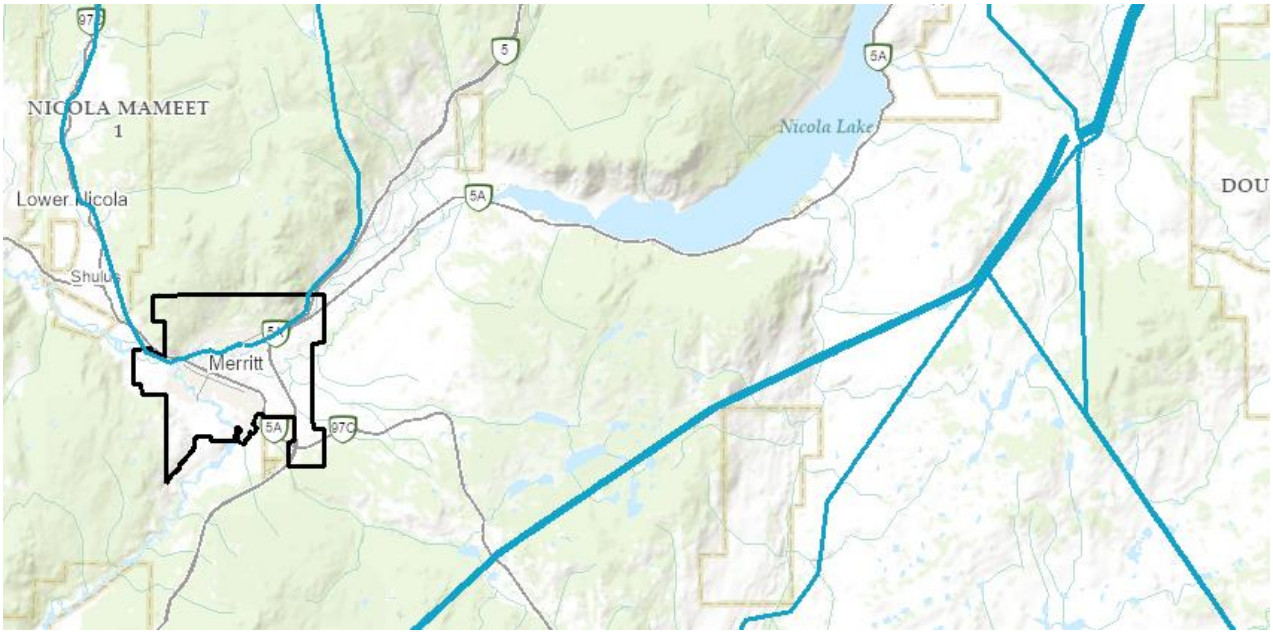

Figure 4. Map of BC Hydro transmission circuits in the Merritt area

The City of Merritt's communication infrastructure includes Voyent Alert!, the BC Emergency Alert Notification Program, and the City of Merritt website and social media pages. Voyent Alert! is a subscription-based mass notification system used to send non-intrusive alerts via landline, text message or phone call to registered participants. It is the primary notification system used by Merritt for sharing critical emergency information but is constrained to registered participants. The BC Emergency Alert Notification Program is used when there is an immediate threat to human life. For emergency events that pose an immediate threat to life and safety, the BC Emergency Alert is used instead.

3.2.2 TRANSPORTATION INFRASTRUCTURE

Merritt is situated along critical transportation routes that lead into the City and connect with surrounding communities such as Kamloops (to the north) and Kelowna (to the east). The major highways into Merritt include Coquihalla Highway (Highway 5), Highway 5A, Nicola Avenue (Highway 97C) and Voght Street. These transportation routes are integral to Merritt and surrounding communities as they serve as primary connection routes and as potential evacuation routes during an emergency and disaster event.

Merritt can only be accessed via road using personal vehicles or by bus as there are no direct rail services that connect to the City of Merritt and no regional airport within municipal boundaries. The municipality has a local transit system that connects North End, Collettville, Diamond Vale and Lower Nicola and provides supportive programs to ensure transit is accessible and equitable for all residents[11].

[11] City of Merritt. (2025, June 16). *Merritt transit services*. https://www.merritt.ca/transit/

3.2.3 WATER INFRASTRUCTURE

The City of Merritt's potable water is supplied from five groundwater wells including Voght Park VFD, Voght Park GE, Fairley Park, Collettville, and Kengard. Each of the wells, apart from Kengard, are located adjacent to the Coldwater River[12]. The aquifers that provide Merritt's potable water are vulnerable to drought conditions or potential water contamination. In 2024 and 2025, Merritt experienced low groundwater levels arising from lower-than-average snowpack[13]. Water conservation efforts were implemented to reduce unnecessary potable water use including watering restrictions, ensuring water meters are in place, implementing a leak detection program[12].

For all water conservation guidelines, the municipality follows the guidelines outlined in the Water Sustainability Act through the Province of British Columbia. This is coupled with the Source Water Assessment and Protection Plan completed for Merritt which provides recommendations on improving drinking water safety based on potential infrastructure vulnerabilities or contaminants.

There is a local community airport in Merritt which does not serve commercial travel. The nearest commercial airport is Kelowna International Airport (YLW). The Airport Terminal Building located on 4510 Airport Road serves as Merritt's alternate EOC location and as such is considered a critical facility.

3.3 ANIMAL AND LIVESTOCK CONSIDERATIONS

In the event of an emergency, residents of the City of Merritt are responsible for the care, transport, and safety of their pets and any small-scale livestock. Animal ownership introduces an important household-level vulnerability, as individuals must ensure their animals are included in emergency planning and evacuation procedures. Failure to do so may result in delayed evacuation or non-compliance with evacuation orders, increasing risks to personal safety and placing additional pressure on emergency response efforts.

Households with multiple animals, limited transportation, or financial constraints may face greater challenges in evacuating safely. As such, residents are encouraged to prepare in advance by arranging transportation, maintaining appropriate supplies (e.g., food, water, medications), and ensuring animals can be identified and reunited if separated. Guidance on emergency preparedness for pets is available through the Government of British Columbia and the Canadian Disaster Animal Response Team (CDART), which outline best practices for including animals in emergency plans and evacuation readiness[14].

Animal-related considerations in this assessment are primarily understood as a behavioural and social vulnerability, influencing evacuation compliance, sheltering needs, and demand for emergency support services. Broader agricultural risks, including pests, disease, and biosecurity

[12] City of Merritt. (n.d.). *The complete circle presentation*. https://www.merritt.ca/wp-content/uploads/2020/01/Water-Report_the_complete_circle.pdf
[13] City of Merritt. (2025, October 14). *Watering restrictions*. https://www.merritt.ca/watering/
[14] Canadian Disaster Animal Response Team. (n.d.). https://www.cdart.org/

considerations, are addressed in relevant hazard-specific sections of this report as well EMCR has prepared a Livestock Relocation Policy[15] to assist local governments in being prepared.

[15] Government of British Columbia. (2025, January 13). *Livestock relocation policy 2.01*. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/embc/policies/201_provincial_support_for_livestock_relocation_policy.pdf

CHAPTER 4 — CLIMATE CHANGE

According to the United Nations, climate change is defined as the long-term shifts in temperature and weather patterns. It has resulted in warming of global temperatures, changing weather patterns, sea level rise and unpredictable and consequential weather events. These shifts can occur from natural causes or from human-caused activities. Human activity is the primary driver of climate change, contributing to the continued release of greenhouse gases (GHG). As GHG emissions continue to rise, so will the effects of climate change.

In Canada, warming is occurring at twice the global rate. This warming is not distributed equally across regions or experienced equally across seasons. A higher rate of warming is occurring in winter compared to other seasons and is most acutely felt in the northwestern regions (such as British Columbia, Alberta or the Territories) with an average increase of 5°C from 1948 to 2016[16]. Per the Coupled Model Intercomparison Project (CMIP), an international climate modelling project, extreme temperatures are projected to increase under all emission scenarios[16]. Coupled with warming temperatures, an increase in annual precipitation amounts, reduction in snow cover and thinner or shorter periods of sea and lake ice can be anticipated.

In British Columbia, communities are already experiencing warmer seasons, more severe weather events, deadlier wildfire seasons and recurring drought conditions. According to the *British Columbia Disaster and Climate Risk and Resilience Assessment*, into 2050 communities will experience warmer seasons with more frequent heat events, reduced precipitation amounts, more drought conditions, and an increase in severity of weather events[17]. Coupled with the effect on hazard conditions, communities will likely face more recurring and compounding hazards events with devastating consequences. In 2021, British Columbia experienced a heat dome that led to 619 heat-related deaths[18]. In the same season, communities experienced significant drought conditions and the third worst wildfire season on record. 2023 marked British Columbia's most destructive and expensive wildfire season to date[19] and record-breaking drought seasons occurred from 2023 to 2024[20].

Merritt faces similar climate impacts, with local climate trends indicating warmer, drier seasons, intense precipitation events, and severe weather and wildfire risk. The climate impacts are compounded by Merritt's urban sprawl, development along the Wildland-urban interface (WUI), and its location along the confluence of the Nicola and Coldwater Rivers. Climate trends for Merritt include the following:

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[16] Gifford, R., Brown, C., Baron, C., Clement, D., Melnychuk, N., Nelson, H., Sales, L., & Spittlehouse, D. (2022). *British Columbia chapter*. In F. J. Warren, N. Lulham, & D. S. Lemmen (Eds.), *Canada in a changing climate: Regional perspectives report*. Government of Canada. https://doi.org/10.4095/314614

[17] Aubie Vines, G., Froese, C., Pacholik, C., Blackwell, B., Garratt, C., Pypker, T., Crew, A., Gislason, M., Safaie, S., Crichton, C., Harper, S., Scordo, E., Curry, C., Kennedy, A., Smith, T., Eyzaguirre, J., Lyle, T., Tsakonas, K., Fang, L., Onur, T., & Woo, A. (2025). *British Columbia disaster and climate risk and resilience assessment: Provincial report executive summary*. Government of British Columbia. https://nrs.objectstore.gov.bc.ca/xedyjn/Projects/2025/dcrra/DCRRA_execsummary_oct_2025.pdf

[18] Innovation, Science and Economic Development Canada. (2022, June 26). *Surviving the heat: Impacts of the 2021 western heat dome in Canada*. Government of Canada. https://science.gc.ca/site/science/en/blogs/science-health/surviving-heat-impacts-2021-western-heat-dome-canada

[19] CBC News. (2023, September 27). *2023 is now officially the most expensive, most destructive wildfire season on record in B.C.* https://www.cbc.ca/news/canada/british-columbia/wildfire-danger-reducing-1.6980041

[20] Government of British Columbia. (n.d.). *Historical drought levels map.* https://droughtportal.gov.bc.ca/pages/historical-drought-levels

- More frequent and severe drought conditions affecting the natural environment, vulnerable populations and cultural areas and values.
- More frequent and intense extreme heat events affecting community health and safety, vulnerable populations and critical infrastructure assets.
- Higher flood risk along the Nicola and Coldwater river systems from variable freeze-thaw cycles and frequent precipitation events affecting community safety, property and critical infrastructure assets and potential for displacement.

In the past five years, residents have experienced several climate induced events, including prolonged drought conditions, extreme heat conditions, and a devastating atmospheric river event that led to the evacuation of the whole community and permanent damage and loss of infrastructure and properties. As warming temperatures continue to climb, so will its influence on hazard intensity and severity.

CHAPTER 5 — RISK ANALYSIS RESULTS AND SCORING

5.1 RISK RESULTS

In this analysis, risk is calculated using a standard formula as follows:

$$Consequence \times Likelihood = Risk$$

This formula is used to compare risk scores for all applicable hazards which could pose a threat to Merritt. Fire hazards and flooding accounted for the three highest ranked hazards. Wildland-urban interface (WUI) fire and wildland fire had the highest scores of 130+, with WUI fire scoring higher for consequences of loss. Riverine flooding follows closely with a score of 128 with a higher consequence score compared to wildland fire. Following riverine flooding was extreme rainfall with a score of 100. The identified high-ranking natural hazards will be affected by climate change, resulting in changing intensity and severity.

From the non-natural hazards, major planned event (MPE) had the highest score, followed by pipeline explosion and leak and telecommunications interruption. While non-natural hazards were out-of-scope for the analysis, the scoring was revised from the 2007 HRVA and included in the Risk Assessment Matrix in Appendix B for comparison.

Each hazard score includes a measure of climate change impacts which could affect the likelihood of the hazard occurrence or the potential consequences assessed. As it is difficult to quantify climate change impacts, the measurement is simplified to either increasing or decreasing impacts only.

