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## 8 Appendices

### 8.1 Summaries of Stakeholder Meetings

As part of the process in collecting data for the HIRA, regional meetings were held during June and July of 2013. These meetings were held in Fort Simpson, Fort Smith, Norman Wells, Inuvik and Yellowknife.

The intent of these meetings was mainly to listen to what stakeholders, within the various regions, saw as the main risks with which they dealt with on a consistent basis. The workshops were looking for regional and local perspectives on what the data collection had shown in order to get a better understanding of what exactly was taking place in communities and regions around the NWT. Another valuable aspect of these meetings was the gathering of local/traditional knowledge from those who lived on and off the land and within the remote communities of the NWT.

The majority of these meetings yielded much of the information which had been gathered remotely through the investigation phase of the project. Many respondents identified areas of concern which were well-known and documented such as floods, forest fires and lack of resources to deal with many issues.

There were also specific regional issues identified which had not been seen in the data collection phase. Some examples of this type of information included the storage of radioactive waste in the South Slave Region, the identification of warming waters within the Sahtu which was leading to issues with fish in the region, and the isolation felt in the Beaufort Delta Region when the telecommunications were lost for several days and residents were unable to access money from local banks and stores.

Attendance at these meetings was good with few exceptions and the feedback from the attendees was well received and very informative. A summary of each of the meetings is contained within each respective Regional HIRA.

### 8.2 Glossary and Terminology

**Critical infrastructure** – essential underlying systems and facilities upon which our standard of life relies.

**Disaster** – essentially a social phenomenon that results when a hazard intersects with a vulnerable community in a way that exceeds or overwhelms the community's ability to cope and may cause serious harm to the safety, health, welfare, property or environment of people; may be triggered by a naturally occurring phenomenon which has its origins within the geophysical or biological environment or by human action or error, whether malicious or unintentional, including technological failures, accidents and terrorist acts.

**Emergency** – a present or imminent event that requires prompt coordination of actions concerning persons or property to protect the health, safety or welfare of people, or to limit damage to property or the environment.

**Emergency management** – the management of emergencies concerning all-hazards, including all activities and risk management measures related to prevention and mitigation, preparedness, response and recovery.

**Hazard** – a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

**Local Authority** – means the council of a municipal corporation as defined in the *Cities Towns and Villages Act*, *Hamlets Act*, *Charter Communities Act*; the council of a settlement corporation as defined in the *Settlements Act*; or an organization which has entered into an agreement with the Minister, pursuant to Sec. 6(1) of the *Act*, to develop and implement a community emergency plan when a local governing municipal corporation does not exist.

**Mitigation** – sustained actions taken to eliminate or reduce risks and impacts posed by hazards well before an emergency or disaster occurs; mitigation activities may be included as part of prevention.

**Resilience** – the capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure.

**Risk** – the combination of the likelihood and the consequence of a specified hazard being realized; refers to the vulnerability, proximity or exposure to hazards, which affects the likelihood of adverse impact.

**Risk-based** – the concept that judicious emergency management decision-making will be based on an understanding and evaluation of hazards, risks and vulnerabilities.

**Risk management** – the use of policies, practices and resources to analyze, assess and control risks to health, safety, environment and the economy.

**Sustainable** – a sustainable approach is one that meets the needs of the present without compromising the ability of future generations to meet their own needs.

**Threat** – the presence of a hazard and an exposure pathway; threats may be natural or human-induced, either accidental or intentional.

**Volunteer firefighter:** a local resident who freely offers his/her services to the community to assist in firefighting duties because the community does not warrant a fulltime fire brigade. These individuals play an essential role in protecting residents and are a very integral part of ensuring the public safety of their communities.

**Vulnerability** – the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. It is a measure of how well prepared and equipped a community is to minimize the impact of or cope with hazards.

### 8.3 Specific Climate Change Report

Researchers do not yet know everything there is to know about climate change including its full potential impact over the next five to ten years. While it is difficult to attribute any single weather event to climate change, world climate scientists agree that climate change makes extreme weather events both more likely to occur and more catastrophic in scope. Even under the best-case climate scenarios, we are likely to experience more extreme weather, more droughts, more destructive storms and floods.

What will changes in temperature and precipitation mean for the NWT? How will higher sea levels affect coastal communities? What might permafrost degradation and stronger and more frequent storms mean for the infrastructure of the NWT?

Emergency planners need to assess the risks and consider how hazard patterns could alter due to climate change. The following table outlines the key climate change effects on both the frequency and consequences for each hazard identified in this document.

Hazard	Key Effects of Climate Change on Frequency	Key Effects of CC on Consequences	↑Increase (frequency)
Civil Unrest	The effect of climate change on activities such as aboriginal livelihoods or increased access to resources and compensation could lead to protests/civil unrest.	The impacts could be larger protests in the NWT and Ottawa or at meetings such as the Artic Council.	↑Increase frequency
Critical Infrastructure Failure - Energy Crisis	Structural elements of energy infrastructure in place could be affected, more frequently.  Transport of fuel could be affected with ice road degradation/shorter season.	Costs to adjust infrastructure for degradation in permafrost.  May require larger fuel storage tanks to adjust for shorter ice road season.	→Neutral or limited impact
Critical Infrastructure Failure – Other	Infrastructure will be affected more frequently by structural effects of permafrost melting (effect on roads, airports, etc.).	Isolated populations with loss of road or airport or telephone service.	↑Increase frequency/ consequence
Earth Movement - Earthquake/ Tsunami	Earth movements are expected to increase.  There is some antidotal evidence that earthquakes can increase with climate change in permafrost regions (normally earthquakes are not/minimally affected by climate change).	With less sea ice, waves (created from ice dropping) could have a larger impact.  Sea level rise can also increase the damage to property and people at shorelines.  Impact of earthquake on less stable permafrost soil,	→Neutral or limited impact

