



Regional District of Bulkley-Nechako

HRVA Electoral Area 'A' Committee Backgrounder

ELECTORAL AREA 'A' HAZARD IDENTIFICATION

DECEMBER 2021

“Know the Risks, Make a Plan, Be Prepared”

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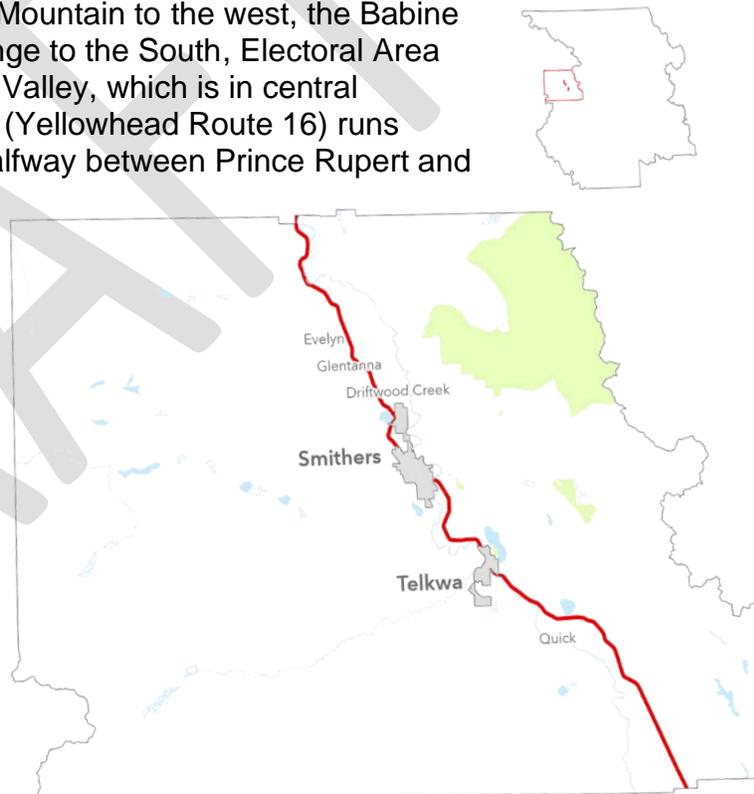
CHAPTER 2: ELECTORAL AREA 'A' HAZARD IDENTIFICATION

Electoral Area 'A' Geographic Setting

Electoral Area 'A' (Smithers/ Telkwa Rural) is the rural area surrounding the Town of Smithers and the Village of Telkwa. Although the jurisdictional boundaries do not include any indigenous settlements, there are two unoccupied Witsset First Nation reserve lands Oschawwinna 31 and Jean Baptiste 28, within the Regional District of Bulkley-Nechako (Regional District). The unincorporated communities within the area include Driftwood Creek, Glentanna, Evelyn, Quick, Hudson Bay Mountain Ski Community, and multiple neighbourhoods. ([website](#)) Electoral Area 'A' is situated on the Yintah (land) of the traditional territory of the Wet'swet'en, home to the Gitdumden (Wolf/Bear) and Laksilyu (Small Frog) Clans people².

Tucked between the stunning Hudson Bay Mountain to the west, the Babine Mountain range to the east and Telkwa Range to the South, Electoral Area 'A', Smithers Rural is located in the Bulkley Valley, which is in central northwest BC. The Trans-Canada Highway (Yellowhead Route 16) runs through the area, which is approximately halfway between Prince Rupert and Prince George. The area is known for its natural beauty, high standard of living and relatively diverse employment opportunities. The area is renowned for its world-class steelhead fishing with several fishing lodges located on nearby rivers.

Electoral Area 'A' is 3,677 square kilometres in area and is transected by the Bulkley River. Development in this unique area is concentrated around the municipalities of Smithers and Telkwa, and along the floor of the Bulkley Valley.



¹ First nations Profiles, Indigenous and Northern Affairs Canada. Witsset Profile reserves listed. Retrieved on March 2, 2021 from: https://fnp-ppn.aadnc-aandc.gc.ca/fnp/Main/Search/FNReserves.aspx?BAND_NUMBER=530&lang=eng

² Office of the Wet'suwet'en website, Clan names retrieved on March 2, 2021 from: <http://www.wetsuweten.com/>

Electoral Area 'A' Hazard History

Electoral Area 'A' has experienced several events that have impacted residents of the region since the early 1900's. The regularity of the event happening determines the risk factor which will be used in the Hazard, Risk, and Vulnerability Analysis.

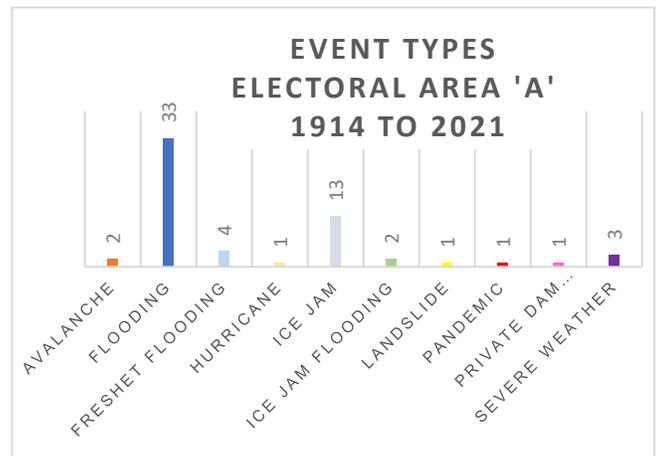
There are several well-known hazards in Electoral Area 'A' including flooding, severe weather, landslides, hazardous materials and explosions, transportation accidents, interruptions to critical services, and wildfires. Many of these hazards are high risk and are a priority to all communities within the Regional District of Bulkley-Nechako.

The graph below shows the actual event types experienced in Electoral Area 'A' from 1914 to 2021. The highest recurring event types and severity of impact in this area are:

- Flooding;
- Ice Jams; and
- Severe Weather.

[Appendix 1](#), Historic Hazard Data, provides the details on recorded events in Electoral Area 'A'.

The Regional District HRVA 2003 Hazard, Risk, and Vulnerability Analysis Priority Matrix identifies the following hazards:



FREQUENCY	Very Low	Low	High	Very High	
	1	2	3	4	
6			Fire – industrial (18)	Fire- interface & Wildfire, Flood (24)	Frequent or very likely
5	Avalanche (5)		Dangerous goods spill, Epidemic- human, Explosion transportation accident – Road (15)	Severe Weather (20)	Moderate or likely
4		Critical Facility Failure, Infrastructure Failure (8)	Transportation accident – Air, Rail (12)	Earthquake (16)	Occasional, slight chance
3		Epidemic – Animal (6)	Landslide, debris flow (9)		Unlikely, Improbable
2			Terrorism (6)		Highly unlikely (rare event)
1		Dam Failure, Mine Accident (2)		Volcano Eruption (4)	Very Rare event

Risk index # is the Frequency x Severity.

Village of Telkwa Emergency Preparedness Plan 2017 Hazard, Risk, and Vulnerability Analysis Priority Matrix identifies the following hazards:

		Very Low	Low	High	Very High	
FREQUENCY	6			Dangerous Goods Spill Flood, Transportation accident road (18)	Fire- interface & Wildfire (24)	Frequent or very likely
	5	Transportation accident – Air (5)	Infrastructure Failure (10)	Transportation accident – Rail (15)		Moderate or likely
	4		Fire – Industrial (8)	Transportation accident – Air, Rail (12)	Earthquake (16)	Occasional, slight chance
	3		Earthquake (6)	Severe Weather (9)		Unlikely, Improbable
	2		Epidemic - Human (4)	Explosion or Emission, Landslide, Debris Flow (6)		Highly unlikely (rare event)
	1		Critical Facility Failure (2)			Very Rare event
		1	2	3	4	SEVERITY

In addition, the Village of Telkwa Evacuation Guide 2020 identified fourteen hazards and their likelihood to occur within Telkwa:

Type	Emergency, Disaster, or Incident	Frequency	Magnitude
Natural	Adverse Weather	MED	LOW
	Flood (100 yr.)	LOW	LOW
	Flood (500 yr.)	LOW	MED
	Flood (1,000 yr.)	LOW	HIGH
	Ice Jams	MED	LOW
	Landslide	LOW	MED
Human Caused	Wildland Urban Interface Fire	MED	MED
	Accident – Rail	LOW	MED
	Accident – Road	HIGH	LOW
	HAZMAT – Rail	LOW	HIGH
	HAZMAT - Road	MED	HIGH
	Pandemic	LOW	HIGH
	Power Outage	MED	MED
Structure Fire	MED	LOW	

The Town of Smithers Emergency Response and Recovery Plan 2016 does not contain a risk matrix.

Defining Hazard Considerations for Electoral Area 'A'

This section provides definitions from the HRVA Hazard Reference Guide 2021 Province of British Columbia, and the Town of Smithers and the Village of Telkwa emergency management plans. These definitions and related information can help to inform the HRVA advisory committee in determining what hazards will be analyzed in this HRVA process.

The hazards are grouped in to three categories: Natural Hazards; Human-Caused Hazards; and Diseases, Pest Infestations & Epidemics. Hazards defined in this section are based on historical events that may have impacted Area A as well as been included in the Hazard, Risk, and Vulnerability Analysis Priority Matrix's from the Regional District HRVA 2003, Village of Telkwa Emergency Preparedness Plan 2017, and Village of Telkwa Evacuation Guide 2020. This backgrounder has also been updated with input and further research resulting from the Hazard Identification workshop on October 8th, 2021. The top four priority hazards identified by RDBN staff include:



Flooding



Severe Weather



Wildfire



Rail Incidents

Known hazards are also identified on a map of electoral area 'A' and can be found in Appendix 3 of this chapter. HRVA Electoral Area 'A' Committee Workbook Backgrounder Additional hazard definitions and information can be found in the provinces [HRVA Companion Guide 2021](#).

If you have information on known hazards, resources or details on resiliency strategies related to the hazards listed below, please include these as notes and pass them on to the Regional District HRVA Coordinator for inclusion in the analysis.

Indigenous Traditional Knowledge

Long before European explorers and traders arrived in the late 1700s, Indigenous people in BC told stories and practiced traditions to share important knowledge about natural hazards. By repeating these stories, Indigenous people passed on valuable information about how to prepare for and survive disasters across time and across generations. (Prepare BC Emergency Management BC, 2019)

Those holding traditional knowledge can assist in understanding the nature of local hazards, suggest appropriate risk reduction and response mechanisms, and even give options for recovery based on past experiences. They can also help us recognize and respect the long history and rich traditions of First Nations communities on this land. (Munsaka, 2018) The Regional District recognizes the importance of learning from traditional knowledge and is looking to continually strengthen and develop relationships in the hopes that this knowledge can assist and inform future emergency planning and preparedness planning.

Summary of Climate Patterns

The information below has been summarized from the *Climate Patterns, Trends, and Projections for the Omineca, Skeena, and Northeast Natural Resource Regions, British Columbia - Technical Report 097, 2016*. (Foord, 2016)

Baseline climate of the Skeena Natural Resource District

Seasonal/Annual	Precipitation (mm)	Mean temperature (°C)	Maximum temperature (°C)	Minimum temperature (°C)
Skeena District				
Winter	136.9	-7.2	8.4	-30.8
Spring	80.8	4.4	25.1	-17.5
Summer	140.6	13.9	31.4	-0.6
Fall	165.3	4.3	24.3	-16.2
Annual	520.4	3.9	31.5	-32.4

Skeena District Climate Trends

The Skeena Natural Resource District has become warmer and wetter over the last century. Mean annual precipitation has increased 5.2%. Most significantly, summer precipitation has increased by more than 10%. The largest increases in precipitation have occurred in the Skeena (southern) portion of the Skeena–Stikine District. Mean annual temperature has increased in the region by 0.2°C. Seasonally, mean winter temperatures have increased the most throughout the region, by about 0.7°C. The Skeena (southern) portion of the Skeena–Stikine District has experienced large increases in precipitation resulting likely in moderate increases in temperature. Summers, overall, are getting warmer in the region.

Skeena District Climate Projections

Climate projections for the northern regions and districts were made for 2055 (2041–2070). Mean annual temperature in the Skeena Natural Resource District is projected to increase by 3.2°C, with minimum temperatures increasing more than maximum temperatures. Mean annual precipitation for the region is projected to increase by 7%. Increases will likely be as rainfall because precipitation as snow is projected to decrease by about 35%. Precipitation is projected to increase the most in the fall. The number of growing degree-days will increase, and the number of frost-free days will increase. The greatest increase in the number of frost-free days is projected to occur in the spring.

A Note about Climate Change:

 Climate change impacts both the frequency and intensity of many hazards. It may also cause new hazards to emerge. In this HRVA methodology, climate change is not indicated as a separate hazard; however, those hazards identified as being impacted by climate change are indicated with a special symbol. e.g. Drought (BC E. M., 2021)

Natural Hazards

Flooding: Lakes, Rivers, and Stream



Flooding is the overflow of natural drainage channels, natural shorelines and/or human-made facsimiles leading to partial or complete inundation from the overflow of inland or tidal waters, and/or the accumulation or runoff of surface waters from any

SOURCE. (BC E. M., 2021)

- Floods in Electoral Area 'A' are caused by natural conditions and geography. The area experiences a variety of flooding due to:
 - Heavy Rains or rain-on-snow events in spring, fall, and winter months;
 - Spring freshet flooding from rapid snow melt;
 - Intense precipitation at any time of year;
 - Ice jams in spring, fall, and winter months;
 - Failure of private dams or flood protection works; and
 - Debris flows on the fans of steep mountain stream channels.
- The Bulkley and Telkwa rivers are of the highest concern in the area.
 - The Regional District has invested in flood risk assessment in [Ebenezer Flats/ Kidd Road Flood Mitigation Study 2019](#);
- 295 addresses are in the floodplain this includes 204 in Telkwa, 10 in Smithers, and 81 in Area 'A'. Of the 81 address in Area 'A' 14 are south of Telkwa, 67 are between Telkwa and Smithers with (47 of which are in the Ebenezer Flats).
- The [Regional District Floodplain Management Bylaw No. 1878, 2020](#) was established to reduce or prevent injury or the loss of life, and to minimize property damage, during flood events. This bylaw contains drawings for Smithers to Telkwa, Quick to Houston, and the Quick Area as mapped for 20-year and 200-year frequency events mapped in 1982 and a drawing of Ebenezer Flats from 2018.
- The Village of Telkwa has invested in [Flood Mitigation Planning](#).
- The Province of BC has invested in [Flood Plain mapping](#) along the Bulkley and Telkwa Rivers. With the BC River Forecast Centre continual monitoring and forecasting river flows.
- See [Appendix 2](#) for hydrometric data reporting annual maximum daily discharge rates (m³/s) for five Ministry of Environment monitoring stations.
- The Village of Telkwa owns and maintains three dikes listed under the Dike Maintenance Act. The dikes and consequence classification of each are as follows (ltd., 2019):
 - Riverside Street, Dike #300, Minor;
 - Bartlett Flood Protection, Dike #302 – Moderate;
 - Cottonwood Flood Protection, Dike #303 – Moderate.³
- Witsset has identified flood hazard areas in their [Witsset First Nation Community land Use Plan](#).
- The Town of Smithers has several owned sites within the 200-year flood plain including Sewage Treatment Plant, Smithers Airport, Riverside Park, Fairgrounds, and the Archery Club. Of particular concern, the location of the Town of Smithers sewage treatment facility.

³ Dike consequence summary by region can be accessed:

https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/drought-flooding-dikes-dams/integrated-flood-hazard-management/dike-management#dike_conseq

- The Village of Telkwa has several owned sites within the 200-year flood plain including Riverside Park, Telkwa Municipal Hall, and the Well and Pump Station.

Notable floods in Electoral Area 'A' include:

- [1966 Spring Ice Jam](#) blocked the Bulkley River near Telkwa taking out the Bulkley River bridge on Highway 16, east of Smithers.
- Additional flood accounts can be found in [Appendix 1](#).

Comments and questions for consideration and further research:

- Interest in a review of climate trends and projects from the background paper of hazard ID.

