Annex C

Dehcho Region Hazard Identification Risk Assessment

Northwest Territories Municipal and Community Affairs

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1 Executive Summary

The 2014 Dehcho Region Hazard Identification Risk Assessment (HIRA) identifies the hazards and examines the risks that pose a threat to the people, property, environment and economy of the Dehcho Region. This type of assessment is a critical part of any emergency management program. Identified hazards can be used in preparedness programs, emergency response plan exercises, and training and awareness programs.

Governments have limited resources and planning for every possible hazard is not a realistic approach. However, an informed ranking of hazards provides a cost-effective approach to hazard mitigation, emergency planning and response. This assessment identified and rated twenty hazards that could affect the Dehcho Region, and then ranked them in order of emergency planning priority. Each region of the Northwest Territories (NWT) has some unique features that were taken into consideration in rating and ranking their hazards.

The Dehcho Region Hazard Summary (insert) provides a list of the hazards ranked into three categories of high, medium and low. These rankings are supported by the Dehcho Region risk matrix (page 6) and the information outlined in the hazard narratives in Section 2, "Hazard Narratives." Each hazard narrative contains risk mitigation strategies to help emergency planners improve their preparedness and response plans. The rankings were determined using best practices methodology combined with insight from communities and local experts and therefore, may not be identical to risks assigned using other methods or criteria.

The Dehcho Region is located in the southwestern part of the NWT, bordering British Columbia and the Yukon. There are 6 communities in the Dehcho Region. The 2011 census reported a population of 3,246 and a land area of 194,494 square kilometers for the region. With a population of 1216 people, Fort Simpson is the

Dehcho Region Hazard Summary

High

1. Flood
2. Fire/Explosion
3. Critical Infrastructure Failure – Other

Medium

4. Critical Infrastructure Failure - Energy Crisis
5. Industrial Emergency
6. Snow Load Hazard
7. Critical Infrastructure Failure - Water Contamination
8. Transportation Accidents
9. Human Disease
10. Earth Movement – Other
11. Weather - Winter Storm

Low

12. Weather - Wind Storm
15. Weather - Other Extreme
14. Earth Movement - Permafrost Degradation
16. Food and Agricultural Emergency
19. Earth Movement - Earthquake/ Tsunami
13. Ice Hazard
17. Civil Unrest
18. War/ International Incident
20. Falling Debris

largest community in the region and is located on an island at the meeting of the Mackenzie and Liard Rivers. It is the commercial and administrative centre for the Dehcho Region.

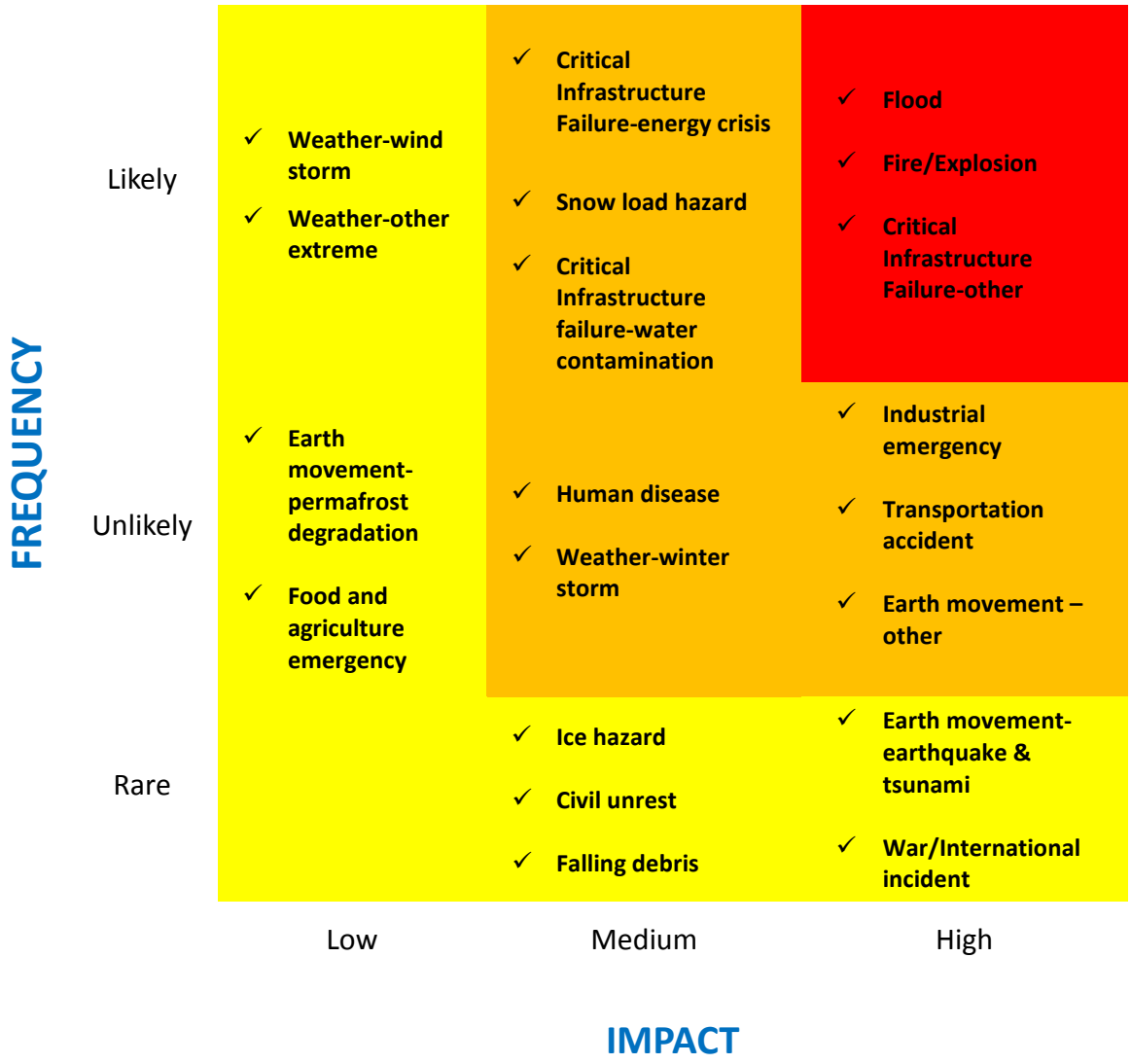
Flood, Fire/Explosion and Critical Infrastructure - Other were found to be high risk hazards in the Dehcho Region having impacted communities and caused damage. Both the Fire/Explosion and Flood hazards were also found to be very likely to increase in frequency due to climate change and cause more extensive damage to communities in the future.

Half of the communities in the Dehcho are currently designated flood risk areas and the other three have some exposure.

Fort Liard, Fort Simpson, Jean Marie River, and Wrigley have development areas with a high or extreme wildfire hazard. Many of the industrial activities in the region have a high or moderate forest fire risk classification. Urban fires in isolated communities with volunteer firefighters can lead to the loss of critical infrastructure.

Critical Infrastructure Failure – Other ranked high as communications and transportation systems and sewage treatment facilities in the Dehcho Region all face challenges that may lead to failure. Planners must consider that Critical Infrastructure Failure can combine with any natural hazard to impair response, prolong recovery and increase damage to a community.

1.1 Dehcho Region Risk Matrix



1.2 Emerging Issues

Prospective mining development, a change in oil and gas extraction, or a shift in demand for natural resources could have an impact on the Dehcho Region exposure to industrial accidents and other hazards.

The opening of the Prairie Creek Mine in the Dehcho Region may increase its exposure to industrial accidents.

The Dehcho Region is undergoing expanded oil and gas development and exploration. There are currently two producing fields in the Dehcho Region; natural gas from the Fort Liard Region, and gas

with oil from Cameron Hills. Several other significant discoveries have been made that are not developed. Should the proposed Mackenzie Gas Project proceed, the region will become a major staging area. These developments could lead to greater Fire/Explosion exposure and increase the potential for Industrial accidents.

1.3 Climate Change

Climate change strongly affects the hazards of the NWT. Temperatures have already increased by 3 to 4 degree Celsius over the past 50 years in the NWT and this rate will continue or increase. Climate change shifts the wind and cloud patterns and changes how many storms and lightning strikes impact the region. Northern climate change has been hard to predict but these are some of the effects that could increase the frequency or impact of hazards in the future:

- Rapidly rising temperatures (Fire/Explosion Hazard, Transportation Accidents Hazard, Critical Infrastructure Hazards, Earth Movement Hazards, Human Disease Hazard);
- Shorter, warmer winters (Transportation Accidents Hazard, Critical Infrastructure Hazards);
- Increased rain and snowfall in many regions (Flood Hazard, Snow Load Hazard, Weather Hazards, Earth Movement Hazards);
- More extreme fall and winter storms (Weather Hazards);
- Less predictable weather (Weather Hazards);
- Increased winds in some areas (Weather Hazards);
- Thinner ice (Ice Hazard);
- Lower water levels in some lakes and rivers (Critical Infrastructure Hazards, Water Contamination Hazard, Transportation Accidents Hazard);
- More forest fires in some areas (Fire/Explosion Hazard); and
- Rising sea levels (Flood Hazard, Earth Movement Hazards).

