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6 Vulnerability Analysis

Vulnerability is shaped by physical, social, economic and environmental factors, which increase the sensitivity of a community to the impact of hazards. Resilience is determined by those factors or processes, which decrease the sensitivity of a community to the impact of hazards. This section of the HIRA outlines how well prepared and equipped the NWT is to minimize the impact of or cope with the hazards examined in Section 5.

6.1 Resilience

Community resilience is the capability to anticipate risk, limit impact, and bounce back rapidly through survival, adaptability, evolution, and growth in the face of turbulent change (CARRI, 2013).

The people of the NWT possess a number of qualities that have proven advantages to overcoming the impacts of a disaster.

The isolation of many communities in the NWT fosters independence among people who are used to power disruptions, communication failures and formidable weather conditions.

Traditional knowledge of the land provides NWT communities with an awareness of the natural hazard signs in the environment that helps them to prepare for disasters that frequently impact their communities (Ford, 2004). The combination of a strong level of awareness among community members to the signs and conditions preceding a flood event, preparation in anticipation of flooding by ensuring an adequate supply of food and by broadcasting information within the community, the existence of evacuation procedures and strong social networks to help with the recovery after the event underlies the community's adaptability. The community is vulnerable only to flood events of great magnitude (Ford, 2004).

While not a factor in every NWT community, the mixed economy, based upon both wage employment and subsistence-based activities, such as hunting, fishing, and gathering, is indicative of cultural vitality and adaptive capacity (Fournier 2012). It reduces the impact of some hazards by giving communities other sources of food supply when hazards impact shipping routes.

Success in the north depends upon the connection of people with one another, with the environment, and with their heritage. These bonds have supported the region's communities for generations. Strong ties with family, friends, and the broader group is reflected in the sharing

Key NWT Resiliency Factors

- Self-reliance
- Awareness of natural hazard signs in the environment
- The mixed economy
- Strong social and cultural capital
- Meaningful partnerships
- Creative and innovative solutions to a variety of challenges
- Preparation for hazard events by ensuring adequate food supplies and by broadcasting hazard information within the community

and mutual self-help practices of many NWT communities (Fournier 2012). Table 6 demonstrates the strong sense of belonging among people of the NWT.

Table 6: Sense of belonging to local community, somewhat strong or very strong. Population ages 12 and older (Source: Statistics Canada, CANSIM table 105-0501 and Catalogue no. 82-221-X)

Number of people who have a sense of belonging to their local community, somewhat strong or very strong in the NWT.	2009	2010	2011	2012
	26,733	26,394	27,575	27,632

By building meaningful partnerships with the private sector, NWT communities increase their resources, knowledge, and expertise which help them limit impact of hazards, and bounce back more rapidly. Impact and Benefit Agreements (IBAs) can be used by NWT communities to benefit from economic development initiatives. An example is the Diavik Diamond Mine. Through community consultations and the development of a community plan, Diavik ensures that local businesses and residents benefit from the development of its mine. Diavik established hiring quotas for the local workforce; slated up to 70 per cent of its business for contract by regional companies; developed training and skills development programs; and established community-based partnerships between communities, local businesses, and regional governments. The outcome of these types of initiatives is greater local capacity and resilience through enhanced human, productive, and financial capital (Fournier 2012).

6.2 Vulnerability Factors

Some of the key vulnerability factors in the communities of the NWT include:

- Lack of adequate infrastructure;
- Remoteness;
- Issues associated with cultural duress and the legacies of Aboriginal policies;
- Underdeveloped private sector;
- Lack of local capacity; and
- Socio-economic impediments.

In the NWT, transportation, communication, waste management, and water treatment infrastructure can be insufficient or in need of repair. Some airports, key public facilities, railroads, and pipelines are in need of renovation. Certain infrastructure such as paved highways and railroads is virtually non-existent in most of the NWT (Fournier, 2012).

The remoteness of communities leads to self-reliance but can complicate emergency response when local resources are overwhelmed. The impact of some hazards can delay or limit external emergency response. For example, a pandemic could impact intercommunity medical response or smoke from a wildfire could limit air evacuation.

The health, vitality, and prosperity of Aboriginal communities are important for regional resilience in the NWT. However, government policy, relocation activities, residential schools, and economic and social issues have led to cultural duress. These factors have also worked to

undermine the self-reliance of Aboriginal communities and, by extension, their capacity to foster resilient societies (Fournier, 2012).

The private sector contributes to community resilience when major business and employers, operating in and around the community, are locally owned. A private sector role may be nominal in the NWT where government is the main employer. Promoting local business increases the resiliency of communities.

6.2.1 Social Vulnerability

This HIRA focuses on certain aspects of social vulnerability and their role in contributing to the risk from hazards. Generally, the term social vulnerabilities reflects "...the degree to which societies or socio-economic groups are affected by stresses and hazards, whether brought about by external forces or intrinsic factors—internal and external—that negatively impacts the social cohesion of a municipality" (United Nations Development Programme, 2000). For the purpose of this report, vulnerability is defined as the ability of an individual within a household to recover from a natural hazard impact.