Related Hazards: Hurricane/Typhoon/High Wind Event / Landslide/Debris Flow / Storm Water Flooding / Flash Flooding / Dam and Spillways Failure / Dike Failure

Drought



Drought is a recurrent feature of climate involving a deficiency of precipitation over an extended period, resulting in a water shortage for activities, communities, or aquatic ecosystems. In BC, combinations of insufficient snow accumulation, hot and dry weather, or a delay in rainfall may cause drought. (BC E. M., 2021)

- Drought can lead to reduced water availability for household and business use. Lower stream flows may cause warmer river temperatures, affecting fish and other aquatic life. Low stream flows can also affect the growth of agricultural crops and limit the water available for irrigation. Low flows and extended periods of low precipitation can also have impacts on groundwater levels. Aquifers – particularly those at shallow depths - may develop a lower water table due to drought in any given year and from previous drought seasons, as there may not be enough water to recharge the aquifer. If natural water sources or adequate storage are not available in a community, it may also lead to insufficient supplies for firefighting. (Econics, May 2021)

Notable regional incidents involving drought:

- Due to relatively normal to high snowpacks in the spring, early forecasts did not flag a drought risk for 2018. However, a heat wave in late spring rapidly depleted snowpacks and caused freshet flooding earlier than normal. That, and the lack of precipitation from July to November, created extensive dry conditions across lots of the province.
- In 2018, the Northwest, Upper Fraser West, Upper Fraser East, and Nechako regions reached Level 2 to Level 3 drought ratings, meaning these areas were very dry. (BC Agriculture & Food Climate Action Initiative, 2019) With the Skeena – Nass (including Witset, Smithers and Telkwa) reaching level 4 from August 23 to November 8th, being extremely dry. (Columbia P. o., British Columbia Drought Information Portal, 2021)

Comments and questions for consideration and further research:

- No monitoring of ground wells on private property and downstream effects.
- Affected by climate change and climate modelling.
- Can affect food security, both wild and cultivated – need for public education on small mitigation issues like rain barrels

Related Hazards: Extreme Heat / Lightning / Animal Disease / Human Disease / Plant Disease and Pest Infestation / Public Health Crisis / Wildfire / Food Source Interruption / Water Service Interruption.

Landslide/Debris Flow



Debris avalanches and debris flows.

Debris avalanches are extremely rapid debris flows of mud, rock, brush, trees, and other debris propelled by torrential rains.

Debris flows are a form of rapid mass down-slope movement of a slurry of loose soils, rocks, and organic matter. (BC E. M., 2021)

- The Regional District has invested in geotechnical assessments in the following areas of Electoral Area A:
 - [Alluvial Fan Study \(Lake Kathlyn Area, Smithers\) 1991](#)
 - [Geotechnical Assessment Potential Terrain Hazards \(Slope Stability\) Lower Viewmount Road Area 2006](#)
- 72 rural area resident addresses are in the Lake Kathlyn Alluvial Fan Area.
- 49 rural area resident addresses are Geotechnical slope concern area on Viewmount rd.
- The Town of Smithers has identified steep slopes as an Environmental Development Permit Area in the [OCP and Schedule B Map](#).
- The Village of Telkwa has identified steep slopes as an Development Permit Area in the [OCP and sensitive ecosystems Map 3](#).
- Witset has identified steep slope areas in their [Witset First Nation Community land Use Plan](#).
- Recognition that landslide outside of the region can have significant impacts on critical infrastructure and supply chains that service the RDBN.

Notable landslides/debris flow in Electoral Area 'A' include:

- [May 6, 2017](#) resident first observed landslide in the Lake Kathlyn Area.

Related Hazards: Avalanche / Land Subsidence / Submarine Slides / Tsunami / Seiche / Lake, River, and Stream Flooding / Flash Flooding / Structure Failure / Electrical Outage / Telecommunications Interruption / Transportation Route Interruption.

Area A Weather Hazards

Climate Norm's 1981-2010⁴

Annual Rainfall 367.2 mm
Annual Snowfall 182.7 mm
Average Temperature, January -7.2 C
Average Temperature, July 15.2 C
Frost-free Days 108 days
Hours of Sunshine 1621 hrs. per year
Maximum Temperature 37.1 C (June 27, 2021)
Minimum Temperature -43.9 C (Jan. 13, 1950)

- According to Environment Canada, in the Smithers area, the minimum extreme temperature recorded was -43.9 degrees Celsius and occurred in January of 1950. On average, there are less than 1.1 days in January where the temperature reaches below -30 degrees Celsius. (Canada E. , 1981-2010)
- Atmospheric River effects can be seen throughout the region. An **atmospheric river, or AR**, is a large, narrow stream of water vapour that travels through the sky. It can stretch to 1,000 miles (1,600 kilometres) long and more than 400 miles (640 km) wide, and on average, carries an amount of water equivalent to 25 Mississippi Rivers. As the rivers cross from the ocean to the land — particularly to mountainous regions like the B.C. coast — the vapour condenses into precipitation, sometimes dumping a month's worth of rain or snow in a matter of days. Less-intense ARs are essential to many continents' water supply by bringing a whole lot of it from the warmer tropical oceans. But the bigger and more intense they get, the more dangerous they can be, triggering landslides and flooding resulting in tens to hundreds of millions of dollars in damage or more. The warmer the air is, the more water vapour an AR can carry. As the atmosphere's average temperature rises, then, an atmospheric river can grow — and when it makes landfall, it can release more rain or snow than in years past. (Linch, 2021)
- Environment and Climate Change Canada is working to create a new warning system that would act as a Canadian version of AR warnings. This system is predicted to be publicly ready in the fall of 2022. (Linch, 2021)

⁴ (Canada E. , 1981-2010)

Snowstorms and Blizzards



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. (BC E. M., 2021)

- Snowfall is a common occurrence in the winter months for the Bulkley Valley, although it is rarely heavy enough to pose a significant risk. Historic climate data collected by Environment Canada suggests that the prevailing winter winds blow from the Southeast. During the winter months, the most common winds are south easterlies. It is important to note that winter winds are generally much stronger than summer winds in the area. (Canada E. , 1981-2010)

Notable Snowstorms in Electoral Area 'A' include:

- According to historic climate data, the greatest one-day snowfall of 105.5 centimeters was recorded on [January 16, 1947](#).
- Additional snowstorm accounts can be found in [Appendix 1](#).

Related Hazards: Extreme Cold / Freezing Rain or Drizzle / Avalanche / Structure Failure / Electrical Outage / Food Source Interruption / Telecommunications Interruption / Transportation Route Interruption / Fuel Source Interruption / Aircraft Incident / Motor Vehicle Incident.

Fog



A cloud based at the earth's surface, consisting of tiny water droplets, or under very cold conditions, ice crystals or ice fog. It is generally found in calm or low wind conditions. Under foggy conditions, visibility is reduced to less than 1 kilometre. (BC E. M., 2021)

- Fog is a concern in the fall in the Bulkley Valley and in Witset. Can cause motor vehicle incidents or service interruptions at the airport.
- Generally, the interior is foggier in the winter months with Smithers averaging 107.65 hours/year with visibility being less than 1 km (Glacierx, 2014)

Related Hazards: Extreme Cold / Freezing Rain or Drizzle / Transportation Route Interruption / Aircraft Incident / Marine Vehicle Incident / Motor Vehicle Incident.

Space Weather



A disturbance or fluctuation in the earth's magnetic field, associated with solar flares. The impact may include disruption of electrical grids, communications systems, navigation equipment, and satellite operations. Resource operations including surveying, drilling, and pipelines may also be negatively affected. (BC E. M., 2021)

- The source of space weather is the Sun. The Sun is a million times larger than Earth and so distant that its light takes eight minutes to reach us. When violent solar phenomena occur, they create space weather effects on Earth, which can pose a hazard for human activities. (Government of Canada, 2021)
- Effects from solar activity include (but are not limited to) geomagnetically induced currents in power systems and pipelines, azimuthal errors in directional drilling, disruptions to HF radio communication and GPS navigation, and failure or misoperation of satellites:
 - Magnetic disturbances induce electric currents in long conductors such as power lines and pipelines causing power system outages or interfere with pipeline corrosion systems.
 - Magnetic disturbances directly affect operations that use the magnetic field, such as magnetic surveys, directional drilling, or compass use.
 - Radio waves used for satellite communications or GPS navigation are affected.
 - Effects on satellites including radiation damage, memory upsets, phantom commands, surface charging and internal charging. (Government of Canada, 2021)

Related Hazards: Cyber Security Threat / Telecommunications Interruption / Electrical Outage / Transportation Route Interruption.

Extreme Heat



Heat waves can be characterized by temperatures significantly above the mean for an extended period, or by a combination of high temperatures with high humidity and a lack of air motion. Heat waves impact upon the very young, the elderly and those with cardiovascular conditions. Heat waves also impact upon agriculture. (BC E. M., 2021)

Notable Heatwaves in the Electoral Area 'A' include:

- The last week in June 2021 brought about unprecedented heat in British Columbia and across western Canada. With forecasts stating it was the warmest stretch since records have been kept (In many instances 100+ years) ((MSC), 2021). With CBC reporting 486 sudden deaths over a five-day period from June 25th – 30th, 2021 195% increase over the approximately 165 deaths that would normally occur in the province over a five-day period. (Service B. C., 2021)
- Temperatures reaching 37.1 'C on June 27, 2021. (NAVCAN, 2021)

Related Hazards: Lightning / Animal Disease / Human Disease / Plant Disease and Pest Infestation / Public Health Crisis / Structure Fire / Wildfire / Drought / Food Source Interruption / Water Service Interruption.

Lightning



Generally, all the various forms of visible electrical discharge that are produced by thunderstorms; often seen as a bright flash of light in the sky. Lightning impacts air transportation, powerlines and communications infrastructure and causes forest fires. (BC E. M., 2021)

- Lightning occurs virtually year-round in the Pacific coastal region. The average date of the beginning of lightning season in Western Canada (1999-2018) for British Columbia - Interior – North and high mountain ranges is June 1st. The Average date of the end of the lightning season in Western Canada (1999-2018) is between October 1st and November 1st. (Canada G. o., Lightning Statistics, 2016)
- The Canadian Lightning Detection Network (CLDN) was established in 1998 and consists of over 80 lightning sensors distributed across Canada. (Canada G. o., Lightning, 2016)
- Some quick facts regarding forest fires from [Natural Resources Canada](#), Forest fires started by lightning, represent 45 per cent of all fires and 81 per cent of the total area burned in Canada, and occur in remote locations and often in multiple clusters. (Canada G. o., Lightning Statistics, 2016) Historical Lightning strike data is included in [Appendix 3 – Hazard Maps](#).

Notable lightening data in Electoral Area 'A' includes:

- Total ground to cloud lighting strikes from 1999-2018 in Smithers was 1858 and the average number of lightening days (within 25km) is 9.5. (Canada G. o., Lightning Statistics, 2016)

Related Hazards: Hail / Wildfire / Storm Water Flooding / Flash Flooding / Electrical Outage / Telecommunications Interruption.

Air Quality

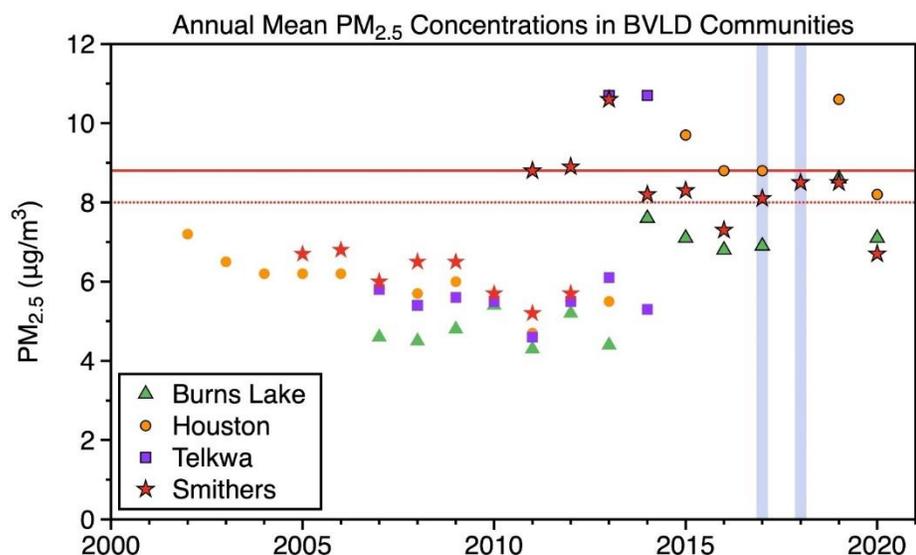


Solids, liquids, or gases which, if discharged into the air, may result in statutory air pollution. (BC E. M., 2021)

- Communities in this region experience air quality episodes due to elevated particulate concentrations at various times throughout the year. Particulate matter is a concern for human health and from an aesthetic point of view. Smithers has an air quality monitoring station that provides an [Air Quality Health Index \(AQHI\)](#), hourly air quality readings, and related health messages. The AQHI reports on the health risks posed by a mixture of pollutants, including [particulate matter \(PM_{2.5}⁵\)](#), ground-level ozone (O³), and nitrogen dioxide (NO²). (BC A. Q., 2021) These readings illustrate the level of health risks with a number and advice on minimizing health risks from air pollutants.
- The most significant air pollutant in the Bulkley Valley Lakes District (BVLD) is fine particulate matter, PM_{2.5}, from open burning, industrial sources, wood burning appliances, backyard burning, transportation road dust and vehicle emissions. A study conducted by Elliot and Copes (2011) has estimated that between 16 to 74 deaths each year are attributable to fine particulate matter concentrations in Northern and Interior Health Regions alone. (Zirnhelt, June 21, 2021)
- In Canada, wildfires can significantly increase air pollution levels of fine particulate matter (PM_{2.5}) posing the greatest human health risk (Canada H. , 2021).
- Elevated PM_{2.5} typically occur in the autumn and winter months when dispersion is poor and many different emission sources (industry, space heating, open burning) are active. (Zirnhelt, June 21, 2021)

Notable Air quality data in Electoral Area 'A' includes:

- The [Bulkley Valley Airshed Management Plan](#)
- The Province of BC has one active Air Quality Monitoring station located in this region [Smithers Muhiem Memorial.](#) (Columbia P. o., Air Quality Data BC, 2021) There was an average level of 8.3 PM_{2.5} over the last ten years (data missing for 2019) with the highest average year in 2013 with an average level of 10.1 PM_{2.5}. 7-10 PM_{2.5} is a High Health Risk according to the AQHI.
- Since 2011 Smithers air quality, annual mean PM_{2.5} concentrations, has exceeded the provincial air quality objectives (8 or 25 ug/m³) consistently, with 2016 and 2020 being slightly



⁵ PM_{2.5} Particulate matter with a diameter of less than 2.5 micrometers (µm). One micrometer is one millionth of a metre. PM_{2.5} is included in fine particulate and is a subset of PM₁₀ (when measuring PM₁₀, it includes PM_{2.5}). PM_{2.5} is typically associated with combustion sources (smoke) and is more closely related to adverse health effects than larger particles.

below the provincial objectives.

- A day is considered an advisory level day if the daily (24-hour) concentration is greater than the provincial objective of 25 ug/m³ for PM_{2.5}. The following chart provides the number of air quality advisory days in Smithers issued by the Ministry of Environment since 2013⁶:

Year	# of days under advisory for fine PM ^{2.5}
2013	11
2016	15
2017	19
2018	4
2019	2
2020	1

- There are three Purple Air Quality Monitoring stations in Telkwa, six in Smithers, one in the RDBN north of Lake Kathlyn and one in Witsset.

Related Hazards: Human Disease / Public Health Crisis / Structure Fire / Wildfire / Ash Fall / Explosions / Hazardous Materials Spill / Oil or Gas Pipeline Spill.

Hurricane / Typhoon / High Wind Event



Hurricanes are tropical cyclones with maximum sustained surface winds of at least 64 knots (118 km/h). Hurricanes are known as typhoons in the western Pacific, very severe cyclonic storms in the North Indian Ocean, and severe tropical cyclones in Australia. There are five classes of hurricane intensity as outlined by the Saffir-Simpson Scale. (BC E. M., 2021)

- The windier part of the year is from November to April, with average wind speeds of more than 6.5 kilometres per hour at 10 metres above the ground. The windiest month of the year in Smithers is January, with an average hourly wind speed of 7.3 kilometres per hour. The calmest month of the year in Smithers is August, with an average hourly wind speed of 5.5 kilometres per hour.
- The wind is most often from the west for 6 months, from April to October, with a peak percentage of 69% on July 21. The wind is most often from the south for 2 weeks, from mid-October to November, with a peak percentage of 36% on October 22. The wind is most often from the east for 5 months, from November to April, with a peak percentage of 46% on January 1. (Cedar Lake Ventures, Inc., 2021)

Related Hazards: Hail / Lightning / Snowstorms and Blizzards / Tornado / Landslide/Debris Flow / Explosions / Hazardous Materials Spill / Seiche / Storm Surge / Lake, River, and Stream Flooding / Coastal Flooding / Storm Water Flooding / Flash Flooding / Dam and Spillways Failure / Dike Failure / Structure Failure / Electrical Outage / Food Source Interruption / Telecommunications Interruption / Transportation Route Interruption / Wastewater Interruption / Water Service Interruption / Fuel Source

⁶ Data received from Ben Weinstein Sr Air Quality Meteorologist Monitoring, Assessment and Stewardship Environmental Protection on August 12, 2021

Interruption / Aircraft Incident / Marine Vehicle Incident / Motor Vehicle Incident / Rail Incident.