A more extensive discussion on climate change can be found in the 2014 NWT HIRA Section 8.3 Specific Climate Change Report.

2 Hazard Narratives

2.1 High

2.1.1 Flood

Figure 1: 2012 Flooding in Nahanni Butte (Source: GNWT, MACA)

Definition An overflow or surge of water which causes or threatens loss of life and property and environmental damage	**Class** Natural Hazard
NWT greatest impacts to date 1800 Evacuated Estimated Total Cost $3,500,000	
Climate Change Projected to increase both frequency and consequence	

Mitigation Strategies	✓ Outline a water management and community development policy. ✓ Develop and exercise plans/programs for: o watershed management; o river/lake/ocean modeling/prediction and monitoring; o erosion control; and o flood response. ✓ In the face of rapid snowmelt and intense rains in spring and summer, communities susceptible to flash flooding should review and improve their drainage facilities and protect vulnerable buildings and facilities.

Vulnerability	Description
People	Evacuation of communities due to flood events is common. Deaths and injury due to flooding can occur during heavy rainstorm events which can interfere with evacuation attempts. Deaths in the NWT due to flooding are rare.
Infrastructure	Personal property damage can be extensive. Contamination by floodwaters, structural damage, and mold can destroy buildings. Roads can be damaged or washed away. Damage to infrastructure can be extensive. Flooding can also negatively affect utilities and critical infrastructure. Utilities such as wastewater treatment, electricity and gas may be disrupted in the event of a flood. Emergency ground vehicles may be unable to respond if roads and bridges are flooded, washed out or covered by debris.
Communications	Communication towers can be damaged by flooding events.

Dehcho Exposure/History

Ice jam flooding is the main type of flooding in the Dehcho Region. Rivers break up much earlier than lakes. Bottlenecks can cause ice jams. Ice jams have caused flooding on the Mackenzie River, in the Fort Simpson area. Environment Canada field staff advises and assists local flood watch committees in the Dehcho Region.

Three communities are designated as a flood risk areas in the Dehcho Region:

- Fort Simpson;
- Fort Liard; and
- Nahanni Butte.

When	Where	Impact
May 1-9, 1989	Liard River	Severe ice jams near 3 Mile Island, flooded the community of Fort Liard. A local State of Emergency was declared. Fort Simpson was also damaged. Personal, municipal and territorial property was damaged and riverbanks were eroded. Over 50 homes were affected by the flooding. Evacuated: 125 Estimated Total Cost: $1,094,778
June 9 2012	Nahanni Butte	The South Nahanni River flooded low-lying parts of the community. The flood caused extensive damage to a number of buildings including the band office, the community's store and the community gymnasium. Evacuated: 72

Community Meeting Feedback

Local knowledge during the workshop supported the analysis of flood being a high risk factor for the Dehcho Region. Virtually every community in the Dehcho has been affected by flooding.

2.1.2 Fire/Explosion

Figure 2: July 2013 Forest Fire near Wrigley (Source: NWT Department of Environment and Natural Resources)

Definition	**Class**
Uncontrolled burning and/or a sudden, violent release of gas under pressure which causes or threatens loss of life and property and environmental damage	Natural and Human-induced

NWT greatest impacts to date
950 Evacuated
Estimated Total Cost $12,044,118

Climate Change
Projected to increase both frequency and consequence

Mitigation Strategies	✓ Consider implementing FireSmart programs for the community and include the response capabilities for urban/rural/wildland fires. ✓ Create fire education training and awareness sessions for first responders and the public. ✓ Enforce fire prevention practices.

Vulnerability	Description
People	High injury and fatality potential from the immediate threat of the fire and the blast as well as an increased mortality rate and respiratory symptoms due to smoke.
Infrastructure	Total loss or damage to most infrastructure including public buildings, roadways, rail-lines, power facilities and water treatment plants. Smoke can impede evacuation of remote communities by air.
Communications	Any existing power lines can be damaged and destroyed by fire/explosion cutting off communication links. The same holds true for microwave towers in regions without in-place power lines.

Dehcho Exposure/History

Table 1: Wildfires and Urban Fires with Losses of $500,000 and Over

Where	When	Impact
Wrigley	2013	Wildfire - Community Evacuation. Evacuated: 40

Wildfire

Lightning activity over the Mackenzie Basin Region is short but intense, with a strong peak in cloud-to-ground lightning during July. The maximum area of lightning activity is influenced by local moisture sources and by topography. Lightning causes up to 80% of the forest fires in the NWT. The following communities throughout the Dehcho Region have a wildfire FireSmart hazard of High or Extreme:

Table 2: FireSmart Hazard Areas of High or Extreme in NWT According to Community CWPP

Community	Development Area	FireSmart Hazard
Fort Liard	New Subdivision	Moderate - High
	Beaver Enterprises – Hwy 7 (bulk fuel tank site)	High
Fort Simpson	Wildrose Acres	High - Extreme
	Nogha Heights	High - Extreme
	Bannock Land	Moderate - High
Jean Marie River	Moderate to High risk to wildfire	
Wrigley	New subdivisions on the south-end and for scattered structures on the east perimeter of the town site	High

Many of the industrial activities in the Dehcho Region have a high or moderate forest fire risk classification including land clearing, timber harvesting, timber processing, mechanical site preparations and other silviculture treatments, gas or oil well operations, mining, highway maintenance and construction, engineering operations, plant harvesting, manufacturing, milling, trenching, and the use of explosives.

Explosion

Many communities have large fuel tanks needed to prepare for the winter months. This large fuel load can result in an explosion if an ignition source is introduced. Nearby forests increase the fire load and the risks to the communities.

Community Meeting Feedback

Summers are becoming hotter and drier. This coupled with the lack of adequate fire-fighting resources has many residents concerned for the future in terms of possible fire damage. Bulk storage areas are another primary concern for community residents. Bulk storage of fuels could lead to explosions which would have disastrous effects on many communities throughout the Dehcho Region. In many cases, bulk fuel storage containers are very close to, or within the community.

2.1.3 Critical Infrastructure Failure – Other

Figure 3: Using cash was the sole method of payment accepted at Fort Simpson's Northern store during a region-wide Internet and long-distance phone disruption – September 2013.(Source: Jeanne Gagnon/NNSL photo)

Definition	**Class**
Failure of services that meet basic human needs, sustain the economy, and protect public safety and security	Human-induced Hazard

NWT greatest impacts to date

- Communications failure
- Road Damages

Climate Change

Projected to increase both frequency and consequence

Mitigation Strategies	✓ Understand the potential risks associated with Critical Infrastructure Failure – Other. ✓ Build partnerships between stakeholders. ✓ Ensure back up/alternate systems in place for life safety. ✓ Ensure emergency response plans are in place.

Vulnerability	Description
People	People in the NWT rely on infrastructure to keep them supplied and in touch with other communities. Any infrastructure collapse could be catastrophic given the harsh nature of most areas where people live.
Infrastructure	Airports are subject to closure regularly in the winter, ice roads rely on a consistent pattern of cold weather and all weather roads are also subject to closure during winter season. Any infrastructure collapse is also exacerbated by the fact that the isolated nature of these communities makes it extremely difficult to repair failed infrastructure. Given the isolated nature of most of the communities within the NWT, any incident which closes down an airport could be severe.
Communications	Communications break downs are common throughout the north as severe weather can shut down facilities and "power bumps" often hamper effective communications. Again, given the isolated nature of the area, repair of these systems is often extremely difficult.

Dehcho Exposure/History

When	Where	Impact
Jan 2003	NWT-wide	Mid-winter temperatures ranging from -1°C in Yellowknife to an incredible 7°C in Fort Smith. The mild El Nino weather put winter road and ice bridge construction behind schedule by a few weeks and created problems for mining and oil and gas industries, which rely on the frozen roadways to transport yearly supplies.

