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CITY OF GREATER SUDBURY

Hazard Identification and Risk Assessment

This document is available in accessible formats upon request.

Revised December 2012

INTRODUCTION

Since September 11, 2001, the Government of Ontario has increased its capabilities and responsibilities in Emergency Management for the Province. The *Emergency Management and Civil Protection Act* changed how municipalities create and maintain their emergency plans. It has also changed the municipal focus on "Emergency Measures" (being preparedness and response) to "Emergency Management" (mitigation, prevention, preparedness, response, and recovery).

PURPOSE

The purpose of this document is to identify the hazards, which have caused, or possess the potential to cause, disastrous situations by overwhelming response capabilities within the City of Greater Sudbury. This information will aid our Emergency Management Section and Emergency Services Department to prepare for more effective emergency responses and operations. The planning phase will seek to mitigate the effects of a hazard, prepare for response measures and ensure the safety of our citizens, preserve life, and minimize damage.

MISSION STATEMENT

The City of Greater Sudbury, Emergency Services Department's mission is to ensure that our municipality is prepared to respond to and recover from all natural, technological and man-made emergencies by providing leadership and support through a risk-based Emergency Management Program of mitigation, prevention, preparedness, response and recovery.

Through Emergency Management, our long-term vision is to co-ordinate and support effective management, training and education to reduce the risks to citizen health, safety, security and property. The key reason for an Emergency Management Program is to support the creation of a disaster-resilient community. A realistic risk-based program properly resourced and exercised will save lives and money.