Social vulnerability information is particularly relevant and should be considered a key element of any emergency plan. Numerous hazards such as floods, fires, and human health emergencies can have serious impacts on vulnerable populations (e.g. the very old and the very young); just as certain types of disasters can have a tremendous impact on the housing market and local economy.

Low-income groups inevitably have less money to spend on building or renting a house designed to avoid or limit damage in the event of a disaster. Low-income groups also have the least resources on which to call when some disaster damages or destroys their housing.

Table 7: Data presented is rounded to the nearest 100 persons, therefore categories may not sum to the totals. (Source: Statistics Canada, Labour Force Survey Prepared by: GNWT Bureau of Statistics)

Year	Population 15+	Labour Force	Employed	Unemployed	Unemployment Rate
2001	28,500	21,800	20,000	1,900	8.7
2002	29,200	22,300	21,000	1,300	5.8
2003	30,200	22,900	21,300	1,600	7.0
2004	31,000	23,700	22,200	1,500	6.3
2005	31,200	24,000	22,700	1,300	5.4
2006	31,300	24,400	23,100	1,300	5.3
2007	31,700	24,800	23,400	1,400	5.6
2008	32,100	24,100	22,700	1,400	5.8
2009	32,100	22,800	21,300	1,400	6.1
2010	32,300	23,200	21,500	1,700	7.3
2011	32,100	24,500	22,700	1,800	7.3
2012	32,100	24,700	22,700	2,000	8.1

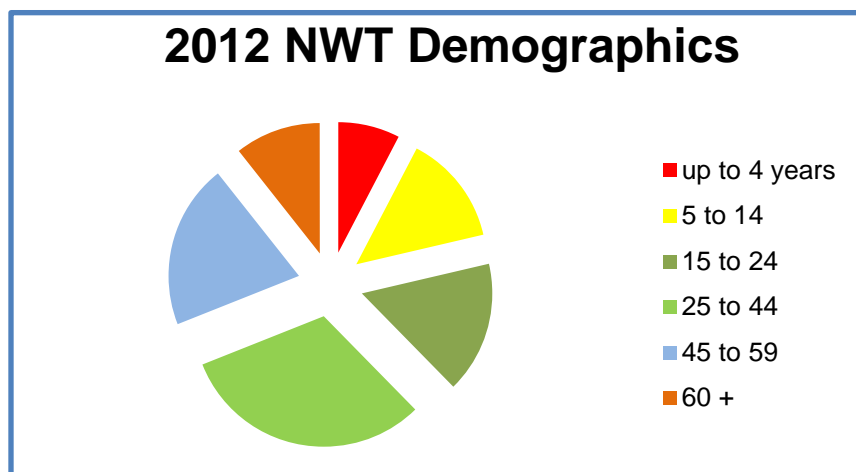
6.2.2 Language Groups

Effective emergency response depends upon efficient communications between responders and the community. Language disparities can be a barrier to accurate communication and leave a community more at risk.

The NWT has 11 official languages. English is the predominant mother tongue. In 2011, 31,340 persons stated that English was their mother tongue, representing 77.5% of the population. With the exception of Tłı̄chǰ, the population with an aboriginal language as a mother tongue is highly concentrated in the older age categories. Half of those aged 45 years and over spoke an aboriginal language as their mother tongue compared to 21% for those less than 25 years of age. By community, Wekweètì had the highest proportion of persons with an aboriginal language as their mother tongue (71%), followed by Gamètì at 69% and Trout Lake at 68% (GWT Bureau of Statistics 2012). Both Wekweètì and Trout Lake showed increases from 2006 while Gamètì declined over the same period. Of those with French as their mother tongue, 75% (810 persons) reside in Yellowknife (GNWT, Bureau of Statistics, 2011).

Mother Tongue is the first language learned at home during childhood and still understood.

6.2.3 Age Groups



Children have special needs and are always at high risk in disasters. In addition, they are also hard to service, since many of the guidelines for equipment, supplies and treatment protocols are designed for adults (Kollek, 2009). In 2011, the National census indicated that with 21.7% of the population 14 and under, the NWT had a higher percentage of children in the population

than Canada as a whole (16.7% 14 and under) (GNWT, Bureau of Statistics, 2011).

6.2.4 Disability

A disaster resilient community means everyone must be part of the solution. Emergency response decisions, policies and plans should reflect the needs of persons living with disabilities. Investment in hazard mitigation should provide for the needs of persons living with disabilities. Table 8 displays the severity of disability of individuals with disabilities in the NWT. Severely and very severely disabled individuals should be taken into consideration in emergency response plans as their capacity to respond to emergency circumstance is unique.

Table 8: Severity of disability for adults and children with disabilities, (Source: NWT Bureau of Statistics; Statistics Canada, Participation and Activity Limitation Survey, 2006)

	Total	Mild	Moderate	Severe	Very Severe
Total - Aged 15 years and over	3,220	1,270	820	760	360

6.3 Critical Facilities

Within this HIRA, critical facilities are defined as facilities that are essential in order for the NWT to carry out emergency response activities.

The primary critical facility for coordination of any large-scale disasters or emergencies is the Emergency Operations Centre (EOC). Before or during a hazard event, the EOC is essential for site support, including the coordination of special resources, information, multiple departments and external agencies. In the NWT according to their emergency response plans, each community has a designated EOC most often located in the municipal government building. Each Region in the NWT has designated an EOC within the Regional Emergency Response Plan.