When	Where	Impact
Oct 6, 2011	10 communities	Telesat's powerful Anik F2 satellite suddenly ceased operating. Remote northern locations were the most affected, with 10 of 33 NWT communities served by NorthwesTel seeing disruptions from the outage. First Air airline cancelled 48 flights, stranding about 1,000 passengers just before the Thanksgiving long weekend.
Sept 18, 2013	Dehcho	A damaged NorthwesTel fibre optic cable cut off long-distance calling and Internet services. People had to deal with paying only by cash, having no cellphone access and no Internet. Using cash was the sole method of payment accepted at Fort Simpson's Northern Store during a region-wide Internet and long-distance phone disruption. A melted fibre terminal caused by a forest fire at the Morrisey Microwave Site was the reason of the disruption, the company confirmed.

The Village of Fort Simpson is currently under an Environment Canada Inspector's Directive to improve the effluent from the sewage treatment facility. A 2012 study by Stantec Architure Ltd. found that the existing process cannot provide for future use and capacity.

Community Meeting Feedback

The biggest concern commented upon at the Dehcho regional meeting was the present state of the highways and roads throughout the NWT and the reliance on seasonal roads. The span of time these seasonal roads could be accessed was believed to be directly affected by climate change according to many residents. The ferry service into Fort Simpson is very unpredictable. The community is left without service for about one month each year while the ferry is out of service and winter roads are unsafe. The river seems to be running more shallow than in the past exacerbating the ferry issue. Recently there have been incidents whereby underground cables and wires have been accidently disturbed by workers excavating land causing infrastructure failure.

2.2 Medium

2.2.1 Critical Infrastructure Failure - Energy Crisis

Figure 4: A Northwest Territories Power Corporation diesel power plant operating in Fort Simpson. (Source: NNSL file photo)

Definition Failure to provide energy required to meet basic human needs, sustain the economy, and protect public safety and security	**Class** Human-induced Hazard
NWT greatest impacts to date Declared state of emergency	
Climate Change Projected to increase both frequency and consequence	

Mitigation Strategies	✓ Understand the potential risks associated with Critical Infrastructure Failure – Energy Crisis. ✓ Build partnerships between stakeholders. ✓ Ensure back up/alternate systems in place for life safety. ✓ Ensure emergency response plans in place.

Vulnerability	Description
People	Given the severe weather in the north, the population relies on a steady and safe supply of energy to provide heating in the winter. Most areas of the NWT are extremely isolated and the health hazards of being left without energy/power are both physical and mental.
Infrastructure	Water lines and sewage lines can freeze and break in severe winter weather without heat or flowing water. Loss of power can cause a situation where pipes burst in the colder temperatures.
Communications	Loss of electrical power can cause disruption to communication systems such as radio and television which people rely on for information.

Dehcho Exposure/History

When	Where	Impact
January, 2003	NWT	Mid-winter temperatures ranging from -1°C in Yellowknife to 7°C in Fort Smith. The mild El Nino weather put winter road and ice bridge construction behind schedule by a few weeks and created problems for mining and oil and gas industries, which rely on the frozen roadways to transport yearly supplies.

In the Dehcho Region, all communities have electricity provided by diesel-fired power plants. Fuel must be shipped into the communities by all season road, pipeline, barge, ice road or air. A shortened ice road season, barge or pipeline disruption, or prolonged extreme weather events can lead to shortages of fuel in communities.

Community	Power Source (NWT Power Corporation website)
Fort Liard	Three diesel generators with a total output of 1.32 MW.
Fort Simpson	Four diesel generators with a total output capacity of 3.2 MW. Fort Simpson also has a 60 kW solar array.
Jean Marie River	Three small diesel generators with a total capacity of 230 kW.
Nahanni Butte	Three small diesel generators with a total output capacity of 245 kW.
Trout Lake	Diesel generator for electricity.
Wrigley	Three generating units with a total output of 781 kW.

Community Meeting Feedback

This issue was addressed at the Dehcho community meeting. The concern was the remoteness of the communities and the difficulty in ensuring reliable energy infrastructure is in place. Due to limited road access Fort Liard is under threat of being cut-off from its fuel supply. This is especially true in the winter when severe weather can close down roads for several days at a time.

2.2.2 Industrial Emergency

Figure 5: Enbridge workers clear access to the spill site on the Norman Wells pipeline south of Wrigley in May 2011. (Source: NNSL/ photo courtesy of Enbridge Pipelines Inc.)

Definition	**Class**
Emergencies involving businesses that handle dangerous goods, hazardous wastes or chemicals or engage in potentially hazardous activities	Human-induced Hazard

NWT greatest impacts to date
Environmental Damage

Climate Change
Projected to increase both frequency and consequence

Mitigation Strategies	✓ Identify the industries in each community and rank according to risk. ✓ Ensure back-ups are in place for the industries ranked as critical. ✓ Ensure appropriate safety and emergency plans are in place.

Vulnerability	Description
People	Industrial accidents have an enormous impact on the health of workers and on the economy in general, which is reflected in the death, disability and personal suffering of workers on one hand, and in absence from work, loss of productivity and health costs on the other.
Infrastructure	Industrial accidents can have a dramatic negative affect on physical and virtual systems which are considered critical. This would include fires or explosions, oil spills which could impact water treatment and dam failure which could impact power supply.
Communications	Communications hubs in small communities could be damaged by an industrial accident in the community.

Dehcho Exposure/History

When	Where	Impact
May 10, 2011	North of Fort Simpson	An Enbridge pipeline leaked oil into the environment near Willowlake River. Approximately 1500 barrels of oil were spilled.

Mining and oil and gas industries are the most common hazardous industries in the NWT. There are currently two producing fields in the Dehcho Region; natural gas from Fort Liard Region, and gas with oil from Cameron Hills. In the Dehcho, there is one operating mine, the Cantung Mine, a producer of tungsten concentrates from underground operations located in the Nahanni area.

In mining, common causes of fatal injury include rock fall, fires, explosions, mobile equipment accidents, falls from height, entrapment and electrocution. Less common but recognized causes of fatal injury

include flooding of underground workings, wet-fill release from collapsed bulkheads and air blast from block caving failure.

Community Meeting Feedback

Residents of the Dehcho are concerned with the transportation of dangerous goods throughout the region.

2.2.3 Snow Load Hazard

Figure 6: Jacques Harvey resorted to using a small snowblower on Feb. 18 to clear the snow from the roof of his house in Fort Simpson. The village had the snowiest winter on record, April 2013. (Source: NNSL online/Roxanna Thompson)

Definition	**Class**
Potential collapse of buildings due to the weight of build-up or drifting of snow	Natural Class

NWT greatest impacts to date
Property Damage (Roofs)

Climate Change
Projected to increase both frequency and consequence
Structures are built using historical snow load standards. When the snow load exceeds the standards, due to wetter, heavier, more frequent or drifting snow, structures can collapse.

Mitigation Strategies	✓ Include snow load hazards in community response plans. ✓ Clear snow from public building rooftops. ✓ Perform a Roof Risk Assessment on key community structures such as schools and community centers.

Vulnerability	Description
People	High numbers of injuries or deaths could occur if an occupied community building or school were to collapse.
Infrastructure	Loss of the building and contents plus loss of the use of this building until repairs or a new structure can occur.
Communications	Potential collapse of microwave towers due to snow load could impact the community's communications.

Dehcho Exposure/History

Community Snow Load Risk Factors

Community	Community Snow Load Risk Factor
Fort Liard	Highest
Fort Simpson	Moderate
Jean Marie River	Moderate
Nahanni Butte	Highest
Trout Lake	Highest
Wrigley	Highest

Studies show that approximately one fifth of public buildings (22%) in the NWT are at risk of collapse due to changing/increasing snow loads. Public buildings at risk include schools, hospitals, community centers and medical centres. Of those buildings at risk, about 10% have been retrofitted since 2004, and another 12% are under a snow load watch status.

Community Meeting Feedback

Residents of the Dehcho spoke of snows coming later in the year and are heavier and wetter than in the past.

2.2.4 Critical Infrastructure Failure - Water Contamination

Figure 7: Fort Liard Water Treatment Plant (Source: Hamlet of Fort Liard)

Definition	Class
Serious contamination of drinking water or loss of supply, that presents a danger to the general health of the public	Human-induced Hazard

NWT greatest impacts to date
Boil water advisories

Climate Change
Projected to increase both frequency and consequence

Mitigation Strategies	✓ Understand the potential risks associated with Critical Infrastructure Failure – Water Contamination. ✓ Plan for identification and reduction of contaminants into ground and surface water. ✓ Ensure water sampling and monitoring program in place. ✓ Ensure emergency response plans are in place.