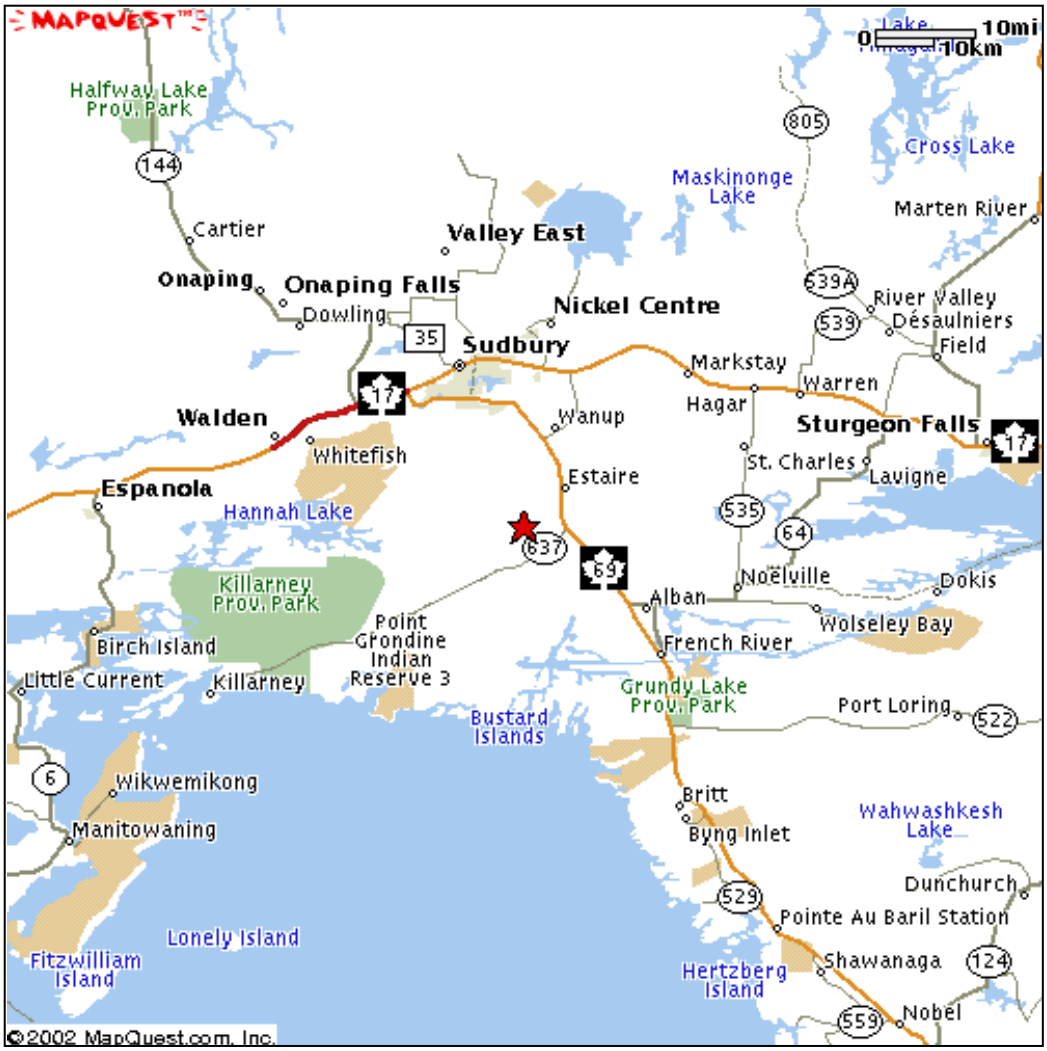
SITUATION

The City of Greater Sudbury is nestled on the southern edge of the "Sudbury Basin" in Northern Ontario (see Figure One). The City sits on the Trans-Canada Highway, connecting Western Canada to Toronto, Ottawa, and other points east of Ontario. Greater Sudbury can be reached by ground via Highways 17, 69 and 144, as well as by train and airplane. Also important to note, is that Sudbury is considered a train "hub", connecting rail lines across Ontario as well as Canada.

Sudbury is surrounded by a number of urban centres, both small and large including:

- Timmins, located 275km North of Sudbury
- Ottawa, located 450km East of Sudbury
- Toronto, located 400km South of Sudbury
- Sault Ste. Marie, located 300km West of Sudbury.

Figure One: City of Greater Sudbury Location Map



POPULATION

It is estimated that 160,274 people live within the 3,627 km^2 area that makes up the City of Greater Sudbury[1]. A breakdown of the City's population by community can be found in Figure Two[1]. The majority of the population resides in the City core located generally in the area formerly known as the City of Sudbury. This area includes the Donovan, Floor Mill, Kingsmount, Downtown, Bell Park, Minnow Lake, New Sudbury, South End and West End. The remainder of the City's population resides in small urban communities separated by rural development and undeveloped land.

Figure Two: Population by Area

Area	Population
Azilda	3,837
Capreol	3,276
Chelmsford	6,570
Coniston	2,149
Copper Cliff	2,604
Dill, Cleland and Dryden	1,080
Donovan, Flour Mill	14,370
Dowling	2,069
Falconbridge	683
Garson	6,492
Hanmer	5,945
Kingsmount - Downtown - Bell Park	6,820
Levack and Onaping	1,948
Lively	4,792
Minnow Lake	10,124
Naughton	758
New Sudbury	24,329
Northeast Townships	43

[1] 2011 Census of Canada

South End	21,686
Val Caron (Blezard Valley/McCrea Heights)	6,335
Val Therese	7,851
Wahnapitae	1,349
West End	8,415
Remaining areas of CGS	16,749

ECONOMY

The City of Greater Sudbury is perceived to be predominantly a mining-based community. The 2006 census lists retail trade as the largest portion of the labour force in Greater Sudbury at 12.6% followed by health care and social assistance at 12.2%. The mining sector comes in third at 7%. The average family income in Greater Sudbury is $81,721, with median family income of $68,411[2].

HIRA WORKING COMMITTEE

The process undertaken to produce the original report involved significant time and effort on the part of the City's Working Committee, which was chaired by the Director of Emergency Medical Services. This Committee, representing City services (Emergency Management, Public Health, EMS, Fire Services and Police), the local hospital, and hydro, met regularly, both as a committee and within sub-committees, to determine the hazards most likely to affect the City as a whole. Currently the report is reviewed by Greater Sudbury's Community Emergency Management Coordinator and circulated to City departments and partner agencies for comment before publication. A sample form used by the City is included as Appendix 2.

HOW DEGREE OF RISK IS MEASURED

Emergency Management Ontario (EMO) provides a template for communities to use for measuring risk based on probability and consequence. The City of Greater Sudbury Emergency Services Department expanded these to include frequency (how often has the event happened in the past) and response capability. The City of Greater Sudbury is one of the larger urban centres in Ontario that does **not** have an urban neighbor within one hour of travel time. Recognizing that external resources are not immediately available, response capability becomes a variable that must be considered when prioritizing risk in the community.

The HIRA (Hazard Identification and Risk Assessment) Committee used a number of factors when evaluating each risk. Though a number of methods were considered, the

[2] Statistics Canada 2006 Census

final product evaluated risks based on frequency, probability, consequences and response capabilities. Each of these factors was assigned a ranking and upon completion, all four factors were combined to provide an overall score out of a possible 15 marks. These risks were then placed in priority order based on their score. A high score indicated an item that was of high risk to the community, whereas a low score indicated an item that was a low risk to the community. Further details with regards to evaluating HIRA are offered below.

1. Frequency: Ranking from 1 (low occurrence) to 4 (high occurrence)

When evaluating each risk's occurrence in the Sudbury area, a great deal of statistical data was used to determine if an event had occurred in the past. Once this data was collected, each risk was ranked based on time factors, such as 5 years, 5-15 years, etc. High marks were assigned to those events that had taken place in the past five years, while low marks were assigned to those events that had never taken place in the Sudbury area.