Hazard	Key Effects of Climate Change on Frequency	Key Effects of CC on Consequences	↑Increase (frequency)
		due to warming associated with climate change.	
Earth Movement – Permafrost Degradation	<p>Thawing of permafrost expected with climate change, top two to three meters will have thawed by 16-20% by 2100.</p> <p>Increase in earth movements, including coastal landslides, subsidence, sink holes, as well as avalanches.</p>	<p>Infrastructure vulnerability related to permafrost thawing, and necessity for building code updates to deal with this trend.</p> <p>Positive feedback loop, as permafrost thawing releases GHGs, thus creating more climate change.</p>	↑Increase frequency/ consequence
Earthquake Movement – Other	<p>Increased landslides are expected, with thawing of permafrost, reducing soil strength.</p> <p>Increased avalanches associated with increases in temperature and precipitation.</p> <p>Excess water draining as permafrost thaws can also lead to subsidence, and excess water creating ponds or draining away.</p> <p>Additional outcomes include the potential for glacial lake outburst floods.</p>	<p>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.</p>	↑Increase frequency/ consequence
Falling Debris	None	<p>Research is being conducted on the impact of climate change on falling debris; early evidence suggests more debris may penetrate the atmosphere.</p>	→Neutral or limited impact
Fire/ Explosion	<p>The length of the fire season in the Territories is expected to increase by up to 50 days this century.</p> <p>Lightning sparks some 80% of forest fires, which are correlated with increase temperatures of climate</p>	<p>Decrease in moisture conditions could lead to larger forest fires.</p> <p>Shorter ice road season availabilities could mean more fuel stored in communities.</p>	↑Increase frequency/ consequence

Hazard	Key Effects of Climate Change on Frequency	Key Effects of CC on Consequences	↑Increase (frequency)
	<p>change.</p> <p>The melting of permafrost and more droughts suggests peat fires will be more common.</p> <p>Warmer temperatures, changes in precipitation, atmospheric moisture, wind, and cloudiness could increase the number and size of wildfires.</p>		
Flood	<p>Projected increase in precipitation (North) by 2050.</p> <p>Medium confidence level (globally) of increases in flooding with increased precipitation.</p> <p>Increased frequency of flash flooding with a combination of snowmelt and intense rain in the spring.</p>	<p>Projections of increase in rain (10-20%) and snowfall (40%) in this by 2050.</p> <p>Precipitation and snow will be concentrated in the Fall and Winter each year. Flooding mostly in April and May with snow melt.</p> <p>In 2050, rainfall increases that were once in 50 years will now by once in 35 years.</p>	↑Increase frequency/ consequence
Food and Agriculture	<p>Increase in temperature increases the number of invasive species.</p> <p>Increase in temperatures may lead to more need for controlled temperature storage for food.</p>	<p>Impact of changing temperatures on climate sensitive livelihoods (fishing, hunting, farming).</p> <p>Effects on roads and ice roadways will affect transportation of food to communities in the NWT.</p> <p>Climate change impacts on surface water will affect agriculture, an industry that is growing.</p>	↑Increase frequency/ consequence
Human Disease	<p>One of the least predictable factors related to climate change is stated to be the effect on infection diseases.</p>	<p>More diseases are likely to survive in warmer temperatures predicted with climate change.</p>	↑Increase frequency/ consequence

Hazard	Key Effects of Climate Change on Frequency	Key Effects of CC on Consequences	↑Increase (frequency)
Ice Hazard	Melting of sea ice. More rescues.	Predictions indicate approx. 10% coverage per decade. There may be no ice cover in the summer by the middle of the century.  Increase in sea level of 1 m within a century.	↑Increase frequency/ consequence
Industrial Emergency	None.	There is expected to be an impact of climate change on infrastructure associated with industry.  Treatment associated industrial usage, such as tailing ponds and for example ice encapsulated arsenic are expected to be affected by climate change.	↑Increase frequency/ consequence
Snow load Hazard	Increased number of days of snow.	1/5 <sup>th</sup> of municipal buildings are under snow load risk (a portion repaired, a portion under watch).  Greater snow removal.  Demands on roadways.  Increased snow during events.  Wetter snow, leads to higher snow loads.  Variation in community's observations from higher snow loads to wetter snow, to less snow – aligns with variability associated with climate change.	↑Increase frequency/ consequence
Transportation Accidents	A shift in the type of travel is possible, for instance climate change's effect on ice roads could lead to more air travel.	Need to shift to all weather roads over time, as climate change has an effect on ice roads and shortens the season of viability.  Infrastructure is also affected, which includes	↑Increase frequency/ consequence

Hazard	Key Effects of Climate Change on Frequency	Key Effects of CC on Consequences	↑Increase (frequency)
		<p>airports and their runways.</p> <p>Concern about the risk associated with degradation of roadways, and the transportation of dangerous goods.</p>	
Water Contamination	<p>Increased siltation and water volumes associated with precipitation.</p> <p>Climate change is expected to lead to the greater bioaccumulation of mercury and POPs.</p>	<p>Increases siltation, and water volume leading to greater demands on systems.</p> <p>Degradation of infrastructure is expected with the climate change effect on permafrost.</p>	↑Increase frequency/ consequence
Weather – Windstorm	Increase in strong winds.	<p>Tornado activity is moving north.</p> <p>Cyclone activity is increasing.</p>	↑Increase frequency/ consequence
Weather – Winter Storm	More intense and frequent winter storms, and more unpredictability.	<p>Increases snowpack, earlier melting, and rain on snow are prevalent with climate change.</p> <p>Increased snow load (both snow and precipitation) on buildings. 1/5<sup>th</sup> of municipal buildings are under snow load watch in NWT.</p>	↑Increase frequency/ consequence
Weather - Other	<p>Increase in rain and snow events.</p> <p>Increase in lightning with heat.</p>	<p>Increase in hotter days will lead to degradation in the permafrost.</p> <p>Snow loading can affect infrastructure.</p>	↑Increase frequency/ consequence
War/ International Incident	Increased attention to the region, associated with increased navigability and access to natural resources, brought on by warming temperatures of climate change.	None.	↑Increase frequency



The following narratives provide added detail concerning the potential effects of climate change relative to territorial hazards identified in table 8.3.