Vulnerability	Description
People	The levels of contaminants in drinking water are seldom high enough to cause acute (immediate) health effects. Examples of acute health effects are nausea, lung irritation, skin rash, vomiting, dizziness, and even death.
Infrastructure	Disasters that destroy infrastructure may result in water contamination by sewage. Chloride ions, usually found in seawater or acid rain, increase the conductivity of water and accelerate corrosion. Chloride can penetrate and deteriorate concrete on bridge decking and parking garage structures, and damage reinforcing rods, compromising structural integrity. It damages vehicle parts such as brake linings, frames, bumpers, and other areas of body corrosion. It impacts railroad crossing warning equipment and power line utilities by conducting electrical current leaks across the insulator that may lead to loss of current, shorting of transmission lines, and wooden pole fires.
Communications	Chloride ions from acid rain significantly aggravate the conditions for pitting corrosion of most metals by enhancing the formation and growth of the pits through a process which weakens them over time.

Dehcho Exposure/History

The responsibility for ensuring safe drinking water is vested with the Government of the NWT, which has passed specific public health legislation designed to ensure the safety of drinking water supplies. The Department of Health is the regulator and is responsible for enforcing the *Public Health Act*, *Water Supply System Regulations*, and *General Sanitation Regulations*, as well as ensuring the *Guidelines for Canadian Drinking Water Quality* are met.

Community governments have the authority and responsibility to provide safe potable water to their residents. In communities where the community government is the owner and operator of the water

treatment facilities, the community government is responsible for the treatment and safety of the water supply in those operations. Responsibilities include treatment of water to meet the Guidelines for Canadian Drinking Water Quality, the submitting of water samples to a laboratory for bacteriological and chemical analysis, and maintaining records of raw water quality, finished water quality and the amounts of chemicals used in treatment.

When	Where	Impact
May 2009	Most of the NWT communities	Oil sands development in the Wood Buffalo Region threatens the water supply to most of the NWT 33 cities, towns and hamlets which are located on water directly downstream from the oil sands. The main area of concern is that contaminants may be getting into the water system which would directly affect the drinking water of virtually all residents of the NWT.

Table 3: Dehcho Region Community Public Water Sources

Community	Public Water Source	Water treatment system classification
Fort Liard	Ground Water	Class I
Fort Simpson	Mackenzie River	Class II
Jean Marie River	Mackenzie River	Small System
Nahanni Butte	Ground Water	Class I
Trout Lake	Trout Lake	Small System
Wrigley	Ground Water	Small System

Community Meeting Feedback

Dehcho residents are concerned with possible contaminants from industry in Northern Alberta since these waters feed the rivers of the Dehcho Region. Within 30 kilometers of Fort Liard there is a small sour gas exploration crew working throughout the year. There is a concern that any accidents at the exploration site would affect the hamlet's drinking water. The Village of Fort Simpson is currently under an Environment Canada Inspector's Directive to improve the effluent from the sewage treatment facility. A 2012 study by Stantec Architecture Ltd. found that the existing process cannot provide for future use and capacity. Fort Simpson residents are concerned that the local water supply could be contaminated due to poor infrastructure.

2.2.5 Transportation Accidents

Figure 8: A Piper PA-31 crashed near Fort Liard with a pilot and five passengers on board, 15 October 2001. (Source: Transport Canada Aviation Safety Letter 2003)

Definition	**Class**
All vehicle accidents which involve large loss of life and property damage	Human-induced Hazard

NWT greatest impacts to date

- Fatalities 32
- Infrastructure damage (power failure, airport damage)
- Property damage

Climate Change

Projected to increase both frequency and consequence

Mitigation Strategies	
	✓ Enforce safety and prevention programs. ✓ Ensure Dangerous Goods practices/regulations are followed. ✓ Implement transportation route monitoring programs. ✓ Confirm that emergency response plans in place for all areas to allow for prompt response to transportation accidents.

Vulnerability	Description
People	Accidents, specifically motor vehicle accidents, are one of the highest causes of death and injury to Canadians every year. Amongst young Canadians (below age 25) vehicular accidents are the number one cause of death in the country. Largest loss of life in one accident usually occurs on passenger flight accidents.
Infrastructure	Any accident which occurs on a roadway has the ability to damage the roadway and therefore leave already isolated areas without any road access. The same holds true for aircraft accidents which may close down an airport making it virtually impossible to gain access to several communities in the NWT.
Communications	Given that communication hubs are serviced by a single communication line, especially in the southern NWT, any accident may cut these lines leading to loss of communications.

Dehcho Exposure/History

NWT transportation infrastructure includes a network of roads, ports and airports. There is also a well-developed marine freight route along the Mackenzie River to the Arctic Ocean.

Aircraft Accident

Statistically, approximately 30% of aviation accidents are weather related and up to 75% of delays are due to weather (NAV 2005). The NWT experiences a number of aviation weather hazards including icing, poor visibility, wind shear and turbulence, weather fronts and thunderstorms. Aging infrastructure at some airports increases the community hazard exposure.

Marine Accident

There is also a well-developed marine freight route along the Mackenzie River to the Arctic Ocean. Within the Mackenzie watershed there are five sectors: the Mackenzie River from Hay River to Tuktoyaktuk, including the Peel River; the western Arctic coast (Beaufort Sea area); the Athabasca River and Lake Athabasca system; Great Slave Lake; and the Liard River and Fort Nelson River System. Navigation problems on the Mackenzie River include a short shipping season (beginning of June to mid-October), ice conditions, low water levels (especially in the fall), four sets of rapids and decreasing daylight in the fall. Because of the rapids, barge tows must stop and each barge must be carefully moved through a channel to protect the cargo.

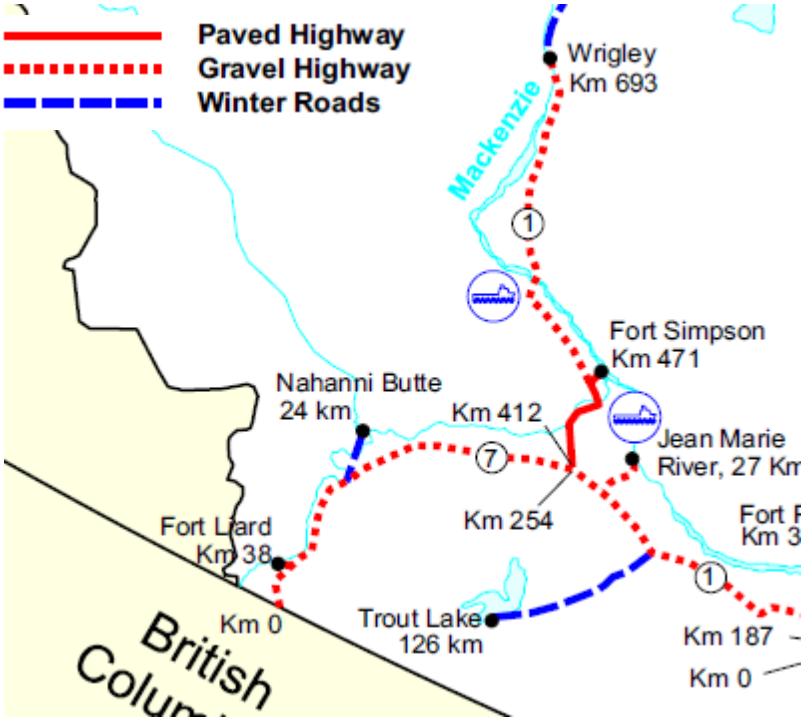


Figure 9: Road System in Dehcho (Source: GNWT Highway system map)

Road Accident

Each year, collisions with wildlife, particularly bison, cause vehicle damage and injuries on NWT highways. Bison can also be found on and alongside Highway 7.

As may be expected, the areas with the heaviest traffic and the largest populations have the highest number of accidents.