2. Probability: Ranking from 1 (unlikely) to 3 (likely)

When evaluating each risk's probability of occurrence, a great deal of research was performed and a number of organizations offered their professional opinions. For example, when researching any natural disasters, Environment Canada was able to provide a number of statistical observations specific to the Sudbury area dating back nearly 30 years. Once an event's probability statistics were reviewed, it was deemed either as a likely, possible or unlikely event to occur in the Sudbury area.

3. Consequences: Ranking from 1 (negligible) to 4 (high)

To determine the potential consequences of each risk, research was performed into the type of damage associated with each risk and professional opinions were sought. Once all research was collected, consequences were ranked by severity, ranging from insignificant damage (damage that is too small to consider) to severe damage (damage including fatalities and loss of essential services).

4. Response Capabilities: Ranking from 1 (excellent) to 4 (poor)

The final component to the HIRA involved analyzing the City's ability to respond to each type of risk. There are many factors that influence the City's response capability including equipment, personnel, communications, technical support, training, experience and contingency plans. The ability of outside agencies to respond to events was also examined. Rankings for this category were placed in reverse order with high marks being assigned to emergencies where the City would have difficulty responding, making these events a higher risk to the community.

THE RANKING SCALE

Each hazard has been scored based on the following scale:

Frequency

1 – Negligible	No history of incidents in the Sudbury area
2 – Low	More than 15 years since last event
3 – Medium	5 - 15 years since last incident
4 – High	Event(s) in the last 5 years

Probability

1 – Unlikely	Has not occurred and unlikely to occur in the future
2 – Possible	Could occur in the future
3 – Likely	Has occurred and will occur again in the future

Consequences

1 – Negligible	Too small or unimportant to be worth considering
2 – Limited	Some injuries, minor/localized
3 – Substantial	Widespread injuries/damage, basic services out
4 – High	Fatalities, severe damage, essential services out

Response Capabilities

1 – Excellent	Ability to respond using only internal resources
2 – Good	Ability to respond using mainly internal resources and a small number of external resources
3 – Fair	Ability to respond using mainly external resources and a small number of internal resources
4 – Poor	Ability to respond using only external resources

SUMMARY OF FINDINGS

The following summary shows a ranked listing of the top hazards for the City of Greater Sudbury emphasizing those hazards that require specific attention in the Emergency Management Program (i.e.: response plans, training/exercises public awareness, etc.).

Event	Ranking
Hazardous Materials Incident – Fixed Site	15
Hazardous Materials Incident – Transportation	15
Human Health Emergencies and Epidemics	15
Tornados	14
Energy Emergencies – Hydro	12

Note: *A ranked listing of all City of Greater Sudbury hazards is located in Appendix 1.*

CATEGORIES OF HAZARDS

The Emergency Management Program divides hazards into three main categories: Natural, Technological and Human-Caused.

1. Natural Hazards

Natural hazards are emergencies that result from the forces of nature. The following natural hazards have been identified and assessed for the City of Greater Sudbury:

• human health emergencies	• extreme heat
• floods	• blizzard
• fires (forest, wildland, urban interface)	• fog
• extreme cold	• agriculture and food emergencies
• ice/sleet storms	• hailstorms
• tornadoes	• hurricanes
• windstorms	• earthquakes
• lightning and thunder storms	• drought

Human Health Emergency and Epidemic

WestNile Virus

Over the past few years, there have been a number of health related events that have taken place, though they are not officially classified as epidemics. From October 2003 to March 2004, the Public Health Unit declared an outbreak of Influenza A. During this same period of time, a cluster of meningitis cases where identified in the Valley East area. It was later determined that these cases were unrelated.

The Sudbury & District Health Unit began documenting cases of West Nile Virus in 2006. West Nile virus is an illness that spreads from mosquitoes to humans. The mosquito is capable of spreading the virus to people and animals while biting for a blood meal. The virus is not spread from person to person, and cannot be spread directly from infected animals, such as birds, horses or pets to people.

