****

**Hazard Vulnerability Risk Analysis**

**Tool Kit for Communities**

**August 2020**

# TABLE OF CONTENTS

Introduction 3

Step 1: Organize 4

Step 2: Training for Working Group Members 5

Step 3: Gather Risk Assessment Information 12

Step 4 – Identify Hazards, Vulnerabilities 13

Step 5 - Assess hazard severity and likelihood. 14

Step 6 – Risk Evaluation 17

Step 7 – Assessing Public Acceptance 18

Step 8 – Action Plan 19

Appendix 1 – Working Group membership and Contact List 20

Appendix 2 – Work Plan Template 21

Appendix 3 – HRVA Template 22

Appendix 4 – Risk Reduction Measures Worksheet 23

Appendix 5 – Risk Reduction Strategies Checklist 24

Appendix 6 – Stakeholder Interest Table 27

Appendix 7 – Action Plan 28

# Introduction

**Hazard, Risk & Vulnerability Analysis**

Identifying and understanding where a community is vulnerable, or at risk, allows emergency managers to prevent or reduce the consequences of hazards.  The assessment should be completed in conjunction or after completion of developing an emergency management plan.

An HRVA is the foundation for any community or regional emergency management program. It informs risk reduction strategies, emergency response and recovery plans, and other elements of emergency programs.  It provides communities with a clear understanding of their potential risks and guides them to focus on the most impactful threats and vulnerabilities.

The purpose of Hazard, Risk and Vulnerability Analysis (HRVA) is to help a community make risk-based choices to address vulnerabilities, mitigate hazards and prepare for response to and recovery from hazard events. Risk-based means based on informed choices of alternate unwanted outcomes. In other words, communities make risk reduction choices based on the acceptability of consequences and the frequency of hazards.

HRVA is a critical part of every emergency program. In Saskatchewan, local authorities are responsible for the direction and control of their community emergency response in order to take action to implement their plan and to protect the property, health, safety and welfare of the public within their control. As per *The Emergency* *Planning Act, 1989,* Section 10, “Every local authority shall at all times be responsible for the direction and control of the local authority’s emergency response unless the minister assumes direction and control pursuant to clause 18(1)(c).”

Hazard, risk and vulnerability analysis (HRVA) is not an end in itself. The purpose of hazard, risk and vulnerability analysis planning is to anticipate problems and possible solutions to help save lives and property, reduce damage, and speed a community’s recovery. HRVA helps us work towards disaster- resilient communities.

# Step 1: Organize

# The local authority or community leadership must commit to or direct the completion of HRVA. These leaders are responsible for emergency measures and will ultimately need to develop an emergency management plan to ensure they are prepared to respond to a given threat or event.

# The first step is of this process is to create a working group to complete the assessment. If your community has an existing Emergency Measures Organization (EMO) Committee, they should be responsible for completing this task. Membership may include representation from a variety disciplines and members of the general public. A chair or coordinator needs to be selected who will organize the groups activities, documentation and provide regular updates to community leadership or local officials.

# Working group size can vary but it is recommended that the groups be limited to 3-7 persons to make coordination and scheduling easier. Examples of disciplines or skills that may be valuable contributors to your working group include:

# Local officials (council members or town administrators)

# public works officials (road workers, water treatment, etc.)

# RCMP, police or bylaw personnel

# fire department representatives

# EMS or local health officials

# Elders, knowledge keepers or retired local officials with historical experience or knowledge of prior events (flood, etc.)

# Members of the general public (interested parties, service clubs, friendship centres)

# Once your membership is selected, schedule an initial meeting to review the objectives of your group, review tool kit material, create a work plan and develop a task list and schedule.

# The work plan and task list is a living document – this means that items can be added or removed as you move through the process. Documenting tasks, requirements, who is assigned and a due date will keep your group focused and moving forward.

# Step 2: Training for Working Group Members

To prepare for emergencies at the community level, it is important to know what to plan and prepare for. You have limited time and resources, so identify risk reduction action items for your greatest risks first.

The Saskatchewan Public Safety Agency has staff available to provide assistance in completing assessments and additional training specific to emergency management plan development and recognizing community specific risk. To contact the SPSA, please call 1-800-667-9660.

A Hazard, Risk and Vulnerability Analysis (HRVA) helps communities answer the following questions:

* What hazards are likely to occur in my community/region?
* How severe will the impact of hazards be on our population, infrastructure, property, environment and other values?
* How resilient is my community to the identified hazards?
* What risk reduction strategies can be implemented?
* Does our current emergency plan(s) meet my community need?