Table 7: HRVA Comparison of Highest-Ranking Hazards

Ranking	2026 HRVA	Ranking	2007 HRVA
1	Wildland-Urban Interface Fire	1	Wildland-Urban Interface Fire
2	Wildland Fire	2	Flooding
3	Riverine Flooding	3	Epidemic and Pandemic
4	Extreme Rainfall	4	Hazardous Materials Accident and Dangerous Goods Accident
5	Drought	5	Mass Crowd Event
5	Major Planned Event	6	Hazard Materials — In Situ
7	Ice Jam	6	Structure Fire
8	Pipeline Explosion and Leak	8	Pest Infestation
8	Telecommunications Interruption	9	Ice Jam
10	Human Disease (including Pandemic and Epidemic)	9	Snowstorm

CHAPTER 6 — HAZARD PROFILES

From the 36 hazards assessed, the following ten natural hazards, and one human caused hazard, were found to pose the highest risk to Merritt. Profiles were prepared for each of the natural hazards included below. The Profiles aim to provide the City of Merritt with an overview of the hazard definition, potential impacts, and climate change considerations. The hazards listed below are to be considered a priority for preparedness, mitigation and response efforts through the municipality due to the higher risk and consequence scores. The remaining hazards included within the HRVA should still be considered within emergency planning considerations, where possible.

Note: The natural hazard rankings were fully developed through engagement, research, and subject matter expert input while the human-caused hazards had their rankings updated from Merritt's 2007 HRVA.

The full Risk Assessment Matrix can be found in Appendix B.

Table 8: High-Ranking Hazards

	Hazard	Likelihood	Consequence	Risk
	Wildland-Urban Interface Fire	4	34	136
	Wildland Fire	5	26	130
	Riverine Flooding	4	32	128
	Extreme Rainfall	4	25	100
	Drought	5	19	95
	Major Planned Event*	5	19	95
	Ice Jam	3	30	93
	Extreme Heat	4	19	80
	Human Disease (Including Pandemic and Epidemic)	3	26	78
	Snowstorm and Blizzard	4	19	76
	Plant Disease, Invasive Species and Pest Infestation	3	22	66

*Major Planned Event is included for comparison across the remaining high-ranking hazards.

6.1 WILDFIRE

Hazard		Likelihood (1–5)	Human Impacts (0–10)	Social Impacts (0–15)	Physical Impacts (0–15)	Economic Impacts (0–10)	Risk (1–250)	Climate Change Impact
	Wildland-Urban Interface Fire	4 *	(7 +	10 +	11 +	6)	= 136	↑

Figure 5. Wildland-urban interface fire risk profile

Hazard		Likelihood (1–5)	Human Impacts (0–10)	Social Impacts (0–15)	Physical Impacts (0–15)	Economic Impacts (0–10)	Risk (1–250)	Climate Change Impact
	Wildland Fire	5 *	(4 +	9 +	8 +	5)	= 130	↑

Figure 6. Wildland fire risk profile

What is a Wildfire? A wildfire is an unplanned or uncontrolled fire that spreads through vegetation such as forests, grasslands, or shrublands. In British Columbia, wildfires are caused by both natural and human activities, with lightning accounting for the majority of area burned in severe seasons. While lightning accounts for the majority of wildfire starts, human-caused ignitions remain a significant contributor to total fire starts. Wildfires vary in size, intensity, rate of spread, and behaviour depending on fuel type, topography, weather conditions, and drought severity. While many fires remain small (under four hectares), extreme fire weather conditions can result in rapid growth to thousands or even hundreds of thousands of hectares. When wildfires encroach upon or threaten structures and infrastructure where development meets forested or vegetated areas, they are classified as wildland-urban interface (WUI) fires. WUI fires present the highest consequence to life safety, property, and critical infrastructure.

Why are they a hazard? Wildfire poses significant risks to public safety, infrastructure, ecosystems, and economic stability. Impacts depend on fire proximity to populated areas and critical assets.

Human and Social Impacts:

- Injury or loss of life.
- Evacuations and displacement.
- Long-term mental health impacts including stress and post-traumatic stress disorder.
- Disruptions to schools, businesses, and community services.
- Poor air quality and respiratory illness from wildfire smoke.

Physical and Infrastructure Impacts:

- Destruction of homes and commercial properties.

- Damage to powerlines, telecommunications, transportation corridors, and water systems.
- Loss of watershed stability and increased risk of erosion or mass wasting following fire.
- Degradation of air quality regionally and provincially.

Wildfires can also trigger cascading hazards. Post-fire landscapes are more susceptible to debris flows, erosion, and flash flooding during intense rainfall events. Extended smoke events can strain healthcare systems and reduce outdoor labour productivity. While wildfire can provide ecological benefits such as nutrient cycling, habitat renewal, and fuel load reduction, these benefits are outweighed when fires occur at high intensity near developed areas and may result in contaminated landscapes.

Climate Change. Climate change is a primary driver of increasing wildfire frequency, severity, and duration in British Columbia. Warmer average temperatures, earlier snowmelt, prolonged drought, and increased lightning activity have extended wildfire seasons and intensified fire behaviour.

The 2023 wildfire season was the most destructive on record in British Columbia in terms of area burned. Drought conditions, extreme heat, and dry lightning contributed to unprecedented fire growth. Climate projections indicate:

- Longer wildfire seasons beginning earlier in spring and extending into fall.
- Increased frequency of extreme fire weather days.
- Greater fuel aridity and drought stress.
- Increased risk of simultaneous large fires across multiple regions.

For the southern interior, including Merritt, increasing vegetation growth during wetter spring periods followed by hotter, drier summers contributes to elevated fuel loading and fire intensity.

Impact. The City of Merritt is highly exposed to wildfire risk due to its location within the Nicola Valley, surrounding forested slopes, and prevailing summer fire weather conditions. Fire danger ratings frequently reach High or Extreme between July and September.

Significant wildfire activity has occurred in surrounding areas, including the 2021 Lytton Creek fire, which demonstrated the rapid escalation potential of extreme fire weather. While most fires near Merritt have historically been suppressed before entering municipal boundaries, secondary impacts such as heavy smoke, evacuation alerts, and highway closures have affected the community.

The 2025 City of Merritt Community Wildfire Resiliency Plan (CWRP) assessed wildfire threat within municipal boundaries. The analysis identified:

- 13% of public lands rated as “extreme” fire behaviour potential.
- 14% rated as “high” fire behaviour potential.
- 33% rated as “moderate” fire behaviour potential.

Neighbourhoods such as the Bench, North Bench, and Collettville are located near high-threat fuel types, with the Bench posing particular concern due to ongoing development and limited evacuation routes that could complicate egress during a WUI event. Surrounding Douglas-fir and ponderosa pine stands increase the potential for high-intensity and crown fires, making fuel management measures, such as thinning, surface fuel reduction, and FireSmart practices, essential.

Wildfire response requires coordinated interagency collaboration. Within municipal areas, the Merritt Fire Rescue Department leads response, while the BC Wildfire Service manages fires on Crown land. Mutual aid agreements with the Lower Nicola Indian Band and Logan Lake Fire Rescue strengthen cross-jurisdictional response capacity.

Given increasing climate pressures, high fuel loads, and interface exposure, wildfire, particularly WUI fire, remains one of Merritt's highest priority hazards, underscoring the need for continued investment in fuel management, evacuation planning, coordination, and public preparedness.

6.2 RIVERINE FLOODING

Hazard		Likelihood (1–5)	Human Impacts (0–10)	Social Impacts (0–15)	Physical Impacts (0–15)	Economic Impacts (0–10)	Risk (1–250)	Climate Change Impact
	Riverine Flooding	4 *	(6 +	9 +	11 +	6)	= 128	↑

Figure 7. Riverine flooding risk profile

What is a Flood? Riverine flooding occurs when water levels in rivers or streams rise beyond their channel capacity and overflow into adjacent floodplains. In British Columbia, riverine floods are among the most frequent and damaging natural hazards and can occur due to:

- Rapid snowmelt during spring freshet.
- Prolonged or intense rainfall events (including atmospheric rivers).
- Rain-on-snow events.
- Ice jams.
- Infrastructure failure (e.g., dikes, dams, culverts, stormwater systems).

Flooding in the southern interior most commonly occurs during spring freshet (May–June) or in fall and winter during high-intensity rainfall events. However, recent climate trends indicate increasing year-round flood potential due to changing precipitation patterns.

Why is it a hazard? Flooding presents significant risks to human safety, infrastructure, the environment, and economic stability. When floodwater encroaches into developed areas, impacts may include:

- Evacuation and displacement of residents.
- Damage to homes, businesses, and agricultural lands.
- Disruption of transportation corridors and supply chains.
- Failure or impairment of water, wastewater, and utility systems.
- Contamination of drinking water and reduced water quality.
- Long-term psychological impacts, including stress, trauma, and depression.

Flood risk can be amplified by upstream land-use changes, watershed degradation, and prior hazard events such as wildfire. Burned landscapes reduce soil stability and infiltration capacity, increasing runoff and debris flow risk during heavy rainfall.

Flood events can cause severe psychological impacts ranging from stress to conflict and can trigger conditions such as depression[21]. It can also lead to potential injuries, fatalities or contribute to other health conditions from degraded water quality resulting from damaged or overwhelmed water infrastructure[22]. Flooding may also trigger cascading hazards such as slope instability, erosion, debris accumulation at bridges, and infrastructure undermining.

Climate Change. Climate models project that flood risk in British Columbia will increase due to warming temperatures and shifting precipitation regimes[22]. Key projected trends relevant to Merritt include:

- Increased winter precipitation, with more falling as rain rather than snow.
- Earlier snowmelt and changes to spring freshet timing.
- Increased frequency and intensity of atmospheric rivers.
- Greater likelihood of rain-on-snow events.

In the Nicola Valley, total annual precipitation is projected to increase, particularly during fall and winter months. As winter temperatures rise, precipitation that historically fell as snow is more likely to fall as rain, increasing winter runoff and peak river flows. While snowmelt-driven peak flows may decrease in some years, rainfall-driven flood events are projected to increase in magnitude and frequency.

The November 2021 atmospheric river event demonstrated the scale of flood risk under extreme climate conditions. Such compound events where saturated soils, high river levels, and intense rainfall coincide are expected to become more likely under future climate scenarios.

Impact. The City of Merritt is uniquely exposed to flood risk due to its location at the confluence of the Nicola River and the Coldwater River. Flooding from either system or simultaneous high flows in both can significantly impact residential neighbourhoods, transportation infrastructure, and critical municipal services.

2021 Atmospheric River Event. In November 2021, a record-breaking atmospheric river caused catastrophic flooding in Merritt, resulting in the evacuation of the entire community. Critical infrastructure, including wastewater systems, roadways, bridges, and utilities, was severely damaged or rendered inoperable. Highway closures isolated the region, and recovery required extensive provincial and federal support, substantial financial investment, and multi-year rebuilding efforts.

Prior to 2021, significant flooding also occurred in 2017 and 2018 during spring freshet, when high flows along the Nicola River washed out bridges and led to the closure of Highway 8. These events highlight both seasonal and rainfall-driven flood exposure.

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[21] Canadian Climate Institute. (2026, April). *Fact sheet: Climate change and flooding.* https://climateinstitute.ca/wp-content/uploads/2024/09/Fact-sheet_-Floods_CanadianClimateInstitute.pdf

[22] Gifford, R., Brown, C., Baron, C., Clement, D., Melnychuk, N., Nelson, H., Sales, L., & Spittlehouse, D. (2022). *British Columbia chapter*. In F. J. Warren, N. Lulham, & D. S. Lemmen (Eds.), *Canada in a changing climate: Regional perspectives report*. Government of Canada. https://doi.org/10.4095/314614

Nicola River. The Nicola River originates in the Thompson Plateau, flows through Nicola Lake, and continues west toward Merritt. Water levels are partially regulated by the Nicola Lake Dam, operated by the BC Ministry of Water, Land and Resource Stewardship.

Flood risk along the Nicola River is typically associated with spring freshet conditions and controlled discharge releases. Due to its broader channel and comparatively slower velocities, flooding impacts may develop more gradually than on the Coldwater River. River conditions are monitored through provincial hydrometric stations and snowpack surveys.

Coldwater River. The Coldwater River originates in the Cascade Mountains and flows northeast toward Merritt, dividing portions of the community including Collettville and Middlesboro. The Coldwater River watershed is smaller and steeper than the Nicola River watershed, resulting in faster response times and higher flow velocities during heavy rainfall.