Documented Cases of Positive WestNile Virus[3]			
Year	**Birds**	**Mosquito Groups**	**Human**
2012	0	2	0
2011	0	0	0
2010	0	0	0
2009	0	0	0
2008	2	0	0
2007	2	0	0
2006	8	12	1

Blue-Green Algal Blooms

2012 saw the continued trend of multiple reports of Blue-Green Algal in area lakes that resulted in the closure of public beaches and Drinking Water Advisories. Ramsey Lake, which is a major source of drinking water for the residents of the City of Greater Sudbury, was one of those lakes affected. (source: Sudbury & District Health Unit)

Blue Green Algal Blooms can have an adverse effect on the City's source of drinking water. They are unsightly and may be toxic if ingested by wildlife, livestock or humans. Photosynthetic bacterium or cyanobacterium (generally known as blue-green algae) is commonly found in small numbers in lakes, ponds and wetlands. While it is normally invisible to the casual observer, it increases dramatically when conditions are favourable (most often during hot, calm weather) and the algae are often seen as blue-green in colour, resembling thick pea soup. Although blooms occur naturally, water bodies which have been enriched with plant nutrients from municipal, industrial and agricultural sources are particularly susceptible.

[3] Sudbury and District Health Unit

H1N1 Pandemic

On June 11, 2009, the World Health Organization (WHO) declared a "Level 6 pandemic". A "Level 6 pandemic" is declared when there is increased and sustained transmission of a virus in the general population. H1N1 (swine flu) first appeared in Mexico in mid March and spread to more than 208 countries including Canada. The vast majority of confirmed H1N1 cases had mild Influenza-Like Illness (ILI) and recovered in 3 to 5 days. The Sudbury & District Health Unit confirmed the first case of H1N1 in Greater Sudbury on May 4th, 2009.

Number of Confirmed H1N1Cases in Greater Sudbury	
Wave 2 - Fall 2009	72
Wave 1 – Spring summer 2009	23

These numbers confirmed that H1N1 influenza (flu) was spreading in our community. Laboratory samples are generally only collected from patients who are at high risk of complications due to influenza infection. Laboratory samples are not collected from every person with influenza-like illness who seeks medical care. Therefore, the numbers in the table only confirm that H1N1 influenza was present in our community. They do not paint the full picture of the level of activity (how many people were infected with influenza overall). (Source: Sudbury & District Health Unit)

The potential consequences of any of these human health emergencies are high and may include fatalities, the quick spread of disease in urban areas, and the strain of health care resources. The City's ability to respond to these threats would be poor as we would have to rely on external resources.

Flood

Flooding is defined as the filling or covering with water or other fluid, overflow, inundation, or the filling of anything to excess. Over the years, a number of overland floods have occurred in the Sudbury area with the most recent flooding occurring in 2002. The consequences have been limited to minor injuries and localized damage. The City's response capabilities for flood response remain fair, having to rely mainly on external resources and a small number of internal resources.

On July 26th, 2009 a massive rainstorm that was concentrated on a small area of Greater Sudbury (downtown area) dumped between 75 to 100 millimeters of rain in a two hour period. The rainstorm resulted in urban flooding that overwhelmed the drainage systems and caused significant property damage in localized areas. Flooded basements and sewer backups were the most common reported damage. There was no significant damage to municipal critical infrastructure.

On September 22nd & 23rd, 2010 Greater Sudbury received 75 mm of rain in a 30 hour period. As a result we experienced some minor localized flooding across Greater Sudbury.

Fire (Forest and Wildland/Urban Interface)
It has been between five and fifteen years since the last major forest or wildland fire occurred in Greater Sudbury, making the probability of one occurring now relatively low. However, the possibility is increasing due to larger amounts of forest fire fuels and climate change issues. The damage associated with such an event is expected to be limited to minor injuries and localized damage given the City's response capability.

Forest/Wildland Fires in Greater Sudbury[4]	
Year (as of Oct 31)	**Number of Fires** (bush, brush, forest)
2012	226
2011	301
2010	364
2009	17
2008	97
2007	179
2006	311
2005	341

Extreme Cold
Extreme cold is characterized by temperatures falling to -30ºC or less. From 1990 to 2002, Environment Canada recorded that an average of 2.4 days fell below these temperatures each year in the City of Greater Sudbury. Given our northern location, the City's ability to respond to these events is high.

Recorded Days with -30ºC Temperatures[5]	
Year (as of Oct 31)	**Number of Days** (-30ºC or less)
2012	0
2011	1
2010	0
2009	3
2008	0
2007	1
2006	0
2005	2

[4] Sudbury Fire Services Database
[5] Environment Canada

Ice/Sleet Storm

On average, there have been approximately 18 days of ice/sleet storms in the City of Greater Sudbury, with December and January being the months with the most freezing rain days recorded. The consequences of this type of event are high and include fatalities, severe damage and the loss of essential services. The City's ability to respond to such an event is fair, having to rely mainly on external resources and a small number of internal resources.