**Civil Unrest:** Civil unrest could be indirectly affected by climate change. Protests related to first nation's treaty rights show that other issues, such as the impact of climate change on livelihoods could draw similar attention. Academic research shows increased likelihood of violence with climate change in warmer environments, and may have some limited applicability to the NWT.

**Critical Infrastructure Failure – Energy Crisis:** The instability of infrastructure, such as fuel tanks and piping, with permafrost degradation could lead to an outage in services. The communities' concerns are single failure, such as an electrical outage, fuel shortages or a pipe failure, having a significant affect due to the remote nature of most communities. Fuel shortages have already occurred in a few communities. The CSA guidelines for infrastructure are being reviewed in the NWT and implementation is taking place on a risk-based approach for new infrastructure. Yellowknife has yearlong access by roadway but other communities rely on ice roads for the shipment of fuel. Alternative energy programs and community energy planning provide a good buffer for risks. Ice coverage of water areas, such as the Northwest Passage, is melting with climate change and there will also be increases in access to energy sources in the future, with the potential for disputes about ownership.

**Critical Infrastructure Failure – Other:** Infrastructure (airports, sewage piping, telephone systems, structures, ice roads, bridges etc.) is subject to the potential damage from soil instability due to permafrost melting, and the implementation of the CSA standard remains important. Climate change is not only expected to shorten ice road seasons, but also increase variability of weather, which could easily shutdown roadways.

Freeze and thaw cycles become more frequent with climate change and can degrade roadways and bridges, and especially ice roads. Community concerns are associated with degraded road conditions, and reliance on ice roadways. An incident that shuts down an airport can have pronounced effects on the movement of the population. The isolation of the population can prove problematic in terms of keeping stocked with supplies and in touch with other communities. The opening of the Northwest Passage, predicted with climate change, may give an alternate means of shipments reaching the NWT.

**Earth Movement - Earthquake/ Tsunami:** Climate change has indirect impacts, which include: sea ice breakage causing waves, increases in sea level and potential damage during a tsunami, or the increased impact of an earthquake on warmer permafrost soil. A tsunami type wave can start from ice breakage and its impacts can be greater with less ice covered water and sea level rise, both attributable to climate change.

**Earth Movement – Permafrost Degradation:** Frozen soil loses its strength as it thaws and makes infrastructure vulnerable to degradation. Thawing may be from both natural causes or causes such as forest fires, vegetation removal and climate change.

Places like Inuvik are the most vulnerable to this degradation with 45-70% of their buildings at risk from permafrost degradation.

**Earthquake Movement – Other:** Increased landslides are expected with the thawing of permafrost reducing soil strength. Increased avalanches are associated with increases in temperature and precipitation. Excess water draining as permafrost thaws can also lead to

subsidence and excess water creating ponds or draining away. Additional outcomes include the potential for glacial lake outburst floods. Isolated populations in the NWT are vulnerable with the loss of road, airport or telephone service.

**Falling Debris:** Early studies indicate there may be a negative impact of increased carbon dioxide accumulation on debris entering the atmosphere, specifically less of this debris will burn up and thus could increase this risk.

**Fire and Explosion:** The largest amount of fuel in the NWT is associated with forests, dry peat and fuel storage. Forest fires are a regular occurrence, and are projected to occur more with increased lightning strikes, which will be more prevalent with warmer temperatures. The length of the fire season is expected to increase by 50 days this century. The melting of permafrost makes peat more dry and susceptible to catching on fire. Large fuel reserves are kept in communities to ensure that quantities are sufficient when access to the community may be limited (i.e. ice road is not open). The burden on emergency firefighting services will increase over time due to the frequency of fires and the length of the fire season. Emergency response will likely need to cope with more of these events in the future. This will require increased capacity and funding, at a time when this service is already strained.

**Food and Agriculture:** Climate change will result in the increase and variability of temperatures, which will have an impact on climate sensitive livelihoods. Temperature also affects invasive species. It should be noted that the NWT has a small agriculture industry, but in recent years has been growing. The effects on roadway infrastructure, including ice roads, will also have an effect on transportation of food to the region.

**Flood:** In the NWT, flooding has been linked to both precipitation increases and early spring run-off conditions. There are projections of increase precipitation and snowfall in the North by 2050, thus expectation of increased flooding in the region. In fact, those one in 50 year occurrences will increase to one in 35 year occurrences in the North. More flooding will continue to occur in the spring, during times of rapid snowmelt and precipitation. The overall susceptibility of buildings and communities is based on the design of drainage systems and the location of the buildings, which require consideration for any design or new construction.

**Human Diseases:** The effect of climate change on diseases is stated to be unpredictable, although it stands to reason that with rising temperatures more diseases that would have been killed off in the cold will survive and the impact will be greater transmission.

**Ice Hazard:** It is predicted that about 10% of ice coverage per decade will be lost due to the increased temperatures associated with climate change. This could manifest as predicated with no ice cover in the summer by the middle of the century. Expect more rescues to be required as ice conditions will become more unpredictable with time. An indirect consequence of loss of sea ice is sea level rise, which is expected to be one metre within a century.

**Industrial:** Given the inability to forecast every effect of climate change on industrial operations, the NWT government can promote emergency preparedness as a means of dealing with emergencies, expected to be more pronounced with climate change. Permafrost degradation will affect the stability of infrastructure. Literature highlights the impact expected from treatment facilities such as mining tailing ponds, which rely on permafrost for structural integrity.

**Snow load:** There has been a 25-35% increase in snow since the 1950s. The number of days (frequency) and amount of snowfall has increased. The snow that falls is wetter due to a combination of rain and snowfall, resulting in higher snow loads. There is recognition of the increased risk of snow loads, and thus some municipal buildings are under watch. More snow removal is necessary on roadways to allow for passage and transportation of goods. There has

been an observation in communities of more snow falling, increased wet snow, and less snowfall. This tends to match with the variability associated with climate change.