## **Goals of Working Group**

1. Create the following documents:
	1. risk profile;
	2. risk reduction action plans to address vulnerabilities and moderate to high risks;
2. Inform your local authorities, leadership and emergency officials, and the public.
	1. Report of findings and recommended action plans.
3. Implement or assist those responsible for risk reduction measures (if approved) and improve local emergency preparedness.

## **Risk Management Process**

The Hazard, Risk and Vulnerability Analysis (HRVA) tool kit recognizes the best practices for emergency management.

The HRVA tool is a step by step process that enables an HRVA committee chair, and a small working group, to complete a hazard, risk and vulnerability analysis. There will be a time commitment to complete the analysis, make recommendations to community leaders and improve emergency plans. process is achievable—the process is easy to understand and the tool includes samples of forms, agendas, checklists and schedules.

The basic process has eight steps.

|  |  |
| --- | --- |
| Step 1 | * Obtain direction from your local authority and review your current emergency management plan
* Draft the work plan checklist and schedule
 |
| Step 2 | * Review materials provided in this tool kit. For further explanation contact the SPSA
 |
| Step 3 | * Begin to gather hazard and vulnerability information and maps
 |
| Step 4 | * Identify hazards and vulnerabilities
 |
| Step 5 | * Assess hazard severity and likelihood
* Identify risk reduction measures
 |
| Step 6 | * Evaluate risk profile and estimate acceptability of risk
 |
| Step 7 | * Assessing Public Acceptance
 |
| Step 8 | * Create action items and report to community leadership
 |

## Your local authorities and/or community leadership should provide guidance on public consultation or may wish to participate directly in public consultation activities.

**Risk Definitions**

The concept of ***risk*** is illustrated by the tightrope walker. Pause for a minute to think about the risk to the person on the high wire. In this example, the risk to the tightrope walker is falling off and getting killed—a high-risk activity!

Now consider that the high wire is only one metre above the ground. The falling ***hazard*** still exists and the chance of falling remains constant, but the risk is considerably different than if the person were 100 metres above the ground. Thus risk does not mean chance, probability or likelihood.

Risk is a total concept of ***likelihood*** of occurrence of a hazard and the severity of possible ***impacts***. Perhaps there is a crowd below the tightrope walker ***vulnerable*** to injury. The severity of impact to the tightrope walker and the crowd can be ***mitigated*** by a safety net, the chance of falling can be ***reduced*** by special training and the extent of injury can be ***mitigated*** by emergency medical response capability.

* **Risk**—the chance of injury or loss as defined *as* ***a measure of the probability [likelihood] and severity*** of an adverse effect to health, property, the environment, or other things of value.
* **Risk analysis**—the systematic use of information to identify hazards and to estimate the chance for and severity of, injury or loss to individuals or populations, property, the environment, or other things of value.
* **Hazard**—a source of potential harm, or a situation with a potential for causing harm, in terms of human injury; damage to health, property, the environment, and other things of value; or some combination of these.
* **Hazard identification**—the process of recognizing that a hazard exists and defining its characteristics.
* **Consequences or impacts**—an adverse effect to health, property, the environment, or other things of value.
* **Vulnerability**—people, property, infrastructure, industry and resources, or environments that are particularly exposed to adverse impact from a hazard event.
* **Response and recovery capability**—is defined as locally available strengths and capacities to reduce the impact of adverse conditions of a disaster. Impact severity and extent of vulnerability are dependent upon the capability or capacity to reduce the severity of impact. A deficiency in response or recovery capability can create an unacceptable exposure.
* **Risk evaluation**—the process by which risks are examined in terms of costs and benefits, and evaluated in terms of acceptability of risk considering the needs, issues, and concerns of stakeholders.
* **Risk reduction measure**—an action intended to reduce the frequency and/or severity of injury or loss, including a decision not to pursue the activity. For example: flood control mitigation works or emergency response exercises.