Wildfire



An unplanned fire - including unauthorized human-caused fires - occurring on forest or range lands, burning forest vegetation, grass, brush, scrub, peat lands, or a prescribed fire set under regulation which spreads beyond the area authorized for burning.

The wildland urban interface (WUI) is any area where combustible forest fuel is found adjacent to homes, farm structures or other outbuildings. This may occur at the interface, where development and forest fuel (vegetation) meet at a well-defined boundary, or in the intermix, where development and forest fuel intermingle with no clearly defined boundary. (Service B. W., 2021)

- 57 rural area addresses are in a high Wildfire Urban Interface risk area. There are no Extreme risk areas in Area A.
- The Wildland-Urban Interface (WUI) occurs where homes, structures, and critical infrastructure are found adjacent to or intermixed with combustible vegetated lands. Historically in BC, the WUI was created by buffering an area, using geographic information systems, where structure density is greater than 6 structures/km² by 2 km. The 2 km buffered area was originally designed to represent a reasonable distance that embers from a wildfire can travel to ignite a structure.
- The Village of Telkwa has a Community Wildfire Protection Plan developed in 2008. The plan is out of date however identifies two common hazards. The first being the Canadian National (CN) rail line that passes thru the Village of Telkwa and falls into moderate threat management units in the Telkwa Fire Protection area. The second common hazard being the large power lines that are a likely ignition source within the Telkwa FPA especially if dead trees are bordering them.
- Fire is a natural, normal process in many ecosystems and is necessary to maintain a healthy forest and a diversity of plant and animal life. In the Bulkley Fire Zone, about 53% of wildfires occur naturally (from lightning strikes). (Patrick Ferguson, 2021)
- Town of Smithers Community Wildfire Protection Plan 2012 (ConsultantsLtd., 2012) identifies common ignitions sources as follows: grass fires in April/May, industrial burning escapes (fires set with purpose), lightning, and misc. escaped campfires, smokers, other miscellaneous ignition.
- The Town of Smithers is surrounded by forests classified as Engelmann Spruce—Subalpine Fir and is considered as a medium fire hazard zone. The Town of Smithers has several wildland-urban interface fire areas that annually experience long periods of moderate to high fire danger during the summer and early fall. (Smithers, 2016)
- Wildfires have cascading effects linked to mental health.
- The Regional District of Bulkley Nechako operates a [FireSmart program](#) that is a federal, provincial, and community-based program that encourages the public to take simple, scientifically proven steps to increase wildfire resiliency. In 2021 the RDBN FireSmart educator conducted 45 home assessments in Electoral Area 'A' to help residents better understand and apply these practices on their properties and homes. These assessments came with funding for mitigation work.

Notable fires outside Electoral Area 'A'

In the summer of 2018, the RDBN mobilized its emergency management structure for over 72 days in response to 15 major fires which resulted in 64 evacuation orders and alerts with 1,544 dwellings under evacuation order, affecting approximately 3,475 people

and requiring the relocation of over 3,000 livestock. Eight dwellings and over 45 other structures were lost and a declaration of state of local emergency was in place from August 1 to September 20. (Inc., 2019)

Key questions for consideration and further research:

- Are there stats on how many fires CN has cause in the province or our region?

Related Hazards: Air Quality / Extreme Heat / Lightning / Structure Fire / Explosions / Drought / Structure Failure / Electrical Outage / Telecommunications Interruption / Transportation Route Interruption / Water Service Interruption.

Earthquake

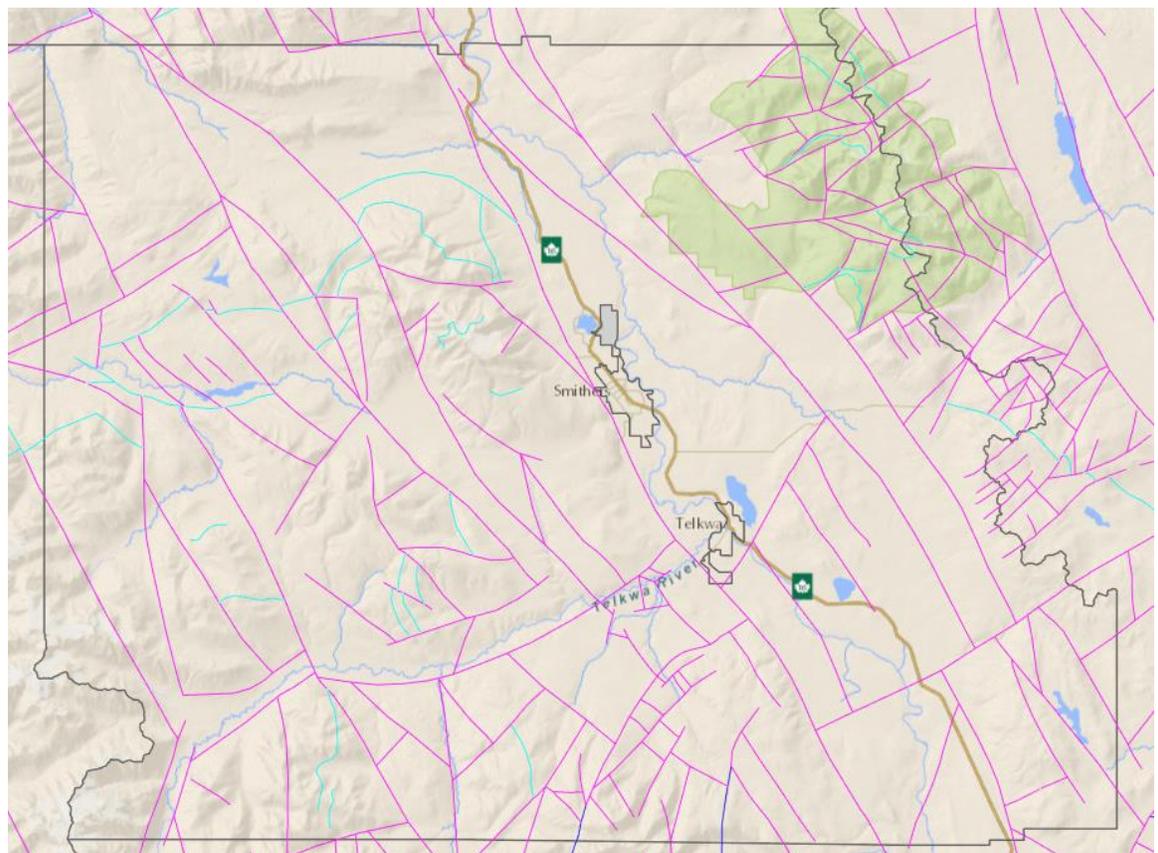


An earthquake is defined as the shaking of the ground due to movement along a fault rupture. When a large magnitude earthquake occurs, energy traveling in seismic waves may cause damage to structures, trigger landslides, liquefaction, or other geologic hazards and, in certain circumstances, generate tsunamis.

Impacts from earthquakes can be widespread and severe. (BC E. M., 2021)

- The Regional District's risk for seismic activity is considered medium to low (Canada G. S., 2015).
- Regional District residents would experience minimal physical impact; however, there could be a significant event that could impact the delivery of goods and services, depending on the location of the epicentre and the impact on major transportation routes from the east and the south.
- A map showing faults lines within Electoral Area 'A' reveals that many faults do exist. Most faults in the regional district are of the Strike-Slip (pink) variety, but there are a few Thrust (light blue) type faults in the mountains surrounding Smithers. See *map – source: [lmapBC](#), retrieve Nov 2nd, 2021*.
- The five biggest earthquakes in BC occurred in 1700, 1946, 1949, 1970 and 2012? They ranged in magnitude from 7.3 (1946) to 9.0 (1700).

Related Hazards: Structure Fire / Avalanche / Landslide/Debris Flow / Land Subsidence / Submarine Slides / Liquefaction / Tsunami / Explosions / Hazardous Materials Spill / Mine Incident / Oil or Gas Pipeline Spill / Seiche / Dam and Spillways Failure / Dike Failure / Structure Failure / Electrical Outage / Food Source Interruption / Telecommunications Interruption / Transportation Route Interruption / Wastewater Interruption / Water Service Interruption / Fuel Source Interruption / Marine Vehicle Incident / Motor Vehicle Incident / Rail Incident.



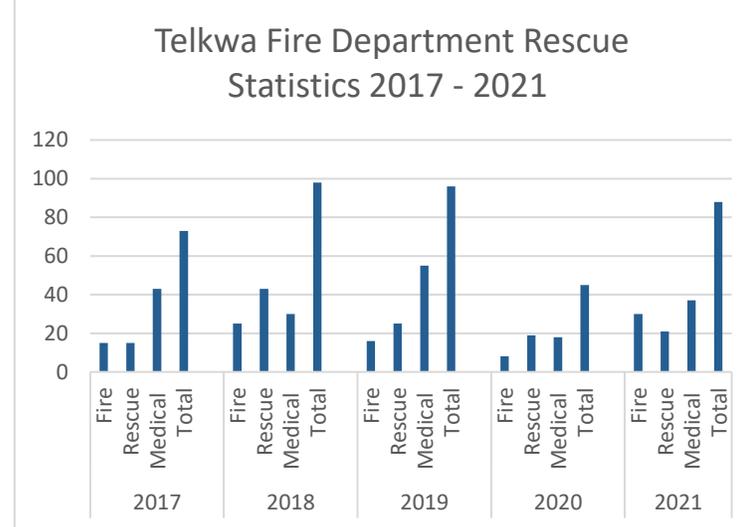
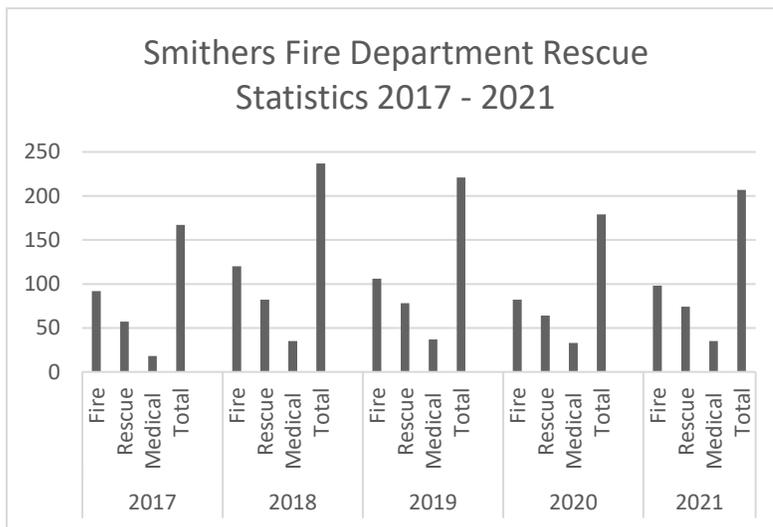
Human Caused Hazards

Structural Fire



Urban fires are fires that occur in a residential, commercial, or industrial community. Rural and urban fires occur on a frequent basis in many parts of the province, and of provincial concern are the fires that cause many deaths and injuries, those that are beyond the ability of the local resources to respond or those that cause severe economic losses. For interface fires, see wildfires. (BC E. M., 2021)

- In 1914 the Smithers Fire Brigade asked the Hazelton Fire Brigade to assist in organizing a fire department in Smithers. (News, 2014)
- Below is a chart outlining the number of call outs that the Smithers and Telkwa Fire departments responded to over the last 5 years:



Notable Structural Fires in the Electoral Area 'A' include:

- May 9, 2019, Smithers recycling depot burn. Smithers, Telkwa and Houston firefighters were on scene and no injuries were reported. (Barker, 2019)
- April 30, 1993, a major industrial fire at PIR sawmill, division of West Fraser Mills. 1000 truck loads of logs were lost, 150 people, including Telkwa and Moricetown Fire Departments were involved, and it raged for 2 days, started from a beehive burner spark. (News, 2014)
- August 2013 Hometown Furniture and Perry & Co. burnt next to the newly owned Bovill Square DURING Smithers Centennial Celebrations. (News, 2014)
- Feb 1965 Standard Oil (Chevron) bulk storage facility on Railway Ave. Three 20,000 gal. gas and oil storage tanks were near the fire. No explosion, and no loss of life during the prevention of this fire. (News, 2014)
- Two Bridges restaurant in Telkwa burnt down, in approximately 2010. This building was located adjacent to the Telkwa Pub and required the call for mutual aid from the Smithers Fire department. This fire drained the Village's water reservoir and resulted in a boil water advisory for the entire Village.
- Smithers Recycling centre burnt down in 2020 causing large plumes of smoke and required mutual aid from Telkwa fire department
- October 2019 a townhouse on Main Street in Smithers burnt displacing 5 families.

Comments and questions for consideration and further research:

- Concern that structural fires may spread to wildfires in our region.
- Need for additional residential prevention education, i.e. Chimney cleaning.
- Need for first responders to know what hazardous or explosive materials are stored in what buildings in communities and rural area properties, building on the farms.
- Need for planning and evacuation routes for bigger community gathering structures and locations.

Related Hazards: Air Quality / Lightning / Wildfire / Explosions / Structure Failure / Electrical Outage / Telecommunications Interruption / Water Service Interruption.

Rail Incident

 An incident involving a passenger, cargo or light-rail train that results in damage, bodily injury, or death. (BC E. M., 2021)

- The CN Rail northern main line crosses the area from east to west roughly paralleling the Highway # 16 corridor traveling through the communities of Telkwa and Smithers. Along this part of its route, it mainly travels on the west side of the Bulkley River. A major rail accident in the area could seriously impact residents, the environment, and cut off large areas to emergency services, particularly if hazardous materials were involved.
- Rail traffic will increase substantially over the next few years as the Prince Rupert container port construction continues and further increasing the risk.
- CN Line runs directly adjacent to Witsset Lake the communities water source.
- There are volumes of hazardous materials transported by CN rail along this route to Prince Rupert including:

Substance PIN # ⁷ and Recommended Evacuation Radius ⁸	
LP Gas UN1978	Initial downwind evacuation for at least 800m
Gasoline UN1203	Initial evacuation for 800 meters in all directions
MTBE (Methyl-tert-butylether) UN2398	Initial evacuation for 800 meters in all directions
Methanol UN1230	Initial evacuation for 800 meters in all directions
Fuel Oil Diesel Fuel UN1202	Initial evacuation for 800 meters in all directions
Caustic Soda UN1823	Initial evacuation for 800 meters in all directions
Sulphuric Acid UN1830	Initial evacuation for 800 meters in all directions
Anhydrous Ammonia UN1005	Initial evacuation for 1600 meters in all directions
Hydrogen Peroxide UN2014	Initial evacuation for 800 meters in all directions
Chlorine UN1017	Initial evacuation for 800 meters in all directions
Sulphur Dioxide UN1079	Initial evacuation for 1600 meters in all directions

- In March of 2020, a CN train derailed east of Prince George BC, forcing a school evacuation. This derailment included seven cars carrying liquefied petroleum gas (LPG), an extremely flammable product. Twenty-eight cars went off the tracks. (Trumpener, 2020)

Notable Rail Incidents in Electoral Area A:

- January 4th, 2012, in Smithers, there was a collision with motor vehicle at a public crossing. 2 adults and 1 child escaped vehicle before impact. (Haggerstone, 2013)
- February 21st, 2012, approximately 12 km east of Smithers in Telkwa, 46 coal cars derailed, spilling coal and damaging cars and rails. (Haggerstone, 2013)

⁷ PIN means product identification number as designated by Transportation Canada for the transportation of dangerous goods.