Tornado

A tornado is defined as a rotating column of air ranging in width from a few yards to more than a mile and whirling at destructively high speeds, usually accompanied by a funnel-shaped downward extension of a cumulonimbus cloud. On May 26, 2008, a tornado touched down on the water at Windy Lake Provincial Park. Environment Canada later confirmed this tornado was rated F0 (no damage). Though it had been more than fifteen years since the last tornado in the Sudbury area, there remains a probability of its re-occurrence. A tornado has a number of consequences including fatalities, severe damage and the loss of essential services. The City's ability to respond to such an event is fair, having to rely mainly on external resources. A number of critical infrastructures are at risk during a tornado including buildings, roads, utilities and rail lines.

Windstorm

A windstorm is a storm that is characterized by high winds or violent gusts, with little to no rain. Over the years, multiple windstorms have occurred in the Sudbury area however, physical injuries were minimal and damage to the City was localized. Windstorms are likely to occur again in the future and although the City has been fortunate in the past, these storms do have the potential for creating significant damage. The City's response capabilities for this type of emergency remain good, as we are able to respond using mainly internal resources, and a small number of external resources. Our main critical infrastructures at risk during such an event include utilities and roads and rail lines, which can easily become obstructed by fallen debris and substantial wind gusts.

Lightning and Thunderstorm

There has been an average of 22 thunderstorm days over a 30-year period (1971–2000) in the Greater Sudbury area. On July 17th, 2006, a line of severe thunderstorms with very strong winds passed through the city. This event, called a "DERECHO", produced wide spread damage to infrastructure and private property and resulted in power outages to hundreds of residents for up to 6 days. Prior to this date, the City had only experienced minor, localized damage due to thunderstorms. If a large scale storm were to occur, the City's ability to respond with internal resources would be quite good, requiring limited external resources and support.

Extreme Heat

Extreme heat is defined as a maximum temperature reaching or exceeding 30ºC and the Humidex reaching or exceeding 40ºC. Between 1990 and 2002, Environment Canada recorded an annual average of 5.8 days reaching or exceeding these temperatures in the City of Greater Sudbury. The City's ability to respond to extreme heat conditions with internal resources is good.

Recorded Days with 30ºC Temperature and 40ºC Humidex[6]	
Year	**Number of Days**
2012	8
2011	6
2010	13
2009	1
2008	0
2007	6
2006	9
2005	20

Blizzards

Violent snowstorms are typically called blizzards. Blizzards are generally defined by a period of six or more hours with winds above 40 km/h with visibility reduced to below 1km by blowing and drifting snow. Over a 49-year period (1954-2002) the Sudbury Airport has recorded an annual average of 1.9 days with daily snowfall exceeding 115cm. The consequences as a result of these types of storms are limited and the City's ability to respond to such events is excellent.

Fog

Between 1971 and 2000, Environment Canada recorded an annual average of 67 days with at least one hour of fog in the City of Greater Sudbury. The City has never experienced a fog incident that has resulted in any damage and as such, the probability of a damaging fog event occurring is quite low. However, should thick fog occur, the City's ability to respond to resulting vehicle accidents would be fair.

Agriculture and Food Emergency

If an agricultural or food emergency were to occur in the City of Greater Sudbury, the consequences would be substantial, as we would lose our essential food supply. The City's ability to respond to such an emergency is fair though we would have to rely mainly on external resources. Our main concern would be the environmental impact on local land, as well as the resulting supply shortage to food banks and private homes. This type of event has never occurred and it is very unlikely that it will in the future.

[6] Environment Canada

Hailstorm

Hail is a precipitation consisting of ice pellets with a diameter of 5 millimetres or more. The probability of a hailstorm occurring in the Sudbury area is quite low, however if such an event should occur, the consequences could include injuries and minor or localized damage.

Hurricane

Greater Sudbury has never experienced a hurricane and the probability of one occurring is low. However, in the event that a hurricane does occur, the consequences could include injuries and minor or localized damage and the City's response capability would depend mainly on external resources.

Earthquake

In the past five years, there have been four earthquakes recorded in Greater Sudbury by the Geological Survey Commission of Canada. Though there was no damage from any of these events, we must recognize the consequences involved, which could include injuries and minor or localized damage. The City's ability to respond to such an event is fair, having to rely mainly on external resources and a small number of internal resources. A number of critical infrastructures would be at risk during an earthquake including buildings, roads, utilities and rail lines.

Earthquakes Recorded in Greater Sudbury[7]	
Year	**Magnitude**
2012	0
2011	0
2010	0
2009	0
2008	0
2007	0
2006 (Nov 29)	4.1
2005 (Mar 13)	3.6
2005 (Sept 21)	2.9

Note:

- On August 23rd,2011, Greater Sudbury residents felt some minor shaking as a result of an earthquake in Charlottesville Virginia, USA measuring 5.9 on the Richter scale.
- On June 23rd, 2010, a magnitude 5.0 earthquake hit central Canada. Although Greater Sudbury residents felt some minor shaking the epicentre of the quake was in Val-des-Bois, Quebec.