The following hazard definitions were adopted by Saskatchewan but were originally prepared by the Disaster Preparedness Resources Centre at the University of British Columbia in order to provide information to municipalities, provincial and federal ministries and departments, local area coordinators and emergency planners.  ***Not every hazard applies to every geographic area, only utilize those appropriate for your areas location, the areas surrounding topography, local industry and community size.***

**Accidents**

* Air crash is an accident involving one or more aircraft that results in damage to aircraft, property or human injury or death. Most crashes occur near airports, however, they can occur anywhere in Saskatchewan.
* Marine accidents include collisions, groundings, strikings, explosions and fires, structural failures as well as accidental spills of petroleum products or chemicals, loss of cargo and human death or injury. Marine accidents can have local or widespread environmental and economic impact.
* Motor vehicle crashes that involve a large number of passengers, or carry hazardous or explosive products that have the potential for a severe human or environmental impact are of concern.
* Rail accidents occur when a train derails or collides with another train, motor vehicle, or obstruction on the rail tracks. Rail accidents have potential for a severe human or environmental impact.

**Atmospheric Hazards**

* Snowstorms vary from light sprinkles of snow to accumulations of several metres. Similar to the effects of blizzards, snowstorms are, however, not often associated with high winds. Snowstorms impact upon transportation, power lines and communications infrastructure, and agriculture.
* Blizzards combined high winds (typically in the 90 to 130 kilometres per hour range), blowing snow, and low temperatures. The effects of the storm are always intensified by the wind chill factor associated with the high winds. Blizzard conditions occur most often in unforested areas where there are no trees present to break the effects of the wind. Blizzards impact upon transportation, buildings, power lines and communications infrastructure, and agriculture. Blizzard conditions are often accompanied by freezing rain.
* Ice storms and ice fogs cause accumulation of ice on structures. An ice storm combines high wind, freezing temperatures, and freezing rain or drizzle. An ice fog combines very cold temperatures, and a source of warm moisture. Ice accretion impacts upon transportation, buildings, power lines and communications infrastructure.
* Hailstorms are precipitation in the form of ice balls of five millimetres or more in size. Hailstorms impact upon agriculture and property.
* Lightning can occur where there is moisture-laden instable air, ascending air and thunderclouds. Lightning impacts air transportation, power lines and communications infrastructure and causes forest fires.
* Smoke particulate levels from fire events, high levels can impact air quality and cause health risk to vulnerable populations.
* Hurricanes, or tropical cyclones are defined as storms with wind speeds in excess of 110 kilometres per hour. Hurricanes cause injury as well as property and infrastructure damage because of high winds, flooding from heavy and rapid rain fall and storm surges from wind and low pressure.
* Tornadoes are funnel clouds of very rapidly rotating air. At the centre is an intense low pressure of rapidly rising air. The tornado is a secondary formation of vortex activity in a higher cloud layer. The extreme wind velocities severely impact upon people, property and infrastructure.
* Heat waves can be characterized by temperatures significantly above the mean for an extended period, or by a combination of high temperatures with high humidity and a lack of air motion. Heat waves impact upon the very young, the elderly and those with cardiovascular conditions. Heat waves also impact upon agriculture.

**Dam Failure**

* Dam failure is a breach in the dam itself, its foundations, abutments, or spillway, which results in large or rapidly increasing, uncontrolled releases of water from the reservoir.

**Disease and Epidemics**

* Human diseases are diseases and epidemics that affect people, cause death, have serious economic implications and form the basis for a mass casualty emergency response. These include epidemics such as meningitis, pandemic flu, hepatitis, E. coli, and other communicable diseases.
* Animal diseases can be spread between animals and sometimes to humans. The threat of foreign animal disease, such as foot and mouth disease, is catastrophic impact on the economy.
* Plant diseases caused by pathogens such as viruses, bacteria, fungi and algae impact upon crops, residential trees, and forests. A widespread outbreak could have severe economic consequences.
* Pest infestations are classified as foliage feeding or root feeding. A widespread outbreak could have severe economic consequences.

**Explosions and Emissions**

* Pipeline and gas well leaks and explosions occur when natural gas or gasoline pipelines, valves or components rupture, by accident, by mechanical failure or corrosion. Gas leaks can also be caused by natural hazards such as earthquakes or landslides.
* Mine explosions are usually caused by a buildup of explosive gases underground in the mine. These gases can be set off by a spark or by miners entering, working or leaving the area. Errors with the handling of explosives underground can also cause life-threatening explosions.

**Fire—Urban and Rural**

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

**Hazardous materials**

* Hazardous materials spill on site or transport route is any uncontrolled release of material posing a risk to health, safety, and property. Transport routes include air, marine, rail and roads. Refer to The Environment Spill Control Regulations for information on reporting spills. Other hazardous materials include radiation and infectious materials.