Region	Emergency Operations Centre (EOC) location
Dehcho Region	Milton Building on 97th Avenue in Fort Simpson
Beaufort Delta Region	2 Firth or 43 Distributor Street Inuvik
North Slave Region	Yellowknife Airport EOC or MACA HQ
Sahtu Region	#6 Canol Road in Norman Wells or #3 Mackenzie Drive
South Slave Region	174 McDougal Road or Sweetgrass Building, 177 McDougal Road

The Territorial EOC (TEOC) will coordinate overall territorial response, ensure communication with appropriate EOCs, provide regular information reports to the Minister, Emergency Measures Officer and participating agencies. The EMO's office suite becomes the facility housing GNWT emergency staff and other critical employees/officers of territorial departments, federal agencies and non-government organizations.

In addition to the EOC, emergency first response facilities are of critical importance to carrying out emergency response activities. These include police, fire, ambulance, and health facilities, along with emergency shelters.

Most communities in the NWT have small capacity shelters in case the evacuation of residents to a safe area is required. Inuvik, Norman Wells, Yellowknife, Fort Simpson, Hay River and Fort Smith (the larger communities) have designated shelters using recreation centres, schools and other facilities, and plans in place to host between 200 and 400 evacuees during an emergency or disaster.

6.4 Critical Infrastructure

Critical infrastructure consists of those physical and information technology facilities, networks, services and assets which, if disrupted or destroyed, would have a serious impact on the health, safety, security or economic well-being of the NWT communities.

Critical infrastructure in NWT can be particularly vulnerable due to:

- high construction and operating costs due to distance, isolation and extreme cold;
- infrastructure that deteriorates rapidly in extreme environments;
- the high cost of reopening infrastructure, even after a brief interruption in operation;
- an existing infrastructure deficit;
- the lack of options and “backups” in infrastructure services; and
- capacity constraints in the form of finances and human resources (National Round Table on the Environment and the Economy, True North, p.47).

Critical infrastructure spans ten sectors:

	Sector	Description
1	Energy and Utilities	e.g. electrical power, natural gas, oil production and transmission systems
2	Communications and Information Technology	e.g. telecommunications, broadcasting systems, software, hardware and networks including the Internet
3	Finance	e.g. banking, securities and investment
4	Health Care	e.g. hospitals, health care and blood supply facilities, laboratories and pharmaceuticals
5	Food	e.g. safety, distribution, agriculture and food industry
6	Water	e.g. drinking water and wastewater management
7	Transportation	e.g. air, rail, marine and surface
8	Safety	e.g. chemical, biological, radiological and nuclear safety, hazardous materials, search and rescue, emergency services, and dams
9	Government	e.g. services, facilities, information networks, assets and key national sites and monuments
10	Manufacturing and Industry	e.g. defence industrial base, chemical industry

(Source: Public Safety Canada, 2010)

6.4.1 Energy and Utilities

In the NWT, there are three main energy sources used to generate electricity: natural gas, diesel fuel and hydro resources. Hydroelectric generation is used in eight communities in the Great Slave Lake area, while natural gas-fired power plants provide electricity to the community of Norman Wells. The remaining 24 communities have electricity provided by diesel-fired power plants. Alternative Energy Programs are being put in place such as a waste-heat recovery system in Ulukhaktok, wind turbines in Sachs Harbour and a Solar Wall in Fort Smith. Fuel must be shipped into the communities by pipeline, barge, ice road or air. The destruction of a bulk fuel storage facility would lead to the loss of the prime energy supply for an entire community including local transportation. Ultimately this has the potential to affect every public service available to local residents including communications.

NWT Power Corporation (NTPC) is a provider of essential services in many communities and should be incorporated into detailed local preparedness and response, particularly those at risk to severe storms or potential evacuation. Northlands Utilities Limited may play a similar role where it is the power distributor.

With a population of about 43,000 people spread across nearly 1.2 million square kilometres, operating on a grid system is not feasible. Wherever possible, NWT Power Corporation provides hydroelectricity. However, each community has its own standalone power plant and facilities to ensure there is a reliable source of electricity, regardless of conditions (NWT Power Corporation website).

Hydro Operations (NWT Power Corporation website)

Yellowknife (Jackfish Lake)

The Yellowknife diesel generation facility is located on the shores of Stock Lake (Jackfish Lake). It supplies power to the City of Yellowknife and communities of Dettah and Behchokò. The standby power plant is used to augment and/or supply prime power as backup to the Snare and Bluefish hydro systems.

The facility includes control equipment, the central control room, fuel storage, stores for the Hydro Region, and the regional office. It also has 8 generators:

- Two 5.18 MW diesel generators;
- Two 2.50 MW diesel generators;
- Two 2.85 MW diesel generators; and
- Two 3.30 MW diesel generators.

Snare Hydro System

The Snare Hydro System is located on the Snare River about 140 km northwest of Yellowknife. It is made up of four separate hydro plants: Snare Rapids, Snare Falls, Snare Cascades, and Snare Forks. Snare Falls can be used as a secondary source of power by the other three power plants. This system provides power to Yellowknife and the communities of Behchokò and Dettah.