⁸ Distances for evacuation zones can be references in the North American 2016 Emergency Response Guidebook available at <https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/ERG2016.pdf>

- August 4th, 2012, on the Telkwa Mine Road near Telkwa B.C., there was a collision with a motor vehicle at a public crossing, no injuries reported. (Haggerstone, 2013) On October 2018 five train cars carrying wood pellets derailed while being moved into a rail yard in Smithers. The cause was unknown (Grace-Dacosta, 2018).

Comments and questions for consideration and further research:

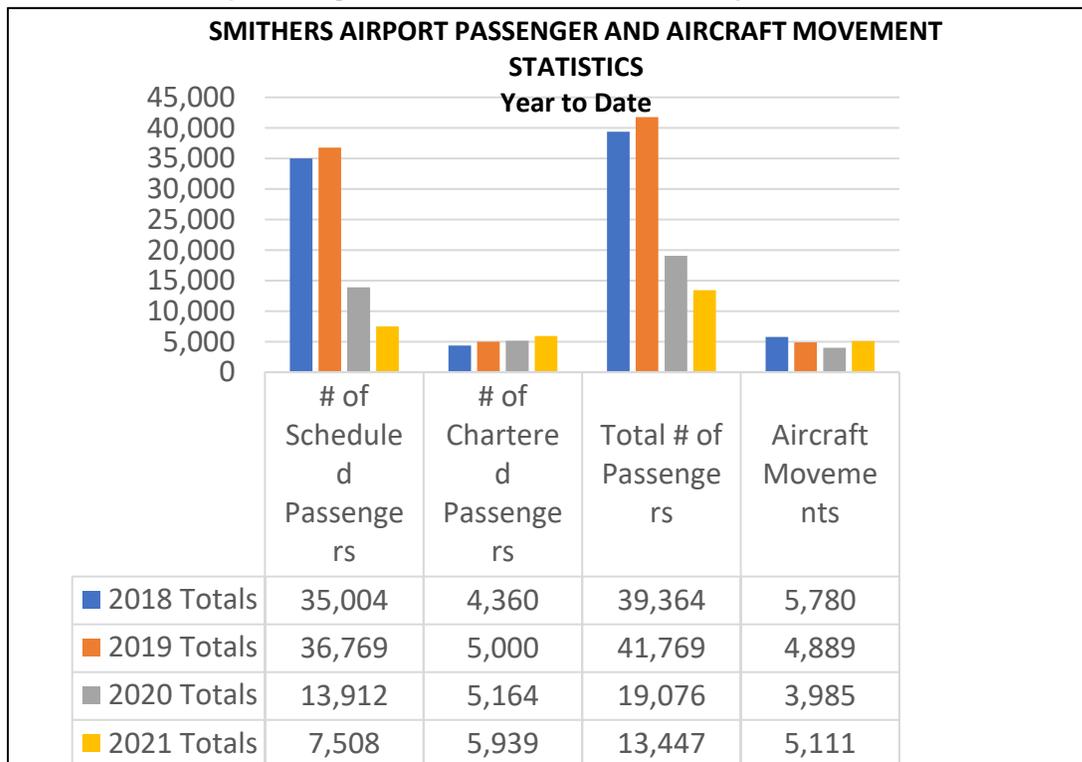
- Need more info on CN Rail Response time and capacity within the region. Where are the hazmat teams, what is the capacity of the local area to deal with these types of events?

Aircraft Incident



An incident involving one or more aircraft that results in damage, bodily injury, or death. (BC E. M., 2021)

- The Smithers Airport is the only airport within the Regional District of Bulkley-Nechako with scheduled air service. Air carriers include Air Canada, Northern Thunderbird Air, and Central Mountain Air.
- The Smithers Regional Airport is mandated in accordance with Transport Canada Aerodrome Standards & Recommended Practices TP312E maintain and update an Emergency Response Plan for the airport grounds, operations, and air space under their jurisdiction.
- ⁹The Smithers Regional Airport has reported the following breakdown of aircraft movement and passenger counts over the last four years:



- In addition to the risk of aircraft damage and injury to passengers, an aircraft crash may have other effects on residents. A wildfire may be started by an aircraft crash, causing damage to property and resources, and possible evacuation of residents.

⁹ Provided by Rob Blackburn Smithers Regional Airport Manager

- Airports can also be a supporting asset to regional emergencies as there is the capacity to move people, goods and services in and out of the region.

Comments and questions for consideration and further research:

- List backup runways for air crafts.
- Independent aircraft incidents – how do they impact local SAR resources and call outs.

Related Hazards: Fog / Snowstorms and Blizzards / Ash Fall / Explosions / Hazardous Materials Spill / Structure Failure / Transportation Route Interruption.

Motor Vehicle Incident



An incident involving a truck, car, bus, farm vehicle, or any other motor- or person-powered vehicle that results in damage, bodily injury, or death. (BC E. M., 2021)

- Highway 16 runs through the region, transecting both Smithers and Telkwa. This route contributes to the risk of motor vehicle crashes in the area, with the majority being reported along Highway 16. The chance of a hazardous materials spill is also high due to the growing volume of truck traffic.
- According to the Insurance Corporation of British Columbia North Central Crashes 2016 to 2020, there were 204 reported casualty crashes¹⁰ in Smithers, and 38 reported casualty crashes in Telkwa. (ICBC, 2020)

Related Hazards: Fog / Freezing Rain or Drizzle / Snowstorms and Blizzards / Explosions / Hazardous Materials Spill / Transportation Route Interruption.

Electrical Outage



A deficit, interruption or failure of electricity or power systems, services, supplies, or resources. Power outages occur on a regular basis, however, they become a concern when the power outage is for a significant amount of time, when the temperatures are very low, or critical infrastructure, persons, livestock, or businesses are affected. (BC E. M., 2021)

- Power outages occur on a regular basis, however, they become a concern when the power outage is for a significant amount of time, when the temperatures are very low, or critical infrastructure, persons, livestock, or businesses are affected.
- Historical electrical outage events in Area 'A' are documented in association with other hazards accounts and can be found in [Appendix 1](#).

Related Hazards: Space Weather / Lightning / Telecommunications Interruption.

¹⁰ "Casualty Crash" (ICBC collision data) motor vehicle crashes resulting in an injury or fatality.

Oil or Gas Pipeline Spill



Pipeline and gas well leaks and explosions occur when natural gas or gasoline pipelines, valves or components rupture, by accident, by mechanical failure or corrosion. Gas leaks can also be caused by natural hazards such as earthquakes or landslides. (BC E. M., 2021)

- PNG Pipeline runs from Summit lake, parallels Highway 16 to Telkwa and then crosses the Telkwa pass through to Terrace. The company has a strong emergency and safety program, including a [Transmission Pipeline Emergency Response Plan](#).

Related Hazards: Animal Disease / Human Disease / Plant Disease and Pest Infestation / Public Health Crisis / Explosions / Hazardous Materials Spill / Fuel Source Interruption.

Food Source Interruption



Food shortages occur when the population of a community undergoes a severe shortage of food. A severe shortage of food can lead to starvation, illness and, in extreme cases, death. (BC E. M., 2021)

- Statistics Canada provides data on the primary types of locations where BC residents buy their food. If residents in the region are representative of BC, they would be expected to buy 87% of their grocery shopping from supermarkets and other grocery stores. The remaining 13% is purchased from convenience and speciality stores. (Strategies, March 2021) Much of the food in the stores is shipped in through the major highway transportation corridors that are susceptible to external hazards and emergencies that can lead to food source interruptions in this region.
- Agriculture in the Bulkley-Nechako is predominantly ranching and forage country. Most agricultural activity is in the west (Bulkley Valley) and east of the region (Nechako Valley) where land, business, and organizations support diverse agriculture activities (Strategies, March 2021). The Bulkley valley supports one abattoir facility, a well-established farmers' market, and strong local support of the agriculture sector through grocers and restaurants.
- The cost of locally grown and produced food remains high within the region.
- The average family in the Northern Health region spends \$1038 a month on groceries (BC Centre for Disease Control Provincial Health Services Authority, 2018).
- Canada's Food Price Report 2021, which forecasts an overall food price increase of between 3% and 5% this year. (Dalhousie University | University of Guelph | University of Saskatchewan | University of British Columbia, 2021)
- The main grocery stores across the region are supplied 50% from the lower mainland and the remainder coming from Edmonton/Alberta. In response to the 2021 November floods in the lower mainland the large chain stores were quick to develop continuity plans to reroute trucking through the US, into Alberta and back over to the North.

Notable Incidents involving food source interruptions:

- [COVID-19 Pandemic \(Started 2020\)](#) exasperated food insecurity for Canadian's who already had food security and affordability issues. Locally, the 2020 COVID-19 Pandemic prompted transportation delays and crisis in availability of food at the grocery stores following the March 2020 provincial lockdowns. The grocery stores implemented purchase limits and store shelves were empty. "Food bank numbers in the local area increased by 22% at the start of COVID-19 and again increased now that government COVID subsidies have stopped." (Salvation Army Food Bank Coordinator, 2021)
- [Big Bar Landslide, BC \(2019\)](#) caused a decline in salmon fisheries affecting FN food supplies.
- The 2016 ice storms in the Lower Mainland prompted an inevitable crisis — highways were closed, and food trucks couldn't make it up here. Store shelves started emptying. This was compounded by the fact that the grocery store in neighbouring Houston had been closed for a few months and so everyone was shopping in Smithers. We were having a food system breakdown.

Related Hazards: Extreme Heat / Extreme Cold / Snowstorms and Blizzards / Animal Disease / Landslide/Debris Flow / Plant Disease and Pest Infestation / Public Health Crisis / Drought.

Transportation Route Interruptions ↗



An interruption or failure of transportation infrastructure or systems. This can include road, rail, or waterway damage, transportation delays due to weather and/or infrastructure failure. Transportation Route Interruptions are probable during disaster events. (BC E. M., 2021)

Related Hazards: Snowstorms and Blizzards / Wildfire / Avalanche / Landslide/Debris Flow / Earthquake / Liquefaction / Tsunami / Lake, River, and Stream Flooding / Aircraft Incident / Marine Vehicle Incident / Motor Vehicle Incident / Rail Incident.

Telecommunications Interruptions ↗



The unavailability of services provided by the communications infrastructure resulting in significant inconvenience or an emergency event caused by human error, equipment malfunction or breakdown. (BC E. M., 2021)

- In the [2020 rain fall and subsequent slides](#) and again in 2021 November floods in the lower mainland the local cell service was disrupted for long periods of time.

Related Hazards: Freezing Rain or Drizzle / Space Weather / Hurricane/Typhoon/High Wind Event / Lightning / Snowstorms and Blizzards / Tornado / Landslide/Debris Flow / Earthquake / Electrical Outage.

Fuel Source Interruptions ↗



A deficit, interruption, or failure of fuel systems, services, supplies or resources. This can include pipeline damage, transportation delays due to weather and/or shipping infrastructure damage, or general shortages due to market supply problems, or panic fuel hoarding during emergencies. Fuel Source Interruptions are probable during disaster events. (BC E. M., 2021)

- The majority of fuel is transported from Alberta via Trans Mountain Pipeline and railway. Prince George is the [distribution centre](#), where fuel is then trucked to its destination. There is a refinery in Prince George that refines gasoline, diesel, propane butane and heavy oil.

Related Hazards: Hurricane/Typhoon/High Wind Event / Snowstorms and Blizzards / Wildfire / Landslide/Debris Flow / Earthquake / Oil or Gas Pipeline Spill / Transportation Route Interruption / Rail Incident.

Dam and Spillways Failure



A breach in the foundations, abutments, or spillways of a dam, which results in a sudden, rapid, and uncontrolled release of the impounded water. n earthquake is defined as the shaking of the ground due to movement along a fault rupture. (BC E. M., 2021)

- The Dam Safety Regulation under the Water Sustainability Act, objective is to mitigate loss of life and damage to property and the environment from a dam breach by requiring dam owners to inspect their own dams, undertake proper maintenance on them, and ensure that these dams meet ongoing engineering standards. The dam administered under this regulation are associated with dams that store or divert fresh water from a stream or aquifer or both. These dams are inspected annually and assigned a failure consequence and risk rating according to the [Dam Safety Regulations of BC](#).¹¹
- In Area A there are 19 dams regulated under the Dam Safety Regulations, five of which have a failure consequence of significant and a failure probability rating being small. Meaning that the risk level is of no concern and includes regular audit programs to identify any changes to operation. (Staff, 2009)
- If a has a failure consequence of significant or higher than the owner is required to provide a record containing information for the use of the local emergency authorities for the dam for the purpose of preparing local emergency plans under the [Emergency Program Act](#).
- Tailing Storage Facilities, including mining dams, in British Columbia are regulated under Part 10 of the [Health, Safety and Reclamation Code for Mines in British Columbia \(the Code\)](#), as established under the [Mines Act](#). These facilities require annual inspections commonly called Dam Safety Inspection that report on risk data. This data is available to the public on the [BC Mine Information website](#). There are no mine tailing ponds¹² in Area A.

Related Hazards: Hurricane/Typhoon/High Wind Event / Landslide/Debris Flow / Earthquake / Mine Incident / Storm Water Flooding / Flash Flooding / Dike Failure / Structure Failure / Electrical Outage / Water Service Interruption.

¹¹ Michael Trudell, Senior Dam Safety Officer.

¹² BC Mine information website: <https://www.mines.nrs.gov.bc.ca/map>

Mine Incident



Mines in BC range from open pit coal and metal mines, underground coal and metal mines, placer operations or gravel pits and quarries. Each mining operation presents unique hazards with incidents ranging from structure failure, tailings dam failure, sediment pond or other containment failure, hazardous materials spill, or explosion. These incidents may be generated by other hazards such as flood or seismic activity. (BC E. M., 2021)

- Telkwa Coal Limited is proposing to develop the Tenas Project, a steelmaking (or metallurgical) coal mine outside Telkwa.
- Davidson Mine, old silver and copper mine tailings.

Comments and questions for consideration and further research:

- Dam failures – need more information on historic tailings ponds

Related Hazards: Animal Disease / Human Disease / Plant Disease and Pest Infestation / Structure Fire / Landslide/Debris Flow / Land Subsidence / Earthquake / Explosions / Hazardous Materials Spill / Oil or Gas Pipeline Spill / Dam and Spillways Failure / Dike Failure / Structure Failure / Water Service Interruption.

Wastewater Interruptions



A deficit, interruption or failure of wastewater or sewer systems, services, supplies, or resources resulting in significant inconvenience or an emergency event. (BC E. M., 2021)

Water Service Interruptions



A deficit, interruption or failure of water systems, services, supplies or resources. (BC E. M., 2021)

- Witset's water and wastewater interruptions are a high priority hazard as many community members are without clean water and septic numerous times a year. The water plant has been studied and there is no infrastructure money to replace, human rights issue.
- Water and sewage systems in both Telkwa and Smithers area adjacent to the Bulkley river and could substantially be at risk during flooding.

Comments and questions for consideration and further research:

- Need for neighborhood planning when it comes to rural residents' dependencies on critical infrastructure and services. i.e. Who has wells vs gravity feed water in certain neighborhoods?
- Need info how many water systems are in rural areas.

Related Hazards: Animal Disease / Human Disease / Plant Disease and Pest Infestation / Public Health Crisis / Structure Fire / Wildfire / Drought / Wastewater Interruption.

Cyber Security Threat



A circumstance or event with the potential to interrupt or adversely impact organizational operations, assets, or individuals (including mission, functions, image, or reputation). Cyber Threats occur through information systems via unauthorized access, destruction, disclosure, modification of information, and/or denial of service. Also, the potential for a threat-source to successfully exploit a particular information system vulnerability. (BC E. M., 2021)

- Cyber security is a big threat for government and businesses for business continuity.
- Increase in phone, facebook, dating apps, and email scams affecting seniors and vulnerable populations. Limited statistics affecting the local community however recent news reports state that “British Columbians reported \$3.5 million in losses to cryptocurrency investment scams in the first eight months of 2021” (Samanski-Langille, 2021).

Related Hazards: Telecommunications Interruption / National Security Threat.