The Coldwater River poses a particularly high risk during atmospheric river events, intense localized storms, or ice jam conditions. Rapid rises in water levels can cause bridge scour, bank erosion, and structural damage to adjacent properties and infrastructure.

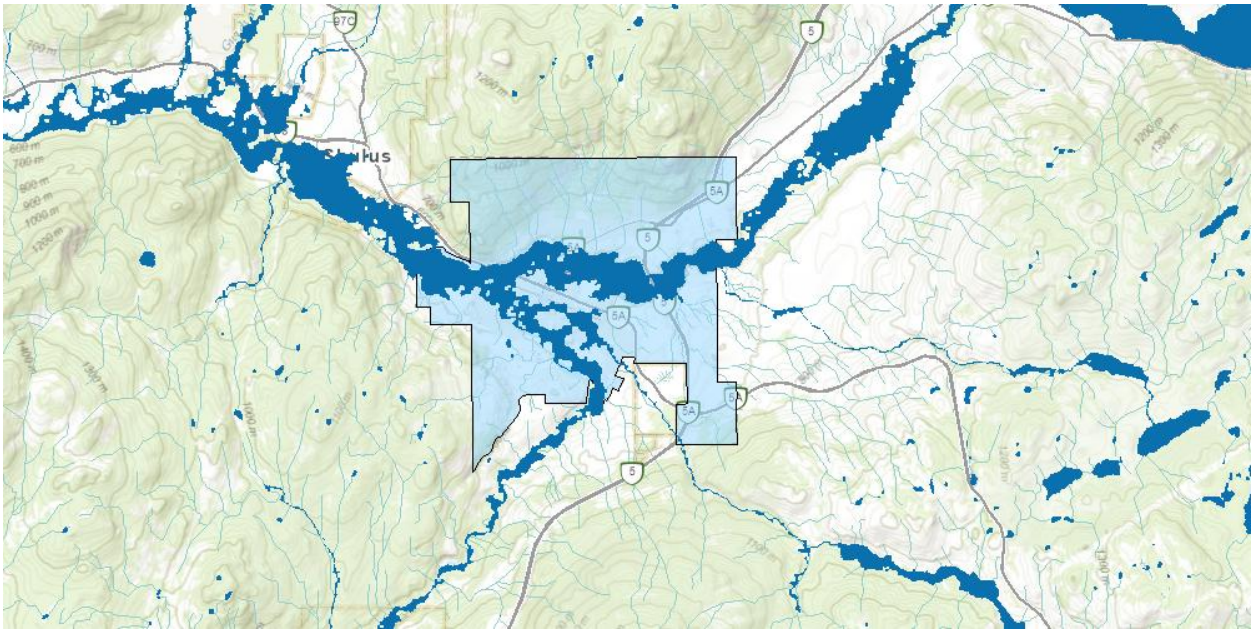

Figure 8. Map of riverine flood exposure in the Merritt area[23]

Given recent catastrophic flooding, projected increases in rainfall intensity, and the City's geographic exposure, riverine flooding remains one of the highest priority hazards for Merritt. Long-term resilience will require continued watershed management, infrastructure upgrades, land-use planning controls, and sustained intergovernmental collaboration.

[23] Government of British Columbia. (n.d.). *B.C. hazard insights tool*. https://bchazardinsightstool-bcgov03.hub.arcgis.com/

6.2.1 ICE JAM

Hazard		Likelihood (1–5)	Human Impacts (0–10)	Social Impacts (0–15)	Physical Impacts (0–15)	Economic Impacts (0–10)	Risk (1–250)	Climate Change Impact
	Ice Jam	4 *	(6 +	8 +	10 +	6)	= 93	↑

Figure 9. Ice jam risk profile

What is an Ice Jam? An ice jam occurs when river ice accumulates and obstructs the natural flow of water, resulting in a rapid rise in upstream water levels and potential overbank flooding. Ice jams most commonly occur during late winter or early spring freshet when warming temperatures, rainfall, or rapid snowmelt break upriver ice. Large ice sheets or fragmented ice flows can lodge against natural bends, shallow sections, or built infrastructure such as bridge piers, restricting downstream flow.

Ice jam flooding is typically sudden, localized, and difficult to predict. Unlike open-water flooding, which develops gradually as river discharge increases, ice jam events can cause rapid water level rises within minutes. Water levels may also recede quickly if the jam releases, sometimes creating downstream surge flooding.

Why is it a hazard? Ice jams present a high-consequence flood hazard due to their unpredictability and potential to cause structural damage. When blockages form, water may overtop riverbanks, inundate adjacent properties, damage critical infrastructure, and displace residents.

Secondary impacts may include:

- Riverbank erosion and channel instability.
- Damage to bridges and culverts from ice impact forces.
- Debris accumulation and sediment transport.
- Disruption to utilities and access routes.
- Environmental impacts to riparian and aquatic ecosystems.

Ice forces exert significant pressure on bridge piers and abutments, increasing the risk of structural compromise. In addition, mid-winter rain-on-snow events or rapid freeze-thaw cycles can increase the likelihood of breakup events that generate ice movement.

The influence of climate change on ice jam frequency remains uncertain; however, warming winter temperatures, increased winter rainfall, and more frequent mid-winter thaw events may contribute to more dynamic freeze-thaw cycles. Reduced overall ice cover may decrease some risks, but more unstable ice conditions and earlier breakups could increase the unpredictability and intensity of individual events.

Impact. Ice jam risk in Merritt is primarily associated with the Coldwater River, with past events occurring near the Main Street Bridge. Blockage at this location has the potential to cause upstream flooding and erosion affecting nearby residential and commercial areas. Critical infrastructure located downstream, including the Public Works Yard and the Merritt Wastewater Treatment Plant, may be exposed depending on the extent and duration of flooding. Impacts to these facilities could disrupt essential municipal services, prolong recovery timelines, and increase economic losses.

Ice jam flooding may also affect areas along the Nicola River, particularly during high-flow freshet conditions. Given Merritt's location at the confluence of these two river systems, compounding hydrological conditions can elevate overall flood risk and contribute to unpredictability of future flood events. Historically, three damaging ice jam events have occurred within the community, demonstrating a recurring but episodic hazard profile[24].

Depending on the severity and geographic extent of an ice jam event along the Coldwater or Nicola Rivers, Merritt may also serve as a host community for evacuated residents from upstream areas. Given the potential for sudden onset, infrastructure damage, and cascading service disruption, ice jams remain a high-consequence seasonal hazard requiring continued monitoring, interagency coordination, and integration into the City's broader flood risk management strategy.

[24] BGC Engineering Inc. (2023). *Thompson Flood Projects.* https://www.fraserbasin.bc.ca/regional-work/thompson-region/thompson-flood-projects/

6.2.2 EXTREME RAINFALL

Hazard		Likelihood (1–5)	Human Impacts (0–10)	Social Impacts (0–15)	Physical Impacts (0–15)	Economic Impacts (0–10)	Risk (1–250)	Climate Change Impact
	Extreme Rainfall	4 *	(5 +	7 +	9 +	4)	= 100	↑

Figure 10. Extreme rainfall risk profile

What is Extreme Rainfall? Extreme rainfall refers to intense precipitation events that exceed typical regional thresholds over a short duration (hours to days), overwhelming natural and built drainage systems. Precipitation may occur as rain, snow, freezing rain, or hail depending on atmospheric conditions; however, extreme rainfall events are characterized by high rainfall intensity, prolonged duration, or both.

In British Columbia, a primary driver of extreme rainfall is the atmospheric river which is a long, narrow corridor of concentrated water vapour that transports significant moisture from tropical or subtropical regions. When these systems make landfall and interact with mountainous terrain, they can release substantial rainfall totals over short periods. Atmospheric rivers are a natural and important component of the hydrological cycle, contributing significantly to annual precipitation and groundwater recharge. However, high-intensity events can create severe flood risk.

Observed climate data indicates that total annual precipitation has increased in many parts of the province, with a higher proportion falling during intense rainfall events. Winter precipitation is increasingly falling as rain rather than snow in interior regions, contributing to elevated runoff and peak flows.

Why is it a hazard? Extreme rainfall can overwhelm stormwater systems, rivers, culverts, and drainage infrastructure, resulting in:

- Riverine and overland flooding.
- Flash flooding in urbanized areas.
- Erosion and sediment transport.
- Landslides and debris flows.
- Infrastructure failure (roads, bridges, utilities).
- Water quality degradation.

Atmospheric rivers are particularly hazardous because they can produce sustained rainfall over multiple days, compounding impacts across watersheds. In November 2021, Merritt experienced three consecutive atmospheric river systems that led to catastrophic flooding, full community

evacuation, and widespread infrastructure damage. That event was among the costliest natural disasters in British Columbia's history, with estimated provincial losses of more than $130 million[25].

Climate Change. Regional and local climate projections indicate communities will experience more frequent, severe and intense precipitation amounts with an increased potential for atmospheric rivers[31] Warmer air temperatures allow the atmosphere to hold more moisture, increasing the rainfall potential of storm systems. For the southern interior, projections suggest:

- Increased winter rainfall totals.
- More frequent and intense atmospheric rivers.
- Higher likelihood of rain-on-snow events.
- Increased short-duration, high-intensity rainfall events.

These changes elevate the risk of compounding hazards, including riverine flooding, flash flooding, erosion, sedimentation, and mass wasting. The interaction between extreme rainfall and prior hazard events, such as wildfire or drought, further increases vulnerability.

Given recent catastrophic events and projected increases in precipitation intensity, extreme rainfall remains a high-priority hazard for Merritt. Proactive adaptation, infrastructure investment, and interagency coordination will be essential to reducing future impacts and strengthening community resilience.

[25] Government of British Columbia. (2025, March 25). *Province funds replacement of flood-damaged dikes in Merritt.* https://news.gov.bc.ca/32145

6.3 DROUGHT

Hazard		Likelihood (1–5)	Human Impacts (0–10)	Social Impacts (0–15)	Physical Impacts (0–15)	Economic Impacts (0–10)	Risk (1–250)	Climate Change Impact
	Drought	5 *	(2 +	5 +	6 +	6)	= 95	↑

Figure 11. Drought risk profile

What is a Drought? A drought is an extended period of abnormally dry weather, lasting a season or more, which can impact communities, terrestrial and aquatic wildlife, and vegetation[26]. Droughts are naturally occurring phenomena which are grouped into five categories characterized by the effect (socio-economic, ecological and agricultural) and state (meteorological and hydrological) of dryness[27].

Drought is commonly classified into five interrelated categories:

- Meteorological drought — prolonged precipitation deficit.
- Hydrological drought — reduced streamflow, reservoir levels, or groundwater.
- Agricultural drought — soil moisture deficits affecting crops and livestock.
- Ecological drought — stress on ecosystems and species.
- Socio-economic drought — water shortages affecting people, businesses, and services.

In British Columbia, drought is typically driven by:

- Low winter snowpack accumulation.
- Early snowmelt and rapid spring runoff.
- Below-average spring and summer precipitation.
- Extended hot, dry periods.

Drought occurs from seasonal precipitation deficits such as reduced precipitation amounts and accumulation, rapid thaw cycles, or prolonged periods of dry conditions[28]. In British Columbia, drought conditions are caused by three factors: low snow accumulation, low spring and low

[26] Natural Resources Canada. (2025, September 11). *Drought is expected to become more frequent and severe in parts of Canada.* Government of Canada. https://natural-resources.canada.ca/climate-change/climate-change-impacts-forests/drought

[27] Ministry of Water, Land and Resource Stewardship. (2026, April). *British Columbia drought and water scarcity operations plan.* https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/drought-info/drought_and_water_scarcity_operations_plan.pdf

[28] Government of British Columbia. (2026, May 6). *Drought information.* https://www2.gov.bc.ca/gov/content?id=6BF51095A3E34E09AADABC91739C6F0B

summer precipitation[28]. Arid or semi-arid climates, such as that in the interior of British Columbia, experience frequent droughts[26].

Why is it a hazard? Drought strains water resources and can significantly affect public health, ecosystems, agriculture, and economic stability. Although drought does not directly damage infrastructure in the way floods or wildfires do, its impacts are widespread, cumulative, and compounding.

Water Supply and Public Health. Severe drought reduces surface water flows and groundwater recharge, increasing the risk of water scarcity. This may lead to:

- Residential and commercial water restrictions.
- Reduced drinking water availability.
- Lower water quality due to higher contaminant concentrations.
- Increased risk of water-borne illness.
- Respiratory irritation from dust and particulate matter.
- Mental health impacts, including stress and anxiety related to water security and livelihoods[29].