Table 4: Dehcho Transportation Risk Exposure

Community	Air	Road	Water/Rail
Fort Liard	Built in 1982, adjacent to the community, the airport has a gravel runway (2956' x 100') and an air terminal building. There is no scheduled air service.	Accessible year-round by road from Fort Nelson, B.C. and Grimshaw, Alta.	
Fort Simpson	Built in 1944, the airport lies 16 km south of the community. It has an asphalt runway (6000' x 150') and an air	Fort Simpson is also a part of the Dehcho Connection, and can be reached by the Liard or Mackenzie Highways.	"Lafferty" Ferry services are provided at Liard River Hwy 1. People also use the river system to travel

Community	Air	Road	Water/Rail
	terminal building. Scheduled flights operate daily.		between communities in the Region and the territory by boat in the summer months.
Jean Marie River	The airport was constructed in 1988 adjacent to the community. It has a gravel runway (2500' x 60'). There is no scheduled air service.	A narrow all-weather access road is located along the stretch of Mackenzie Highway between Fort Providence and Fort Simpson.	River travelers leave from Great Slave Lake and make their way up the Mackenzie River.
Nahanni Butte	Built in 1962, the airport lies adjacent to the community. It has a gravel/earth runway (2500' x 60'). There is no scheduled air service.	No road access during the summer months but people are ferried across the Liard River by river taxi. In the winter an ice road connects the community to the Liard Highway. An all season road is currently under construction.	
Trout Lake	Adjacent to the community, the airport was built in 1987. It has a gravel runway (2500' x 60'). There is no scheduled air service.	Winter road connects the community with the Mackenzie Highway.	The community is also accessible by boat and snowmobile.
Wrigley	The airport was built in 1965, 2.7 km from the community. It has a gravel runway (3500' x 100') and an air terminal building. There is no scheduled air service.	Connected to the Mackenzie Highway. In summer drivers cross the Liard River by ferry to Fort Simpson then cross the Mackenzie River by ferry to follow the route north. In winter the ferries are replaced with ice bridges.	"Johnny Berens" Ferry

Community Meeting Feedback

At the Dehcho Region meeting, residents raised concerns over poor highway infrastructure causing accidents. Dangerous goods such as fuel and oil are being transported through some of the communities. An accident involving one of these vehicles could cause extensive damage to a community.

2.2.6 Human Disease

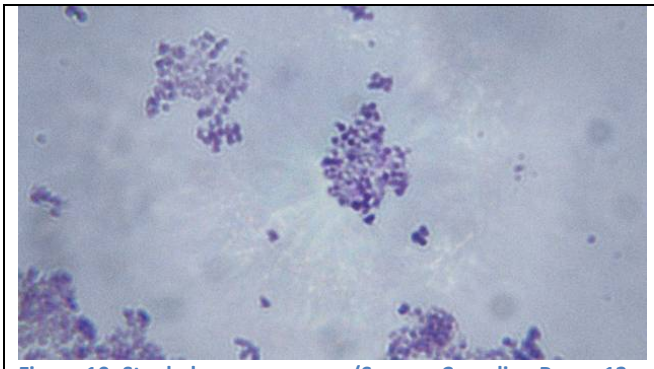


Figure 10: Staphylococcus aureus (Source: Canadian Press, 12 Oct 2012)

Definition	Class
A grave or widespread illness that presents a danger to people's health	Natural Hazard

NWT greatest impacts to date
Fatalities 600

Climate Change
Projected to increase both frequency and consequence

Mitigation Strategies	
	✓ Ensure disease monitoring plans are in place between all levels of government and private sector. ✓ Ensure preparedness plans are in place. ✓ Ensure response plans are in place and are exercised, including containment and quarantine procedures. ✓ Human vaccination against anthrax is available for personnel likely to be involved in investigating or responding to anthrax outbreaks.

Vulnerability	Description
People	Injury and death from human disease can severely impact an isolated community where continual medical care is limited.
Infrastructure	While human diseases do not impact infrastructure directly, some disruption in critical services could occur when enough of the population is affected. Support services to remote communities could be cut off during a pandemic or severe epidemic.
Communications	N/A

Dehcho Exposure/History

When	Where	Impact
1928	Mackenzie District	Influenza epidemic sweeps through the Mackenzie District, killing about 600 people, approximately 10 to 15% of the population of each village.
Since 2008	NWT wide	Methicillin-Resistant Staphylococcus Aureus (MRSA) infections. 55 hospitalizations (5 of them had to be flown south for treatment). Fatalities: 2
November 2009	NWT wide	H1N1 - 45 hospitalizations. Fatalities: 1

Pandemic

Worst case scenario in the GNWT Pandemic plan – each community may be completely isolated and little or no extra resources (human or material) will be available from the Region, Territory, or Nation during the Pandemic period.

Table 5: Health Care Facilities in Dehcho Region

Community	Health Care Facilities
Fort Liard	Health Centre
Fort Simpson	Health and Social Services Centre
	Elders Care Home
Jean Marie River	Health Station
Nahanni Butte	Health Cabin
Trout Lake	Health Station
Wrigley	Health Center

Community Meeting Feedback

This hazard was not mentioned as a concern at the Dehcho Region meeting.

2.2.7 Earth Movement – Other

Figure 11: 1985 North Nahanni rockslide, NWT. (Source: University of Waterloo, Landslide Research Program)

Definition	Class
Movement of the ground causing wide spread damage not involving permafrost degradation or earthquake	Natural Hazard

NWT greatest impacts to date

- Fatalities 1
- Property damage $1,000,000
- Infrastructure

Climate Change

Projected to increase both frequency and consequence

Mitigation Strategies	✓ Develop and enforce building standards. ✓ Develop/distribute and facilitate public awareness programs. ✓ Ensure that emergency plans are in place. ✓ Ensure "safe areas" are available and known to community members.

Vulnerability	Description
People	Injuries or even death could occur from riverbank collapse or sinkholes.
Infrastructure	Damage to buildings, roads and other infrastructure has and is being caused by these earth movements including erosion, riverbank collapse and sinkholes. Also increase in maintenance costs associated with landslides and avalanches, even where no infrastructure damage occurs.
Communications	Interruption can occur if earth movement impacts communication towers.

Dehcho Exposure/History

Across the NWT, people have experienced losses from various earth movement hazards.

Community Meeting Feedback

Residents in Fort Simpson mentioned that the erosion of river banks has begun to threaten existing roads. One representative referenced a photo from 60 years ago which showed the river banks have moved significantly since that time and the road built along the river, which was once thought to be in a safe location, is now close enough to be impacted by a riverbank collapse. This could lead to a transportation accident.

2.2.8 Weather - Winter Storm

Figure 12: Winter in Fort Liard (Source: Hamlet of Fort Liard)

Definition	**Class**
Strong weather characterized by ice, snow and freezing rain	Natural Hazard

NWT greatest impacts to date

- Infrastructure damage (power failure, airport damage)
- Property damage

Climate Change

Projected to increase both frequency and consequence

Mitigation Strategies	
	✓ Develop and enforce snow load standards. ✓ Ensure that plans are in place for severe winter storms. ✓ Develop/distribute and facilitate a public awareness program around how to prepare for and what to do in a severe winter storm. ✓ Identify and communicate available "safe areas" for community members.

Vulnerability	Description
People	Heavy winds and cold temperatures can combine with power loss to cause injury and death that could be extensive. Blowing snow creates hazardous driving and working conditions (see Transportation hazard).
Infrastructure	Heavy winds and snow can cause damage to buildings, loss of power and water and sewage systems. Snow build-up on roofs can cause collapse (see Snow-load hazard).
Communications	Snow and heavy winds can knock out communications systems.

Dehcho Exposure/History

Winter storms cause millions of dollars of lost revenue due to shut down of operations and slow transportation of goods and services every year. The increased frequency of snowstorms has had an impact on roadway safety. More snow removal is necessary to allow for safe travel, and the transportation of goods.

Community Meeting Feedback

Snows are coming later in the year and are heavier and wetter than in the past. Winters are no shorter than in the past but appear to be starting later with warm weather continuing on into October most years.

2.3 Low

2.3.1 Weather - Wind Storm

Figure 13: Microburst Damage to Trees in Fort Smith, September 2012 (Source: Northern News Services)

Definition	Class
Strong weather characterized by damaging movement of air	Natural Hazard

NWT greatest impacts to date

- Property Damage (drill rig)
- Infrastructure (transmission tower)

Climate Change

Projected to increase both frequency and consequence

Mitigation Strategies	
	✓ Develop and enforce building standards for severe winds. ✓ Develop/distribute and facilitate public awareness programs. ✓ Ensure emergency plans include response to wind storms. ✓ Ensure "safe areas" are available and known to community members.

Vulnerability	Description
People	All wind storms have the potential to cause injury or death due to structural damage, flying debris or storm surges. Hurricanes also can cause flooding (see Flood Hazard). Tornados can cause many injuries and death but are very rare across the NWT.
Infrastructure	Heavy winds can cause great damage to buildings and infrastructure, and knock out power across large areas. Tornados can cause heavy damages but are very rare across the NWT.
Communications	Heavy winds are often responsible for damage to communications towers.

Dehcho Exposure/History

Chinook winds up to 100 knots have been recorded at Little Doctor Lake close to the Nahanni National Park. Chinooks are relatively common in the Fort Liard area.

Community Meeting Feedback

There was agreement among the residents of all meetings that the NWT was seeing more extreme windstorms in recent years.