The system contains:

- A main turbine with an 8.0 MW generator at Snare Rapids;

- A smaller turbine with a 500 kW generator at Snare Rapids;
- A variable pitch turbine with a 7.4 MW generator at Snare Falls;
- A variable pitch turbine with a 4.3 MW generator at Snare Cascades; and
- Two 5.0 MW generators and a 150 kW standby generator at Snare Forks.

Bluefish Hydro Facility

NTPC purchased the Bluefish Hydro Electric facility, located outside Yellowknife, from Miramar Con Mine in 2003. It is located at Bluefish Lake, the headwaters of the Yellowknife River. In conjunction with the Snare Hydro System, Bluefish provides power to the City of Yellowknife and communities of Behchok̓ and Dettah.

The facility consists of the two dams, headgate, penstock, and operations office. It also has the following hydro units:

- A 3.5 MW hydro unit; and
- A 4.0 MW hydro unit.

Taltson Hydro

The Taltson Hydro plant is located approximately 64 kilometers north of Fort Smith on the Taltson River. It provides power to Fort Smith, Hay River, Hay River Reserve, Fort Resolution and Enterprise.

The hydro plant consists of:

- An 18 MW hydro unit; and
- A 300 kW emergency standby diesel generator.

Table 9: Power Sources by NWT Community (Source: NWT Power Corporation website)

Region	Community	Power Source (NWT Power Corporation website)
Inuvik	Aklavik	Plant currently has a 1.28 MW capacity, consisting of four 320 kW diesel engines.
	Fort McPherson	Total installed capacity of the plant is 1.83 MW. The plant also provides residual heat to various buildings using the Aadrii heating system.
	Inuvik	Thermal Operations regional office complex is located in Inuvik. Two power plants consist of: <ul style="list-style-type: none"> • three natural gas fuelled generators rated at 2.8 MW, 2.8 MW, and 2.1 MW; • two 2.5 MW diesel generators; • one 720 kW diesel generator; and • one 300 kW diesel generator.

Region	Community	Power Source (NWT Power Corporation website)
	Paulatuk	Power plant has a total installed capacity of 840 kW.
	Sachs Harbour	Three diesel generators with a total installed capacity of 795 kW.
	Tsiigehtchic	Three small generating units with a total capacity of 500 kW.
	Tuktoyaktuk	Three diesel generators have a total installed capacity 2.21 MW.
	Ulukhaktok	Three diesel generators that have a combined capacity of 1.16 MW. The plant also has a small heat recovery system that heats three buildings in the community.
Sahtu	Colville Lake	Three small generating units ranging from 75-90 kW.
	Déjine	Total installed capacity of the plant is 1.19 MW, generated one 550 kW and two 320 kW diesel generators.
	Fort Good Hope	Three diesel generators with a total installed capacity of 1.23 MW.
	Norman Wells	Power plant is a standby plant with two generating units. NTPC currently purchases the electrical energy from ESSO and resells it to the community. Total installed capacity of Norman Wells standby plant is 2.12 MW.
	Tulita	Three diesel engines with a total installed capacity of 1.1 MW.
North Slave	Behchokò	Primarily supplied with electricity generated from the Snare Hydro system. The standby plant consists of: <ul style="list-style-type: none"> • An 850 kW diesel generator, and • A 350 kW diesel generator.
	Dettah	Bluefish Hydro Facility.
	Gamètì	Diesel plant has three generators rated at 100, 212 and 300 kW.
	Łutselk'e	Diesel plant consists of three diesel generators rated at 180, 320 and 320 kW.
	Wekweèti	Diesel Generator.
	Whatì	The main diesel plant contains two generators, rated at 175 kW and 480 kW each. In addition, a separate module also contains a 320 kW generator. NTPC uses excess heat from diesel generation to provide heating to the local school through the Waste Heat Recovery System.
	Yellowknife	Bluefish Hydro Facility.
South Slave	Enterprise	Taltson Hydro plant.
	Fort Providence	Diesel generator plant for electricity.

Region	Community	Power Source (NWT Power Corporation website)
	Fort Resolution	Taltson Hydro plant, plus diesel plant has one diesel generator with a capacity of 600 kW. There is also a standby 100 kW diesel generator located at Buffalo Junction which is approximately 77 km west from Fort Resolution on Highway 5 to Hay River.
	Fort Smith	Hydro electricity from the Taltson Hydro Facility. A standby diesel plant consists of three diesel generators with a total connected generating capacity of 6 MW.
	Hay River	Taltson Hydro plant.
	Hay River Reserve	Taltson Hydro plant.
	Kakisa	Diesel power to generate electricity.
Dehcho	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.

Additional On-site Facilities

All plants also have fuel storage, substations, office and staffing facilities, and inventory storage.

Backup Reliability

In case of emergency, NTPC has several generators that are available on demand. These emergency generators would be transported by land or air, should the need arise.

6.4.2 Communications and Information Technology

The NWT communications system is a mixture of land-based services and satellite served communities. The NWT has two major service providers, NorthwesTel and SSi Micro (ACIA Report, 2011).