The City of Merritt relies on groundwater aquifers beneath the municipality for potable water supply. Prolonged drought can reduce aquifer recharge rates and groundwater levels, placing strain on municipal water systems and requiring conservation measures.

Agriculture and Economic Impacts. Drought can reduce crop yields, pasture productivity, and livestock health. Impacts may include:

- Reduced harvest volumes.
- Increased irrigation demand.
- Higher feed costs.
- Increased pest pressures.
- Livestock stress and reduced productivity[30].

Agricultural producers in the Nicola Valley are particularly vulnerable given the region's reliance on seasonal precipitation and surface water flows.

[29] ClimateData.ca. (2026). *Drought and human health in Canada.* https://climatedata.ca/drought-and-human-health-in-canada/

Wildfire Risk. Drought significantly increases wildfire hazard by reducing vegetation moisture content. Drier fuels ignite more easily and burn more intensely[30]. Hot and dry atmospheric conditions can also increase lightning activity, raising ignition potential.

The severe wildfire seasons in recent years, including the record-breaking 2023 season in British Columbia, were strongly linked to prolonged regional drought, high temperatures, and lightning activity.

Ecosystem and Aquatic Impacts. Low stream flows and elevated water temperatures can damage aquatic ecosystems and stress fish populations. Reduced flows in the Coldwater River and Nicola River can:

- Degrade fish habitat.
- Increase fish mortality risk.
- Concentrate pollutants.
- Disrupt spawning cycles.

Drought can also reduce wetland function, alter riparian vegetation, and contribute to long-term ecosystem degradation.

Additionally, prolonged dry conditions can reduce soil cohesion and vegetation stability. When intense rainfall follows drought, there is an increased risk of erosion, runoff, and flooding due to reduced infiltration capacity[30].

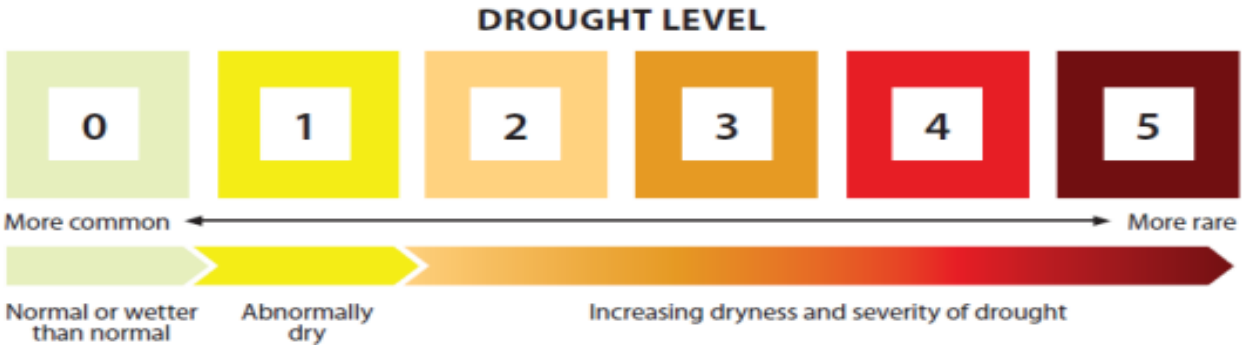

Figure 12. British Columbia drought level scale[28]

Monitoring and Measurement. Drought conditions in British Columbia are assessed using a six-level provincial classification system administered by the Government of British Columbia. Levels range from 0 (normal) to 5 (exceptionally dry), comparing current hydrological conditions against the historical record.

Drought ratings are typically updated bi-weekly from freshet through late fall and provide an objective measure to inform water conservation measures and response planning. Level 4 and 5

[30] Canadian Climate Institute. (2025, August). *Fact sheet: Climate change and drought.* https://climateinstitute.ca/wp-content/uploads/2024/09/Fact-sheet_-Drought_CanadianClimateInstitute.pdf

drought ratings indicate high-severity conditions requiring voluntary or mandatory conservation actions.

Climate Change. Climate change will contribute to more severe, frequent and recurring droughts in the interior of British Columbia with climate projections indicating drier, warmer summer periods coupled with earlier or reduced snowmelt associated with warmer temperatures[31]. In 2023, British Columbia experienced its most destructive and costly wildfire season to date driven by underlying regional drought conditions, warmer temperatures and lightning activities[32]. In 2024, more than 80% of water basins in the province were experiencing Level 4 or 5 drought conditions, the highest drought severity levels recognized by the Government of BC, in one of the driest summer seasons[33]. The City of Merritt was prompted to promote water conservation efforts due to low groundwater levels.

Impact. Drought conditions can pose a significant risk to aquatic species, can strain potable water sources such as wells, and cause potential health impacts from pollutants[34]. The City of Merritt is located at the confluence of the Coldwater and Nicola Rivers, which are fed from the Nicola watershed. This watershed is prone to drought and has experienced severe drought conditions in 2015, 2017 and 2023, and 2024[27]. The Nicola Watershed is home to more than 7,000 residents from the municipality and surrounding First Nation communities and has environmental and cultural significance[34].

Drought presents the following localized risks:

- Reduced groundwater recharge affecting municipal supply wells.
- Lower river flows impacting aquatic ecosystems.
- Increased wildfire risk in surrounding forested areas.
- Agricultural production losses in the region.
- Increased strain on emergency management during concurrent wildfire or heat events.

Given projected climatic trends, drought represents a high-likelihood, high-consequence hazard for Merritt. Long-term adaptation strategies, including water conservation planning, aquifer monitoring, integrated watershed management, wildfire mitigation, and agricultural resilience measures, will be critical to reducing vulnerability and strengthening community resilience.

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[31] Bonsal, B. R., Peters, D. L., Seglenieks, F., Rivera, A., & Berg, A. A. (2019). Changes in freshwater availability across Canada. In E. Bush & D. S. Lemmen (Eds.), *Canada's changing climate report* (pp. 261–342). Government of Canada. https://changingclimate.ca/site/assets/uploads/sites/2/2018/12/CCCR-Chapter6-ChangesInFreshwaterAvailabilityAcrossCanada.pdf

[32] Government of British Columbia. (2026, January 2). *Wildfire season summary.* https://www2.gov.bc.ca/gov/content?id=7E638CD0E7B9465F9840C62269BE8DCB

[33] CBC News. (2023, September 11). *B.C. drought brings increased flood risks, far-reaching damage, experts warn.* https://www.cbc.ca/news/canada/british-columbia/bc-drought-impacts-1.6961982

[34] Nicola Watershed Governance Partnership. (n.d.). *About the Nicola Watershed Governance Partnership (NWGP).* https://nwgp.ca/about-the-nwgp/about-the-nicola-watershed

6.4 EXTREME HEAT

Hazard		Likelihood (1–5)	Human Impacts (0–10)	Social Impacts (0–15)	Physical Impacts (0–15)	Economic Impacts (0–10)	Risk (1–250)	Climate Change Impact
	Extreme Heat	4 *	(5 +	5 +	6 +	4)	= 80	↑

Figure 13. Extreme heat risk profile

What is Extreme Heat? Extreme heat events are prolonged periods of abnormally high temperatures relative to local seasonal norms. In British Columbia, extreme heat events are defined using regional temperature thresholds, duration, and overnight recovery conditions, as sustained high overnight temperatures significantly increase health risk.

Climate projections for the southern interior of British Columbia indicate that extreme heat events will become more frequent, longer in duration, and more intense. Merritt, located in the semi-arid Nicola Valley, already experiences hot, dry summers, and seasonal temperature averages have increased over recent decades. Earlier onset of high temperatures in late spring and extended heat into early fall are becoming more common.

Why is it a hazard? Extreme heat poses significant risks to human health, infrastructure, ecosystems, and economic activity. Prolonged exposure to elevated temperatures can lead to:

- Heat exhaustion, heatstroke, dehydration, and hyperthermia.
- Exacerbation of chronic cardiovascular, respiratory, and renal conditions.
- Increased mental health stress and substance-related harms.
- Elevated mortality during severe events.

The 2021 heat dome event was the deadliest weather event in Canadian history, resulting in 619 heat-related deaths in British Columbia. Since that event, additional periods of sustained summer heat and drought have reinforced the increasing severity of heat risk across the province.

Extreme heat disproportionately affects vulnerable populations, including seniors, individuals living alone, people with chronic illnesses or disabilities, outdoor workers, those experiencing homelessness, and households without adequate cooling or ventilation. Housing quality, urban heat island effects, limited tree canopy, and financial constraints can further compound vulnerability.

In addition to health impacts, prolonged heat can strain critical infrastructure and services[35]:

[35] Beugin, D., Clark, D., Miller, S., Ness, R., Pelai, R., & Wale, J. (2023). *The case for adapting to extreme heat: Costs of the 2021 B.C. heat wave*. Canadian Climate Institute. https://climateinstitute.ca/wp-content/uploads/2023/06/The-case-for-adapting-to-extreme-heat-costs-of-the-BC-heat-wave.pdf

- Reduced efficiency and capacity of electrical transmission and distribution systems due to increased resistance and demand.
- Increased likelihood of localized power outages during peak cooling demand.
- Potential failure of health or cooling equipment without adequate backup systems.
- Degradation of transportation infrastructure (e.g., asphalt rutting).
- Increased water demand and pressure on potable water and groundwater systems.
- Reduced agricultural productivity and livestock stress.

Climate Change. Climate change is a primary driver of increasing extreme heat risk. Warmer baseline temperatures raise the probability of surpassing extreme heat thresholds. In the interior of British Columbia, projections indicate:

- More frequent multi-day heat events.
- Higher daytime maximum temperatures.
- Reduced overnight cooling.
- Longer heat seasons.

Extreme heat can also contribute to cascading hazards. Elevated temperatures dry vegetation and soils, increasing wildfire risk and severity. Heat can contribute to thunderstorm development and lightning ignition, further elevating wildfire potential. Drought conditions, compounded by heat, reduce soil moisture and strain water supplies. Poor air quality from wildfire smoke may coincide with heat events, compounding respiratory health risks.

Impact. The City of Merritt faces increasing exposure to extreme heat due to its geographic location, semi-arid climate, and projected warming trends. Rising summer temperatures and more frequent heat alerts will require proactive municipal planning and community outreach.

For Merritt, preparedness considerations include ensuring access to cooling spaces, protecting outdoor workers, maintaining electrical and water system resilience, and integrating heat risk into land use and urban planning (e.g., increasing shade and green infrastructure).

Given observed trends and future climate projections, extreme heat is assessed as a high-likelihood, high-impact hazard that will continue to increase in frequency and severity. Proactive mitigation, public education, and cross-sector coordination will be critical to reducing health impacts and strengthening community resilience.

6.5 HUMAN DISEASE (INCLUDING PANDEMIC AND EPIDEMIC)

Hazard		Likelihood (1–5)	Human Impacts (0–10)	Social Impacts (0–15)	Physical Impacts (0–15)	Economic Impacts (0–10)	Risk (1–250)	Climate Change Impact
	Human Disease	3 *	(6 +	8 +	5 +	7)	= 78	↑

Figure 14. Human disease risk profile

What are Human Diseases? Human diseases are illnesses caused by viral, bacterial, fungal, or parasitic pathogens. Many are communicable, meaning they can spread between individuals through direct contact, respiratory droplets or aerosols, contaminated surfaces, food and water, animal or insect vectors, or environmental exposure.

Most communicable diseases can be managed through established public health measures such as vaccination programs, infection prevention and control practices, masking, isolation protocols, testing, and public advisories (e.g., boil water notices). However, highly infectious diseases may spread rapidly, mutate, or evade immunity, resulting in localized outbreaks (epidemics) or global spread (pandemics).

The COVID-19 pandemic demonstrated how quickly a novel pathogen can disrupt global health systems, economies, and social structures. Since 2020, governments at all levels have strengthened surveillance systems, stockpiling strategies, and emergency health coordination frameworks. Nevertheless, emerging infectious diseases, antimicrobial resistance, and zoonotic spillover events remain ongoing risks.

Why are they a hazard? Human disease events can significantly impact community health, mental well-being, and the continuity of essential services. Widespread illness may result in:

- Increased hospitalizations and strain on healthcare capacity.
- Workforce shortages due to illness, caregiving responsibilities, or quarantine requirements.
- Disruptions to education, childcare, and social services.
- Reduced industrial, manufacturing, and commercial productivity.
- Supply chain interruptions.
- Increased demand for social supports and food security programs.