2.3.2 Weather - Other Extreme

Figure 14: Looking southwest from Fort Simpson airport at approaching thundershower (Source: NAV CANADA credit: D Whittle)

Definition	Class
All weather related hazards excluding wind storm and cold weather storms	Natural Hazard

NWT greatest impacts to date

- Power failures
- Road Damages

Climate Change

Projected to increase both frequency and consequence

Mitigation Strategies	
	✓ Develop and enforce building standards for identified extreme weather hazards. ✓ Develop/distribute and facilitate public awareness programs. ✓ Ensure that emergency plans are in place. ✓ Ensure "safe areas" are available and known to community members.

Vulnerability	Description
People	Extreme cold temperatures can cause injury and death. Temperatures of -55 and colder have an extremely high risk of causing injury as exposed skin can freeze in less than 2 minutes. Temperatures of -48 to -54 have a very high risk of causing injury as exposed skin can freeze in 2 to 5 minutes. Temperatures -40 to -47 have a high risk of causing injury as exposed skin can freeze in 5 to 10 minutes. Under foggy conditions, visibility is reduced to less than 1 kilometre and vehicle accidents can result (see Transportation Accidents Hazard). Ocean and lakes areas, and in particular the large lakes such as Great Bear Lake and Great Slave Lake, are cloud and fog prone through the fall until they freeze over completely (see Transportation Accidents Hazard).
Infrastructure	Extreme cold temperatures can cause significant property damage, mechanical malfunctions and burst pipes. Drought can cause crop failure, depletion of municipal water sources, increase in forest fire risk (see Fire/Explosion Hazard) and insufficient water flow through waterways. Lighting storms can lead to fires (see Fire/Explosion Hazard). Combining heat wave with the dry climate of the Arctic creates ideal conditions for wildfires (see Fire/Explosion Hazard).

Vulnerability	Description
Communications	A geomagnetic storm can knock out communications and have a variety of effects on technology. Radio waves used for satellite communications or GPS navigation are affected by the increased ionization with disruption of the communication or navigation systems. The high energy particles affect satellites causing failure or equipment damage. The magnetic disturbances directly affect operations that use the magnetic field, such as magnetic surveys, directional drilling, or compass use. Magnetic disturbances also induce electric currents in long conductors such as power lines and pipelines causing power system outages or pipeline corrosion.

Dehcho Exposure/History

When	Where	Impact
Jan 2008	Fort Simpson	Cold snap of nine straight days of -40°C temperatures. Lingering ice fog obscured entire neighbourhoods, caused several flight disruptions, lengthened work commutes, and halted mail delivery. The -50°C wind chill and the freezing fog caused a 90 minute power failure. Schools were closed.

Chinooks can cause drastic changes in temperature. In December 1999, for example, a Chinook took Fort Simpson's temperature from minus teens on the 22nd to plus 14°C on the 23rd. Plus temperatures remained until Dec 24th. Christmas Day temperatures were as low as minus 18°C and by the last day of the month/year were as low as minus 39°C. The warmth is often accompanied by strong, gusty surface winds. Freezing rain is possible with the warm air. Chinooks are relatively common in the Fort Liard area.

Community Meeting Feedback

There was much discussion among residents at all meetings regarding the increase in extreme weather. This primarily included higher temperatures in the summer months and a shifting in seasons. Whereas in the past, summer weather deteriorated in late August, recent years have seen warmer weather lasting into late September. There was also a general agreement that, although the NWT is not as consistently cold as it has been in the past, there are wilder swings and more extreme storms.

2.3.3 Earth Movement - Permafrost Degradation

Figure 15: Permafrost degradation of highway (Source: NWT Climate Change Impacts and Adaptation Report, 2008)

Definition	Class
Movement of the ground causing wide spread damage caused by loss of permafrost	Natural Hazard

NWT greatest impacts to date

- Power failures
- Road Damages

Climate Change

Projected to increase both frequency and consequence

Mitigation Strategies	
	✓ Develop and enforce building standards for building slumping and/or collapse. ✓ Develop/distribute and facilitate public awareness programs. ✓ Include permafrost degradation risk actions in emergency plans.

Vulnerability	Description
People	Injury and death could result from the unexpected collapse of land or a building.
Infrastructure	Permafrost has always figured heavily into Arctic infrastructure design, construction, and maintenance (NRTEE, 2009; CSA, 2010). Infrastructure systems in permafrost have depended on the stability of permafrost as a foundation material. Permafrost erosion along streams and rivers is threatening dikes, bridges and culverts.
Communications	Some damage to communication towers possible.

Dehcho Exposure/History

When	Where	Impact
2008	Trout Lake	A fuel leak from a cracked pipe in the fuel tank. The pipe cracked when the permafrost under the tank thawed and shifted. Estimated Total Cost: $200,000 (clean-up)

Ground movement caused by melting permafrost has resulted in the cracking or sloping of building walls and foundations. It has also resulted in heaving, slope failure, sinkholes and potholes, affecting all forms of infrastructure. Permafrost degradation causes erosion along streams and rivers threatening dikes, bridges and culverts. The Fort Simpson airport runway has undergone major repairs due to permafrost degradation.

A mixture of different types of permafrost is found under all of the NWT including: continuous, extensive discontinuous and sporadic discontinuous permafrost. The area where Jean Marie River is located is approximately where sporadic and discontinuous permafrost zones meet.

Figure 16: Permafrost Zones (Source: Atlas of Canada Permafrost Map)

Community Meeting Feedback

Residents of Trout Lake mentioned an underground pipeline broke in the past few years when it was affected by shifting ground caused by the thawing of the permafrost.

2.3.4 Food and Agricultural Emergency

Figure 17: : Bison (Source: GNWT, Parks)

Definition	Class
Any emergency which affects food security, food quality or food safety for many people	Natural Hazard

NWT greatest impacts to date

- Food recall

Climate Change

Projected to increase both frequency and consequence

Mitigation Strategies	
	✓ Ensure disease and recall monitoring plans are in place between all levels of government and private sector. ✓ Ensure public awareness information and programs are available from the Federal Government and industry associations. ✓ Ensure that response plans include containment and quarantine procedures.

Vulnerability	Description
People	Humans are reliant on a well regulated safe supply of food and agricultural processes. Any emergency caused by a failure of this system can impact on the immediate and long term health of anyone affected.
Infrastructure	N/A
Communications	N/A

Dehcho Exposure/History

When	Where	Impact
February 12, 2012	All Co-op grocery Stores in the NWT	A brand of frozen hamburgers manufactured in Ontario was recalled as it may have been contaminated with E. coli. Consumption of food which contains this strain of virus can cause life-threatening illness.

Community Meeting Feedback

In 2012 Fort Simpson suffered an incident where all the meat sold locally had to be recalled due to contamination. Limited access to the community and sole sourcing of food products can lead to similar incidents in the future. In addition, the community has seen rodent issues which may cause even greater problems with stored food. This rodent issue could cause a health hazard to residents.

2.3.5 Earth Movement - Earthquake/ Tsunami

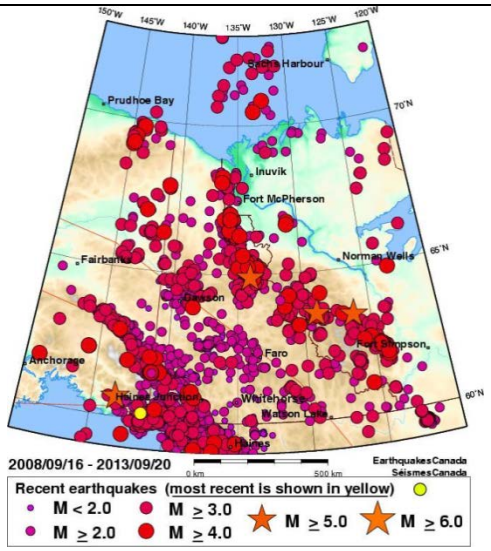


Figure 18: Earthquakes 2008-2013 (Source: Earthquakes Canada)

Definition	**Class**
A slip along a fault in the earth causing the ground to shake and/or the large wave caused by it	Natural Hazard

NWT greatest impacts to date
Minor Property damage 1985

Climate Change
Could increase impact

Mitigation Strategies	✓ Develop or adopt and enforce building standards for earthquakes. ✓ Develop/distribute and facilitate public awareness programs for what to do in the case of an earthquake or tsunami. ✓ Ensure that emergency plans are in place. ✓ Plan and communicate "safe areas" for community members to go to in the event of an earthquake or tsunami.