**Transportation Accidents:** There is a need to consider shifting to all weather roads over time, as climate change has a dramatic effect on ice roads and shortens their season of usage. The GNWT estimates that one million dollars per year is required for maintenance of roadways due to climate change. Based on information presented its likely this figure will continue to increase. An elevated risk exists with degraded roadways and the transportation of dangerous goods. Search and rescue will need to contend with the changes in climate affecting roadways and the possibility of involvement of dangerous goods. Airport infrastructure can be affected with degradation of permafrost associated with climate change. Although aircraft accidents are not frequent, any increase associated with infrastructure degradation could have a devastating effect in terms of the impact to people and property, as well as the isolation affect with airline operations being halted. With climate change there is a general increase in snowstorms affecting shipments by road or air.

**War and International Incident:** There is increased attention in the Arctic region, with melting sea ice. Clearing of sea ice leads to easier navigation and access to natural resources. It seems possible that a clash could occur in the region. There is a security environment developing, but equally an environment of cooperation through the Artic Council.

**Water Contamination:** With climate change there is expected to be greater water volumes to treat due to increased precipitation. There is an additional load on the water treatment systems, with increased siltation and turbidity. In addition, the structure of water treatment systems and piping rely on permafrost that will degrade with climate change. Thus reference to the CSA standards for opportunities to upgrade systems through maintenance and replacement should be considered.

**Weather – Windstorm:** There is expected to be an increase in windstorms in the NWT, and this has already been observed. Tornados will be more frequent in the North with increased temperatures. Also, cyclones are expected to be more frequent with more temperature fluctuations.

**Weather – Winter Storm:** There are more intense and frequent winter storms, and generally more unpredictability. There are increases in snowpack, earlier melting, and a combination of rain and snow that leads to wetter and heavier snow.

**Weather - Other Extreme:** With climate change there will be an increase in rain and snow events, an increase in lightning with heat, degradation of permafrost with heat. Increased snow loads will affect structures.

## 8.4 Existing GNWT Response Capabilities

This section provides a summary of the NWT's response capabilities which were considered when assessing the territories' overall risk to the hazards discussed in Section 5.

In the NWT, emergency responders of all types have historically been difficult to recruit and retain. This has led to issues with inexperienced responders facing the challenging environmental conditions throughout the NWT. Efforts to train local or volunteer resources can be limited by financial concerns.

### 8.4.1 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 the *Propane Cylinder Storage Regulations*. NWT has adopted Firesmart principles to identify and mitigate hazards (Office of the Fire Marshal Public Safety Division, 2013).

Fire departments in the NWT are largely composed of volunteers, with only Yellowknife employing full-time fire fighters. Only Yellowknife, Hay River and Inuvik employ a full-time fire chief. 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. In contrast, approximately 85,000 volunteer firefighters comprise 3000 volunteer fire departments across Canada (Office of the Fire Marshal Public Safety Division, 2013).

Many communities in the NWT experience difficulty in the recruitment of volunteers. Although reasons vary, a significant factor is the training which requires individuals to take time away from home and work for even the basic level.

### 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 weather, forest and fire conditions, forecasting fire behaviour and conditions to guide preparedness arrangements, and managing NWT forest fire suppression operations;
- Advising Emergency Management Office and communities on forest fire conditions and behaviour, and recommending appropriate courses of action (seasonal); and

- 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.

#### 8.4.2 Police

Police servicing in the NWT is designated as G Division and is split into a North and South District. The capital city of Yellowknife is its own entity and does not fall under either district command. There are currently 23 RCMP Detachments in the NWT:

- Aklavik Detachment;
- Behchokò Detachment;
- Déljne Detachment;
- Fort Good Hope Detachment – also services Colville Lake;
- Fort Liard Detachment;
- Fort McPherson Detachment – also services the community of Tsiigehtchic;
- Fort Providence Detachment – also services the community of Kakisa;
- Fort Resolution Detachment;
- Fort Simpson Detachment;
- Fort Smith Detachment;
- Gamètì Detachment;
- Hay River Detachment - also services the community of Enterprise and the Hay River Reserve;
- Inuvik Detachment;

## Community Wildfire Protection Plans (CWPP)

### Dehcho

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

### Inuvik

Aklavik CWPP 2012  
 Fort McPherson CWPP 2012  
 Inuvik CWPP 2012  
 Tsiigehtchic CWPP 2010

### North Slave

Behchokò CWPP 2012  
 Dettah CWPP 2012  
 Gamètì CWPP 2012  
 Łutselk'e CWPP 2012  
 Wekweètì CWPP 2012  
 Whatì CWPP 2012  
 Yellowknife CWPP 2012

### Sahtu

Colville Lake CWPP 2012  
 Déljne CWPP 2012  
 Fort Good Hope CWPP 2010  
 Norman Wells CWPP 2010  
 Tulita CWPP 2011

### South Slave

Enterprise CWPP 2010  
 Fort Providence CWPP 2010  
 Fort Resolution CWPP 2011  
 Fort Smith CWPP 2010  
 Hay River CWPP 2011  
 Kakisa CWPP 2010

- Łutsek'e Detachment;
- Norman Wells Detachment;
- Paulatuk Detachment;
- Sachs Harbour Detachment;
- Tuktoyaktuk Detachment;
- Tulita Detachment;
- Ulukhaktok Detachment;
- Whatì Detachment;
- Wrigley Detachment; and
- Yellowknife Detachment – also services N'dilo, and Dettah.

Neither Wrigley nor Gamètì Detachments have existing infrastructure in place to allow for RCMP members to reside and work in these communities full-time. RCMP members are designated as part of these detachments and travel to them on a regular basis.