Infectious diseases disproportionately affect vulnerable populations, including seniors, individuals with compromised immune systems, those with underlying medical conditions, people experiencing homelessness, and individuals with limited access to healthcare. Workers in high-exposure occupations such as healthcare, retail, transportation, and emergency response also face elevated risk.

Lessons from COVID-19, as documented in the 2024 Provincial Health Officer's Annual Report, highlight the broader societal consequences of pandemics, including:

- Increased frequency and severity of discriminatory acts, including anti-Asian racism.
- Increased prevalence and severity of gender-based violence.
- Employment instability, particularly among marginalized communities and workers in the informal economy.
- Heightened food insecurity related to affordability and accessibility.
- Delays in routine childhood immunizations and reduced use of emergency departments.
- Significant increases in mental health challenges, particularly among individuals with disabilities, pre-existing mental health conditions, and socio-economically marginalized populations.

These impacts underscore that disease events extend beyond health outcomes and can affect nearly all sectors of society.

Climate Change. Climate change is expected to influence disease patterns in British Columbia. Warmer temperatures, changing precipitation patterns, and altered ecosystems may contribute to:

- Expansion of vector-borne diseases (e.g., ticks and mosquitoes) into new geographic areas.
- Increased risk of zoonotic disease transmission due to wildlife habitat shifts.
- Higher incidence of food- and water-borne illness associated with extreme heat or flooding.
- Poor air quality events (e.g., wildfire smoke) that compound respiratory illness impacts.

As the climate continues to warm, disease surveillance and interagency coordination will remain critical to early detection and response.

Impact. During an epidemic or pandemic, the City of Merritt may experience operational strain as municipal staff manage continuity of operations alongside increased community needs. Critical services including emergency response, water and wastewater operations, public works, and communications may be affected by staffing shortages or modified public health directives.

In British Columbia, the Provincial Health Services Authority (PHSA) and the First Nations Health Authority (FNHA) provide provincial leadership, coordination, and specialized health services. The BC Centre for Disease Control (BCCDC) is a branch of the PHSA which provides guidance, technical expertise and surveillance of communicable diseases.

There are over 80 reportable communicable diseases that are monitored in British Columbia which include respiratory, vector-borne and zoonotic, bloodborne, food and waterborne and

environmental pathogens[36]. Public health orders, vaccination campaigns, and risk communication strategies are implemented as required based on disease severity and transmission risk.

For the City of Merritt, preparedness considerations include:

- Maintaining business continuity plans for municipal services.
- Ensuring redundancy in critical staffing roles.
- Coordinating with public health authorities for timely communication.
- Supporting vulnerable populations through collaboration with community partners.
- Integrating public health scenarios into emergency operations centre (EOC) training and exercises.

Human disease events remain a moderate-to-high likelihood hazard with significant cross-sector consequences. While public health systems have strengthened since COVID-19, the potential for future epidemics or pandemics continues to require coordinated planning, resilient service delivery models, and strong partnerships between municipal government, health authorities, Indigenous partners, and community organizations.

[36] Government of British Columbia. (2022, September). *Selected communicable diseases other than COVID-19*. In *Examining the societal consequences of COVID-19*. https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/annual-reports/societal-consequences-ch-9.pdf

6.6 SNOWSTORM AND BLIZZARD

Hazard		Likelihood (1–5)	Human Impacts (0–10)	Social Impacts (0–15)	Physical Impacts (0–15)	Economic Impacts (0–10)	Risk (1–250)	Climate Change Impact
❄	Snowstorm and Blizzard	4 *	(4 +	5 +	6 +	4)	= 76	↑

Figure 15. Snowstorm and blizzard risk profile

What are Snowstorms and Blizzard? Characterized as meteorological disturbance giving rise to a heavy fall of snow, often accompanied by strong winds. Snowstorm and blizzards impact upon transportation, powerlines and communications infrastructure, and agriculture[37]. Unlike blizzards, snowstorms are not always accompanied by strong winds; however, when high winds and blowing snow occur simultaneously, white-out conditions can significantly reduce visibility and create hazardous travel conditions. Extreme cold events involve prolonged periods of significantly below-normal temperatures, often associated with Arctic air masses.

In Canada, winter storms and extreme cold remain leading causes of weather-related injuries and fatalities each year, particularly among vulnerable populations such as older adults, individuals experiencing homelessness, and those with underlying health conditions. Cold exposure can result in hypothermia, frostbite, and increased cardiovascular and respiratory stress.

The City of Merritt is monitored by an Environment and Climate Change Canada weather station (Merritt STP), which meets World Meteorological Organization standards. Updated Canadian Climate Normals (1991-2020)[38] indicate that Merritt continues to experience consistent winter snowfall, with December and January historically being the snowiest months. Average January temperatures remain well below freezing, and extreme minimum temperatures below -35°C have been recorded in recent decades. Recent cold snaps in 2021 and 2022 demonstrate that extreme Arctic outflow events continue to affect the southern interior of British Columbia.

Significant single-day snowfall events exceeding 30-40 cm remain possible. Climate variability has increased the likelihood of short-duration, high-intensity precipitation events, including heavy, wet snow that can place substantial loads on infrastructure. Snow accumulation averages remain consistent with historic trends; however, interannual variability has increased, with some winters experiencing below-average snowfall and others producing significant storm cycles.

Why is it a Hazard? Snowstorms and blizzard conditions can impact transportation networks, utilities, public health, and essential services. In Merritt, Highway 5 (Coquihalla Highway), Highway 97C (Okanagan Connector), and local arterial routes are critical transportation corridors. Heavy snowfall or drifting can restrict access to and from the community, disrupt supply chains, and impede emergency response operations. Road closures can isolate the municipality and delay

[37] Government of British Columbia. (2021). *Hazard reference guide for the HRVA tool.* https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/local-government/hrva/guides/hrva_hazard_reference_guide.pdf

[38] Environment and Climate Change Canada. (2026, April 16). *Canadian climate normals.* Government of Canada. https://climate.weather.gc.ca/climate_normals/index_e.html

police, fire, ambulance, and mutual aid support. Accumulation of heavy or wet snow on power lines, communication towers, and tree canopies may result in line failures and power outages. Prolonged outages during blizzard events can escalate risks to life safety, particularly for residents reliant on electric heating or medical equipment. Frozen water infrastructure, burst pipes, and ice-related damage to buildings are also potential impacts.

Snowstorms and blizzards may contribute to secondary hazards, including:

- Increased residential heating demands and potential fire risk.
- Ice formation and localized ice jams along the Coldwater and Nicola Rivers.
- Increased motor vehicle collisions.
- Strain on emergency shelters and warming centres.
- Disruptions to agriculture, including impacts to livestock and greenhouse operations.

Climate Change. Climate change is projected to alter winter hazard patterns in the interior of British Columbia. While average winter temperatures are expected to increase over the long term, climate projections indicate greater variability and more frequent temperature extremes. This may result in:

- More intense but shorter-duration snowfall events.
- Increased likelihood of heavy, wet snow due to temperatures fluctuating near 0°C.
- More frequent freeze-thaw cycles, contributing to hazardous road conditions and infrastructure stress.
- Occasional severe Arctic outflow events despite overall warming trends.

Warmer winters may reduce total seasonal snowfall some years; however, when precipitation does occur, it may fall in higher-intensity bursts. Freeze-thaw variability can also increase the risk of ice accumulation, infrastructure degradation, and winter flooding associated with rain-on-snow events.

Impact. The City of Merritt's location within the Nicola Valley and its reliance on regional highway corridors heightens its exposure to transportation disruption during severe winter storms. The municipality's ability to maintain priority routes, coordinate snow clearing, and ensure continuity of operations is critical to reducing overall risk. Vulnerable populations including seniors, individuals with mobility limitations, newcomer groups, and residents experiencing housing insecurity, may face heightened risk from limited resources, access and purchasing power and unfamiliar climate.

Although snowstorms were historically considered a routine seasonal hazard, increasing climate variability, infrastructure interdependence, and reliance on transportation corridors elevate the overall consequence profile. Based on updated climate data, infrastructure exposure, and cascading risk potential, snowstorm and extreme cold events continue to represent a priority seasonal hazard for the City of Merritt and warrant ongoing mitigation, preparedness planning, and interagency coordination.

6.7 PLANT DISEASE, INVASIVE SPECIES AND PEST INFESTATION

Hazard		Likelihood (1–5)	Human Impacts (0–10)	Social Impacts (0–15)	Physical Impacts (0–15)	Economic Impacts (0–10)	Risk (1–250)	Climate Change Impact
	Plant Disease, Invasive Species and Pest Infestation	3 *	(2 +	7 +	9 +	4)	= 66	↑

Figure 16. Plant disease, invasive species, and pest infestation risk profile

What are Plant Diseases, Invasive Species, and Pest Infestations? An invasive species or pest is non-native pest or pathogens that is introduced into the local environment and may cause significant harm to native ecosystems, and agricultural and resource sector values. Invasive species can affect agricultural crops, urban environments, forests and traditional ways of life. These species and pathogens are often introduced accidentally into the natural environment and are spread through natural and non-natural carriers.

Invasive species and pests are controlled through pest management plans which include detection programs, control programs, and education and outreach. Pest management requires intergovernmental and public collaboration to control invasive species and support native species resiliency. In British Columbia, species such as mountain pine beetle (MPB) or heat grass have contributed to drier and more flammable vegetation[39].

Why is it a Hazard? Pest infestations and invasive species can damage critical infrastructure assets, decrease agricultural productivity, reduce water quality, and threaten natural ecosystems and traditional ways of life.

Agriculture and Economic Impacts. Invasive species such as yellow hawkweed can disrupt crop yield, threaten livestock health, and affect agricultural operations. Impacts include:

- Reduced crop yields and crop quality.
- Decreased economic yield and higher production and pest management costs.
- Increased livestock injury or fatality.
- Disrupt food supply chains and agricultural industries.

Wildfire Risk. Invasive species such as MPB or cheat grass contribute to wildfire conditions through increased drier and flammable vegetation. MPB affects Douglas fir and ponderosa pine and can reduce healthy and young trees to dead stands within two years. While cheat grass leaves behind dry and dead vegetation in peak summer months.

Indigenous Ways of Life. Invasive species challenge cultural and traditional practices for First Nation communities. Local flora and fauna are often replaced by invasive pests, affecting the

[39] Natural Resources Canada. (2026, January 12). *Mountain pine beetle.* Government of Canada. https://natural-resources.canada.ca/forests-forestry/insects-disturbances/mountain-pine-beetle

gathering of traditional foods or medicine, challenging wildlife food and water resources, and exacerbating food security and economic pressures[40].

Critical Infrastructure. Invasive species can damage critical infrastructure assets such as transportation (e.g. roads, bridges, asphalt) and drainage infrastructure (e.g. culverts). This may include:

- Contaminate gravel pits along construction sites.
- Damaged concrete and asphalt along road shoulders, bridge footings and sidewalks.
- Reduce drainage and stability of drainage infrastructure.

Climate Change. Climate change is expected to contribute to the growth and spread of pests and invasive species. Changing climate conditions, frequent weather events and increased carbon dioxide intake can contribute to:

- Increased vulnerability of native species associated with warmer temperatures and changing precipitation patterns.
- Expansion of invasive pests (e.g. MPB) into new geographic areas.
- Higher resistance of pests to pest management practices (e.g. herbicides) arising from higher carbon dioxide intake.
- Change in species lifecycles and favourable reproduction and growth cycles from changing climate conditions (temperature, humidity, precipitation).

With a warmer climate and changing precipitation patterns, pest management plans and intergovernmental coordination are necessary to slowing spread and protecting local biodiversity.

Impact. Merritt's ability to manage, control and remediate areas affected by invasive species and pests is critical to reducing economic, cultural and infrastructure impacts. Farmers, agricultural producers and Indigenous communities will face heightened risk from several pests and species if left uncontrolled.

Warming temperatures and changing precipitation reduce the culling of pests and contribute to favorable conditions for their reproduction and spread. The City of Merritt should amplify messaging and resources made available through the Thompson Nicola Regional District Invasive Plant Program.

[40] Invasive Species Council of BC. (n.d.). *Indigenous connection.* https://bcinvasives.ca/indigenous-connections/

CHAPTER 7 — CONCLUSION

This Hazard, Risk, and Vulnerability Analysis provides the City of Merritt, partner agencies, and community members with a foundational understanding of the hazard and risk landscape applicable to the local area. This analysis was inclusive of all natural hazards that could pose risks to the municipality and its residents, with findings indicating that wildfires and flooding pose the greatest threat based on their likelihood, historical occurrence, and potential consequences. By systematically identifying and analyzing these hazards, the City is better positioned to prioritize planning efforts, strengthen mitigation initiatives, and align emergency management programs with the most pressing risks facing the community.