Vulnerability	Description
People	Some injury and possible death may occur due to landslide or structural collapse caused by a major earthquake in the western part of the territory.
Infrastructure	Structural damage to buildings and infrastructure could be caused by a major earthquake in the western part of the territory.
Communications	Communications could be disrupted by a major earthquake.

Dehcho Exposure/History

When	Where	Impact
Oct 5, 1985	Mountains west of Fort Simpson	A magnitude 6.6 earthquake. No injuries, loss of life or major structural damage was reported.
Dec 23, 1985	Mountains west of Fort Simpson	The largest earthquake recorded in this area, to date was a magnitude 6.9 event. No injury, loss of life or major structural damage was reported. Wrigley, Fort Simpson, Nahanni Butte and Fort Liard experienced this earthquake. Vehicles bounced on the road and trees and power lines whipped back and forth. Sections of the banks of the Mackenzie River slumped into the water.

Community Meeting Feedback

This hazard was not mentioned as a concern at the Dehcho Region meeting.

2.3.6 Ice Hazard

Figure 19: Petitot River, May 2005 (Source: Hamlet of Fort Liard)

Definition	Class
Formations or movements of ice which cause loss of life, property and/or environmental damage	Natural Hazard

NWT greatest impacts to date

- Property Damage

Climate Change
Projected to decline

Mitigation Strategies	✓ Develop and enforce building standards for ice accumulations. ✓ Develop/distribute and facilitate public awareness programs. ✓ Confirm that ice storm emergency plans in place. ✓ Ensure "safe areas" are available and known to community members.

Vulnerability	Description
People	Injury and loss of life can occur when boats are damaged or sunk by ice
Infrastructure	Icebergs still threaten offshore oil rigs, fishing boats and ships. Ice shoves can damage buildings that are near to a body of water.
Communications	None

Dehcho Exposure/History

Research did not reveal any exposure or history of this hazard in the Dehcho Region. Please review the 2014 NWT HIRA for further information.

Community Meeting Feedback

Discussions indicated that there have been incidents where ice has damaged pipes along the shore of the river, which are intended to off-load fuel from barges.

2.3.7 Civil Unrest

Figure 20: Idle No More protesters at the Dehcho Bridge near Fort Providence, NWT, 5 Jan 2013 (Source: Randall McKenzie/CBC)

Definition	**Class**
People breaking the law in order to bring attention to their cause	Human-induced Hazard

NWT greatest impacts to date

- Fatalities 9
- Property Damage (Mine)

Climate Change

Projected to increase both frequency and consequence

Mitigation Strategies	✓ Have intelligence and monitoring plans in place with law enforcement and stakeholders. ✓ Coordinate integrated response plans with stakeholders.

Vulnerability	**Description**
People	Civil unrest can directly impact the safety and security of individuals or groups of persons whether or not they are targeted by the unrest. There is also a threat of injury to public responders and those persons involved in the unrest.
Infrastructure	Damage to public and private property is almost always a staple of civil unrest. There is also an increase in cyber terrorism which targets computer systems which control defense establishments as well as public utilities.
Communications	Acts of civil unrest or terrorism can impact communications which disrupt public authorities' ability to deal with the unrest.

Dehcho Exposure/History

Research did not reveal any exposure or history of this hazard in the Dehcho Region. Please review the 2014 NWT HIRA for further information.

Community Meeting Feedback

This hazard was not mentioned as a concern at the Dehcho Region meeting.

2.3.8 War/ International Incident

Figure 21: Joint Task Force (North) Headquarters Yellowknife (Source: Wikipedia)

Definition	**Class**
An action or clash that results in a wider dispute between two or more nation-states.	Human-induced Hazard

NWT greatest impacts to date
N/A

Climate Change
Projected to increase in frequency

Mitigation Strategies	✓ Ensure notification and information/communication protocols are in place with Federal Government Departments. ✓ Ensure appropriate emergency plans are in place based on the perceived or real risk of war and potential casualty threats.

Vulnerability	**Description**
People	The main effects of war on people are poverty due to destruction of properties and business, death and property destruction. War can also cause a dramatic impact on civilian health, because of the weapons which may be highly radioactive.
Infrastructure	The most commonly held thoughts on war's effect on infrastructure is the destruction of roadways, railways and bridges to hamper an enemy's ability to move freely and accumulate forces at a given point. In recent wars there have been specific examples of water and power plants being targeted in order to dramatically impact the ability of a populace to survive in a given area.
Communications	Communication facilities are likely the first to be targeted in any war or act of war or terrorism. Without communications authorities will be unable to respond to threats coherently and the loss of information can lead to a general state of panic amongst a population.

Dehcho Exposure/History

Research did not reveal any exposure or history of this hazard in the Dehcho Region. Please review the 2014 NWT HIRA for further information.

Community Meeting Feedback

This hazard was not mentioned as a concern at the Dehcho Region meeting.

2.3.9 Falling Debris

Figure 22: First piece of debris found from the crashed Cosmos-954 Soviet satellite, 1978. (Source: Wikipedia)

Definition	**Class**
Any object (such as a satellite) which survives its passage through the Earth's atmosphere and impacts Earth	Natural Hazard

NWT greatest impacts to date
Environmental

Climate Change
N/A

Mitigation Strategies	✓ Have monitoring and notification protocols in place with appropriate agencies (i.e. CSA, NASA, NAV CANADA). ✓ Ensure emergency plans are in place for potential risks associated with falling debris.

Vulnerability	**Description**
People	Any object falling to earth from space will be of concern in terms of public safety and there will always be a worry of people being injured or killed by falling debris. Given the low population of the NWT and rare occurrence of these events there is a low likelihood of this happening.
Infrastructure	Damage to buildings, roads and other infrastructure would be a concern in the event of falling debris.
Communications	An object which falls from space may impact a communications satellite or microwave tower which could directly impact communications in a region.

Dehcho Exposure/History

When	**Where**	**Impact**
January 24, 1978	Near Great Slave Lake	A Soviet satellite, Cosmos 954, crashed to earth scattering radioactive waste across 124,000 square kilometers of the NWT, Alberta and Saskatchewan. The clean-up operation continued into October 1978.

Community Meeting Feedback

This hazard was not mentioned as a concern at the Dehcho Region meeting.

3 Existing Response Capabilities

This section provides a summary of the Dehcho Region's response capabilities that were considered when assessing the regions overall risk to the hazards discussed in Section 2.

3.1 Emergency Response and Preparedness Organizations

Under overall management of the MACA Regional Superintendent, the GNWT is responsible for assisting Local Authorities within the Dehcho Region when requested, or assuming operational control when the Local Authority's capacity or jurisdiction is exceeded. In fulfilling these regional responsibilities the GNWT shall:

- Establish a committee to plan for and respond to emergencies;
- Develop and maintain the Dehcho Regional Emergency Response Plan;
- Implement plans and procedures for an integrated response to emergencies within the Region affected;
- Provide prompt and coordinated response to specific requests for assistance from the Local Authority and/or when the capacity of the Local Authority is exceeded;

The response to most emergencies is managed by the Local Authority, as the community government of the affected community. The Regional Emergency Response Committee is established as the body responsible for the planning and coordination of the area response to emergencies within each region. The Regional Emergency Response Committee provides support and assistance in specific areas as requested by the Local Authority. Should the emergency exceed the capabilities of the Local Authority to respond, or should its jurisdiction be surpassed, the GNWT may assume control of emergency operations in an effort to return conditions to normal under the authority of the Emergency Measures Officer, as the senior territorial emergency official appointed by the Minister Responsible for Civil Emergency Measures.

The GNWT, through the Emergency Measures Organization, is responsible for providing assistance to support regional emergency operations, or assuming operational control when the incident is a matter of GNWT jurisdiction. In fulfilling its headquarters responsibilities the GNWT shall:

- Establish committees, comprised of various designated emergency agencies, to plan for and respond to emergencies;
- Develop and maintain the NWT Emergency Plan;
- Implement procedures for an integrated response to emergencies within any part of the NWT;
- Provide prompt and coordinated response to emergencies to assist regional emergency operations;
- Coordinate the provision of specialized assistance of agencies from the Federal Government and other provinces and territories not provided for in the Plan, and
- Assume direction and control of GNWT emergency operations when the emergency is a matter of Territorial Government jurisdiction.

In accordance with established Government of Canada emergency arrangements, Public Safety Canada (PSC) will assist the GNWT in responding to emergencies in the Northwest Territories. To fulfill its emergency responsibilities PSC has agreed to:

- Appoint a senior representative to TERC; and
- Coordinate the required assistance of federal departments and agencies not resident in the NWT during any GNWT response to emergencies.