NorthwesTel

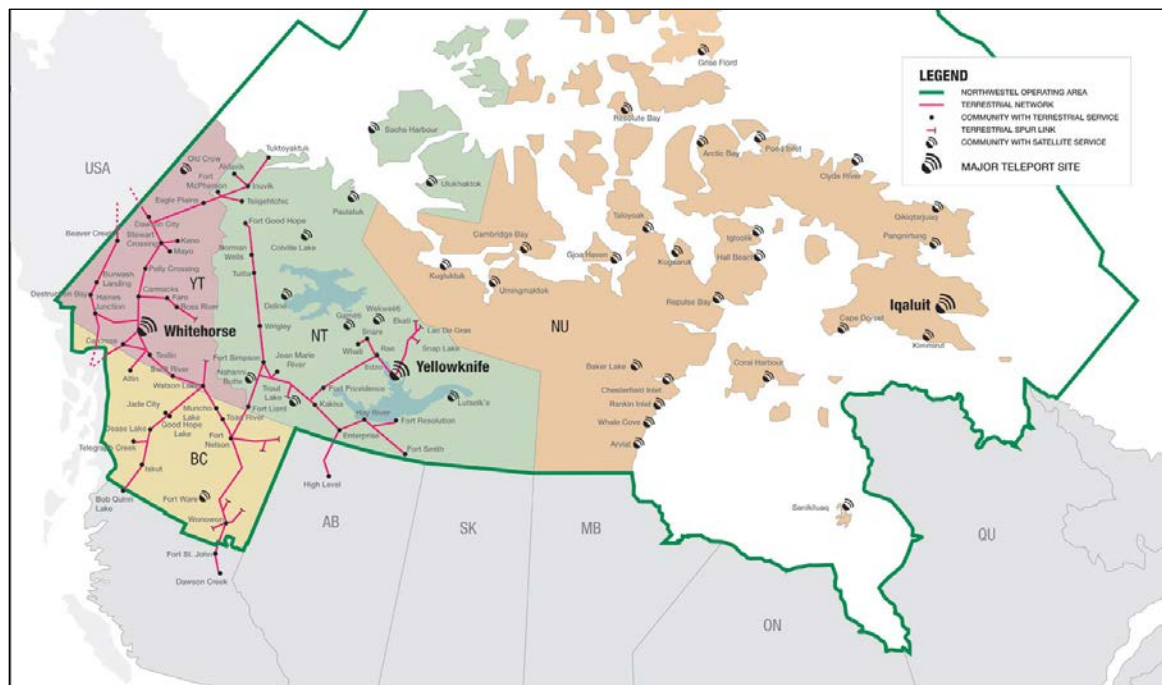
Headquartered in Whitehorse, NorthwesTel delivers a broad range of telecommunications solutions and television services to a population of 120,000 northern Canadians in 96 communities scattered throughout the Yukon, NWT, Nunavut, northern British Columbia and Alberta.

NorthwesTel's operations include local telephone services; long distance communications by microwave radio, fiber optic cable and satellite; cable television, and advanced data communications, including High Speed Internet in many parts of its operating area (ACIA Report, 2011).

Northwestel also provides wireless services for northern customers through cellular, broadband wireless, wireless Local Area Networks, wireless Metropolitan Area Networks and trunked radio services (ACIA Report, 2011).

Website: <http://www.nwtel.ca/>

Table 10: Northwestel Operating Area (Source: Northwestel website)



SSi Micro

Headquartered in Yellowknife, SSi Micro is the largest Internet Service Provider in Northern Canada, serving more than 60 Northern communities within Nunavut and the NWT (ACIA Report, 2011).

Website: <http://www.ssimicro.com/>

Since 1996, government investors (both as users and investors for public access), service providers and community organizations have struggled to finance, upgrade and build the networks needed to use 21st century communication tools (ACIA Report, 2011).

Communication infrastructure in the Arctic is fragile, creating a high level of vulnerability that can jeopardize the safety and security of Canadian citizens. Information is key for responders to be prepared. Early identification of requirements for emergency services is important to avoid 11th hour problems accessing services.

There is no cell phone coverage along the vast majority of roads in the NWT. There are dead spots in satellite phone reception. It is very difficult to send photos or large amounts of data from the field during an emergency, and challenging to keep workers safe if communications fail (ACIA Report, 2011).

6.4.3 Finance

There are five major banks in Yellowknife that offer a full range of personal and business banking, investment and financial services. All branches have automated banking machines.

There are also a number of independently-owned ATM machines throughout the city. Some mid-sized communities have banks such as CIBC in Hay River, Inuvik, Fort Simpson and Norman Wells, RBC in Hay River, and the Bank of Montreal in Fort Smith.

6.4.4 Health Care

All healthcare facilities are deemed critical infrastructure and are outlined in the table below.