Disease, Pest Infestations & Epidemics

Plant Disease and Pest Infestation



Plant diseases include invasive pests including insects and mites, and plant pathogens including fungi, bacteria and viruses' impact upon crops, forests, and urban environments. New introductions and/or widespread outbreaks could have severe economic and environmental consequences. (BC E. M., 2021)

- With climate change, shifts in the distribution, lifecycles, and prevalence of agricultural pests (insects, diseases, weeds, and invasive species) are anticipated. Increasing average annual temperatures (in particular winter minimum temperatures) combined with shifting precipitation patterns are already magnifying pest impacts, pest management complexity and associated costs of production.
- The region has been significantly impacted by Mountain Pine Beetle outbreaks, in part due to increased winter survival rates. Modelling of changes to bio geoclimatic zones (BGC zones) how that the Interior Douglas Fir zone will spread northward and increase in area, while the Sub-Boreal Spruce zone will decrease dramatically. While this modeling was completed with a forestry lens, agricultural pests associated with these ecosystems would be expected to shift along with the BGC zones. (BC Agriculture & Food Climate Action Initiative, 2019)
- Since 2005, the Regional District of Bulkley-Nechako has partnered with the Northwest Invasive Plant Council (NWIPC) to address invasive plant species spread within the region. The NWIPC coordinates the invasive plant response based on priority areas and species and on funding availability through their network of partners. Specifically, funds contributed from the RDBN go toward a number of programs including local education and signage on invasive plants and invasive plant monitoring and treatment at RDBN owned and administered properties. In addition, the NWIPC administers the [Private Landowner Rebate program](#) that offers rebates to land owners that use contractors to treat for invasive plants on their property.
- The Northwest Invasive Plant Council (NWIPC) is currently targeting 60 invasive plants for management, as per the [NWIPC 2020 Target Plant List](#). The list of species is reviewed, updated and approved by the membership every spring at the annual general meeting. The [Bulkley IPMA Plant list for 2020](#) identified species listed in electoral area A and G.
- Invasive plant species up and down rail lines and highways taking over farm fields – Knapp weed, hock weeds. This results in spraying along Creeks and rivers causing harm to the environment.
- Agriculture producers can also experience challenges due to pests, including grasshoppers, aphids, cutworms and more. Some resources and information are linked below to help with identification, monitoring and management of pests in gardens and crops. [Grasshopper Monitoring and Control in BC](#) ; [Pesticides and Pest Management - Province of BC](#)

Related Hazards: Animal Disease / Human Disease / Public Health Crisis / Drought / Food Source Interruption.

Human Disease (Including Pandemic and Epidemic)



Diseases that are caused by pathogenic microorganisms and are spread directly, or indirectly, from one person to another. Diseases can impact public health, cause death, have economic implications, and result in mass casualty response. These include epidemics such as meningitis, pandemic flu, hepatitis, E. coli, and other communicable diseases.

A pandemic is the worldwide spread of a new disease. The total number of people who get severely ill can vary. However, the impact or severity tends to be higher in pandemics in part because of the much larger number of people in the population who lack pre-existing immunity to the new virus. (BC E. M., 2021)

Notable Pandemic Incidents in BC:

- COVID-19 Pandemic (2020)
- Ebola (2013-16)
- H1N1 Flu Pandemic (2009)
- SARS Outbreak (2003)
- The lands in BC have been populated by the ancestors of First Nations since time immemorial. Epidemics spread through First Nations communities in advance of explorers. Some researchers have suggested epidemics reached the Northwest Coast as early as the 1500s, believing the well-known epidemics from the Caribbean and Central America may have spread to the Pacific Coast through native trade networks and social contact. Some of the recorded epidemics in the Interior were known to have originated on the prairies during the historic period (early 1800s). The introduction of infectious diseases from Europe and Asia into the Northwest Coast and adjacent areas, and an increase in the severity of warfare, had devastating effects on the people. Smallpox, influenza, measles, and whooping cough were recorded epidemics, with smallpox particularly recurring with devastating effects in the native population. The 1918-19 influenza pandemic was the last major epidemic to seriously affect First Nations and marked the end of the epidemic cycles that had begun over 150 years previously. In some cases, entire villages were significantly reduced in single disease events, with mortality rates ranging from 50% to 90% of the population. (First Nations Health Council, 2011)
- History of Pandemics: <https://www.visualcapitalist.com/history-of-pandemics-deadliest/>

Related Hazards: Animal Disease / Plant Disease and Pest Infestation / Public Health Crisis.

Public Health Crisis

A localized or regional event that poses or causes a significant threat to the health of human populations. The event may be declared as a Public Health Emergency if the event meets at least two of the following criteria:



- a regional event that could have a serious impact on public health;
- a regional event that is unusual or unexpected;
- there is a significant risk of the spread of an infectious agent or a hazardous agent; and
- there is a significant risk of travel or trade restrictions because of the regional event.

An example of a Public Health Crisis is the contamination of a communities drinking-water supply by a hazardous material. If the event is regional in nature and poses a serious impact to public health, it may be declared a Public Health Emergency. (BC E. M., 2021)

- Overdose B.C.'s Public Health Emergency Progress Update on B.C.'s Response to the Overdose Crisis reported that on April 14, 2016, B.C.'s provincial health officer declared a public health emergency under the Public Health Act. In July 2017, the Ministry of Mental Health and Addictions was established, in part, to work in partnership to develop an immediate response to the overdose emergency. (Columbia B. , 2021)
- Preliminary data in 2021 has found that fentanyl or its analogues have been detected in 85% of all illicit drug toxicity deaths. In 2020, fentanyl or its analogues have been detected in 86% of deaths. (Service C. , 2021) In the Northwest¹³ the Illicit drug toxicity deaths between 2011-2021 have increased and are reported as follows:

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021 ¹⁴
1	0	6	2	6	10	8	14	16	17	16

- By Health Authority (HA), in 2021, the highest rates were in Vancouver Coastal Health (46 deaths per 100,000 individuals) and Northern Health (45 per 100,000). Overall, the rate in BC is 39 deaths per 100,000 individuals in 2021.
- The [2019 Taking the Pulse of the Population An Update on the Health of British Columbian](#) identifies positive Mental Health as a public health challenge and a provincial goal. Collecting public health statistics as indicators to monitor this complex public health crisis. Under Section 66 of the Public Health Act, the Provincial Health Officer (PHO) has the authority and responsibility to monitor the health of the population in BC, and to provide independent advice on public health issues and the need for legislation, policies, and practices respecting those issues.
- Read: <https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/overdose-response-progress-update-aug-dec-2020.pdf>

Related Hazards: Air Quality / Extreme Heat / Extreme Cold / Animal Disease / Human Disease / Plant Disease and Pest Infestation / Explosions / Hazardous Materials Spill / Structure Failure / Electrical Outage / Food Source Interruption / Telecommunications

¹³ Smithers and Houston are in the Northwest [Health Service Delivery Area](#).

¹⁴ <https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/statistical/illicit-drug.pdf>

Interruption / Transportation Route Interruption / Wastewater Interruption / Water Service Interruption / Fuel Source Interruption.

Animal Disease



Precipitation in the form of lumps of ice mainly associated with thunderstorms. Hail ranges in size from that of a small pea to the size of cherries, but has been observed as large as grapefruit. Hail in Canada occurs most frequently during the summer when thunderstorm activity is at its peak.. (BC E. M., 2021)

- Risk of bovin – economic impacts in ranching community, there is no experience locally but could change any time.
- Moose and fish population hazards – rural communities are reliant on food harvested from the land.

Related Hazards: Human Disease / Plant Disease and Pest Infestation / Public Health Crisis / Food Source Interruption.

APPENDIX 1 – ELECTORAL AREA 'A' HISTORIC HAZARD EVENTS

Year	Event Type	Severity	Cause	Impact Effect	Description
1914	Flooding	moderate	rain on Snow	train & transportation delay - 36 hours	Incessant rains, 147mm/4days. Slides east and west of Smithers. Bulkley River rose significantly, carrying large quantities of trees and driftwood. Train traffic delayed for 36 hours.
1914	Landslide	moderate	rain on Snow	train delay	Incessant rains, 147mm/4days. Slides east and west of Smithers. Bulkley River rose significantly, carrying large quantities of trees and driftwood. Train traffic delayed for 36 hours.
1916	Flooding	high	Spring Run off	transportation	Telkwa Fiver and Bulkley River rose suddenly washed the Telkwa River bridge out. Cut a new channel under the government bridge. Traffic was suspended as a result.
1917	Hurricane	high	gale force winds	telephone, telegraph	Gale force winds, upset buildings, downed trees, Telephone, and telegraph wires were put out of commission.
1917	Flooding	high	Rain on Snow	transportation	Gale winds downed trees & ranch buildings. High waters in Bulkley River caused extensive damage to Telkwa River Bridge. Smaller bridges further upstream were washed out or damaged. Roads through Telkwa were impassable. Had had unusual wet summer and fall.
1919	Ice Jam	high	Ice jam	transportation, industry	Ice in the Bulkley River jammed at the turn near the bridge east of Telkwa. The backed-up water flooded the flats upstream and thin layer of ice were deposited. One chunk of ice as big as a house was in one of the fields until haying season. Ice also took out two spans of the bridge across the Bulkley River at Huber. Business section along river was flooded. Road along river was littered with chunks of ice.
1923	Flooding	low	Heavy Rains in 24-hour period	transportation	Heavy rains (close to 30 cm in a 24-hour period) turned highway through Smithers into a "sea of mud". Main St. was reported "to have started to run east and west in places."
1931	Flooding	low	Spring Run off	Transportation	In Walcott a small settlement between Telkwa-Houston, children residing on west side of the Bulkley River were unable to attend school due to flooded conditions of the river. Used to be a ferry at Walcott but was condemned for public use and was replaced with the present suspension bridge)
1935	Flooding	high	Rain on Snow	Transportation	Bulkley River hit an all-time high for fall runoff with Quick recording the maximum daily discharge of 838m ³ /s Smithers bridge was damaged. Telkwa river changed course, bridge at Telkwa washed out. Dynamite was used to prevent logjams. Business section of Telkwa and Coal Mine were flooded.

Year	Event Type	Severity	Cause	Impact Effect	Description
1936	Flooding	high	Spring run off	Transportation	Record high temp (95F) last week in May caused rapid snow melt resulting in rivers rising suddenly reaching highest levels in 30 years of records. First Nations said it was the highest in 100 years. Trains could only go north/west bound as far as Smithers and tracks were severely damage from Smithers to Prince Rupert. Bulkley River had huge log jam that caused more flooding which resulted in the bridge at Smithers being washed out.
1947	Avalanche	moderate	Heavy Snow Fall	Transportation	Record snowfall in one day in Smithers of 105.5 cm. Public works crews had to shovel off highway bridges by hand as it was feared the weight of the snow and machinery would be too great for the bridges. Landslides occurred between Smithers ad Terrace blocking highway and rail. The highway was built in 1944, but it was considered that not enough traffic warranted the expenditure to keep highway open during the winter months. It was not until the winter of 1951-1952 that the highway was kept open during the winter months.
1948	Flooding	high	Spring Run off	Transportation /Residential Evacuation	Hot weather caused severe flood conditions all through BC resulting in the Premier Byron Johnson declaring BC a State of Emergency. Considered the worst flood since 1936. Flooding damage encompassed the Bulkley, Nechako and Fraser Rivers. Roads, bridges, and rails were washed out. As a result, Ministry of Transportation submitted a special warrant No. 4 Flood Control & Relief-Expenditures to March 31, 1949. The road west of Houston to the bridge across the Bulkley River, being low-lying had been a source of trouble. To avoid future disruption, Public Works built a long earth and gravel fill along the flat leading into Houston (Interior News July 15, 1948). The highway between Smithers-Telkwa flooded in three places with water flowing over the road.
1949	Ice Jam	high	Heavy snow fall/cold temperature	Transportation / Residential Evacuation	Ice jam flooding occurred on the Bulkley River east and west of Quick. Water backed up from a narrow canyon at Telkwa flooding some farms on low ground as far as Quick to a depth of 4 - 5 ft. River overflowed its banks, flooding the road at Quick Station and the Post Office/General Store. Residents were evacuated along with 50 head of cattle. Around Dec 30th though the river was still plugged with ice for a distance of 12.8 km immediately below Quick, water levels had fallen 3 ft.
1950	Ice Jam	moderate	Ice Jam	Transportation and Residential evacuation	Drift ice started jamming the Bulkley River in a bend of the river at the east end of the bridge near Smithers. Ice built up between Smithers-Telkwa. The river's surface was frozen in a canyon 6.4 km south of the Bulkley Bridge. Water started backing up into an old slough. An ice jam 1.6 km east of Smithers caused two farms to flood with 3 foot of water resulting in an evacuation. Water covered

Year	Event Type	Severity	Cause	Impact Effect	Description
					400m section of Hwy 17 800m from Smithers. 25 Cm of water was pouring across the highway. School buses were disabled.
1950	Severe Weather	low	Cold Temperature/strong winds	Transportation	A six-week continuous cold snap between late December 1950 and early February 1951 was described as the longest cold spell in the history of the Bulkley Valley. Smithers temperatures stayed below -17.8°C from December 27, 1950, to January 19, 1951
1950	Flooding	low	Spring Run off	Transportation	Several days of hot weather cause rapid snow melt resulting in flooding of the Bulkley River. Streets along river were flooded.
1951	Flooding	moderate	Spring Run off	Transportation	Heavy Rains and hot weather created flood conditions on the creeks flowing into the Bulkley River. Washout of roads and closure of highway caused freight to be delayed.
1956	Flooding	high	Heavy Wet Snow	Transportation and Utilities	45.7Cm of heavy wet snow fall causing telegraph poles to be loaded down from the weight. Disrupted power services for 5 days. A train derailment delayed rail service.
1962	Avalanche	moderate	Rain on Snow	Fatality, Industrial	Smithers experienced a heavy snowfall followed by heavy rains. A snow slide on Hudson Bay Mountain's Glacier Gulch swept away a mine employee's cabin. Debris was scattered for 300 m down slope. The next day two members of the rescue team were hit and buried by another snow avalanche but managed to extricate themselves. The victim's body was recovered from under 2.4 m of snow.
1964	Flooding	high	Spring Run off	Transportation, utilities, residential evacuation	Heavy Rain over a two-day period caused 3 secondary roads to be closed after some small bridges were washed out. The pump house of the Smithers water system along the Bulkley river and several trailers at the Bulkley Bridge were endangered. On June 3, the Bulkley River at Quick recorded a max daily discharge of 847 m3

Year	Event Type	Severity	Cause	Impact Effect	Description
1966	Ice Jam	high	Ice Jam	Transportation , Residential Evacuation	<p>On Good Friday evening, an ice jam blocked the Bulkley River between the bridge and Riverside Park. Ice was piled 15 ft. (4.5 m) above the river level, with some blocks as big as 10-ft. (3 m) square and 4 ft. (1.2 m) thick. It dammed up thousands of gallons of water, causing the river to flood behind it and to drop 8 ft. (2.4 m) below normal ahead of it. The backed-up waters overflowed their banks and flooded the flats surrounding the bridge area. The water levels rose more than 1 ft. (30 cm) in half an hour. A 290-ft. (87 m) section of the 22-year-old Bulkley River bridge on Highway 16, 1 mi. (1.6 km) east of Smithers, was taken out by break-up ice. Riverside residents were evacuated. On the Smithers side, the Vetterli farm and Lubbers' Trailer Court were inundated. On April 9, the Department of Highways reinforced the Canyon bridge on the Moricetown (Telkwa) Highroad. On April 10, some quicksand collapsed, splitting the village's sewer system. In an effort to break the ice jam, engineers set off a series of dynamite explosions that caused flooding at the village's temporary water pumping station, leaving villagers without water. On April 10 and 11, the Department of Highways crews exploded several hundred pounds of dynamite in the icepack. Three quarters of the ice jam was moved, and the bridge site cleared. Nearly 300 ft. (90 m) of highway bridge and supporting pier were torn loose. A 40-mi. (64-km) gravel road detour was opened on April 8 for passenger cars and other light vehicles only. On April 11, the icepack moved, only to get stuck again 1 mi. (1.6 km) downstream. On the River Park section, over 0.5 mi. (800 m) of ice got stuck and caused the area to flood. A state of emergency was declared by Village Chairman Joe MacDonald to give the Council powers to cope with the water and sewer problems in the community. Work on the pump site at Riverside Park had to be discontinued. On April 12, a channel broke through the ice jam easing the problems of the waterworks crews when the water levels went down. Two small Smithers-based helicopters handled direct cross-river traffic. Detoured traffic on the Moricetown-Telkwa Highroad had to be cut down to a single-lane pilot relay system. Daytime traffic was limited to light vehicles; truck traffic was restricted to the hours between midnight and 8:00 a.m. On April 13, approximately 8,000 lb. (3,632 kg) of dynamite were placed under the ice from a hovering helicopter. The blast, synchronized to go off every 15 minutes, consisted of 150-350 lb. (68-159 kg) each. A Bailey bridge put in to replace the lost bridge section was opened on April 21. The ice was also holding back in a section of the Bulkley River in the Quick-Walcott area between Telkwa-Houston.</p>