8.4.3 Medical and Health Authorities

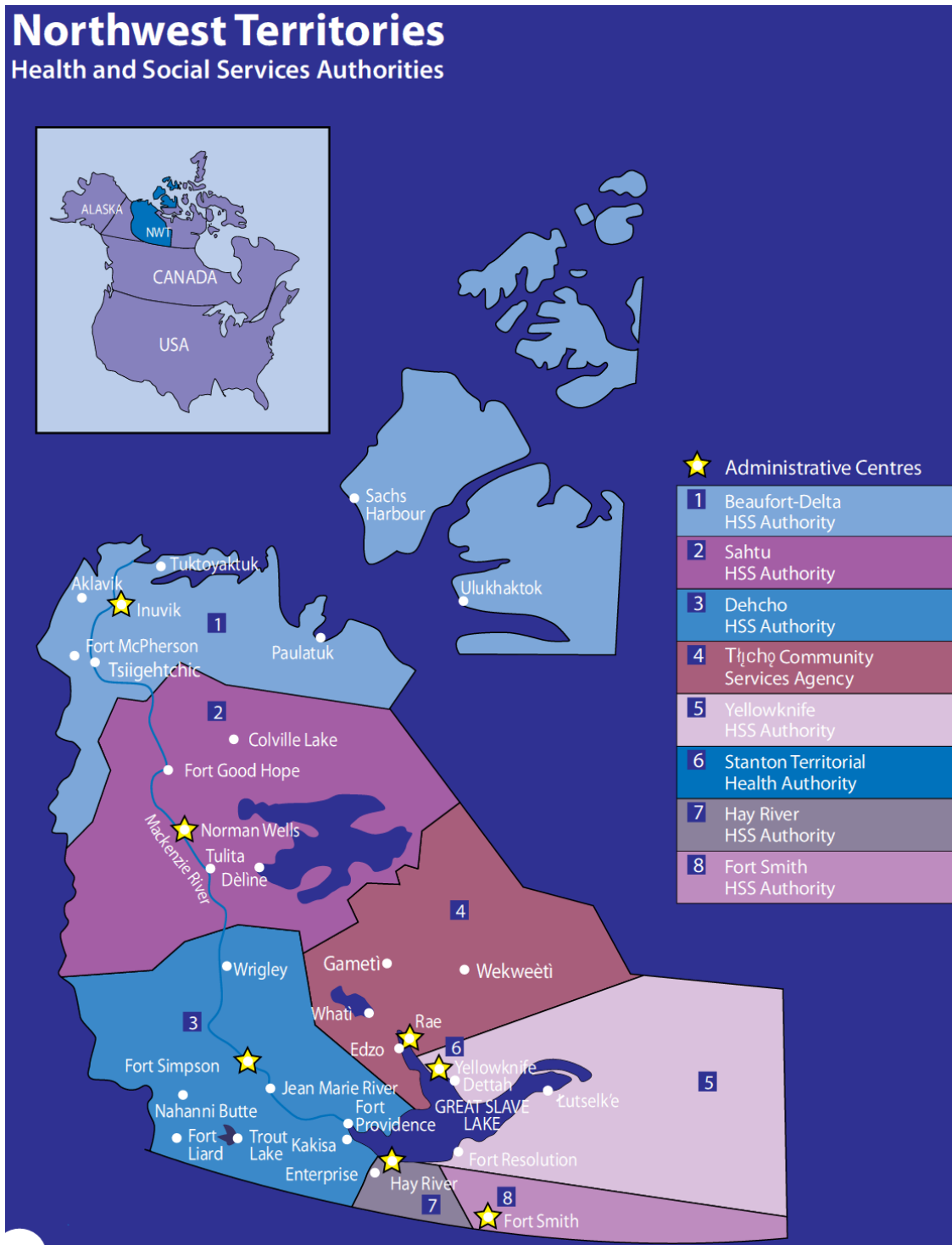


Figure 32: NWT Health and Social Services Authority Map 2008 (Source: GNWT Health and Social Services [http://www.hss.gov.nt.ca/sites/default/files/nwt\\_hss\\_authority\\_map.pdf](http://www.hss.gov.nt.ca/sites/default/files/nwt_hss_authority_map.pdf))

### Beaufort-Delta Health and Social Services Authority (BDHSSA)

The BDHSSA operates the Inuvik Regional Hospital (51-bed hospital), 8 health centres and community based health and social services programs throughout the Inuvik Region. It includes:

- Nine practicing physicians;
- Seven remote health centers;
- Seven remote social services locations;
- Three group homes; and
- Two seniors care facilities.

### 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 Workers, physician from Fort Simpson makes monthly visits to the community, for 3-5 days
Fort Providence	Health Centre	Nurse in Charge, Community Health Nurses, Nurse Practitioner, Community Health Worker, 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
Hay River Reserve	Patients drive to Hay River for their medical needs	
Jean Marie River	Health Cabin	1 Community Health Worker, Fort Simpson Health and Social Services team have regular scheduled visits to Jean Marie River
Kakisa	Patients drive to Fort Providence or Hay River for their medical needs	
Nahanni Butte	Health Cabin	1 Community Health Worker (CHW), Fort Simpson Health and Social Services team have regular scheduled visits



Community	Health Care	Health Resources
Trout Lake	Health Cabin	1 Community Health Worker (CHW), Fort Simpson Health and Social Services team have regular 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

#### Fort Smith Health and Social Services Authority

Community	Health Care	Health Resources
Fort Smith	Health and Social Services Centre	Acute care beds, offices and clinic examination rooms - nurse practitioner is on staff while a compliment of 4 physicians and two practicing midwives

#### Hay River Health and Social Services Authority

Community	Health Care	Health Resources
Hay River	H.H. Williams Memorial Hospital	The H.H. Williams Memorial Hospital a 29 bed accredited Hospital; a 15 bed long term care facility; a supportive living program consisting of three residential homes and a day program building; a medical clinic (including Specialists) and a variety of social, mental health, community and home care services.

#### Sahtu Health and Social Services Authority

Community	Health Care	Health Resources
Colville Lake	Receives health and social services from the Fort Good Hope Health Centre	Physician visits once a month
Déljine	Health Centre	3 Nurses, 3 Prevention and Health Promotion Workers, 2 Home Support Workers, Physician visits 5 days a month
Fort Good Hope	Health Centre	3 Nurses, 3 Prevention and Health Promotion Workers, 2 Home Support Workers, Physician visits 5 days a

Community	Health Care	Health Resources
		month
Norman Wells	Health Centre	4 Nurses, 1 Prevention and Health Promotion Worker, 1 Home Support Worker
Tulita	Health Centre	3 Nurses, 2 Prevention and Health Promotion Workers, 1 Home Support Worker

### Stanton Territorial Health Authority

Yellowknife - Stanton Territorial Hospital, with 80 beds available for inpatient care and 30 beds dedicated to ambulatory care (i.e. Medical Day Care Unit, Surgical Day Care Unit), Stanton Medical Clinic, Stanton Medical Centre, and Stanton Ophthalmology Clinic.