This HRVA represents the first step in an ongoing cycle of risk analysis, mitigation, preparedness, response, and recovery. Its findings provide an evidence-based foundation to support discussions regarding acceptable and unacceptable levels of risk, inform updates to emergency plans and bylaws, and guide the strategic allocation of resources to enhance community resilience. The analysis also highlights opportunities to invest in mitigation measures that can reduce long-term recovery costs, protect critical infrastructure, and safeguard public health and safety. As risks evolve over time, the HRVA should be treated as a living document, reviewed and updated regularly to reflect new data, post-incident learnings, and emerging climate science.

Emergency management is a collective responsibility that extends beyond municipal government. Strengthening resilience in Merritt will require sustained interagency partnerships, clear alignment of priorities across departments and jurisdictions, collaboration with Indigenous partners and regional stakeholders, and meaningful engagement with residents, businesses, and community organizations. Building a culture of preparedness through education, training, exercises, and transparent risk communication will be essential to reducing vulnerability and enhancing adaptive capacity across the community.

For more fulsome discussions and informed emergency planning, the City of Merritt could consider assessing technological and human-caused hazards, as they were outside the scope of this analysis. Future analyses could examine risks related to infrastructure failure, hazardous materials incidents, transportation disruptions, cybersecurity threats, and other non-natural hazards that may intersect with or be exacerbated by natural events. Expanding the scope in subsequent analyses will provide a more comprehensive understanding of the municipality's overall risk profile and further support integrated, all-hazards emergency management planning and disaster risk reduction initiatives.

LIST OF ACRONYMS AND ABBREVIATIONS

BCCDC — BC Centre for Disease Control

CDART — Canadian Disaster Animal Response Team

CMIP — Coupled Model Intercomparison Project

CWRP — Community Wildfire Resiliency Plan

DRIF — Disaster Resiliency and Innovation Funding Program

EDMA — Emergency and Disaster Management Act

EMCR — Emergency Management and Climate Readiness

EOC — Emergency Operations Centre

FNHA — First Nations Health Authority

GHG — Greenhouse Gases

HRVA — Hazard, Risk, and Vulnerability Analysis

MPB — Mountain Pine Beetle

MPE — Major Planned Event

NOAA — National Oceanic and Atmospheric Administration

NVIT — Nicola Valley Institute of Technology

PHSA — Provincial Health Services Authority

PiT — Point-in-Time Count

TNRD — Thompson-Nicola Regional District

WUI — Wildland-urban interface

USGS — US Geological Survey

LIST OF REFERENCES

Aubie Vines, G., Froese, C., Pacholik, C., Blackwell, B., Garratt, C., Pypker, T., Crew, A., Gislason, M., Safaie, S., Crichton, C., Harper, S., Scordo, E., Curry, C., Kennedy, A., Smith, T., Eyzaguirre, J., Lyle, T., Tsakonas, K., Fang, L., Onur, T., & Woo, A. (2025). *British Columbia disaster and climate risk and resilience assessment: Provincial report executive summary*. Government of British Columbia. https://nrs.objectstore.gov.bc.ca/xedyjn/Projects/2025/dcrra/DCRRA_execsummary_oct_2025.pdf

B. A. Blackwell and Associates Ltd. (2025). *Community wildfire resiliency plan.* https://www.merritt.ca/wp-content/uploads/2025/03/Merritt_CWRP_2024_FINAL-06Feb2025.pdf

BGC Engineering Inc. (2023). *Thompson Flood Projects.* https://www.fraserbasin.bc.ca/regional-work/thompson-region/thompson-flood-projects/

Beugin, D., Clark, D., Miller, S., Ness, R., Pelai, R., & Wale, J. (2023). *The case for adapting to extreme heat: Costs of the 2021 B.C. heat wave*. Canadian Climate Institute. https://climateinstitute.ca/wp-content/uploads/2023/06/The-case-for-adapting-to-extreme-heat-costs-of-the-BC-heat-wave.pdf

Bonsal, B. R., Peters, D. L., Seglenieks, F., Rivera, A., & Berg, A. A. (2019). Changes in freshwater availability across Canada. In E. Bush & D. S. Lemmen (Eds.), *Canada's changing climate report* (pp. 261–342). Government of Canada. https://changingclimate.ca/site/assets/uploads/sites/2/2018/12/CCCR-Chapter6-ChangesInFreshwaterAvailabilityAcrossCanada.pdf

Bush, E. & Lemmen, D. S. (2019). *Canada's changing climate report*. Government of Canada. https://doi.org/10.4095/314614

Canadian Climate Institute. (2025, August). *Fact sheet: Climate change and drought.* https://climateinstitute.ca/wp-content/uploads/2024/09/Fact-sheet_-Drought_CanadianClimateInstitute.pdf

Canadian Climate Institute. (2026, April). *Fact sheet: Climate change and flooding.* https://climateinstitute.ca/wp-content/uploads/2024/09/Fact-sheet_-Floods_CanadianClimateInstitute.pdf

Canadian Disaster Animal Response Team. (n.d.). https://www.cdart.org/

CBC News. (2023, September 11). *B.C. drought brings increased flood risks, far-reaching damage, experts warn.* https://www.cbc.ca/news/canada/british-columbia/bc-drought-impacts-1.6961982

CBC News. (2023, September 27). *2023 is now officially the most expensive, most destructive wildfire season on record in B.C.* https://www.cbc.ca/news/canada/british-columbia/wildfire-danger-reducing-1.6980041

City of Merritt. (2022). *Official community plan.* https://www.merritt.ca/wp-content/uploads/2024/10/2336_Official-Community-Plan_with-Amendments_2024_SM.pdf

City of Merritt. (2025, June 16). *Merritt transit services.* https://www.merritt.ca/transit/

City of Merritt. (2025, October 14). *Watering restrictions.* https://www.merritt.ca/watering/

City of Merritt. (2026). *Introduction to Merritt*. https://www.merritt.ca/introduction-to-merritt/

City of Merritt. (n.d.). *Merritt business & investment*. https://www.merritt.ca/invest/

City of Merritt. (n.d.). *The complete circle presentation.* https://www.merritt.ca/wp-content/uploads/2020/01/Water-Report_the_complete_circle.pdf

ClimateData.ca. (2026). *Drought and human health in Canada.* https://climatedata.ca/drought-and-human-health-in-canada/

Crenshaw, K. (1991). Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color. *Stanford Law Review*, *43*(6), 1241–1299. https://doi.org/10.2307/1229039

Environment and Climate Change Canada. (2026, April 16). *Canadian climate normals.* Government of Canada. https://climate.weather.gc.ca/climate_normals/index_e.html

Gifford, R., Brown, C., Baron, C., Clement, D., Melnychuk, N., Nelson, H., Sales, L., & Spittlehouse, D. (2022). *British Columbia chapter*. In F. J. Warren, N. Lulham, & D. S. Lemmen (Eds.), *Canada in a changing climate: Regional perspectives report*. Government of Canada. https://doi.org/10.4095/314614

Government of British Columbia. (2021). *Hazard reference guide for the HRVA tool.* https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/local-government/hrva/guides/hrva_hazard_reference_guide.pdf

Government of British Columbia. (2022, September). *Selected communicable diseases other than COVID-19*. In *Examining the societal consequences of COVID-19*. https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/annual-reports/societal-consequences-ch-9.pdf

Government of British Columbia. (2025, January 13). *Livestock relocation policy 2.01*. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/embc/policies/201_provincial_support_for_livestock_relocation_policy.pdf

Government of British Columbia. (2025, March 25). *Province funds replacement of flood-damaged dikes in Merritt*. https://news.gov.bc.ca/32145

Government of British Columbia. (2026, January 2). *Wildfire season summary.* https://www2.gov.bc.ca/gov/content?id=7E638CD0E7B9465F9840C62269BE8DCB

Government of British Columbia. (2026, May 6). *Drought information.* https://www2.gov.bc.ca/gov/content?id=6BF51095A3E34E09AADABC91739C6F0B

Government of British Columbia. (n.d.). *B.C. hazard insights tool.* https://bchazardinsightstool-bcgov03.hub.arcgis.com/

Government of British Columbia. (n.d.). *Historical drought levels map.* https://droughtportal.gov.bc.ca/pages/historical-drought-levels

Homeless Services Association of BC. (2025, April 3). *Merritt — 2025 homeless count.* https://www.bchousing.org/sites/default/files/media/documents/Homeless-Count-Merritt-2025.pdf

Innovation, Science and Economic Development Canada. (2022, June 26). *Surviving the heat: Impacts of the 2021 western heat dome in Canada.* Government of Canada. https://science.gc.ca/site/science/en/blogs/science-health/surviving-heat-impacts-2021-western-heat-dome-canada

Invasive Species Council of BC. (n.d.). *Indigenous connection.* https://bcinvasives.ca/indigenous-connections/

Ministry of Water, Land and Resource Stewardship. (2026, April). *British Columbia drought and water scarcity operations plan.* https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/drought-info/drought_and_water_scarcity_operations_plan.pdf

Natural Resources Canada. (2025, September 11). *Drought is expected to become more frequent and severe in parts of Canada.* Government of Canada. https://natural-resources.canada.ca/climate-change/climate-change-impacts-forests/drought

Natural Resources Canada. (2026, January 12). *Mountain pine beetle.* Government of Canada. https://natural-resources.canada.ca/forests-forestry/insects-disturbances/mountain-pine-beetle

Nicola Watershed Governance Partnership. (n.d.). *About the Nicola Watershed Governance Partnership (NWGP).* https://nwgp.ca/about-the-nwgp/about-the-nicola-watershed

Statistics Canada. (2025, December 9). *Focus on geography series, 2021 census of population.* Government of Canada. https://www12.statcan.gc.ca/census-recensement/2021/as-sa/fogs-spg/page.cfm?topic=8&lang=E&dguid=2021A00055933006

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APPENDIX A — RISK MATRIX

Hazard Category	Climate Change Impact
Natural	↑ Increasing
Human Caused	↓ Decreasing
Technological and Infrastructure	✕ No Change

Category	Hazard	Likelihood Rating (1–5)	Human Impacts (0–10)	Social Impacts (0–15)	Physical Impacts (0–15)	Economic Impacts (0–10)	Risk (1–250)	Climate Change Impact
	Wildland-Urban Interface Fire	4 *	(7 +	10 +	11 +	6)	= 136	↑
	Wildland Fire	5 *	(4 +	9 +	8 +	5)	= 130	↑
	Riverine Flooding	4 *	(6 +	9 +	11 +	6)	= 128	↑
	Extreme Rainfall	4 *	(5 +	7 +	9 +	4)	= 100	↑
	Drought	5 *	(2 +	5 +	6 +	6)	= 95	↑
	Major Planned Event	5 *	(4 +	6 +	4 +	5)	= 95	✕
	Ice Jam	4 *	(6 +	8 +	10 +	6)	= 93	↑
	Pipeline Explosion and Leak	4 *	(4 +	5 +	8 +	5)	= 88	✕
	Structure Fire	5 *	(4 +	4 +	6 +	3)	= 85	✕
	Telecommunications Interruption	4 *	(2 +	5 +	6 +	8)	= 84	↑
	Extreme Heat	4 *	(5 +	5 +	6 +	4)	= 80	↑
	Human Disease (including Pandemic and Epidemic)	3 *	(6 +	8 +	5 +	7)	= 78	↑
	Snowstorms and Blizzards	4 *	(4 +	5 +	6 +	4)	= 76	↑
	Water Service Interruption	3 *	(5 +	5 +	6 +	8)	= 72	↑