Year	Event Type	Severity	Cause	Impact Effect	Description
1966	Flooding	moderate	Flooding	Transportation	Heavy flooding occurred in the Smithers area. Nearly 2.5 in. (63.5 mm) of rain fell in 24 hours. Trout Creek bridge, west of Smithers, had its cross bracing and pile bent damaged. The approach scoured out, and the east abutment of the new bridge fell into the stream channel. The approaches to the new bridge were also partially swept away. The old Highroad to Moricetown was used as a detour. On October 24, telephone service west of Trout Creek was temporarily cut off. Extensive bank erosion occurred adjacent to the Trout Creek store. At Toboggan Creek, debris at the culvert inlet caused a deep scour hole under the culvert discharge. In Telkwa, the Bulkley River flooded its banks alongside River Road. The Telkwa River crested well above the previous spring's flood stage.
1968	Ice Jam	low	Ice Jam	Transportation	Pile- up of ice against the bridge piers threatened the Bulkley River Bridge. Efforts by the Hwy Dept. to break up the ice jam by blasting failed. The ice eventual washed out after the river backed up.
1968	Flooding	low	Spring Runoff	Transportation	Warm weather with temperatures in the high 70's F (ca. 26o C), coupled with two days of warm rain brought rivers in the Bulkley Valley to the flood level. On May 20-21, the Bulkley, Telkwa, and Buck rivers went on the rampage. The Bulkley River was at its highest level since 1964. On May 21, the Bulkley River at Quick and the Skeena River at Glen Vowell recorded maximum daily discharges of 861 m3/s and 2,700 m3/s, respectively (Environment Canada 1991).
1972	Flooding	moderate	Spring Runoff	Residential, Transportation	Hot weather caused snowmelt and runoff. The Bulkley River overflowed its banks and flooded basements in Smithers. Floodwaters of the Bulkley River came very close to washing out Highway 16 at Eddy Park in Telkwa. On May 31, water lapped at the edge of the highway for a day. The Bulkley River at Telkwa peaked around May 31. The Bulkley River flooded its banks at Telkwa. The street in front of the Telkwa Hotel and Eddy Park were under water. The street leading off the highway at Eddy Park was under water for three days.
1976	Flooding	low	Spring Runoff	Transportation	On April 9, spring runoff caused flooding near Smithers. Backyards on King Street were flooded with 6 in. (15 cm) of water. The double culverts at the top of "Suicide Corner," the S-curve on Highway 16 east of the Northern Training Centre, could not handle the spring runoff. A water course, 5 in. (12.5 cm) deep and 50 ft. (15 m) long, flowed across the highway at the bottom of the hill. Only some shoulder damage occurred. Record breaking temperatures and spring runoff caused small creeks to overflow their banks. Bigelow Creek flooded the parking area and storage yard of Smithers Concrete Products.

Year	Event Type	Severity	Cause	Impact Effect	Description
1978	Flooding	moderate	Heavy Rains	Transportation	Near Telkwa, minor flooding occurred in the lower Coal Mine Road area. The Telkwa River took out the abutment of a logging road some 20 mi. (32 km) along Coal Mine Road. At the confluence of the Telkwa and Bulkley rivers, high water aggravated erosion on the north bank of the Bulkley River opposite the confluence and further downstream at Big Eddy Park. A preliminary cost estimate to provide diking and broken rock riprap bank protection from the vicinity of the fire hall to Big Eddy Park was \$195,000.
1984	Ice Jam	high	Ice jam flooding	Transportation , Residential Evacuation	An ice jam on the Bulkley River near Quick, between Smithers-Houston, caused flooding near the Quick bridge. On December 23, the water started rising near the Dave Gillespie residence, the lowest spot on the floodplain near the bridge. The 63-year-old Quick bridge itself was not endangered. Though one abutment is situated in the middle of the river, the structure is buttressed by piles driven into the river bottom bedrock. By Christmas Eve the water reached a depth of 2 m. According to Larry Garinger, field engineer with the Water Management Branch, anchor ice had formed on the bottom of the river. *1) Due to a long cold spell most of the channel was occupied by ice frozen to the bottom. Though the discharge was low, overbank flow occurred. Floating ice damaged and removed small fruit trees with diameters to about 6 cm on the floodplain near the bridge (Gottesfeld, pers. comm.). The ice stretched for about 12 km south from the Telkwa bridge. Ten families living on the floodplain adjacent to the bridge were evacuated on Christmas Day. When the flooding subsided, seven families returned to their homes. The waters rose and receded several times. On December 27, the situation was more threatening than before. The water rose to a depth of more than 2 ft. (60 cm) in 10-15 minutes where Quick Road crosses the railroad tracks. The Bulkley River cut a new channel, flowing directly under the Buchfink residence. On December 28, after a major shift in the ice jam occurred, the families had to leave their homes a second time. On December 30, the evacuation order was lifted, and most residents returned to their homes. The ice jam later broke up by itself.

Year	Event Type	Severity	Cause	Impact Effect	Description
1986	Flooding	high	Spring Run Off Heavy Rain	Transpiration/ Residential Evacuation	On June 15, about 50 volunteers helped sandbag the Bulkley River near Eddy Park on the west side of Telkwa. The riprapped riverbank near the Village of Telkwa water intake and the Village and Fire Hall suffered damage because of high-water levels and high velocities of the Bulkley River. On June 15, the Bulkley River at Quick recorded a maximum daily discharge of 721 m ³ /s. On the same day, the Telkwa River below Tsai Creek recorded a maximum instantaneous discharge of 132 m ³ /s and a maximum daily discharge of 120 m ³ /s (Environment Canada 1991). The Telkwa River eroded riprap H55:T55at the foot of Elm Street in Telkwa. Flood flow necessitated the emergency placement of some 200 loads of riprap to stabilize the right bank at the upstream end of the existing bank protection ("Bartlett area"). Further upstream, a recently constructed cut-off dyke probably prevented damage to area houses and was itself undamaged. One family in the Upper Driftwood (Bulkley River Tributary) was evacuated by helicopter on June 15. Very high floodwaters and logjams on Driftwood Creek caused considerable erosion adjacent to residence. Several bridge approaches on Forest Service roads (FSR) were washed out, causing at least \$24,000 damage. A record 55 mm of rain in 24 hours broke the June 24-hour record of 29 mm. This intensity, even without snowmelt, will produce fall-winter period floods
1988	Flooding	moderate	Heavy Rain	Transportation , Residential flooding	Received 59.4 mm of rain in 2 days. West of Smithers, flooding occurred in the Slack and Nielsen roads area, where roads washed out and basements flooded. Biggs Creek at the end of Nielsen Road flooded, dumping gravel on driveways in the neighbourhood. Mud, rock, and debris plugged culverts along Nielsen and Slack roads. Some residents had their driveways washed away. Power outages occurred because of downed trees. Lines to the Ski Hill Road and the transmitters on Mt. Harry Davis near Houston were out. Most of the damage occurred on the south side of the Bulkley River. Near Telkwa, Goathorn Creek had most of its approach washed away. Approximately 400 ft. (120 m) of Coalmine Road near the beginning of the logging road washed away.
1991	Flooding	moderate	Heavy Rain	Transportation	The heavy rain also caused damage in the Smithers-Telkwa area. The weather station at the Smithers airport recorded 95.3 mm of rain for November 9 and 10. Creeks in the Smithers area impacted by high water levels were Toboggan, Casson, Simpson, Canyon, and big creeks. Toboggan Creek at the fish hatchery was in imminent danger of flooding. The high water did permanent damage to fish spawning grounds near the Toboggan Creek Fish Hatchery

Year	Event Type	Severity	Cause	Impact Effect	Description
					and threatened to flood ponds holding salmon fry. According to hatchery manager Mike O'Neill, that summer's wild spawn along creeks was wiped out by the floods, which were worse than the ones in 1988. /The Telkwa River flooded its banks and carried down trees and other debris. At the confluence with the Bulkley River, standing waves up to 1 m were seen. Flood damage to the Telkwa FSR was estimated at \$114,200. A Telkwa family was stranded at their Cottonwoods Flats home for five days after floodwaters washed out their driveway, creating an island. A dike built parallel to the property eight years previous caused the water to back up and then to flood. To avoid future problems, officials have indicated that an old river channel will be opened to divert the overflow.
1992	Flooding	low	Ice jam	Transportation , residential evacuation alert	a massive ice jam in the Bulkley River near Smithers caused the waters to rise to dangerous levels. The jam started forming down river near the Canyon Creek confluence. Current stream flow was 70m ³ /s. On Christmas Day, the river had backed upstream to the Dohler Flats area at the end of Rosenthal Road causing water over the banks. Pack ice backed up quickly upstream, preventing a high ice dam that would have caused flooding in the Kidd Road subdivision. The river breached its banks in the 22nd Ave. and Columbia area of the Ebenezer subdivision. The damage was confined to some basement flooding from rising groundwater levels. Christmas Day was the most threatening, the river rose as much as 2 m in half an hour. Careening ice blocks moved across the lowest-lying areas. Approximately 50 residents were advised to evacuate. On Boxing Day, the risk of flooding was so severe in the Dohler Flats area that the Ministry of Environment recommended the approximately 20 families living in the area to move into hotels in Smithers. However, the residents choose to stay to look after their properties. On December 27, the dam stabilized and none of the 50 homes in the area had been flooded, but Provincial Emergency Program workers warned residents to prepare to evacuate. The extremely cold weather with temperatures of -30 C caused the ice pack to thicken, but also lessen the chance of flooding. One resident estimated the ice flow about 2-3 mi. (3.2-4.8 km) long, and the water level 3 m above normal. On December 28 the water rose 5 ft. (1.5 m) overnight, but later dropped. Cooler weather stabilized the ice jam, which was now about 8 km long. The sudden cold weather prevented serious ice jam flooding near Smithers in the low-lying Kidd and Ebenezer subdivision just opposite the town and Dohler Flats on the west bank of the river below Smithers. On December 27 and 30, Smithers

Year	Event Type	Severity	Cause	Impact Effect	Description
					recorded temperatures of -22 C and -35 C, respectively. On December 28, the dam was just over 4 km long and not showing any signs of weakening. The event started on December 23 when the weather warmed up to zero and started to rain. The water level rose and ice patches along the riverbanks broke off and started floating downstream. When the weather turned cold again the dam started to form at a narrowing where a pile of boulders caught the floating ice. Water was also rising at the other end of town. Officials had considered blasting the dam on Christmas Day, but believed the ice was too soft and therefore unsafe for workers to walk on to set up an explosive device.
1995	Severe Weather	high	Heavy Snow	Residential and Industrial damage	In early January, heavy snowfall caused many roofs of commercial buildings and barns in the Bulkley Valley to collapse. In the Smithers area, there were at least 12 collapses, all farm buildings and other structures built without permits or inspections. Snow core samples taken by Richard Wainwright, building inspector for the Regional District of Bulkley-Nechako, showed a snow load of 45 lb/in. ² . As of January 21, uncovered roofs in Houston had about 2 ft. (60 cm) of snow at a weight of about 31 lbs./in. ² . In Smithers, the entire roof of The Peak billiards and espresso came down. The 50 x 90 ft. (15 x 27 m) building, constructed in June 1979, was worth about \$250,000. For years it operated as an auto parts store before the Peak opened the previous April. A sidewall collapsed, crushing a couple of vehicles, and narrowly missing the next-door building. The wall on the other side was pushing dangerously against the Legion building, forcing the evacuation of occupants. On January 7, snow loads also collapsed the roof of the downtown Smithers Bi-Rite Furniture warehouse. Bi-Rite's main building also suffered snow-load damage. On January 11, the landmark Storie barn collapsed from the weight of the snow on its roof. Built in the mid-1920s by the Fagerlet family, it was used store hay and house cattle and horses. In Quick, a 1.5-year-old hay barn slumped over. The 60 x 80-ft. (18 x 24 m) building was used to store hay, a tractor, and some equipment
1996	Severe Weather	high	Heavy Snow	Transportation , Residential damage	Smithers A (75 cm snow/2 days), Between late afternoon on November 7 and the afternoon of November 9, the Bulkley Valley recorded about 48 hours of continuous snow. The storm paralyzed the valley, leaving roads and driveways clogged, knocking out power lines and causing cancelled air flights. Many long-time valley residents said they couldn't recall "as big a dump of snow so early." During the storm, between 2,000-3,000 customers lost power for different lengths of time, some for more than a day. Parts of Smithers lost power, but