[7] Geological Survey Commission of Canada

Drought
Drought can be defined as a prolonged period of abnormally dry weather producing a moisture shortage that affects crops and forests, and reduces water resources to a degree, that creates serious environmental, economic or social problems. It has been more than fifteen years since the last severe drought in the Sudbury area and as such, the possibility of its occurrence is unlikely. The anticipated damage associated with a drought in Greater Sudbury would be small. However, if a large scale drought were to occur, the City's ability to respond is rated as fair.

2. Technological Hazards

Technological hazards are emergencies that result from the manufacture, transportation, and use of technology or certain substances. The following technological hazards have been identified and assessed for the City of Greater Sudbury:

• hazardous materials: chemical release	• other mass casualty incidents
• hazardous materials: transport incident	• critical infrastructure failure: water
• air accident: passenger, offsite, rural	• critical infrastructure failure: bridge
• air accident: passenger, offsite, residential	• critical infrastructure failure: hospital
• air accident: passenger, onsite	• transportation accident: passenger (road and rail)
• energy emergency: hydro	• nuclear facility emergency
• explosion / fire	• dam failure
• mine emergency	• petroleum / gas pipeline emergency

Hazardous Materials: Chemical Release (breaches confines of facility)
Greater Sudbury has experienced hazardous material releases into the atmosphere on five occasions in the last five years. Though these were minor events, it is likely to re-occur due to the types of industries present in this community. These types of events are difficult to control and impossible to contain since the chemicals tend to follow the direction of the wind. The consequences from such an emergency could be substantial and may include widespread injuries/damage and the loss of essential services. There is also a great risk for negative environmental impact as well as damage to critical infrastructure. The City's ability to respond to such an event remains poor as we would need to call outside sources such as the Ministry of the Environment and CHEMTREC.

(See table below)

Hazardous Materials: Fixed Site	
2012	no incidents
2011	no incidents
2010 – July 1	sulphuric acid
2010 – January 22	sulphur
2009 – June 1	Oleum (Sulphur Trioxide)
2008 – October 9	chlorine
2006 – August 3	ammonia

Hazardous Materials: Transport Incident
On July 7th, 2011, a truck carrying chlorine caught fire on the southwest bypass. Fortunately Greater Sudbury Fires Services were able to contain the fire quickly and it did not result in a threat to public safety. In 2004, an accident involving a transport truck carry hazardous material caused minor injuries and localized damage. However, this type of event could happen again in the Sudbury area due to the number of major highways running through the city. Our ability to respond to such an event remains poor as we would need to call outside sources such as the Ministry of the Environment and CHEMTREC.

Air Accident: Passenger, Offsite, Rural
The City of Greater Sudbury has one airport that is serviced by Air Canada, Bearskin Airlines and Porter Airlines.

Though a commercial passenger aircraft has never crashed in a rural area of Sudbury, private aircrafts have. Given the large number of flights that pass through the area on a daily basis, there remains the possibility of this type of event occurring at both the commercial and private level. If this type of event did occur, the consequences would be limited to some injuries and localized damage and our ability to respond is fair. The major concern with a rural, offsite crash is the ability of the rescue team to locate and access the fallen aircraft.

Air Accident: Passenger, Offsite, Residential
Though there has never been a passenger aircraft that has crashed in a residential area of the City of Greater Sudbury, this type of event cannot be ignored due to its substantial consequences. These consequences could include widespread injuries and damage, as well as the loss of basic services. The City's ability to respond to such an incident is fair having to rely mainly on external resources.

Air Accident: Passenger, Onsite
Though a passenger aircraft has never crashed at the Sudbury airport, we cannot ignore the possibility. The consequences associated with such an event are limited to some injuries and localized damage. The City's ability to respond to such an event is good as we are able to respond with mainly internal resources and limited external support.

Energy Emergency: Hydro
Though there is no power generating station in Greater Sudbury, the possibility of a power related event occurring remains a concern. On July 17, 2006, hydro infrastructure was severely damaged due to a severe windstorm leaving hundreds of residents without power for up to 6 days. In August of 2003, the City of Greater Sudbury experienced the province wide substantial power failure which resulted in a 19-hour blackout for most residents. On January 17th, 2011, a power outage affected over 7600 customers which lasted over six (6) hours. The temperature on that date was -12 degrees Celsius. An energy emergency occurring during the winter months is more severe and could result in a number of consequences including fatalities, severe damage and the loss of essential services. Even though the City has experienced this type of emergency, the ability to generate power locally does not exist. Our ability to respond with internal resources to such an event remains good.