Table 11: Health Care Facilities within Each NWT Community

Region	Community	Health Care Facilities
Inuvik	Aklavik	Health and Social Services Centre
	Fort McPherson	Health Centre
	Inuvik	Inuvik Regional Hospital (includes the Long Term Care Centre)
	Paulatuk	Health and Social Services Centre
	Sachs Harbour	Health Centre
	Tsiigehtchic	Health Centre (Out of Inuvik)
	Tuktoyaktuk	Health Centre
	Ulukhaktok	Health and Social Services Centre
Sahtu	Colville Lake	Health Station
	Déjine	Health Centre
	Fort Good Hope	Health Centre
	Norman Wells	Health Centre
	Tulita	Health Centre
North Slave	Behchokò	Health Centre
		Jimmy Erasmus Seniors Home
	Dettah	Health Station
	Gamètì	Health Centre
	Łutselk'e	Health Centre
	Wekweètì	Health Centre
	Whatì	Health Centre
	Yellowknife	Stanton Territorial Hospital - manages the provision of all medevac and patient transfer services in NWT
		Stanton Medical Clinic
		Stanton Medical Centre
		Stanton Ophthalmology Clinic
		Healthy Family Program Centre (47th Street)
		Home and Community Care, Public Health (1 st floor, Jan Stirling Building)
Centre for Northern Families		
Frame Lake Community Health Clinic		

Region	Community	Health Care Facilities
		Yellowknife Primary Care Centre
		Aven Cottages - Territorial Dementia Facility - AVENS – A Community for Seniors
		Aven Manor – A Community for Seniors
South Slave	Enterprise	Patients drive to Hay River for their medical needs
	Fort Providence	Health Centre
	Fort Resolution	Health Centre
		Fort Resolution “Our Great Elders” Facility- Homecare and Administration
	Fort Smith	Northern Lights Special Care Home
		Health and Social Services Centre
		Polar Crescent Group Home – Child welfare
		Trailcross Treatment Centre – Child welfare
	Hay River	H.H. Williams Memorial Hospital
		Woodland Manor Long Term Care Residence
		South Slave Medical Clinic
Hay River Reserve	Patients drive to Hay River for their medical needs	
Kakisa	Patients drive to Fort Providence or Hay River for their medical needs	
Dehcho	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

Health and Social Services has initiatives that rely on good connectivity, and are actively implementing new technology that aims to improve service delivery to patients throughout the NWT at lower costs. Efforts include increased telehealth for specialist connections, electronic record management, and increased computing radiography rolled out in 18 communities. Any of these services can be disrupted by hazards which effect communications.

6.4.5 Food

The isolation of many parts of the NWT, and the cost of transporting food to remote communities, contribute to high food insecurity. Hazards that impact transportation can lead to food scarcity. The NWT has little conventional agriculture. Much of the local food economy is based on traditional harvesting. There are significant hunting, trapping, and fishing industries in the territory. Community freezers may be considered critical facilities. The GNWT has several programs that assist the development of hunting and trapping in the territory and support the teaching of this knowledge to the next generation.

6.4.6 Water

NWT communities rely on surface water, and in some cases groundwater, as sources for their public water supply. The management of drinking water is the shared responsibility of all levels of government. Community governments are responsible for operating and maintaining Water Treatment Plants (WTPs) and systems. The GNWT is responsible for the regulation of water supply systems providing certification training and support to WTP operators and for working collaboratively with stakeholders to implement the NWT Water Stewardship Strategy.

Table 12: Public Water Source by NWT community (Source: 2010 GNWT Report on Drinking Water)

Region	Community	Public Water Source	Water treatment system classification
Inuvik	Aklavik	Mackenzie River	Class II
	Fort McPherson	Deep Water Lake	Class II
	Inuvik	Mackenzie River and 3 Mile Lake	Class I
	Paulatuk	New Water Lake	Small System
	Sachs Harbour	DOT Lake	Small System
	Tsiigehtchic	Tso Lake	Class I
	Tuktoyaktuk	Kudlak Lake	Class I
	Ulukhaktok	RCAF Lake	Small System
Sahtu	Colville Lake	Colville Lake	Small System
	Déljine	Great Bear Lake	Small System
	Fort Good Hope	Mackenzie River	Small System
	Norman Wells	Mackenzie River	Class II
	Tulita	Great Bear Lake	Class I
North Slave	Behchokò (Edzo)	West Channel	Class II
	Behchokò (Rae)	Marian Lake	Class II
	Dettah	see Yellowknife	N/A
	Gamèti	Rae Lake	Small System
	Łutselk'e	Great Slave Lake	Small System
	Wekweètì	Snare Lake	Small System
	Whatì	Ground Water	Class I
	Yellowknife	Yellowknife River	Class I
South Slave	Enterprise	see Hay River	N/A
	Fort Providence	Mackenzie River	Class II
	Fort Resolution	Great Slave Lake	Class II
	Fort Smith	Slave Lake	Class III
	Hay River	Great Slave Lake	Class II
	Hay River Reserve	see Hay River	Small System

Region	Community	Public Water Source	Water treatment system classification
	Kakisa	see Hay River	N/A
Dehcho	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

6.4.7 Transportation

NWT transportation infrastructure includes a network of roads, ports and airports, including a rail connection to Hay River. Overall, the NWT has 2,200 kilometers of all-weather roads, complemented by 2,100 kilometers of ice roads. Over 570 km of the ice roads are private for oil and gas development and mine resupply. There is also a well-developed marine freight route along the Mackenzie River to the Arctic Ocean. Sachs Harbour, Ulukhaktok, Paulatuk, and Łutselk'e are fly-in only, with



Figure 31: Ferry (Source: NWT Highway, Ferry and Ice Crossing Information Brochure, Department of Transportation)

no access to roads at any time of the year. A further 11 communities only have winter roads. There are 27 community-based airports plus several privately-operated air strips.