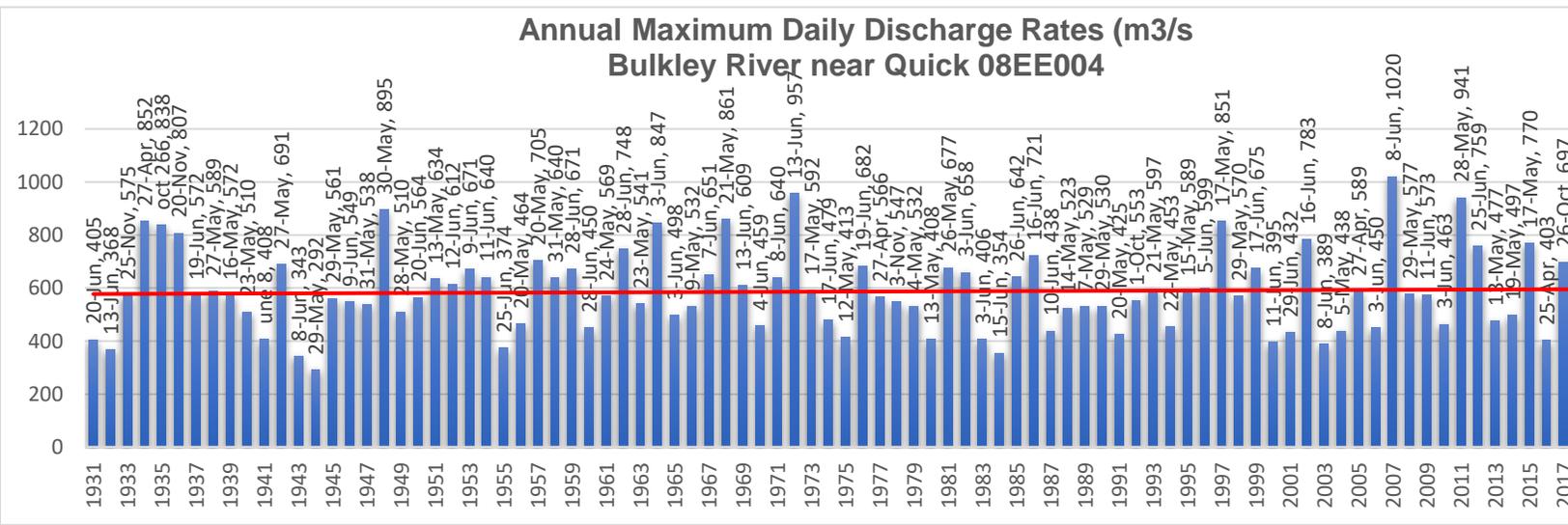
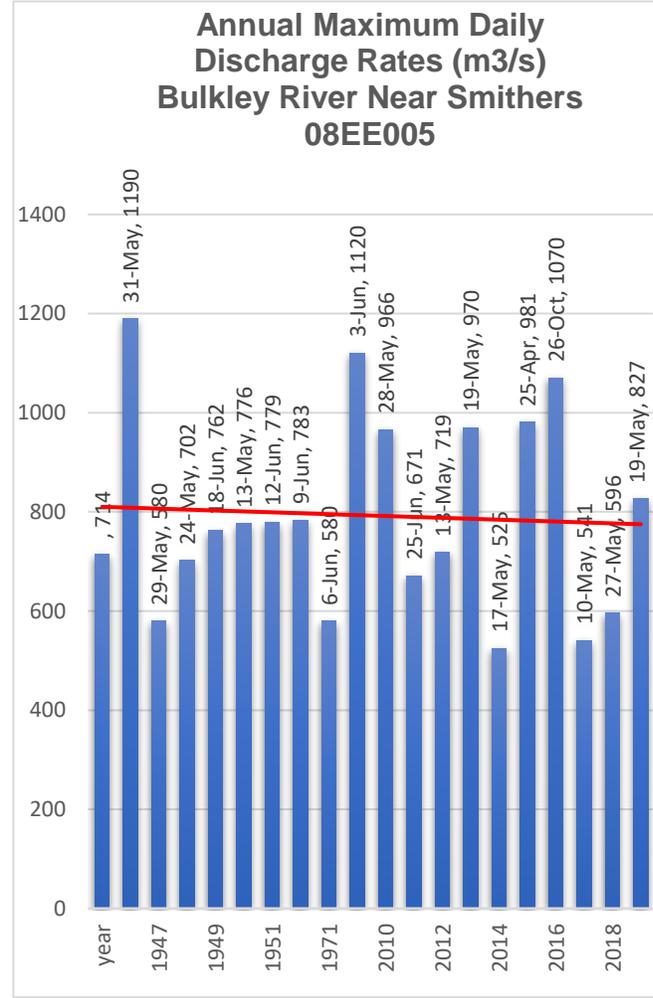
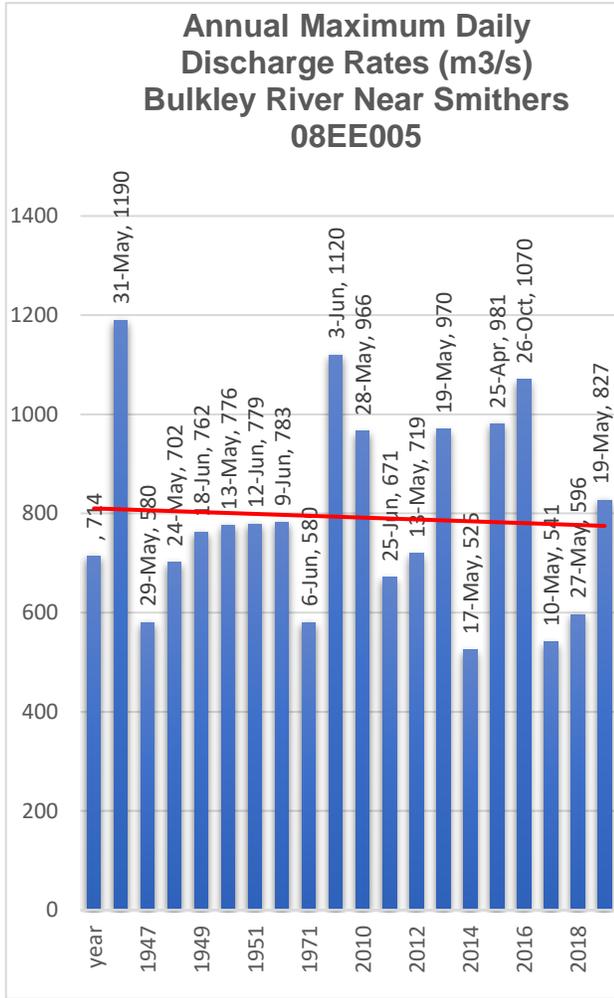
Year	Event Type	Severity	Cause	Impact Effect	Description
					the longest outages were in the rural areas, including Driftwood, Kidd Road, Seymour Lake, and Kroeker Road. To the east, the Quick-Walcott area was out as well.
1997	Flooding	moderate	Spring Run Off	Transportation Residential, evacuation	Floodwaters threatened several low-lying spots in Smithers and Telkwa. The village of Telkwa had some dikes in place at the end of Cottonwood and Elm streets. At Eddy Park, a sandbag dike had been placed at the end of April. Other locations threatened by flooding included Quick Station and the Walcott area. Near Smithers, areas flooded were three successive river terraces on the right bank (downstream direction) of the Bulkley River from the Smithers bridge downstream to the confluence with Canyon Creek. The opposite bank is highly unstable in places where a house has been condemned unsafe due to the mass wasting and erosion of its landmass adjacent to the river. The most acute flooding situation was on Ebenezer Flats, where more than 200 volunteers built a 400-m sandbag dike. Early on May 16, the Bulkley River breached its banks adjacent to Columbia Road, flowing into low-lying yards and over roads. In the Columbia Street area, 12 ft. (3.6 m) or more of river shore was lost. This flood also washed away a large portion of the top end of Beaver Island, which acts as a protective mechanism from the river. On May 17, floodwaters working its way around the dike threatened residents on Kidd Road. Volunteers, forest fire and highway maintenance crews managed to put up another dike at Kidd Road. The four other potential areas of flood concern in Smithers, the Fall Fair Grounds, Riverside Park, areas around the bottom of Main Street and the sewage treatment plant on Dohler Flats were being watched. The town also kept 10,000 unfilled sandbags at hand. Around May 17, three families temporarily moved out of their 22nd Avenue homes. Cooler weather on May 18-19 caused the Bulkley River's water levels to drop.
2000	Ice Jam	low	Ice jam	Transpiration	At the end of December, an ice jam in the Bulkley River caused flooding near Smithers. Between Raymond Road and Gidding's Field, the river was completely covered with debris. The water level at the CN Rail line at Tatlow came to within 0.3-0.5 m of the tracks while adjacent fields were flooded. At Dohler Flats, the ice jam remained unchanged.

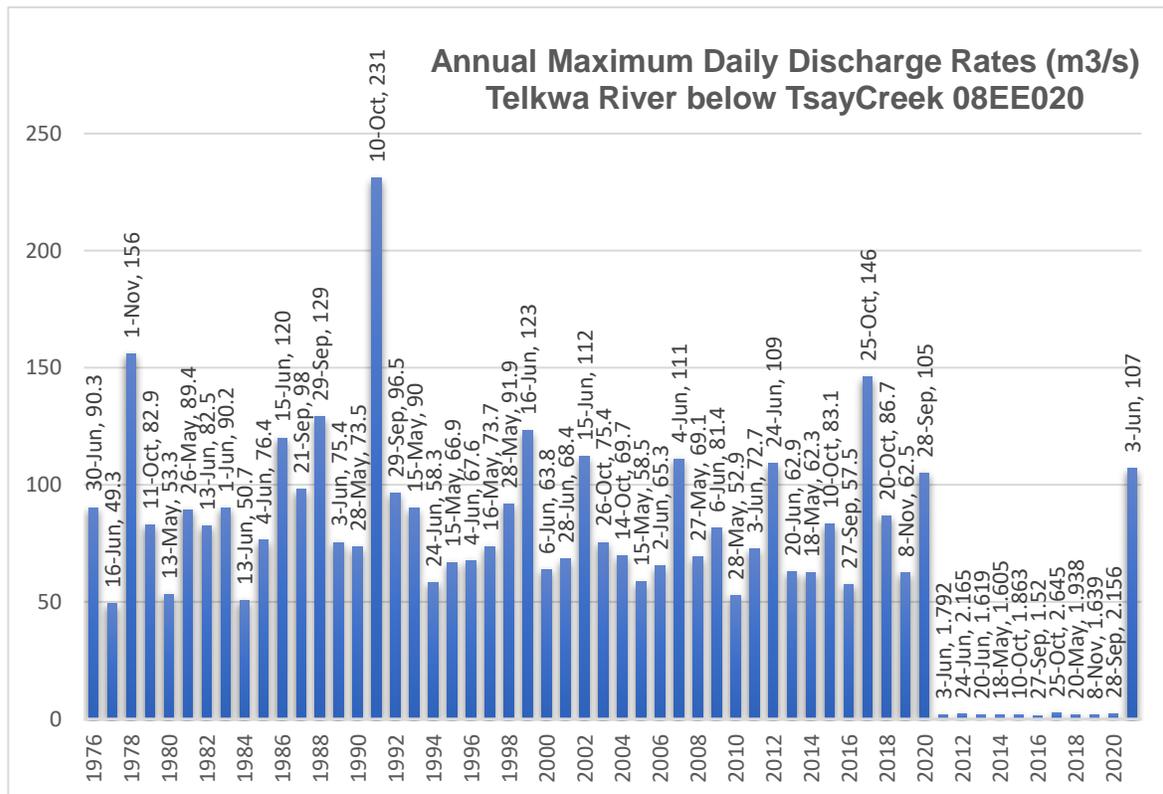
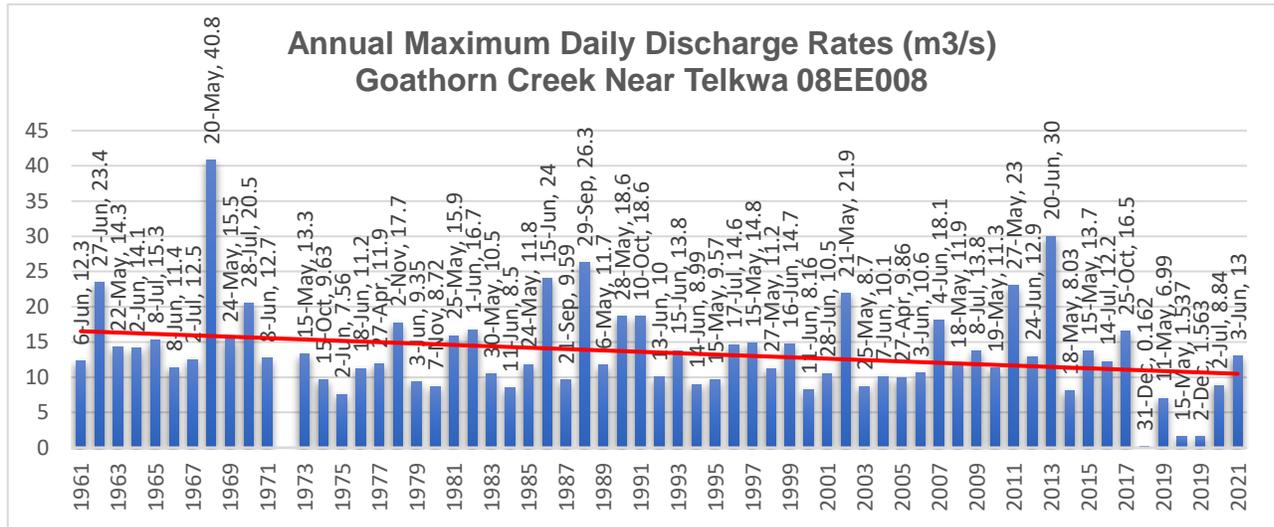
Year	Event Type	Severity	Cause	Impact Effect	Description
2002	Flooding	high	Spring Run Off	Transpiration	In June, local snowpacks were about 200% of normal. This was reflected in above normal temperature in the preceding months. On May 15, the Tsai Creek snow pillow station situated at 1,360 m a.s.l. in the Telkwa River watershed west of Smithers recorded a snow water equivalent of 1909 mm (Schwab et al.). At Smithers and Terrace, at least 40 people evacuated 13 homes in anticipation of rising water levels. On June 20, the Skeena and Bulkley rivers were still very high but receding.
2002	Ice Jam	low	Ice Jam	Transportation	At the end of December, ice jams on the Bulkley River caused flood concern in the Telkwa-Smithers area from Tatlow to Dohler Flats. On December 21, CN Rail removed ice from around their tracks at location 9 km on Tatlow Road and was closely monitoring the situation on December 22. On that day, the river appeared more stable. At Dohler Flats, the water levels were down 30 cm compared to the previous day. However, water levels in the Raymond Road-9 km on Tatlow area were still high. At the Tatlow ice jam location, the water was only 30-60 cm below the CN Rail tracks.
2002	Private Dam Breach	low		Residential Damage	April Quick private Dam Breach: April 30 Neighbour's upstream has a private dam on a waterway that is holding back approximately 8000 cubic metres of water in a reservoir, and it appears the dam is failing. A report will be made to PEP advising of the potential impact downstream should the dam fail. Unknown what waterway this dam has been built on.
2002	Flooding	low	Spring Run Off	Residential Damage	May Dahlie Rd flood of Dahlie Creek flooding of blocks and foundation of a single Trailer; Homeowner indicated that the creek is rising very quickly and coming over the lawn. Creek is cutting a bank 50 - 60 ft. behind the trailer. The water only needs to rise another 8-12 inches and it will remove the blocks from under the trailer. The property is on a natural curve on the creek. It was advised since 11:30 AM that the creek has surged and has now risen another 8 inches. The trailer is in immediate threat of flooding. 2651 Dahlie Rd
2002	Freshet Flooding	High	Spring Run Off	Residential Damage	May Telkwa Deep Creek crossing blocked culvert under HWY 16 needing to evacuate live stock and flooding on Gibson Creek; Culvert under hwy 16 is blocked by debris concerned about imminent flooding of adjacent properties. Evacuated 35 cows and 25 calves today, and still has a couple of cows in the danger area. Access roads are flooded, and water is rising, and in conjunction Gibson creek is flooding the property. This is under 18 inches of water and rate of flow is very high. This situation will not abate overnight and is expected to worsen and access roads to be closed due to this.

Year	Event Type	Severity	Cause	Impact Effect	Description
2002	Freshet Flooding	high	Spring Run Off	Residential Evacuation	May Ebenezer flats flooding of Bulkley River 10 properties impacted; Advised that the water is rising, and the residents are concerned, they requested sand and sandbags.
2002	Freshet Flooding	low	Spring Run Off	Residential Damage	May Dohler Flats near Smithers, there's a river erosion cutting bank within 190' of home. Report received about river erosion cutting bank of river within 190' of some homes. One homeowner has already lost 10' of his property. At 1330 hours, water was 35' from his house.
2003	Freshet Flooding	low	flooding		Jan 1, 2003, Telkwa River flood within the Village of Telkwa with debris flowing down river. Have begun to pay close attention to the Telkwa River which is believed to have risen about a foot in the last 10 minutes. There is a lot of debris flowing down river.
2005	Ice Jam	low	Ice Jam	Transportation	During early January, some low-lying land near Smithers flooded before the river broke through the ice jam in the Bulkley River. Jan 14
2005	Flooding	low	Flooding		
2007	Flooding	high	Flooding	Transportation , Residential Evacuation	An ice jam resulted in the sudden flooding of the residential area known as Ebenezer Flats. Regional District of Bulkley Nechako declared a state of local emergency and a total of 16 persons were evacuated from their homes on the 25 but was lifted and residents were allowed back in their homes on the April 26.
2007	Flooding	high	Spring Run Off	Transportation , Residential damage and evacuation	One of the highest water levels in history. Twenty-six residences were evacuated for an eight (8) day period from June 5, 2007, to June 11, 2007, 2007 in the Ebenezer Flats area. An additional thirty-four (34) residences and one (1) school in the Kidd Road area of Ebenezer Flats and eight (8) residences in the Quick area were put on evacuation alert. An evacuation alert was also put in place for residences along Francois Lake and included approximately 350 homes.
2007	Flooding	high	Flooding	Residential Evacuation	Flooding along the Bulkley River impacting residents at Ebenezer Flats and Dholer Flats. (# people activated in the event 12, task # 80335)
2009	Ice Jam	high	Ice Jam	Transportation	Required evacuation of Ebenezer Flats Residents and caused significant damage to homes and property.
2009	Ice Jam		Ice Jam	Residential Evacuation	Ice Jam breakup along the Bulkley River impacting residents at Ebenezer Flats. This event required immediate evacuation of residents at Ebenezer Flats for three days. (# people activated in the event 6, task # 100533)
2010	Ice Jam		Ice Jam		Ice Jam forming
2011	Flooding	moderate	Flooding	Residential Evacuation	Evacuation order in place for Ebenezer Flats on May 27- downgraded to an alert on May 29- rescinded