Category	Hazard	Likelihood Rating (1–5)	Human Impacts (0–10)	Social Impacts (0–15)	Physical Impacts (0–15)	Economic Impacts (0–10)	Risk (1–250)	Climate Change Impact
	Mass Wasting Events	3 *	(6 +	5 +	8 +	5)	= 72	↑
	Severe Thunderstorms	5 *	(3 +	3 +	6 +	2)	= 70	↑
	Storm Water Flooding	3 *	(4 +	7 +	6 +	6)	= 69	↑
	Dam Failure	2 *	(6 +	11 +	10 +	7)	= 68	↑
	Plant Disease, Invasive Species, Plant Infestation	3 *	(2 +	7 +	9 +	4)	= 66	↑
	Transportation Route Interruption	4 *	(2 +	5 +	5 +	4)	= 64	↑
	Extreme Cold	3 *	(5 +	6 +	6 +	4)	= 63	↑
	Motor Vehicle Incident	5 *	(3 +	4 +	3 +	2)	= 60	×
	Freezing Rain	5 *	(2 +	3 +	5 +	2)	= 60	↓
	Electrical Outage	3 *	(3 +	5 +	5 +	6)	= 57	↑
	Animal Disease	3 *	(2 +	5 +	6 +	6)	= 57	↑
	Hail	4 *	(3 +	3 +	6 +	2)	= 56	↓
	Aircraft Incident	4 *	(4 +	4 +	3 +	3)	= 56	×
	Earthquake	2 *	(5 +	6 +	9 +	6)	= 52	×
	Dangerous Goods Accident	3 *	(4 +	4 +	8 +	2)	= 54	↑
	Waste Water Service Interruption	2 *	(5 +	5 +	6 +	8)	= 48	↑
	Hazardous Materials — In Situ	3 *	(4 +	4 +	4 +	2)	= 42	×
	Structure Failure	2 *	(6 +	4 +	7 +	4)	= 42	↑
	Erosion and Sedimentation	3 *	(2 +	3 +	6 +	2)	= 39	↑
	Land Subsidence (and Sinkholes)	2 *	(4 +	4 +	5 +	2)	= 30	↑
	Volcanic Ashfall	1 *	(3 +	3 +	4 +	2)	= 12	×

APPENDIX B — CONSEQUENCE MATRIX

	People		Social			Physical			Economic	
Rating	**Threat to Safety**	**Displacement**	**Mental Health Impact**	**Support System Impact**	**Cultural Impact**	**Property Damage**	**Critical Infrastructure Impact**	**Environmental Damage**	**Economic Impact**	**Reputational Impact**
1 Minor	No measurable health and safety impacts, no injury or illness.	Not likely to result in shelter-in-place or evacuation notices.	Unlikely to result in short- or long-term mental health concerns.	No noticeable impacted to social networks or community support.	No disruption to cultural artefacts, spaces, or knowledge.	Unlikely to result in damage.	Minimal disruption or damage to critical assets and services. No disruptions to community.	Minimal and reversible damage may not require remediation.	No measure disruption or effect on local businesses, essential services or livelihoods.	Not likely to cause reputational impacts, no public attention or loss of trust.
2 Low	Likely to result in injuries, illness or loss of life that is within the scope of normal operations.	Low portion of the community will require to shelter-in-place or self evacuate. Supports can be provided within normal scope of operations.	Likely to cause short-term or mild emotional stress. Treatment can be provided within normal resources.	Likely to cause short-term disruption to social networks and daily life. Community trust and support are not affected.	Short-term or limited damage to cultural spaces, artefacts, or knowledge. Restoration may take a few days to weeks.	Minor non-structural damage.	Small portion of the community impacted by service disruptions. Restoration may take a few hours to days.	Localized and reversible damage. Remediation is possible and could take hours to a few weeks.	Minimal disruption to few businesses, essential services or livelihoods.	Limited or short-term reputational impacts, minor public inquiry.

	People		Social			Physical			Economic	
Rating	Threat to Safety	Displacement	Mental Health Impact	Support System Impact	Cultural Impact	Property Damage	Critical Infrastructure Impact	Environmental Damage	Economic Impact	Reputational Impact
3 Moderate	Likely to result in injuries, illness or loss of life that is beyond normal operations. Additional capacity, resources, or response plans may be activated.	Portion of the community will require to evacuate or shelter-in-place. Additional regional supports may be required.	Likely to cause short- and long-term mental and emotional stress. Treatment can be provided within normal resources; additional resources may be required to supplement.	Likely to cause short-term disruption to social networks and daily life. Community trust and support are mildly affected.	Some significant damage to cultural spaces, artefacts, or knowledge. Restoration may take a few months.	Localized and severe damage. Repairs may be costly.	Localized community disruption of few critical services. Restoration may take a few days to weeks.	Localized damage with remediation possible within a few weeks.	Localized weeks long disruption to businesses, essential services or livelihoods.	Some significant reputational impacts, negative backlash or loss of confidence.
4 High	Likely to result in significant mass illness, injury or loss of life. Local resources and capacity are exceeded. Emergency Response Plans are activated, and Mutual Aid may be required.	Portion of the community will be evacuated or displaced for some time. Provincial, Regional or Humanitarian Supports may be required.	Likely to cause significant long-term mental and emotional stress. External supports are required to provide treatment options and programs.	Likely to cause short-term and long-term disruption of social networks and daily life. May result in long-term social isolation with community support and trust degraded.	Significant but reversible damage to cultural spaces, artefacts, or knowledge. Restoration or recovery may take months to years.	Widespread structural damage. Repairs may be costly and reconstruction may take months to years.	Widespread damage to critical infrastructure assets and services. Portion of the community will experience multiple service disruptions. Restoration may take few weeks to months.	Major but reversible damage. Remediation may be difficult and could take months or years.	Months long disruption of businesses, essential services or livelihoods, potential for business closures or layoffs.	Significant and long-term reputational impacts, erosion of public trust in leadership.

	People		Social			Physical			Economic	
Rating	Threat to Safety	Displacement	Mental Health Impact	Support System Impact	Cultural Impact	Property Damage	Critical Infrastructure Impact	Environmental Damage	Economic Impact	Reputational Impact
5 Extreme	Likely to result in mass illness, injury or loss of life that exceed all capacity and resources. Provincial, Regional or Federal resources are required.	Majority of the community may be displaced for years. Permanent relocation may be pursued.	Likely to cause widespread and long-term mental and emotional stress. Extensive external supports are required to provide treatment options. Will require long-term programs for support.	Likely to cause significant months to years long disruption of daily life. Complete breakdown of social networks.	Severe or irreversible damage to cultural spaces, artefacts, or knowledge. Restoration and recovery may not be possible.	Widespread and irreparable damage. Reconstruction will take years.	Severe and irreparable damage to critical infrastructure assets and services. Significant portion of the community will be impacted by long-term outages. Restoration may take months to years.	Severe or irreparable damage. Remediation may not be possible or could take decades.	Widespread and long-term loss of businesses, essential services or livelihoods, potential for collapse of industries.	Irreparable reputational impacts, long term damage to public trust, potential legal consequences.

APPENDIX C — NATURAL HAZARD DEFINITIONS

Hazard	Definition	Source
Drought	Drought is a naturally reoccurring period of abnormally dry weather conditions that can lead to water scarcity. This typically occurs during warmer months but may result from ongoing conditions throughout all seasons. Drought can lead to reduction in municipal water service, crop failure, increase in wildfire risk and more.	EMCR HRVA Hazard Reference Guide, Government of BC
Earthquake	An earthquake is the sudden shaking of the ground caused by movement of tectonic plates. This shaking or movement can cause damage to infrastructure or injury of people.	EMCR HRVA Hazard Reference Guide
Extreme Heat	Extreme heat is prolonged periods of excessively high temperatures, higher humidity, and low air flow that persist over a given period. Extreme heat events include heat waves or heat domes. These events can cause serious health risks such as heat strokes or exhaustion, strain infrastructure, and increase wildfire risk.	EMCR HRVA Hazard Reference Guide, Canadian Climate Institute
Extreme Cold	Extreme cold refers to prolonged periods of excessively low temperatures, sometimes accompanied by high air flow. These events can cause serious health risks such as hypothermia or frostbite, damage infrastructure and more.	EMCR HRVA Hazard Reference Guide, Health Canada
Extreme Rainfall (or Precipitation)	Extreme rainfall occurs when an abnormally large amount of rain falls over a short period of time, exceeding local amounts or levels. This includes events such as Atmospheric Rivers which are long and narrow corridors in the atmosphere that carry a tremendous amount of water from one region to another. These events cause pose a significant threat to life and safety, can lead to displacement and severely damage infrastructure.	Environment and Climate Change Canada, FloodWise BC
Erosion and Sedimentation	Erosion occurs when soil and organic matter are weathered or degraded away due to natural processes (air, water, etc.). Sedimentation occurs when soil and organic matter are deposited and solidified through natural or human processes.	Government of BC

Hazard	Definition	Source
Freezing Rain	Freezing rain occurs when rain freezes on contact with a surface when temperatures are below freezing. Freezing rain will typically coat power lines, roads, cars, etc. and lead to damaged infrastructure, power outages, deteriorating road conditions or potential injury.	EMCR HRVA Hazard Reference Guide
Riverine Flooding	Riverine Flooding occurs from the overflow of water onto land from periods of heavy rainfall, snowmelt, or infrastructure failure. Flooding can cause displacement of communities, pose a threat to safety, damage infrastructure and property, and overwhelm emergency response resources.	EMCR HRVA Hazard Reference Guide, Environment and Climate Change Canada
Human Disease (including Epidemic and Pandemic)	Human disease refers to an illness that can affect any human and disrupt normal bodily functions or alter mental functions. This can be caused by a microbe, parasite, or toxin and could transmit between people. Epidemic: Refers to the rapid spread of a known or unknown illness within a region or area. This illness is localized and could mutate or change as it continues to spread. Pandemic: Refers to the rapid spread of a known or unknown illness across regions, countries or continents. This illness occurs a global scale, has a spread and infection rate and can mutate significantly or is caused by novel pathogens.	EMCR HRVA Hazard Reference Guide, BC Centre for Disease Control
Hail	Hail or hailstorms are large precipitation typically in the form of irregular ball shapes made of ice. Hail can range in diameters from 5 to 50 mm or more and can cause injury and damage to infrastructure and property.	Environment and Climate Change Canada
Ice Jam	An ice jam occurs when large chunks of ice accumulate and block the flow of water in a river or stream. This occurs when a period of cold weather is following by a period of higher temperatures causing ice and snow to thaw. This typically occurs in the spring and can lead to significant flooding scenarios.	Environment and Climate Change Canada

Hazard	Definition	Source
Land Subsidence (and Sinkholes)	Land subsidence refers to the gradual or sudden downward movement or sinking of the ground. This often occurs due to the removal of underground resources such as groundwater or mining. On the other hand, sinkholes occur when underlying soluble rocks are dissolved leading to a sudden hole or depression in the ground. Both can lead to damaged infrastructure, especially roads and buildings, and could lead to potential injuries.	EMCR HRVA Hazard Reference Guide, USGS
Livestock or Animal Disease	Animal disease refers to an illness that can affect any animal and can be caused by a microbe, parasite or toxin. These diseases can be infectious or non-infectious and could transmit between animals or from animal to human.	EMCR HRVA Hazard Reference Guide, Government of BC, Office of the Chief Veterinarian
Mass Wasting Events	Mass wasting results from the downward slope movement of loose soils, organic matter, rocks, snow or ice under the influence of gravity. This downward movement is typically rapid and can cause damage or destruction to infrastructure, property and the environment. Examples include avalanches, landslides and debris flows.	University of Guelph, Natural Resources Canada
Snowstorms and Blizzards	Snowstorm events occur during periods of heavy snowfall, high winds and reduced visibility. These events can disrupt services, damage infrastructure, and pose significant health and safety risks. This can occur over a short period of time (a few hours).	Environment and Climate Change Canada
Severe Thunderstorms	Severe thunderstorms refer to periods of heavy rain, high winds and accompanied by lightning and thunder. Thunderstorms occur during periods of higher humidity and warmer weather. These events can lead to potential flash flooding, pose a threat to life and safety, or damage infrastructure.	National Oceanic and Atmospheric Administration (NOAA), Environment and Climate Change Canada
Volcanic Ashfall	Ashfall refers to the deposit of fine particles (minerals, rock etc.) that were released into the atmosphere from a volcanic eruption. Ashfall is carried and distributed by wind over a large distance. Ashfall can pose a health risk to individuals with respiratory conditions or weakened immune systems, can disrupt aviation and damage critical infrastructure assets.	EMCR HRVA Hazard Reference Guide, US Geological Survey (USGS), National Oceanic and Atmospheric Administration (NOAA)

Hazard	Definition	Source
Wildland Fire	Wildland fire refers to the uncontrolled and rapid spread of fire through vegetation such as forests, grasslands etc. Wildland Fires occur during the summer months and can occur from lightning or due to intentional or non-intentional human actions.	EMCR HRVA Hazard Reference Guide
Wildland-Urban Interface Fire	WUI fire occurs when wildland fire approaches the transition zone of where infrastructure meet with vegetated areas. This typically occurs at the fringe areas of a city.	EMCR HRVA Hazard Reference Guide, FireSmart Canada
Plant Disease, Invasive Species and Pest Infestation	A species, pest or pathogen that has been introduced into the local environment. This can impact agricultural crops, local forests and urban environments such as street trees and parks. This can occur intentionally or accidentally.	EMCR HRVA Hazard Reference Guide