Table 13: Community Transportation Types (Source: GNWT Ministry of Transportation website)

Region	Community	Air	Road	Water/Rail
Inuvik	Aklavik	No airport.	Winter ice road connects to the Dempster Highway through Inuvik.	Bulk supplies and food are barged in during the summer months.
	Fort McPherson	Located 3.2 km south of the hamlet, the airport was built in 1972 and has a gravel runway (3500' x 100') and an air terminal building. There is limited, seasonal service.	Dempster Highway from Dawson City, Whitehorse and Inuvik year round. There are minor disruptions to road access with during break-up and freeze-up.	"Abraham Francis" Ferry service Km 74 – Peel River. This crossing is subject to extreme high and low water level fluctuations which may cause delays at any time.

Region	Community	Air	Road	Water/Rail
	Inuvik	Twelve kilometres east of the community, the full-service airport was built in 1956/58. It has an asphalt runway (6000' x 150') and an air terminal building. Flights operate daily. Inuvik Mike Zubko Airport is deemed a port of entry into Canada and is staffed by the Canada Border Services Agency.	Dempster Highway from Dawson City, Whitehorse. It is an unpaved, gravel road. There are two ferry crossings that make the road impassable for periods during break-up and freeze-up. In the winter drivers cross the rivers by ice bridge.	
	Paulatuk	Adjacent to the hamlet and built in 1994, the airport has a gravel runway (4000' x 100') and an air terminal building. Flights three times a week.		
	Sachs Harbour	The airport is adjacent to the hamlet and was built in 1955/56. It has a gravel runway (4000' x 100') and an air terminal building. Flights twice weekly.		
	Tsiigehtchic		Dempster Highway either from the Yukon or from Inuvik. The highway from Inuvik crosses the river using a ferry service in summer (from 0900-0100, late May-late October) and ice road in winter.	"Louis Cardinal" Ferry services are provided at Mackenzie River Hwy 8.
	Tuktoyaktuk	The airport was built in 1955 and lies 3.2 km SE of the hamlet.	In the winter an ice road is built along the waterways of the	

Region	Community	Air	Road	Water/Rail
		It has a gravel runway (5000' x 150') and an air terminal building. Flights to Inuvik daily. Tuktoyaktuk James Gruben Airport is deemed a port of entry into Canada.	Beaufort Delta between Inuvik and Tuktoyaktuk.	
	Ulukhaktok	Built in 1978, the airport lies 3 km north of the hamlet and has a gravel runway (4300' x 100') and an air terminal building. Flights two days a week.		
Sahtu	Colville Lake	Adjacent to the community, the airport was built in 1975. It has a gravel runway (2400' x 100'). Flights four days a week.	An ice road opens up in winter connecting the community to Fort Good Hope.	
	Déjĭne	One of the NWT's newer airports, it was built in 1998, 2.3 km NW of the community. It has a gravel runway (3925' x 100') and an air terminal building. Flights Monday to Saturday.	Accessible in the winter by an ice road links that links Déjĭne to Tulita and the Mackenzie River winter road.	
	Fort Good Hope	The airport lies 2.4 km from the community and was built in 1994. It has a gravel runway (3000' x 100') and an air terminal building. Flights daily, Monday to Saturday.		Shipping along the Mackenzie River in the summer.
	Norman Wells	Built in 1942, the airport is adjacent to	A winter road alongside the	

Region	Community	Air	Road	Water/Rail
		the community. It has an asphalt runway (6000' x 150') and an air terminal building. Flights daily to various destinations within the NWT.	Mackenzie River is built from the Dehcho region up through the Sahtu.	
	Tulita	The airport was built in 1982, 2 km NE of the hamlet. It has a gravel runway (3000' x 100') and an air terminal building. Flights daily, Monday to Saturday.	A winter road links Tulita to Wrigley and ultimately to the Mackenzie Highway. It usually is open from mid to late winter.	The community is accessible by river in the summer months. Barges deliver supplies up the Mackenzie River.
North Slave	Behchokò	No airport.	Accessible year-round by the Mackenzie Highway. An ice road opens in the winter giving the community access to Whatì. Year-round bus service from Yellowknife with regular stops in Behchokò, to Hay River.	
	Dettah	No airport.	Via ice road in the winter or during summer using the Ingraham Trail.	Accessible by a six and half kilometer boat ride.
	Gamètì	Built in 1991, 3 km NE of the community, the airport has a gravel runway (3000' x 100') and an air terminal building. Flights daily except Saturdays.	A winter road off Highway 3 provides winter access to the community.	In the summer people can travel to and from Behchokò by boat.
	Łutselk'e	Located 1.8 km NE of the community, the airport was built in 1994 and has a gravel runway (3000'	There is no road access to Łutselk'e.	Łutselk'e to Yellowknife by snowmobile, across Great Slave Lake,