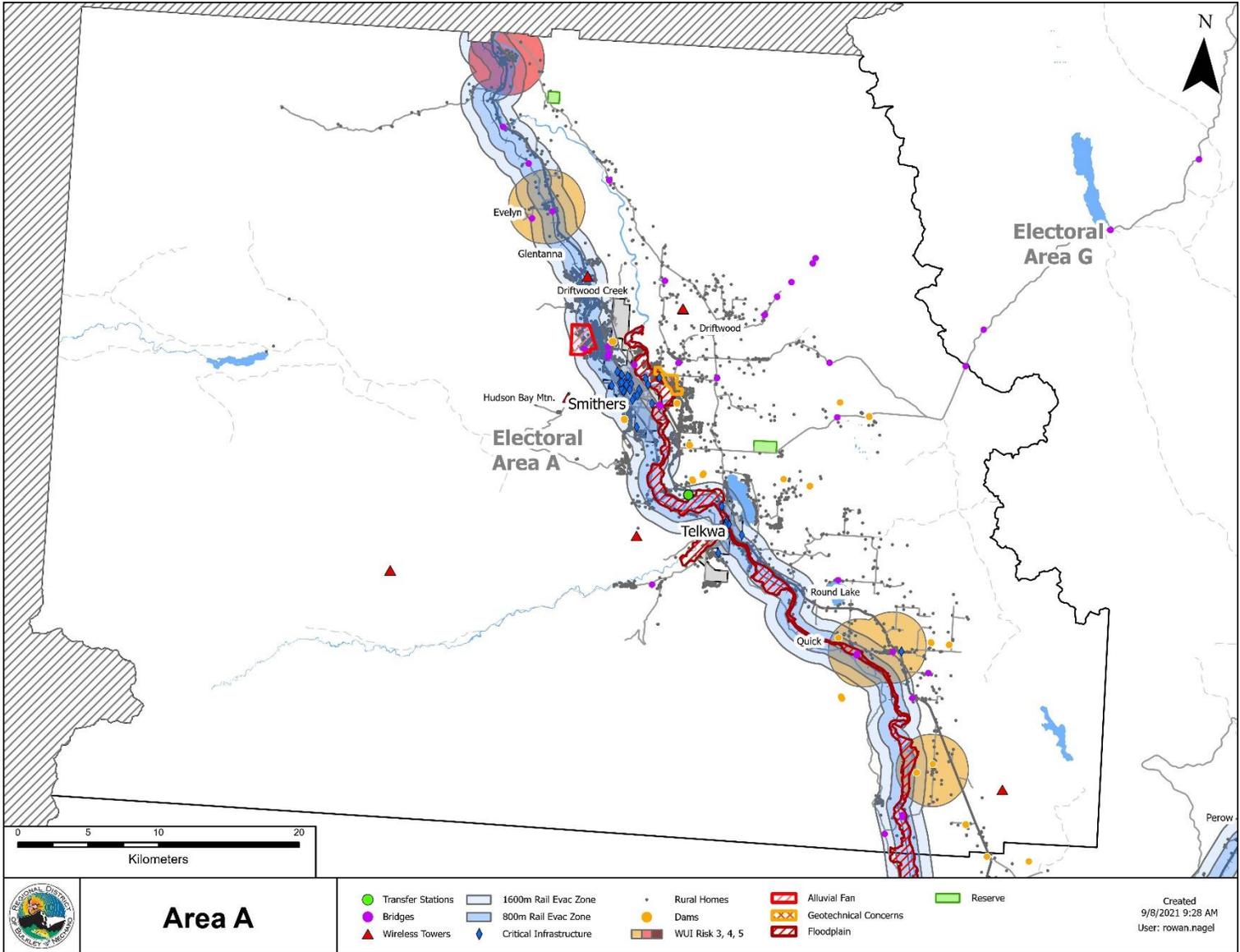
Year	Event Type	Severity	Cause	Impact Effect	Description
					June 3. Evacuation Alert for Quick Station Rd. May 17- rescinded June 3.
2011	Flooding	moderate	Flooding	Residential Evacuation	Flooding along the Bulkley River impacting residents at Ebenezer Flats.
2012	Ice Jam	low	Ice Jam	Residential Evacuation	Public Notice issued Jan 18.
2012	Flooding	low	Potential flooding		High Stream advisory issued.
2012	Flooding	low	Ice Jam Flooding	Transportation	Some residents had flooding, but no evacuations were issued. Some road blockage/re-routing in area
2012	Flooding	moderate	Flooding	Residential Evacuation	Flooding along the Bulkley River threatening residents at Ebenezer and Dohler Flats.
2015	Ice Jam	low	Flooding		Dohler flats Potential Ice Jam Bulkley River - January 16, 2015
2016	Ice Jam Flooding	low	Ice Jam Flooding		Ice Jam Bulkley Valley River (task # 164729)
2016	Gas/Diesel Spill				March 3, 2016, A truck went over a 40' embankment AT Degal Pit Passing Lane, and spilled: <ul style="list-style-type: none"> ▪ 2,800 litres of marked gas; ▪ 17,500 litres of clear gas; and ▪ 2,000 litres of diesel.
2017	Landslide			Residential evacuation	May 6, 2017, resident first observed landslide. In the 2389 Balsam Road
2017	Ice Jam Flooding	low	Ice Jam Flooding	Residential Damage	Bulkley Valley Ice Jam,
2020	Pandemic	moderate	Pandemic	Social economic	COVID-19 Pandemic, Business shut down and restrictions on gatherings and inter-community travel.

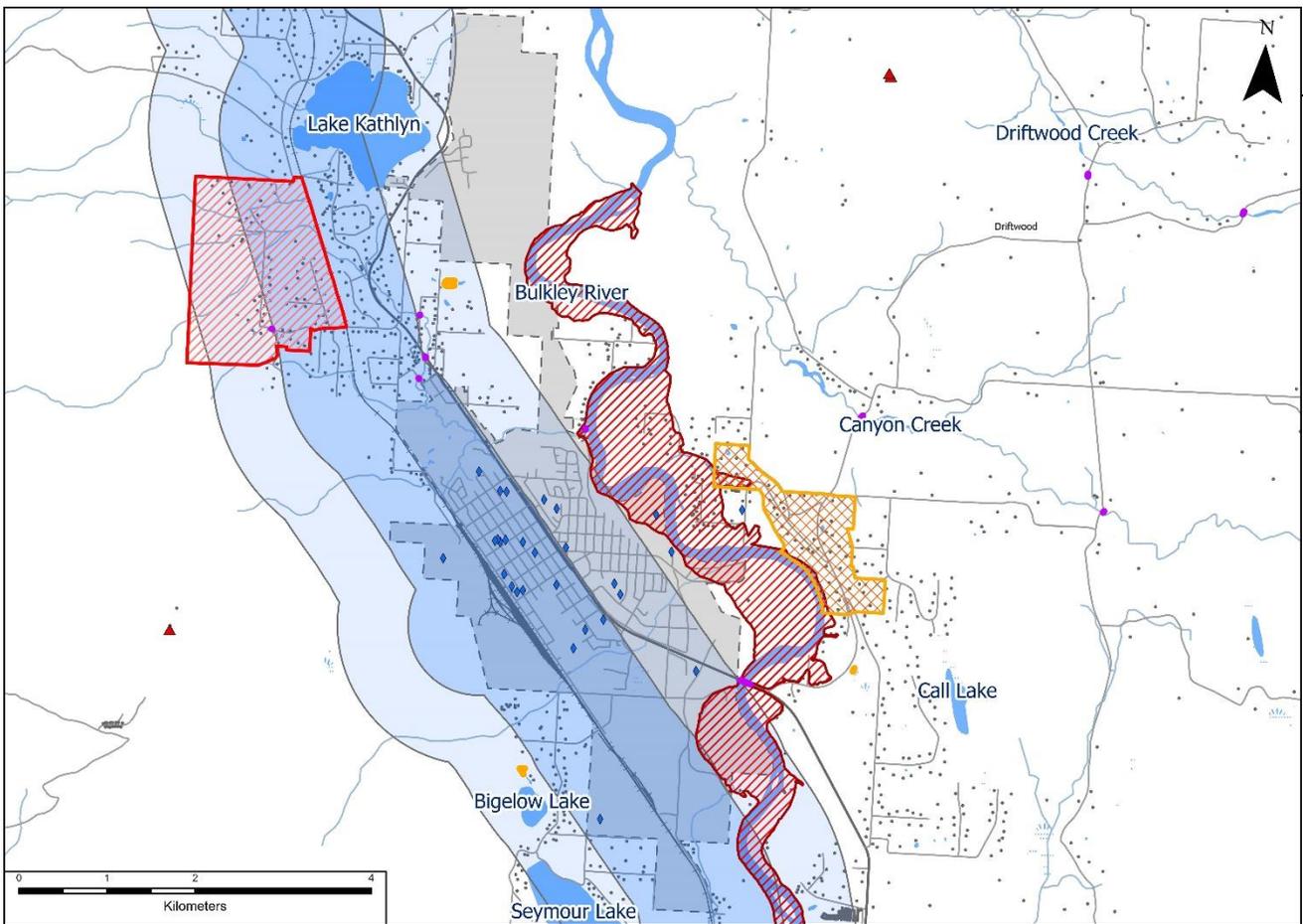
APPENDIX 2 – ELECTORAL AREA 'A' HYDROMETRIC DATA





APPENDIX 3 – ELECTORAL AREA 'A' KNOWN HAZARDS MAP

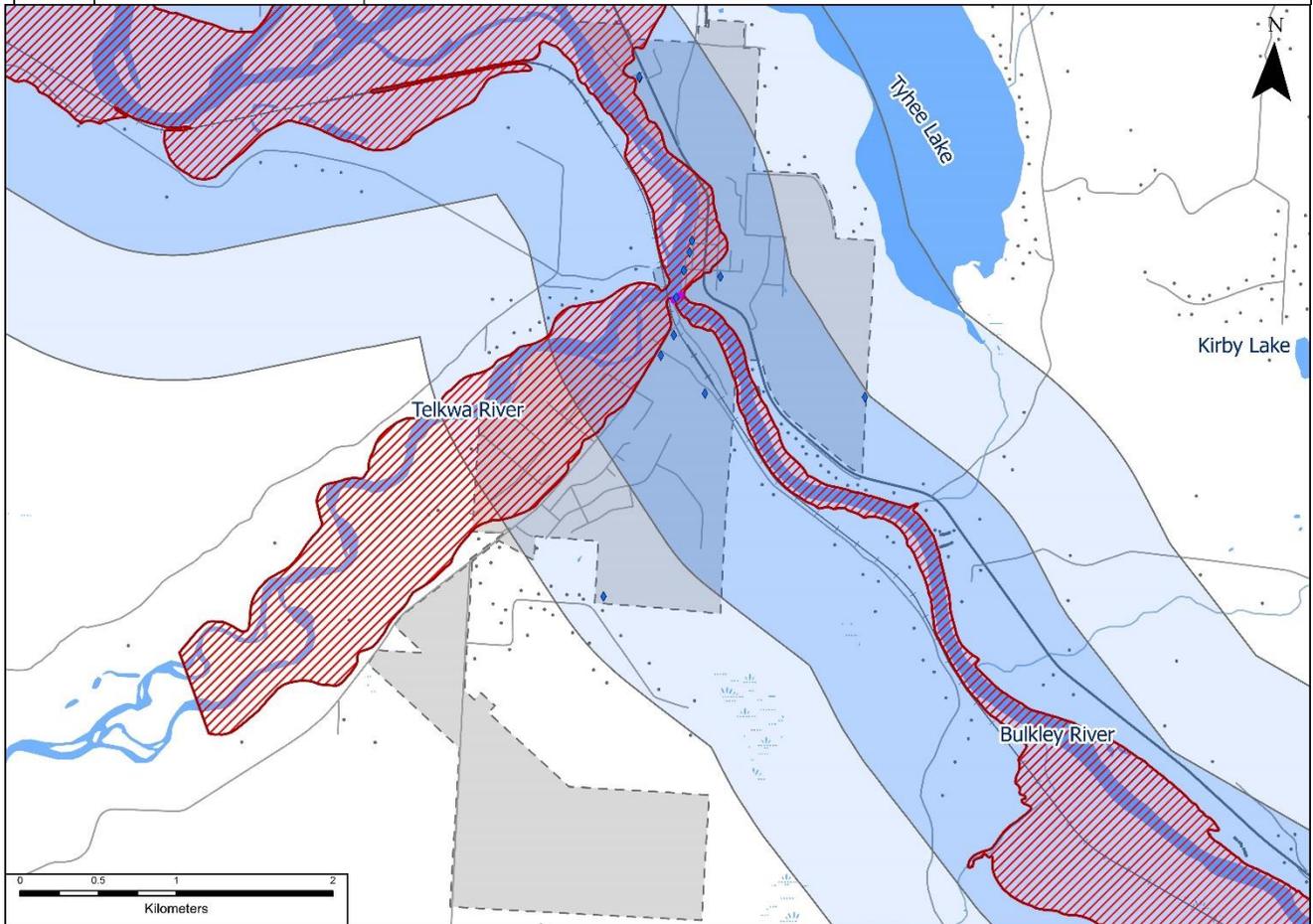




Smithers

Transfer Stations	1600m Rail Evac Zone	Rural Homes	Alluvial Fan	Reserve
Bridges	800m Rail Evac Zone	Dams	Geotechnical Concerns	
Wireless Towers	Critical Infrastructure	WUI Risk 3, 4, 5	Floodplain	

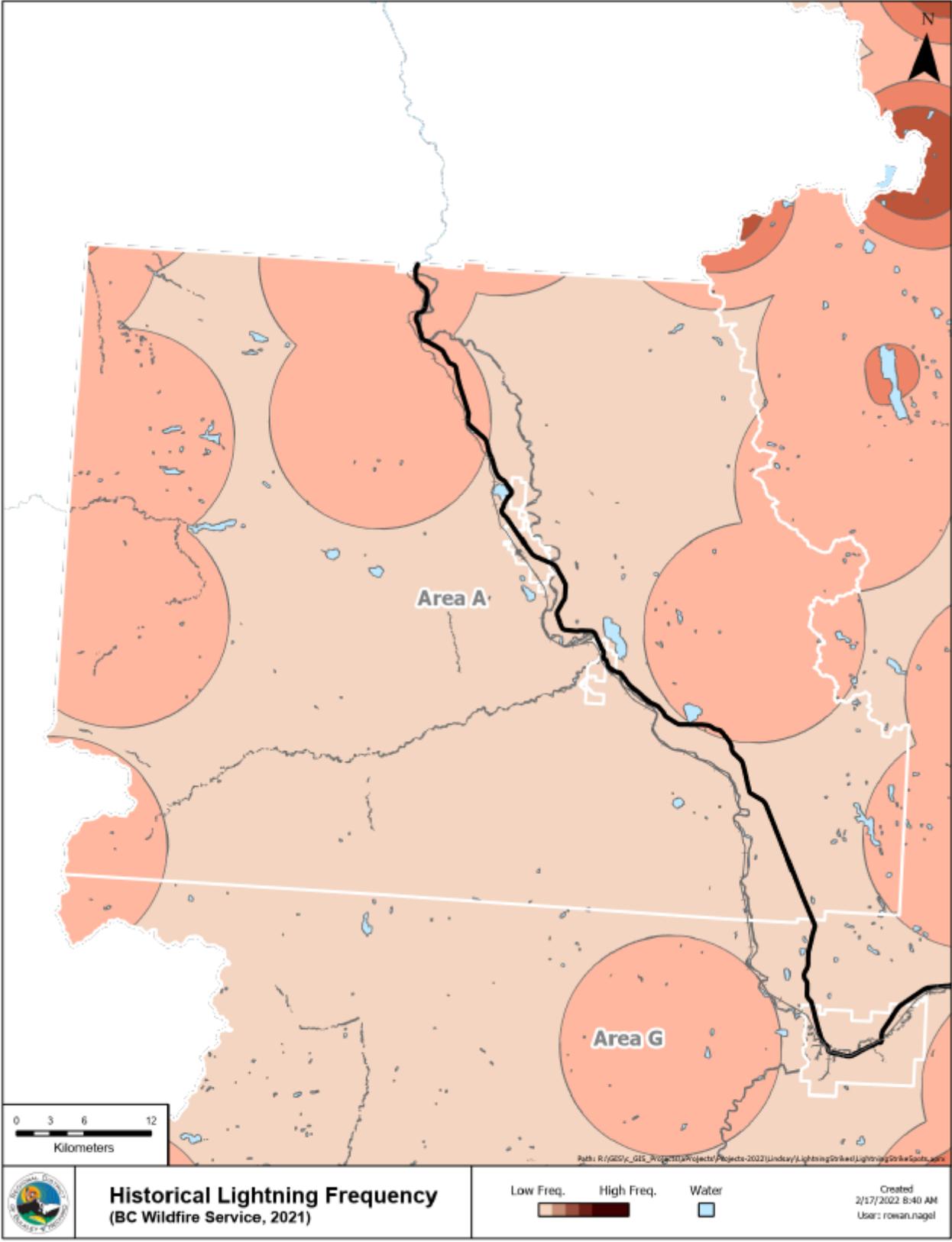
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User: rowan.nagel



Telkwa

Transfer Stations	1600m Rail Evac Zone	Rural Homes	Alluvial Fan	Reserve
Bridges	800m Rail Evac Zone	Dams	Geotechnical Concerns	
Wireless Towers	Critical Infrastructure	WUI Risk 3, 4, 5	Floodplain	

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User: rowan.nagel



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