APPENDIX D — TECHNOLOGICAL AND HUMAN-CAUSED HAZARD DEFINITIONS

Hazard	Definition	Source
Aircraft Incident	Aircraft incident involves the crashing or impact of one or more aircraft into the ground, a structure or another aircraft. These incidents can occur due to human error, mechanical failure or from weather conditions and can lead to injury, damage or death.	EMCR HRVA Hazard Reference Guide
Dangerous Goods Accident	Dangerous goods accident refers to an emergency event that involves the spill or leaking of dangerous substances during transport or transfer between facilities. These substances may be flammable, corrosive, explosive or radioactive in nature.	EMCR HRVA Hazard Reference Guide, Transport Canada
Hazardous Materials — In Situ	Hazardous Material incident refers to any emergency event that involves the spill or leaking of substances that are dangerous to human health, safety and the natural environment. These substances may be flammable, poisonous, corrosive, explosive or radioactive in nature.	EMCR HRVA Hazard Reference Guide
Major Planned Event (MPE)	MPEs include any planned or unplanned event that has a significantly large attendance that may overwhelm standard response capacities. The location, duration and nature of these events require special planning and coordination between multiple jurisdictions or agencies. MPEs include events such as concerts, marathons, protests, etc.	EMCR HRVA Hazard Reference Guide
Motor Vehicle Incident	Motor vehicle incidents involve the crash or impact of one or more vehicles into a structure, another vehicle or pedestrians. These incidents can either be accidental or intentional in nature and lead to injury, fatalities and damage. Motor vehicles include a car, bus, truck or farm vehicle.	EMCR HRVA Hazard Reference Guide
Structure Failure	Structure failure refers to the partial or total collapse of infrastructure such as buildings, bridges, roads etc. This can occur from human-error, structural problems due to engineering or construction practices, or from natural hazard events.	EMCR HRVA Hazard Reference Guide

Hazard	Definition	Source
Structure Fire	Structure fires refer to fires that occur in residential, commercial or industrial area and affect all forms of building assets. They can lead to potential injuries, health concerns and damage or loss of infrastructure.	EMCR HRVA Hazard Reference Guide
Transportation Route Interruption	An interruption or failure of transportation systems, assets or services. This can result from external hazards such as severe weather or infrastructure failure.	EMCR HRVA Hazard Reference Guide
Electrical Outage	Power or electrical outage is an extended interruption or failure of the electrical grid or infrastructure which can lead to a loss of service. Extended power outages can lead to concern and potential impacts on infrastructure, health and safety of residents.	EMCR HRVA Hazard Reference Guide
Wastewater Interruption	An interruption, failure or disruption of wastewater systems, assets, or services. This can be caused by human-error, technological failure or external hazards. Long-term disruption can cause impacts to human health and safety or lead to environmental consequences.	EMCR HRVA Hazard Reference Guide
Water Service Interruption	An interruption, failure or disruption of water systems, assets or services. This can be caused by human-error, technological failure or external hazards. This includes infrastructure failure and potential water contamination. Water contamination refers to the presence of harmful toxins or microbes that are found in drinking water supply. This contamination can be accidental, intentional or occurring from natural processes. Long-term disruption can cause impacts to human health and safety, damage water infrastructure or harm natural ecosystems.	EMCR HRVA Hazard Reference Guide, Health Canada, HealthLink BC
Dam Failure	Dam Failure refers to the uncontrolled release of water from a breach in the foundations or spillways of a dam. These failures can result from improper construction, maintenance and management and may deteriorate from compounding hazard events. Dam failures can pose serious threat to life and safety, lead to economic disruption and loss and environmental damage.	EMCR HRVA Hazard Reference Guide, Government of BC

APPENDIX E — LIST OF CRITICAL INFRASTRUCTURE

The following critical infrastructure assets are located within the municipal bounds of the City of Merritt and provide critical services to residents. This list is not inclusive of critical infrastructure assets that provide services to Merritt residents but are outside of the municipal boundary.

Sector	Infrastructure	Owner	Address
Energy and Utilities Infrastructure	Merritt Green Energy Plant	Merritt Green Energy	1234 Midday Valley Road
	Merritt Substation	BC Hydro	3420 Voght Street
Government Infrastructure	City Hall	City of Merritt	2185 Voght Street
	Diamond Vale Elementary	SD58	2675 Coldwater Avenue
	École Élémentaire Collettville	SD58	615 Lindley Creek Road
	Merritt Airport Terminal	City of Merritt	4510 Airport Road
	Merritt Bench Elementary School	SD 58	3341 Grimmett Street
	Merritt Central Elementary School	SD 58	1501 Voght Street
	Merritt Public Works Yard	City of Merritt	1298 Coldwater Avenue
	Merritt Secondary School	SD 58	1561 Chapman Street
	South Central Interior Distance Education School	SD 58	2975 Clapperton Avenue
Health	Nicola Valley Hospital and Health Centre	Interior Health	3451 Voght Street
Information and Communications Technology	Granite Avenue Cell Tower	TELUS Corp	2052 Granite Avenue
Safety Infrastructure	Merritt Airport Terminal Building (EOC Building)	City of Merritt	4510 Airport Road
	Merritt Fire Rescue Department	City of Merritt	1799 Nicola Avenue
	Merritt Fire Zone Office	BCWS	4476 Airport Road

Sector	Infrastructure	Owner	Address
	Royal Canadian Mountain Police (RCMP) Station	RCMP	2999 Voght Street
Transportation Infrastructure	Houston St. Bridge	City of Merritt	-
	Main Street Bridge	City of Merritt	-
	Nicola Ave Bridge	City of Merritt	-
	Voght St. Bridge	City of Merritt	-
	Middlesboro Bridge	City of Merritt	-
Water Infrastructure	Active Mountain Booster Station	City of Merritt	-
	Active Mountain Reservoir	City of Merritt	-
	Colletville Sanitary Lift Station	City of Merritt	-
	Collettville Well	City of Merritt	-
	Fairley Park Well	City of Merritt	1788 Quilchena Avenue
	Grandview Booster Station	City of Merritt	-
	Grandview Heights Reservoir	City of Merritt	-
	Grimmett Reservoir	City of Merritt	-
	Kengard Well	City of Merritt	-
	Merritt Wastewater Treatment Plant	City of Merritt	1298 Coldwater Avenue
	Nicola Sanitary Lift Station	City of Merritt	-
	Nicola Reservoir	City of Merritt	-

Sector	Infrastructure	Owner	Address
	South East Balancing Reservoir	City of Merritt	-
	Voght Park Well #1	City of Merritt	1500 Canford Avenue
	Voght Park Well #2	City of Merritt	-

APPENDIX F — ENGAGEMENT SUMMARY

Four engagement opportunities were held for participants from November to December 2025. An in-person HRVA Workshop was held on November 12, 2025, at the Merritt Civic Centre followed by two group interviews on November 25, 2025, at Merritt City Hall. A third virtual group interview was held on December 03, 2025, via Microsoft Teams.

Engagement materials were prepared which included the consequence definitions matrix used in the analysis, guiding questions and three scenarios. The scenarios prepared were informed by previous emergency events that have impacted Merritt or were of great concern — wildfire, flooding and extreme temperatures. The scenarios were used to guide participant discussions across three central themes such as community vulnerability, potential consequences and traditional and ecological knowledge.

Participants included representatives from non-profit organizations, Indigenous governing bodies, provincial and regional agencies, emergency response agencies, infrastructure partners and municipal departments. For the ease of coordination, participants were separated between external and internal groups. External groups were selected to participate in the in-person Workshop while internal groups were selected to participate in group interviews. This allowed the Project Team to work around schedule commitments and synergize participant knowledge accordingly. There were 14 participants that attended the HRVA Workshop, and 8 participants attended the group interviews, across virtual and in-person.

The four forums were facilitated by the Project Team using the three scenarios and guiding questions to inform discussions. The engagement sessions provided an avenue for the following:

- Discussion on the consequences and potential scoring based on the consequence matrix.
- Exploration of community vulnerability that could increase risk or reduce resilience.
- Discussion on traditional and ecological knowledge and practices that could support community resiliency.

The information gathered during the sessions provided context on historical events and physical, social and economic vulnerability of the region which helped inform the evaluation of consequences for all hazards. A survey was circulated on January 27, 2026, to Merritt staff to gather additional insight into perceptions of natural hazard risk and preparedness. It was comprised of seventeen questions that included open-ended, multiple choice and ranking options. Respondents provided insight into historical emergency events, vulnerable populations, hazards of concern, and perceptions on gaps in existing risk reduction measures

Participants indicated the following:

- Vulnerable neighborhoods to wildfire and riverine flood risk, particularly homes upstream from the Coldwater River (for flooding) and the Bench neighborhood (for wildfire).
- Historical wildfire, flooding and extreme cold events that have impact Merritt and the response actions that were implemented.

- Hazard perceptions with Wildfire, Extreme Heat, Drought, Snowstorms and Blizzards ranking highest for recurrence and consequences.
- Critical infrastructure vulnerabilities and interdependencies, specifically assets along flood extents or with minimal redundancy.
- Vulnerable populations, with an emphasis on Elders, people with disabilities, newcomers, visitors and those facing homelessness.
- Barriers to reducing risk, including funding constraints, educational outreach and municipal capacity.

Recommended Future Engagement Opportunities

Target ongoing EDMA cycles (risk updates every 5 years or post-event per s.93 reporting) to build resilience and meet Indigenous coordination duties (s.13).

Table 9: Engagement Opportunities

Engagement Type	Target Audience	Objectives
IGB Feedback Round	IGBs (e.g., nearby First Nations), agencies	Review/share draft HRVA; incorporate traditional knowledge gaps; validate vulnerabilities
Public Open House	Residents, businesses, visitors (esp. vulnerable groups)	Build awareness; gather input on scenarios/consequences; ID new risks (e.g., drought)
Vulnerable Population Focus Groups	Elders, disabled, homeless, newcomers	Deep-dive barriers/access (aligns with equity in EDMA principles)
Sector Table Updates	Infrastructure/emergency partners	Review post-event reports; update interdependencies (e.g., Coldwater assets)
Post-Event Debriefs	All prior participants + responders	Lessons on animals/livestock (per prior queries), evacuations, recovery

APPENDIX G — CLIMATE CHANGE RESOURCES

The following portals provide a range of climate resources including historical climate data, projections and forecasting. The datasets and information available can be used to supplement the analysis results and outcomes.

Climate or Hazard Portal	Description
ClimateData.ca	ClimateData.ca offers a wide range of climate resources pertaining to historical climate data, projections and forecasting. The platform includes datasets and analysis on temperature, precipitation, sea-level change and future building design values.
Climate Atlas of Canada	Climate Atlas is an interactive tool for residents, researchers and political leaders to learn about climate change in a multi-media format combining climate science, mapping and story telling. The Atlas contains datasets pertaining to temperature, precipitation, agriculture with municipalities and Indigenous communities overlaid.
Canadian Centre for Climate Services	The Canadian Centre for Climate Services provides access to climate data, tools and information including historical climate data, climate projections, forecasting, trends and variations and mapping and reporting.
Disaster and Climate Risk and Resilience Assessment	The British Columbia Disaster and Climate Risk and Resilience Assessment includes comprehensive information on six hazards — riverine flood, coastal flood, extreme heat, wildfire, drought and water scarcity and earthquake. It includes information on how hazards will be influenced by climate change, impact to things we value and how hazards may impact certain groups of people differently. As part of the Assessment, a BC Hazards Insights Tool was created which provides spatial information and access to hazard and exposure data at the provincial and regional level.
Canada in a Changing Climate	Canada in a Changing Climate is the National Assessment on climate change in Canada, the impacts on communities, the environment and the economy and the adaptation measures implemented thus far. It includes regional and national issues reports, Indigenous Resilience Report and Health of Canadians.
Plan2Adapt	The Plan2Adapt Tool supports in understanding and planning around climate change impacts in British Columbia. It provides information about project climate change across the province under a high emissions scenario.
Indigenous Climate Hub	The Indigenous Climate Hub provides helpful information and resources on climate change stories from Indigenous perspectives. It is a Indigenous-led project and is a national online platform all First Nations, Inuit and Métis peoples, communities and organizations.