### Tłıchq Community Services Agency

Community	Health Care	Health Resources
Behchokq	Jimmy Erasmus Seniors Home	
	Health Centre	7 Nurses, 2 Social Workers, Addiction Counselor
Gameti	Health Centre	1 Nurse
Wekweeti	Health Station	Nurse
Whati	Health Centre	2 Nurses

### Yellowknife Health and Social Services Authority

Yellowknife Health and Social Services Authority (YHSSA) provides community-based health and social services programs to 20,000+ residents of Dettah, Fort Resolution, Łutselk'e, N'Dilo and Yellowknife.

Community	Health Care	Health Resources
Fort Resolution	Health Centre	1 nurse practitioner, 1 community health nurse, a Community Health Representative, Bi-weekly physician visits
	"Our Great Elders" Facility- Homecare and Administration	Home nursing care services
Łutselk'e	Health Centre	2 community health nurses, a community health representative,

Community	Health Care	Health Resources
		Physician visits
Yellowknife	Home and Community Care (1st floor, Jan Stirling Building)	
	Public Health (1 <sup>st</sup> floor, Jan Stirling Building)	
	Healthy Family Program Centre (47th Street)	
	Integrated Services	
	Centre for Northern Families	Walk-in clinic, a nurse practitioner and a doctor
	Frame Lake Community Health Clinic	11 Physicians, 2 Nurse Practitioners,
	Yellowknife Primary Care Centre	15 Physicians, 4 Nurse Practitioners,

### Medical Travel

Medical travel is a GNWT health care benefit provided to all NWT residents who do not have access to medical travel benefits through an employer. The Medical Travel staff arrange emergency medical evacuations, schedule air travel bookings, special charter bookings and ground transportation between communities for residents living in the NWT's 33 communities.

### Ground Ambulance and Highway Rescue Services

The communities of Yellowknife, Hay River, Behchokò, Inuvik, Fort Simpson and Fort Smith operate a community-based ground ambulance service which is operated predominantly 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. Communities with ambulance services also provide both highway ambulance and rescue services within a prescribed distance of their municipal boundaries.

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.

<b>Ambulance Service Providers (2004)</b>	
Yellowknife	City of Yellowknife
Hay River	Town of Hay River
Fort Smith	Town of Fort Smith
Behchok̄	Tłı̄ch̄ Community Services Board
Inuvik	Blue Ice EMS Ltd
Fort Simpson	Village of Fort Simpson

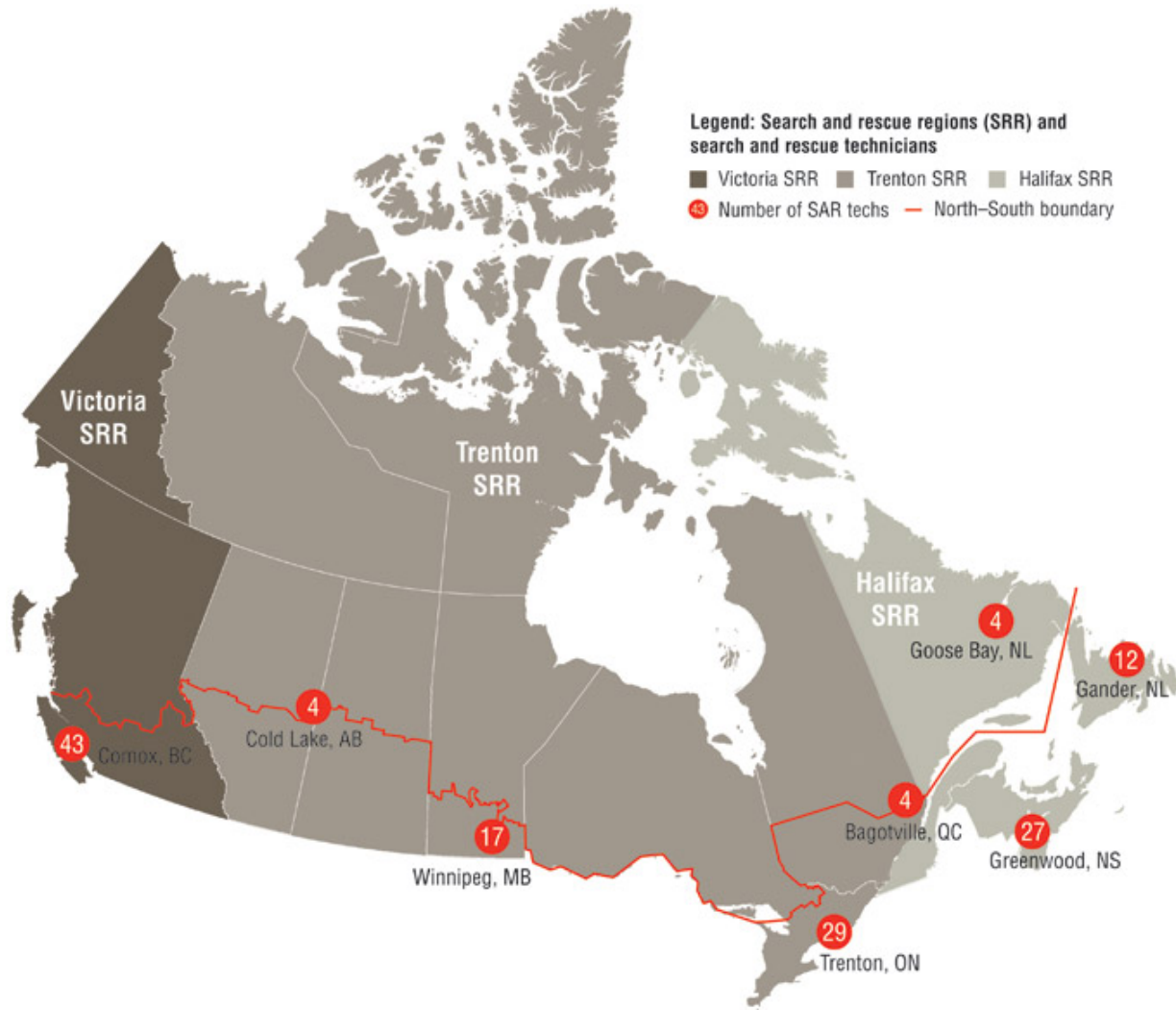
#### 8.4.4 Search and Rescue (SAR)

<b>SAR response to</b>	<b>Primary</b>	<b>Secondary</b>
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 Vessel of opportunity

SAR response to	Primary	Secondary
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.