Explosion/Fire
An emergency involving an explosion or fire has not occurred in the Sudbury area in the past 5 to 15 years. However, the consequences involved with this type of situation are high, resulting in the possibility of fatalities, severe damage and the loss of essential services. The City's ability to respond to this situation is fair having to rely mainly on external resources. It is important to note that severe environmental impacts could occur as a result of an explosion, as well as damage to critical infrastructure within the City.

Mine Emergencies
As one of the world's leaders in mining, the consequences of a mining emergency are limited, resulting in the possibility of injuries and minor localized damage. However, this type of event is likely to happen in the City of Greater Sudbury as it has in the past. Our ability to respond to such an incident is fair having to rely mainly on external resources and a small number of internal resources.

Other Mass Casualty Incidents
A Mass Casualty Incident is defined as any single occurrence that overwhelms local resources. Mutual Aid agreements with surrounding authorities would ensure that first response agencies such as Police, Fire, and EMS receive adequate assistance within a reasonable time period. The local hospital would be overwhelmed with the number of injured, particularly if the incident involved biological, chemical, or radiological agents. The City's ability to respond to this type of emergency would be fair having to rely mainly on external resources.

Critical Infrastructure Failure: Water
The consequences that would result from a water emergency are high and include fatalities, severe damage and the loss of essential services. Furthermore, the City's ability to respond to such an event remains fair having to rely mainly on external resources to manage the situation. A large environmental impact to ground, air and water could be expected if the water emergency involved contamination.

Critical Infrastructure Failure: Bridge
On May 7, 2004, a bridge under construction collapsed, blocking a major arterial road in the city. The consequences that could result from a bridge collapse are limited to a localized area. The City's ability to respond with internal resources to such an event is good.

Critical Infrastructure Failure: Hospital
On June 6, 2007, Sudbury Regional Hospital, St Joseph's site, sustained minimal fire damage as a result of an electrical fire in the lower level of the building. The hospital was taken off the hydro grid and ran on auxiliary generator power for several hours. The Emergency Room was relocated to the Memorial site and a number of patients were transferred to other facilities. Eight hours later the generator failed and the full scale evacuation of patients began. When power was restored hours later, the evacuation of patients ceased. Though this incident resulted in minor damage to the building and only a partial evacuation of patients this type of event cannot be ignored. The consequences of a loss of hospital beds to the community are significant. The City's ability to respond with internal resources to the fire is good; however our ability to replace hospital beds in the community is poor and would require assistance from external resources.

Transportation Accident: Passenger (Road and Rail)
Though it has been more than fifteen years since the last transportation accident that involved passengers traveling by road or rail, we cannot deny the possibility that it could occur in the future. The consequences as a result of this type of event are limited to injuries and minor or localized damage. Our ability to respond to such an event remains good having to rely mainly on internal resources and only a small number of external resources.

Nuclear Facility Emergency
There is currently no nuclear facility found within the Greater Sudbury area, making the possibility of an emergency occurring very unlikely. However, we must note the consequences involved should a nuclear facility emergency occur. These consequences could include injuries and minor, localized damage. As well, the City's ability to respond to such an event would be low, and as such we would rely heavily on external support and resources.

Dam Failure
When a dam fails or is subject to massive overtopping, huge quantities of water rush downstream with great destructive force. A dam failure has never occurred in the Sudbury area, and as such it remains unlikely. Even so, we must acknowledge the substantial consequences that could result from a dam failure including widespread injuries and/or damage and the loss of basic services. The City's ability to respond to this type of event remains good, as we are able to rely mainly on internal resources with minimal external support.

Petroleum/Gas Pipeline Emergency
Although there has never been a petroleum or gas pipeline emergency in the City of Greater Sudbury and it has been determined that it is an unlikely event to occur in the future, we must recognize the consequences. There is a possibility of injuries and minor or localized damage resulting from a petroleum or gas pipeline emergency, the City's ability to respond to such an event is good***.***

3. Human Hazards

Human hazards are emergencies that result directly from human actions. The following human hazards have been identified and assessed for the City of Greater Sudbury:

• sabotage
• terrorism
• civil disorder

Sabotage
In 2008, there was a significant rise in the number of arsons in Greater Sudbury. There were no fatalities however, property damage was significant. Property damage/loss due to arson included a warehouse, an apartment building, a restaurant and a police storefront. The United Steelworkers Hall, a Sudbury landmark, was destroyed on September 19th. The Steelworkers Hall fire posed a significant threat to the community as the building sits over a culvert that flows into the lake from which the City draws much of its drinking water. Runoff from the water used to put out the fire and the materials in the building could have contaminated the lake. Though the occurrence of sabotage events remains low, it is important to note that the consequences of such events are substantial and include widespread injuries/damage and the loss of basic services. The City's ability to respond to sabotage is fair, using mainly external resources and a small amount of internal support.