**Hydrologic**

* Drought results from an abnormal water deficiency. The impact can be crop failure, forest fire conditions, dust storms, insufficient and polluted water supplies and other ecological and economic effects.
* Erosion and accretion is the wearing away and accumulation of land by natural forces such as wave action, river and tidal currents and precipitation. Accretion in rivers increases the risk of flooding. Erosion of shoreline slopes increases the risk of slope failure. These processes can result in property damage.
* Local flooding may be associated with an extreme hydrologic event such as a record rainfall or by poor or blocked drainage. Flooding impacts upon transportation, property and agriculture.
* Freshet flooding is a late spring event caused by the melting of snow pack. Flooding impacts upon transportation, property and agriculture.
* Ice jams are an accumulation of broken river ice caught in a channel, usually at a shallow, narrow or curved portion, frequently producing local floods during the spring breakup. Ice jams can also occur on freeze-up. Ice jams impact communities and agriculture by flooding behind the ice jam, or by flash flooding by its sudden release.
* Storm surges are increases in water levels which exceed normal tide heights. They are caused by winds driving water shoreward and often by a rise in water level due to a low pressure system. Storm surge flooding impacts people and property.

**Power Outages**

* Power outages occur on a regular basis, however, they become a concern when the power outage is for a significant amount of time, when the temperatures are very low, or critical infrastructure, persons, livestock or businesses are affected.

**Riots**

* Riots are violent public disorders by a group of persons with either a common or random intent to destroy property, assault persons, or otherwise disturb the peace.

**Seismic**

* Earthquake or ground motion is defined as violent shaking of the ground accompanying movement along a fault rupture. Seismic energy traveling in waves may cause damage to structures, trigger landslides, liquefaction or other geologic event, or generate tsunamis. Impacts from earthquakes can be widespread and severe.
* Tsunamis or seismic sea waves result from offshore earthquakes where there is sudden subsidence or uplift. Impacts include coastal flooding, which can be intensified in inlets. This can destroy homes and property. Possible death and suffering may be mitigated with warning. Proximity to the source of the tsunami defines the warning period. A local event may provide 15 minutes warning; a distant event may provide five or more hours warning.

**Space Objects**

* Space objects crash is the result of either a technological or natural object from space penetrating the earth's atmosphere and crashing on earth causing damage. This can be a meteor, meteorite, asteroid or other naturally occurring space object, or it can be a man-made satellite, space station, or space craft.

**Structural**

* Structural collapse occurs when a building or structure collapses due to engineering or construction problems, metal fatigue, changes to the load bearing capacity of the structure, human operating error or other cause such as earthquake, flood, fire, explosion, snow or ice buildup.

**Terrorism**

* Terrorism is considered to be a hostile act committed against the state and designed to exercise the use of terror, especially as a means of coercion. Most common forms include bomb threat, explosions from bombs, sabotage, kidnapping or hostage situations. Other terrorism threats include those from chemical, biological, radiological or nuclear (CBRN) weapons.

**Volcanic**

* Ash falls occur where fine volcanic ash has been ejected out of a vent into the atmosphere, possible transported by upper level winds, and deposited on the earth. Impacts include health hazards, pollution of water supplies, disruption of transportation and structural collapse.
* Pyroclastic flows are sudden and very rapid flows of hot gas, ash and rock particles down the slopes of a volcano associated with explosive eruptions. They destroy everything in their path.
* Lava flows are slow speed flows of molten rock. People can evacuate, but structures are usually destroyed when in the path of a lava flow.
* Mud flows are slurries of water and rock particles. These can occur long after an eruption has deposited ash. Mud flows are extremely destructive but usually confined to valley bottoms.

**Wildfire**

* Wildfire exists when there is uncontrolled burning in grasslands, brush or woodlands. Interface fire is wildfire that impacts or threatens adjacent property and infrastructure or human lives.

## **Vulnerability**

* Vulnerability is defined as people, property, infrastructure, industry and resources, or environments that are particularly exposed to adverse impact from a hazard event.
* Consider a hazard scenario with a vulnerable population, such as an elementary school along an earthquake fault where a large number of casualties might occur. This scenario might have a consequence magnitude rating of "very high". The recognition of vulnerabilities identifies opportunities for risk reduction. For example, if a risk reduction measure were implemented to give the school a seismic upgrade, then the consequence rank is lower and the overall risk might become acceptable.
* There are four groups of vulnerabilities to consider in your hazard scenarios: social, physical, economic and environmental. Some examples include:

## **Social**

* + - Confined – penitentiaries or jails
		- Elderly – group homes or retirement complexes
		- Gender – mothers and children, violence against women
		- High density – shopping malls, theatres, stadiums, high-rise buildings
		- Infirm – hospitals
		- Language – ethnic centres
		- Persons with disabilities – vision, hearing, mobility, mental, dependency
		- Young – schools or recreation centres

## **Physical**

* + Bridges
	+ Communications systems – telephone, radio, cellular, television
	+ Critical infrastructure
	+ Gas and oil transmission and distribution pipelines
	+ Hazardous waste sites
	+ Historic sites
	+ Mobility of population
	+ Power transmission towers
	+ Property and infrastructure in close proximity to hazard
	+ Trailer parks and campgrounds
	+ Transportation – routes, terminals, systems: road, rail, air, water
	+ Water reservoirs and hydro dams

## **Economic**

* + Farm land and animals
	+ Lack of economic diversity – single major employer or tourism
	+ Limited access to credit
	+ Minimal access to critical services
	+ No insurance
	+ Poor – social housing or low-rent areas

## **Environmental**

* + Areas of biodiversity and ecological value – wetlands
	+ Parks
	+ Resource degradation or depletion – forests
	+ Sensitive areas – coastline or fisheries

**Step 3: Gather Risk Assessment Information**

In this step, you will begin the process of developing a *risk information library* tosupport hazard identification and risk analysis. Your community is not the only party interested in identifying and mitigating risks. Several provincial and federal organizations either have a responsibility or an interest as well. They have the advantage of skilled experts in their field of responsibility who have already completed formal or scientific assessments of some potential hazards or features of your area.

Many organizations make their assessments and reports publicly available on their websites or from their offices. Key organizations to contact include:

* Saskatchewan Public Safety Agency
	+ Provincial risk assessment
	+ Fire mitigation plans
	+ Emergency Management planning reference materials
	+ Fire danger map
	+ Fire Smart Program
* Water Security Agency
	+ Forecasts Advisories and Flood Watch
	+ Infrastructure evaluations (i.e. dams)
	+ Emergency flood damage reduction program
	+ Stream flows and lake levels
* Ministry of Highways
	+ Maps (Highway Hotline)
	+ Road/bridge assessments
* Environment Canada
	+ Seasonal weather forecasts
	+ Historical weather information

An important component is surveying your community and surrounding area. Tour your area, examine the conditions and known hazards. If needed, take pictures or video to use during the assessment discussions with the working group or for inclusion in your report to your leadership or local authorities.

**Step 4 – Identify Hazards, Vulnerabilities**

After examining the research material, evidence and your visual inspection the working group can now populate the HRVA Template.

Hazards are specifically defined for the purposes of this assessment and are located in the training section for reference.

Vulnerabilities are specifically defined for the purposes of this assessment and are located in the training section for reference. Where possible, map vulnerabilities that can be mapped. Use general information to reduce time requirements for now.

Complete the template (Appendix 3). Do not rank the likelihood and severity of the hazard at this time.

**Step 5 - Assess hazard severity and likelihood**

**Qualitative Risk Ranking Measures**

Assessing the likelihood of hazard scenarios and the magnitude of impacts requires the application of a consistent method of measurement. This section provides a means of ranking different hazards and examples to help with selection of an appropriate rank. Note it is important to rank the consequence severity prior to completing the likelihood rating.

**Consequences and Severity**

There may be multiple impacts for a hazardous event. After you rank the severity of each applicable consequence you will need to input the “overall” severity rank into the Hazard & Risk Analysis form. If the highest consequence severity rank was “high” for any of the types of impacts, then choose this rank as the overall severity. There are seven categories of impacts to be assessed for each hazard: fatality, injury, critical facilities, lifelines, property damage, environment; and economic and social.

|  |
| --- |
| Fatality |
| Rank | Description | Criteria | Example |
| 1 | very low | 0-4 | No deaths |
| 2 | low | 4-9 | Avalanche |
| 3 | high | 10-49 | Mine explosion |
| 4 | very high | 50+ | Plane crash |

|  |
| --- |
| Injury |
| Rank | Description | Criteria | Example |
| 1 | very low | 0-4 | Auto collision |
| 2 | low | 5-49 | Small explosion |
| 3 | high | 50-2000 | Contaminated water |
| 4 | very high | 2000+ | Pandemic flu |

|  |
| --- |
| Critical facilities (hospitals, fire/police services, etc.) |
| Rank | Description | Criteria | Example |
| 1 | very low | temporary relocation | Evacuation of a shelter |
| 2 | low | closure of a few days | School |
| 3 | high | loss of 50% of capability | First responders |
| 4 | very high | long term disruption | Hospital destroyed |