Region	Community	Air	Road	Water/Rail
		x 100') and an air terminal building. Flights throughout the week.		after the ice freezes.
	Wekweèti	Three kilometers east of the community, the airport was built in 1994. It has one gravel runway (3000' x 75') and an air terminal building. Flights four days a week.	Ice road covering both land and frozen water from January through March.	
	Whati	Built in 1991, the airport lies 1.6 km east of the community. It has a gravel runway (3000' x 100') and an air terminal building. Flights every day except on Saturdays.	A winter road off Highway 3 provides winter access to the community.	
	Yellowknife	Four kilometers from the city centre, the full-service airport was built in 1946/47 and has two asphalt runways (7500' x 150' and 5000' x 150'). It has an air terminal building and aviation fuel is available. Sixty scheduled flights depart daily to destinations across Canada. Yellowknife Airport is deemed a port of entry into Canada and is staffed by the Canada Border Services Agency.	Accessible by the Mackenzie Highway and Highway 3 year-round.	
South	Enterprise	No airport.	Hwy 2 – Hay River Highway (Great	

Region	Community	Air	Road	Water/Rail
Slave			Slave Route) This highway, the NWT's shortest, connects the town of Hay River to Highway 1 at the community of Enterprise. The highway runs through Hay River, terminating on the southern shore of Great Slave Lake. Its total length is 48.6 kilometres, all of which are paved.	
	Fort Providence	The airport lies 3 km east of the community and was built in 1972. It has a gravel runway (3000' x 100'). No scheduled air service.	Fort Providence is accessible by road year-round. Dehcho Toll Bridge spans the Mackenzie River at km 24 on Highway #3.	
	Fort Resolution	The airport has a gravel runway (4000' x 100') and an air terminal building. No scheduled air service.	NWT Highway 6 ends at Fort Resolution.	Accessible by boat along the Slave River and via Great Bear Lake.
	Fort Smith	Located 4 km NW of the community, the airport was built in 1938/39. There are two runways, one asphalt (6000' x 200') and one asphalt/gravel (1800' x 100', summer only), and an air terminal building. Flights daily.	Accessible by the Mackenzie Highway year-round. A winter road connects the community to Fort Chipewyan and Fort McMurray.	
	Hay River	Full-service airport lies 4 km NE of Hay River was built in 1942/43. It has two runways, one asphalt (6000' x 150') and one	Accessible by the Mackenzie Highway year-round.	The north end of the CN Northern Railway Line from Edmonton. Large barge terminal (some 70 acres) for

Region	Community	Air	Road	Water/Rail
		asphalt/gravel (4000' x 150'). It also has an air terminal building. Flights daily.		receiving, loading and offloading barges.
	Hay River Reserve		Hay River Reserve is accessed on a side road from Highway 5 in summer. In winter there is an ice crossing between the town and reserve.	
	Kakisa		Connected to the Mackenzie highway by a 13 kilometre all-weather road less than 200 kilometres west of the Alberta/NWT border.	Floatplane or boat in the summer and snowmobile in the winter.
Dehcho	Fort Liard	Built in 1982, adjacent to the community, the airport has a gravel runway (2956' x 100') and an air terminal building. 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 terminal building. Scheduled flights operate daily.	Liard or Mackenzie Highways.	"Lafferty" Ferry services are provided at Liard River Hwy 1. People also use the river system to travel between communities in the region and the territory by boat in the summer months.

Region	Community	Air	Road	Water/Rail
	Jean Marie River	The airport was constructed in 1988 adjacent to the community. It has a gravel runway (2500' x 60'). No scheduled air service.	A narrow all-weather access road is located along the stretch of Mackenzie Highway between Fort Providence and Fort Simpson.	Boat from Great Slave Lake 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. Ferried across the Liard River by river taxi. In the winter an ice road connects the community to the Liard Highway.	
	Trout Lake	Adjacent to the community, the airport was built in 1987. It has a gravel runway (2500' x 60'). 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. No scheduled air service.	Mackenzie Highway.	"Johnny Berens" Ferry.

6.4.8 Safety

All facilities housing the fire stations, RCMP and Ranger Patrols in each community are considered critical facilities. See section 8.4.2 Police for further information.

6.4.9 Government

All facilities housing government operations in each community are considered critical facilities. Some examples in Yellowknife include the Legislative Assembly, City Hall, and Yellowknife Correctional Centre.

6.4.10 Industry

Critical infrastructure in some NWT communities must include industries that support the local economy such as mines or oil and gas extraction.

Table 14: Yellowknife Major Employers (Source: Yellowknife Community Profile <http://www.yellowknife.ca/>)

Major Employers	Full Time Employees
Government of the NWT (1)	2,320
Government of Canada (2)	766
Diavik Diamond Mines Incorporated	368
BHP Billiton Diamonds	280
RTL Robinson Trucking	260
Yellowknife Education District No. 1	230
First Air	226
Northwestel	174
Yellowknife Catholic Schools	164
City of Yellowknife	176
Air Tindi	170

Amounts based on actual number of Full Time Employees as of September 1, 2008

(1) Per GNWT Main Estimates

(2) Includes all federal Crown Corporations and the RCMP