With the signing of the Agreement on Cooperation of Aeronautical and Maritime Search and Rescue in the Arctic, Canada can look to its circumpolar neighbours for assistance in the face of an Arctic crisis. Currently, the Joint Rescue Co-ordination Centre at CFB Trenton in Ontario commands air search and rescue for the NWT. The lack of northern ports was identified as a problem in the Quadrennial SAR Forum, July 15, 2013 (National Search and Rescue Secretariat, 2013).



**Figure 33: Search and Rescue Regions (Source: CBC News/Conference Board of Canada)**

#### 8.4.5 Emergency Response and Preparedness Organizations

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.

#### 8.4.6 Public Works and Utilities

During an emergency, GNWT Public works and Services department is responsible for:

- Provision of specialized equipment and personnel;
- Professional assistance in undertaking reconstruction;
- Damage assessment in the public sector;
- Assistance in the acquisition of special emergency accommodation for GNWT emergency workers;
- Technical advice regarding electrical installations, pressure vessels and other materials and installations which may affect the response to an emergency; and
- Provision of emergency postal/courier services.

The following private utilities can also provide support:

- NorthwTel might undertake to coordinate existing telecommunications service providers to ensure a proper level of emergency preparedness is maintained at territorial and regional level in providing voice and data service during emergencies;
- NWT Power Corporation 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;
- Air Transport companies should be listed in the community resource register – and informed that they could become part of local response should conditions dictate; and
- Construction firms may also have unique equipment that may be valuable to community response and they should be identified in community resource data.

#### 8.4.7 Emergency Social Services

The Health and Social Services department assists local authorities in meeting the needs of disaster victims by providing, issuing or arranging for the following services:

- Personal counseling services;
- Acute care and mental health contingency planning and services; and
- Critical incident stress debriefing for victims and emergency response personnel.

The Canadian Red Cross is also available in collaboration with local authorities to provide emergency social services delivered by volunteers and staff, trained to national standards.

#### 8.4.8 Amateur Radio

Yellowknife Amateur Radio Society (YARS) is a society incorporated and registered with the GNWT Registrar of Societies to provide assistance and support to civil authorities in times of emergency. YARS is affiliated with the Radio Amateurs of Canada. They currently operate two permanently linked VHF repeaters, one in Yellowknife and the second in Bechokò. A third repeater, to be located in Hay River, is under evaluation.

#### 8.4.9 HAZMAT

Yellowknife Fire department maintains NFPA 472 Haz-Mat Operations level for 24 career fire staff. Dangerous Goods supplier/transporters may have to undertake the provision of chemical identities and documentation, emergency medical information, immediate response advice, representatives at the EOC/Site, strategy for controlling releases, monitoring and restoration.

In the NWT from 2003 to 2007 only 3 first responders received CBRN Training at any level (Public Safety Canada, 2008).

An initial oil spill response capacity is required on site of a land-based oil handling facility under the *Canada Shipping Act, 2001* during loading or offloading operations which support community resupply operations. In Inuvik, CCG has placed community packs of spill equipment in communities however there have not been enough spills to keep people trained. There is no organization or company to maintain paid full time or part-time spill response employees. If a spill occurred during a key harvesting time it was suggested there might be a shortage of individuals to respond to an oil spill as many would be on the land.

#### 8.4.10 Canadian Forces

Headquartered in Yellowknife, NWT, Joint Task Force (North) is responsible for Canadian Joint Operations Command's single largest region. Joint Task Force (North)'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, Joint Task Force (North) 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, Joint Task Force (North) maintains detachments in Whitehorse, Yukon, and Iqaluit, Nunavut.

Joint Task Force (North) is responsible for the command of the Canadian Rangers in the North through the 1st Canadian Ranger Patrol Group and for support to the Cadet program and the Junior Canadian Rangers program in the three territories.

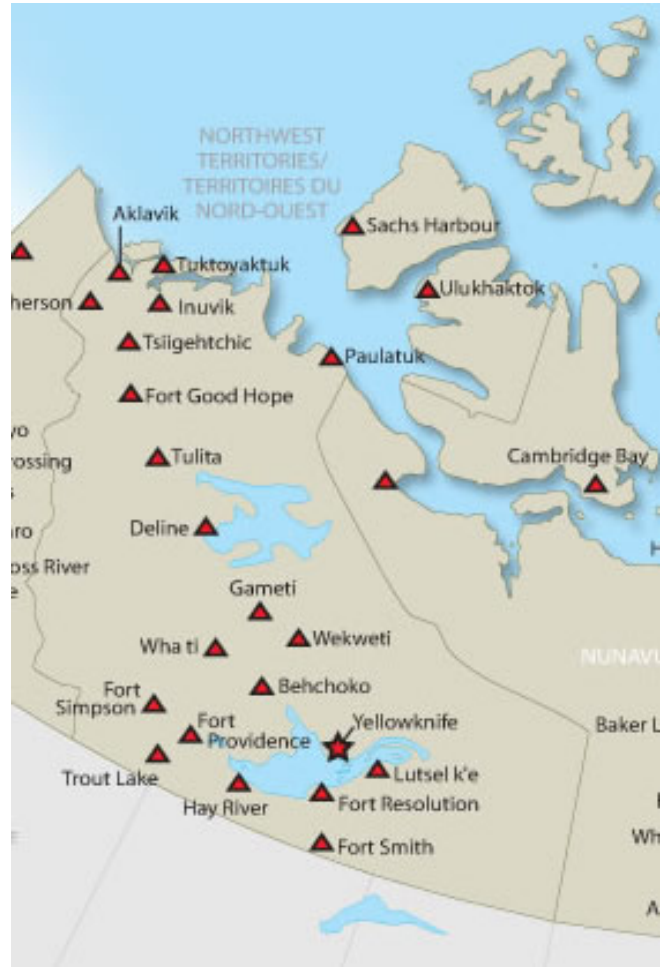
In total, there is approximately 250 Regular Force, Reserve Force and civilian personnel who are working north of the 60th parallel within one of the following units:

- Joint Task Force (North) 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.