|  |
| --- |
| Lifelines (water, gas, power, etc.) |
| Rank | Description | Criteria | Example |
| 1 | very low | temporary interruption | Ferry service |
| 2 | low | interruption for a few days | Power |
| 3 | high | interruption for a week | Water supply |
| 4 | very high | long term disruption | Bridge collapse |

|  |
| --- |
| Property Damage |
| Rank | Description | Criteria | Example |
| 1 | very low | minimal damage | Flood damage–2 homes |
| 2 | low | localized damage | Mud slide–several homes |
| 3 | high | localized and severe | Interface fire–community |
| 4 | very high | widespread and severe | Dam failure |

|  |
| --- |
| Environmental Impact |
| Rank | Description | Criteria | Example |
| 1 | very low | minimal damage | House fire |
| 2 | low | localized damage | Harbour oil spill |
| 3 | high | localized and severe | Toxic chemical spill |
| 4 | very high | widespread and severe | Radiation contamination |

|  |
| --- |
| Economic and Social Impact: |
| Rank | Description | Criteria | Example |
| 1 | very low | temporary impact | Power loss |
| 2 | low | temporary and widespread | Loss of lifeline |
| 3 | high | extended and widespread | Pandemic flu |
| 4 | very high | long term disruption | Foot and mouth disease |

**Likelihood**

The likelihood rank chosen for a hazard is the occurrence frequency for the hazard scenario. You should not rank the likelihood of a hazard scenario without first ranking the severity of consequences because the more severe a scenario is, the less likely it is to occur. This is demonstrated in the following example:

*The historical recorded frequency of a natural gas leak that causes a small evacuation, but no injury or death, be once every three years. If your hazard scenario includes one fatality, then the likelihood is no longer “every three years”—it might be once every 10 or 20 years*.

Do not overestimate the likelihood of a “worst-case” scenario.

|  |
| --- |
| Hazard Likelihood |
| Rank | Measure of likelihood | Return period in years |
| 6 | Frequent or very likely | Every 1 – 3 years |
| 5 | Moderate or likely | Every 3 – 10 years |
| 4 | Occasional, slight chance | Every 10 – 30 years |
| 3 | Unlikely, improbable | Every 30 – 100 years |
| 2 | Highly unlikely, rare event | Every 100 – 200 years |
| 1 | Very rare event | Every 200 – 300 years |

* **Frequent or very likely** to occur events usually have a high number of recorded incidents or anecdotal evidence. For example, a rural valley that is subject to some degree of flooding every year or so.
* **Moderate or likely** to occur hazards also have a historical record but occur with a frequency of three to ten years. For example, an urban interface fire threat in a region that experiences forest fires every year.
* **Occasional or slight chance** means events are those that occur infrequently. There may be little recorded historical evidence and a return interval of 10 to 30 years is possible. For example, a rail accident where dangerous goods are released.
* **Unlikely or improbable** refers to hazards that are not expected to occur more frequently than once every 30 to 100 years. There may be no historical incidents in the community. For example, a commercial airplane ground collision with a total loss of life.
* **Highly unlikely or rare** events are extremely unlikely and have a return period of 100 to 200 years. For example, a "one-hundred-year flood."
* **Very rare** events may happen every 200+ years. For example, an earthquake might occur every 200 years somewhere in Saskatchewan.

**Capacity to Respond and Recover**

The capability to respond and recover is defined as locally available strengths and capacities to reduce the impact of adverse conditions of a disaster.

Information on what capabilities exist to respond and recover affect your hazard scenario contributes to the severity of impact of a natural disaster or event. A deficiency in response or recovery capability can create an unacceptable exposure or vulnerability.

A few examples of response and recovery capacity include:

* first responders – fire, police, ambulance;
* reception or evacuation centres;
* alert plan and system;
* evacuation plan;
* training and equipment – emergency operations centres;
* response and recovery plan; and
* hazard specific contingency plan.

Return to the HVRA template (Appendix 3) and apply rankings to the hazards and vulnerabilities you previously identified. Identify response and recovery capacity in your community, your region or at a provincial level for each of the hazards and vulnerabilities you identify in the template. That capacity may serve to reduce overall risk and limit the impact of hazards or vulnerability.

To validate your ranking the group should complete the risk reduction and mitigation worksheet (Appendix 4) for each of the hazards. A check list with risk reduction strategies is attached (Appendix 5) to assist you in completing this exercise. Adjust your rankings in the HVRA as needed based on any additional information determined through completing the worksheets.