Joint Task Force North (JTFN) - in accordance with Canadian Forces (CF) Directive "Provision of Essential Services to Civilian Authorities", JTNF may assist the GNWT in:

- Search and rescue;
- Communications;
- Emergency transportation;
- Provision of manpower and other resources;
- Disposal of hazardous materials; and
- Specialized training within the CF area of expertise.

3.2 Fire

The Fire Chief/Local Assistant is responsible for directing the activities of the Fire Department to ensure that loss of life, property or injury as a result of fire is prevented and/or minimized within each community. The Fire Chief/Local Assistant is the sole authority and command at the scene of a fire.

MACA delivers training to community government fire departments through its School of Community Government.

The Office of the Fire Marshal (OFM) protects the public from loss of life and property as a result of fire. The OFM has direct contact with fire departments and the public across the NWT. The OFM plays a regulatory role by enforcing the *Fire Prevention Act* and its associated regulations, namely, the *Fire Prevention Regulations*, *Fireworks Regulations*, and *Propane Cylinder Storage Regulations*. The NWT has adopted Firesmart principles to identify, mitigate and document hazards.

Fire departments in the Dehcho are composed of volunteers. It is estimated that approximately 340 volunteer firefighters support the NWT's community fire service which is an average of 10.3 per community, well below the national average of 28.

Wildfire

The Department of Environment and Natural Resources directs the GNWT Forest Fire protection and suppression initiatives to provide:

- Assistance in the provision of and support to mobile/portable radio systems;
- Assistance in the procurement of radio communications equipment;
- Monitoring of weather, forest and fire conditions, forecasting fire behaviour and conditions to guide preparedness arrangements, and managing NWT forest fire suppression operations;

- Advice to the Emergency Management Office and communities on forest fire conditions and behaviour, and recommending appropriate courses of action (seasonal); and
- The requisition of special firefighting and safety equipment, and other specialized materials and supplies which are available (seasonal).

Environment and Natural Resources is working with communities in the NWT to develop and implement Community Wildfire Protection Plans (CWPP). These plans are designed to identify and reduce wildland fire risk in communities. CWPP's are becoming a national standard for agencies and communities responsible for wildland fire management. The process is recognized as a crucial first step in better preparing homeowners and communities to reduce the risk of loss.

Community Wildfire Protection Plans (CWPP) Dehcho Region

Fort Liard CWPP 2011
Fort Simpson CWPP 2011
Jean Marie River CWPP 2010
Nahanni Butte CWPP 2011
Trout Lake CWPP 2011
Wrigley CWPP 2011

3.3 Police

Police servicing in the NWT is designated as G Division and is split into a North and South District. There are currently 3 RCMP Detachments in the Dehcho Region:

- Fort Liard Detachment;
- Fort Simpson Detachment; and
- Wrigley Detachment.

3.4 Medical and Health Authorities

All communities in the Dehcho Region fall under the Dehcho Health and Social Services Authority.

Dehcho Health and Social Services

Community	Health Care	Health Resources
Fort Liard	Health Centre	1 Nurse in Charge, 1 Nurse Practitioner, 2 Community Health Nurses, 1 Community Health Worker, 2 Home Support Worker, physician from Fort Simpson makes monthly visits to the community, for 3-5 days.
Fort Simpson	Health and Social Services Centre	5 Community Health Nurses and 1 Nurse Administrator, laboratory, x-ray, autoclave, OBS, pharmacy room, 2 emergency rooms and 5 clinic rooms, 2.88 physicians per year, which is currently covered by locum physicians.
Jean Marie River	Health Cabin	1 Community Health Worker, Fort Simpson Health and Social Services team have regular scheduled visits to Jean Marie River.
Nahanni Butte	Health Cabin	1 Community Health Worker (CHW), Fort Simpson Health and Social Services team have regular scheduled visits.
Trout Lake	Health Cabin	1 Community Health Worker (CHW), Fort Simpson Health and Social Services team have regular.

Community	Health Care	Health Resources
		scheduled visits
Wrigley	Health Center	1 Community Health Worker (CHW) and 1 Community Health Representative (CHR) along with the Home Support Worker (HSW). Fort Simpson Health and Social Services team have regular scheduled visits.

Ground Ambulance and Highway Rescue Services

The village of Fort Simpson operates a community-based ground ambulance service which is staffed entirely by volunteers. In light of the necessary resources, capacity, equipment and training, Health and Social Services Authorities generally do not provide support for ground ambulance services within communities or on NWT highways. The Village also provides both highway ambulance and rescue services within a prescribed distance of their municipal boundary.

The GNWT utilizes a Highway Emergency Alerting Protocol (HEAP) to assist the RCMP and community Fire Departments in responding to vehicular accidents on territorial highways and winter roads. The Protocol describes a uniform plan for emergency response to highway accidents in various zones designated across the NWT. It guides the following activity:

- Establishing command authority;
- Dispatching resources;
- Accident reporting;
- Emergency landing procedures; and
- Clarifying medevac coverage areas.

The Stanton Territory Health Authority coordinates inter-facility and medevac services for the territory, including the Dehcho region.

3.5 Search and Rescue

SAR response to	Primary	Secondary
Aircraft incidents	Canadian Forces	RCMP Civil Air Search and Rescue Association (CASARA) Search and Rescue Volunteer Association of Canada (SARVAC) Any multi-tasked Federal aircraft or vessel
Marine incidents in tidal and international waters	Canadian Coast Guard	Canadian Forces Canadian Coast Guard Auxiliary (CCGA) Search and Rescue Volunteer Association of Canada (SARVAC) Any multi-tasked Federal aircraft or vessel Police force of jurisdiction

SAR response to	Primary	Secondary
		Vessel of opportunity
Ground and inland water incidents	Parks Canada within National Parks, Crown owned land – military bases and training areas Territorial responsibility delegated to RCMP	Canadian Forces Canadian Coast Guard Any multi-tasked Federal aircraft or vessel Civil Air Search and Rescue Association (CASARA) Canadian Coast Guard Auxiliary (CCGA) Search and Rescue Volunteer Association of Canada (SARVAC)

Organization	SAR Responsibility
Royal Canadian Mounted Police	Coordination of public ground search and rescue (including inland waters).
Canadian Forces	Humanitarian assistance including air and marine search and rescue.
Fisheries and Oceans (Coast Guard)	Marine emergency alerting including ship spills and marine search and rescue under coordination of the National Search and Rescue Program and support of marine search and rescue volunteer training under the coordination of the National Search and Rescue Program.
Transportation Canada	Air search and rescue alerting and support of air search and rescue volunteer training under the coordination of the National Search and Rescue Program.
Park Canada Agency	Available to provide professional advice and support on search and rescue.

3.6 Canadian Forces

Headquartered in Yellowknife, JTFN is responsible for Canadian Joint Operations Command's single largest region by far. In fact, JTFN's area of responsibility encompasses approximately four million square kilometres, or 40 per cent of Canada's land mass, and 75 per cent of its coastal regions.

Created as part of a broader transformation of the Canadian Forces in 2006, JTFN is one of 6 regional Joint Task Forces across Canada, and reports directly to Canadian Joint Operations Command, located in Ottawa, Ontario.

In addition to its headquarters located in Yellowknife, NWT, JTFN maintains detachments in Whitehorse, Yukon, and Iqaluit, Nunavut.

JTFN is responsible for the command of the Canadian Rangers in the North through the 1st Canadian Ranger Patrol Group and supports the Cadet program and the Junior Canadian Rangers program in the three territories.

In total, there are approximately 250 Regular Force, Reserve Force and civilian personnel who are working north of the 60th parallel within one of the following units:

Figure 23: 1st Canadian Ranger Patrol Group in NWT (Source: Government of Canada, Canadian Army website)

- JTFN Headquarters and its two detachments in Iqaluit and Whitehorse;
- Area Support Unit (North);
- 1st Canadian Ranger Patrol Group;
- 440 (Transport) Squadron;
- 1 Field Ambulance Detachment; and
- C Company of the Loyal Edmonton Regiment.

Dehcho Region Communities with a Ranger Patrol

Fort Simpson
Trout Lake

4 HIRA Conclusions

This type of assessment is a critical part of any emergency management program. Identified hazards can be used in preparedness programs, emergency response plan exercises, and training and awareness programs.

Qualitative data, definitions and more extensive analysis of each hazard is provided in 2014 NWT HIRA Section 5 Hazard Narratives. Other regional summaries are contained in Appendix 8.7, which provides communities with a more locally focused risk assessment.

Hazards are interconnected, fluid, not subject to regional and territorial boundaries and may have unique outcomes. The Dehcho Region HIRA should be updated routinely when new information about hazards that could impact the Dehcho Region becomes available.