**NWT Communities  
with a Ranger Patrol**

- Aklavik
- Behchokò
- Déłjne
- Fort Good Hope
- Fort McPherson
- Fort Providence
- Fort Resolution
- Fort Simpson
- Fort Smith
- Gamètì
- Hay River
- Inuvik
- Łutselk'e
- Paulatuk
- Sachs Harbour
- Trout Lake
- Tsiigehtchic
- Tuktoyaktuk
- Tulita
- Ulukhaktok
- Wekweètì
- Whatì
- Yellowknife



**Figure 34: 1st Canadian Ranger Patrol Group in NWT (Source: Government of Canada, Canadian Army website)**

## 8.5 Online Survey Result Summary

### SCOPE OF THE SURVEY

As part of the NWT Hazard Risk Identification Assessment, Vanguard EMC Inc. launched two online publically available surveys on May 27th 2013 which ran for three months. They closed Aug 30, 2013.

#### NWT Hazard Community Survey

This survey was to be completed by any resident of the NWT, about their community or the community which they represent.

#### NWT Territory-wide Hazard Survey

This survey was to be completed by any resident of the NWT, who was interested in commenting on hazards territory-wide.

Each survey consisted of six questions as well as the definition of each hazard and contact information for regional superintendents. Each survey should have taken about three minutes to complete.

### OBJECTIVES

- Validate the list of hazards that exist in the territory, both natural (i.e. geological, meteorological, and biological), and technological and human-induced (i.e. accidental or intentional) created by Vanguard EMC Inc., based upon HIRA project research.
- Gain a broader understanding of how frequently hazards occur and how severe their impact may be on communities, critical infrastructure, property, and the environment, in the past, and which hazards pose the greatest threat to communities.
- Identify any hazards that had been overlooked during the scan of relevant studies, plans and other research methods.

### SURVEY PROMOTION

The GNWT MACA website homepage invited all residents of the NWT to participate in both surveys.

E-mail invitations were sent directly to key individuals across the Territory asking them to participate in the survey.

During the HIRA workshops, participants were invited to complete the online survey and given the opportunity to complete a paper survey provided by Vanguard EMC Inc.

### STATISTICS

Completion rate	92%
Complete responses	14 online
Estimated completion time	3:30 minutes
Oldest response	June 11, 2013

Newest response

Aug. 20, 2013

## SUMMARY

The top five hazards that participants felt would cause the greatest damage to the people, property and environment in the NWT:

1. Critical Infrastructure Failure - Energy Crisis would prove to cause the greatest damage;
2. Fire/Explosion;
3. Human Disease;
4. Flood; and
5. Weather - Winter Storm.

The top five hazards based upon how likely they are to cause damage to the NWT over the next ten years:

1. Fire/Explosion;
2. Flood;
3. Critical Infrastructure Failure - Energy Crisis;
4. Weather - Winter Storm; and
5. Earth Movement – Permafrost Degradation.

Additional Comments and Hazards Proposed:

- Carrington Event (solar flare);
- Forest pests and diseases;
- Telecommunications/Data network will be a source of damage in the future. The reliance on this type of communication to provide core services such as medical services and the aging infrastructure provided by vendors such as NWTel will increase the risk to the GNWT of failures;
- Recommendation that transportation accidents could be divided into air, road, rail and marine as many communities have risk to one or two but not all and a response is fundamentally different for each; and
- More attention has been focused on the need for effective emergency preparation and response in recent years due to the increase in natural disasters as a result of climate change.

## FURTHER DETAILS

No one ranked the following hazards as one of the top five hazards that they feel would cause the greatest damage to the people, property and environment in the NWT:

- Earth Movement – Other;
- Falling Debris;
- Ice Hazard;
- Snow Load Hazard; and
- Weather - Wind Storm.

No one ranked the following hazards as one of the top five hazards based upon how likely they are to cause damage to the NWT over the next ten years:

- Civil Unrest;
- Earth Movement - Earthquake/ Tsunami;
- Earth Movement – Other;
- Falling Debris;
- Food and Agricultural Emergency; and
- Ice Hazard.

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### Other Documents Reviewed for this HIRA

Maps with topographic details of the NWT

A copy of the current plans for communities in the NWT including:

- Municipal/Village Emergency Response and Recovery Plans/Emergency Management Plans;
- Evacuation plans;
- Wildland urban interface fire plans;
- GNWT Pandemic plan; and
- Mosquito control program / West Nile virus plan.

Official Community Plans (OCPs) with appendices and attachments:

- OCPs; and
- Area Plans.

A copy of the Emergency Program Bylaws

Fire response capability

Capabilities of the local ESS (include Reception Center locations), First Responder, Search and Rescue and Highway Rescue groups

Gas, electric, fuel and propane service providers

Telecommunication, radio broadcast and amateur radio service providers

Major financial institutions in the NWT

Local hospitals, labs and health centers

Waste disposal and recycling programs/centers

Agricultural production, type and quantity

Critical government facilities in the NWT

Leading manufacturers in the NWT

Municipal/village local water sources and type of sewage treatment

A list of heavy industries and their locations, especially those that utilized hazardous materials (dangerous goods)

Local building codes and compliancy

Known derailments, and common motor vehicle accident sites including ice roads