**Step 6 – Risk Evaluation**

Now that the working group has made some initial rankings of identified hazards and validated them by completing risk reduction exercises it is beneficial to review the materials with a wider group of stakeholders and partners. A workshop or targeted meeting is an option to ensure that your work to date and potential mitigation/response strategies are robust.

Potential stakeholders that could be valuable resources are:

* Officials from the Saskatchewan Public Safety Agency;
* Representatives from First Nations Emergency Management or Indigenous Services Canada;
* Regional official from Water Security Agency;
* Regional official from Government Relations;
* Local and regional health officials;
* Or any other emergency management expert available to the community.

The purpose of this workshop is to gain input on the HRVA work to date from a wider group of stakeholders than the HRVA working group. The workshop will:

* review risk rankings and proposed risk reduction measures;
* record issues, concerns and acceptability of risk; and
* consider which mitigation strategies should become draft action plans.

Once the workshop is completed risk ratings and reduction measures can be finalized.

**Step 7 – Assessing Public Acceptance**

Addressing hazards and creating a local emergency plan is not just a concern to community leadership. Community members, private business and service organizations may have an interest in understanding risk and mitigation efforts.

A stakeholder interest table has been included for your reference (appendix 6). This table should be provided to your community leadership as part of your final report which includes your proposed plan for public consultation should action plans be approved.

The working group should discuss with community leadership if public consultation is needed. Community leadership determines what information should be publicly released and determine next steps.

**Step 8 – Action Plans**

Now the working group has done all the research and analysis required to produce an evidence based report. This report should include a summary of hazards and vulnerabilities identified based in priority order (risk rankings), the analysis of public interest, and action plans that can be approved by community leadership.

**Preparing Action Plans**

Each Action Plan should be described in terms of six elements:

* Rationale – Explains why the effort is required and how it serves the objectives or overall mission of the Emergency Program;
* Project – Summarizes the action to be taken to clarify the intent of the effort. Where appropriate, this section outlines the scope of the action and any limitations to consider in issuing assignments;
* Tasks – Lists the recommended actions to consider in selecting personnel, estimating time requirements, and setting a budget. In some tasks, several persons may be required to work together to accomplish the intended results;
* Responsible – Identifies the individual with the responsibility and authority to cause or to carry out the Action Plan. In some plans, the responsible person will facilitate or oversee the work of others, such as volunteers or contractors;
* Due Date – Names the target year or date for completion of the Action Plan; and
* Budget – To the best of your ability, estimate the funds required to complete the actions. Dollar figures shown do not include time commitments of the Emergency Coordinator or volunteers.

A template for developing action plans has been included (Appendix 7). Once action plans have been completed they can be attached you your report and submitted for approval to community leadership.

Once approved the working group may be assigned further tasks related to implementation. These action plans may require revision to emergency management plans.

# Appendix 1 – Working Group membership and Contact List

|  |  |  |
| --- | --- | --- |
| Name | Telephone (work and cell number) | Email Address |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# Appendix 2 – Work Plan Template

|  |  |  |  |
| --- | --- | --- | --- |
| Task Name | Requirements (what steps are involved) | Member Assigned | Due Date |
| Meeting Schedule and Agenda | Create a contact listSet a meeting schedule and find a meeting location | Chair |  |
| Review reference material in tool kit | Review tool kit | All |  |
| Gather reference material and maps | Get map of the area with roadways, train tracks, waterways, etc. marked | Member X |  |
| Research reports from external agencies and circulate to members | Water Security assessments for your areaFire Risk reports from SPSA for areaEmergency plans or assessments from neighboring communities and industries |  |  |
| Complete HRVA Template | Identify hazards and vulnerabilitiesList response and recovery capacityDiscuss likelihood and impacts | Group |  |
| Evaluate risk profile  | Validate risk rankings and work to date is accurate |  |  |
| Assess Public Acceptance |  |  |  |
| Create Action Plans |  |  |  |
| Report to community leadership |  |  |  |

**Appendix 3 – HRVA Template**

|  |  |  |  |
| --- | --- | --- | --- |
| HazardPlease list the category and the specific hazard | Vulnerabilities and ImpactsWhat will happen as a result of the event?What services are impacted?What happens to residents? | Likelihood6: Frequent or Very Likely5: Moderate or Likely4: Occasional, Slight Chance 3: Unlikely, Improbable2: Highly Unlikely (Rare Event) 1: Vary Rare Event | Consequence Severity4: Very High3: High2: Low1: Very Low |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Appendix 4 – Risk Reduction Measures Worksheet**

|  |  |  |
| --- | --- | --- |
| **Hazard** | **Risk Reduction Measures In Place Today** | **Risk Reduction Measures that Could be Applied** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Appendix 5 – Risk Reduction Strategies Checklist**

|  |
| --- |
| **Risk Reduction Measures Checklist** |
| This checklist is provided to assist with brainstorming risk reduction measures. Most are all-hazard in nature. You should provide details of measures that apply to the hazards in your community. For example: construction: flood control works to target a spring freshet flooding hazard. These measures are intended to either reduce the likelihood of a hazard event, reduce the severity of impact of the hazard, or both. |
| **Strategy** | **Risk Reduction Measure** | **Reduces Likelihood (Y/N)** | **Reduces Severity (Y/N)** |
| Mitigation | *Construction* |  |  |
| Mitigation | *Emergency program guide* |  |  |
| Mitigation | *Forecasts* |  |  |
| Mitigation | *Hazard, risk and vulnerability analysis* |  |  |
| Mitigation | *Hazard, vulnerability and response capability mapping* |  |  |
| Mitigation | *Standards – building, engineering* |  |  |
| Mitigation | *Update HRVA and emergency program guide* |  |  |
| Mitigation | *Zoning and regulations to avoid hazard* |  |  |
| Mitigation & preparedness | *Public education - community* |  |  |
| Mitigation & preparedness | *Public education - schools* |  |  |
| Mitigation & preparedness | *Public information* |  |  |
| Mitigation & response | *Technical information sources* |  |  |
| Preparedness | *Exercises & drills* |  |  |
| Preparedness | *Training - government* |  |  |
| Preparedness | *Training – local emergency program* |  |  |
| Preparedness | *Training - volunteers* |  |  |
| **Strategy** | **Risk Reduction Measure** | **Reduces Likelihood (Y/N)** | **Reduces Severity (Y/N)** |
| Response | *Alert and notification plan* |  |  |
| Response | *Communications & warning systems* |  |  |
| Response | *Damage assessment documentation* |  |  |
| Response | *Emergency operations centre* |  |  |
| Response | *Emergency operations staff* |  |  |
| Response | *Emergency services capability* |  |  |
| Response | *Evacuation plan and routes* |  |  |
| Response | *Hazard specific contingency plan* |  |  |
| Response | *Hazmat response capability* |  |  |
| Response | *Incident command system* |  |  |
| Response | *Liaison with external agencies* |  |  |
| Response | *Mutual aid agreements* |  |  |
| Response | *Public communication plan* |  |  |
| Response | *Rapid damage assessment capability* |  |  |
| Response | *Reception centres* |  |  |
| Response | *Resource list* |  |  |
| Response | *Response information management* |  |  |
| Response | *Search and rescue volunteers* |  |  |
| Response | *State of local emergency declaration* |  |  |
| Response | *Urban search and rescue plan* |  |  |
| **Strategy** | **Risk Reduction Measure** | **Reduces Likelihood (Y/N)** | **Reduces Severity (Y/N)** |
| Response & Recovery | *Emergency social services organization* |  |   |
| Response & Recovery | *Financial organization* |  |   |
| Response & recovery | *Psychological trauma capability* |  |   |
| Recovery | *Business continuity plan* |  |   |
| Recovery | *Debris removal, mortality plan* |  |   |
| Recovery | *Financial and humanitarian assistance* |  |   |
| Recovery | *Insurance* |  |   |
| Recovery | *Reconstruction assistance* |  |   |

**Appendix 6 – Stakeholder Interest Table**

|  |  |
| --- | --- |
| **Stakeholder group** | **Stakeholder Interest** |
| Social service agencies and non-profit |  |
| General population |  |
| Local business |  |
| Local industry |  |
| Local interest groups |  |
| Media |  |
| Other regional municipal governments or indigenous governments |  |
| People at risk (residents) |  |
| Provincial health authority |  |
| Provincial interest groups |  |
| Regional interest groups |  |
| Schools |  |
| Vulnerable people |  |

**Appendix 7 – Action Plan**

|  |
| --- |
| **Action Plan** |
| *Hazard or Vulnerability Identified* |  |
| *Objective* |  |
| *Rationale* |  |
| *Project* |  |
| *Tasks* |  |
| *Responsible* |  |
| *Dates* |  |
| *Budget* |  |