Terrorism
Though the City of Greater Sudbury has never endured a terrorist attack, given the events happening around the world we cannot ignore the possibility. The consequences that come as a result of a terrorist attack are high and can include fatalities, severe damage and the loss of essential services. The City of Greater Sudbury's ability to respond to a terrorist attack including chemical, biological, radioactive and nuclear agents is poor.

Civil Disorder

Though it has been more then fifteen years since the last occurrence within the Sudbury area, we cannot deny the possibility that civil disorder could occur in the future. The consequences involved in a civil disorder could include injuries and minor and localized damage. The City's ability to respond to such a situation is good using mainly internal resources and few external resources.

REPORT MAINTENANCE

This report is reviewed and updated annually by the staff of Emergency Management as required by the Province of Ontario, *Emergency Management and Civil Protection Act*.

Appendix 1

RANKED LISTING

Hazard	Ranking	Frequency	Probability	Consequences	Response Capabilities
NATURAL EVENTS					
Human Health Emergencies	15	4	3	4	4
Tornadoes	14	4	3	4	3
Floods	12	4	3	2	3
Fires (Forest and Wildland)	12	4	3	2	3
Lightning and Thunderstorms	12	4	3	3	2
Earthquakes	11	3	3	2	3
Ice / Sleet Storms	11	4	2	2	3
Extreme Cold	11	4	3	2	2
Extreme Heat	11	4	3	2	2
Windstorms	10	3	3	2	2
Blizzards	9	4	3	1	1
Fog	8	1	2	2	3
Agriculture and Food Emergencies	8	1	2	3	2
Hailstorms	7	1	2	2	2
Hurricane	7	1	1	2	3
Drought	7	1	2	2	2
TECHNOLOGICAL EVENTS					
Hazardous Materials – Fixed Site	15	4	3	4	4
Hazardous Materials – Transportation	15	4	3	4	4
Energy Emergency - Hydro	12	3	3	4	2

Hazard	Ranking	Frequency	Probability	Consequences	Response Capabilities
TECHNOLOGICAL EVENTS (continued)					
Critical Infrastructure - Computers	12	4	3	3	2
Explosions or Fire	12	3	2	4	3
Mine Emergencies	11	3	3	2	3
Extreme Air Pollution	11	4	2	2	3
Critical Infrastructure - Hospital	10	3	3	2	2
Other Mass Casualty Incidents	10	1	2	4	3
Critical Infrastructure – Water	10	1	2	4	3
Critical Infrastructure – Sewers	10	3	3	2	2
Infrastructure/ Bridge Collapse	9	3	2	2	2
Air Crash Offsite– Rural	9	1	2	2	4
Building Structural Collapse	9	1	2	3	3
Critical Infrastructure – Telecomms	9	1	2	3	3
Transport Accident – Passenger	8	2	2	2	2
Nuclear Facility Emergency	8	1	1	2	4
Air Crash Onsite – Airport	8	2	2	2	2
Dam Failure	8	1	2	2	3
Air Crash Offsite – Residential	7	1	2	2	2
Energy Emergency – Natural Gas	5	1	1	1	2
Petroleum / Gas Pipeline emergency	5	1	1	1	2

Hazard	Ranking	Frequency	Probability	Consequences	Response Capabilities
HUMAN EVENTS					
Sabotage	13	4	3	3	3
Civil Disorder	8	2	2	2	2
Terrorism	7	1	2	2	2

HIRA SHEET

Event:
Type:

Score

Frequency	4	High	Event(s) in the last 5 years.
	3	Medium	It has been 5-15 years since the last event.
	2	Low	It has been more than 15 years since the last event.
	1	Nil	It has never occurred in the Sudbury area.

Probability	3	Likely	Has occurred in the past and will occur again in the future.
	2	Possible	Could occur in the future.
	1	Unlikely	Has not occurred and will not in the future.

Consequence	4	High	Fatalities, severe damage, essential services out.
	3	Substantial	Widespread injuries/damage, basic services out.
	2	Limited	Some injuries, minor/localized damage.
	1	Negligible	Too small or unimportant to be worth considering.

Response Capabilities	4	Poor	Ability to respond using only external resources.
	3	Fair	Ability to respond using mainly external resources and a small number of internal resources.
	2	Good	Ability to respond using mainly internal resources and a small number of external resources.
	1	Excellent	Ability to respond using only internal resources.

Environmental Impact:

Environment	Concerns	Controlling these Concerns
Ground		
Air		
Water		

Other Concerns:

Critical Infrastructure at Risk

Population Affected:

Organizations That Can Offer Assistance:

Existing Plans: