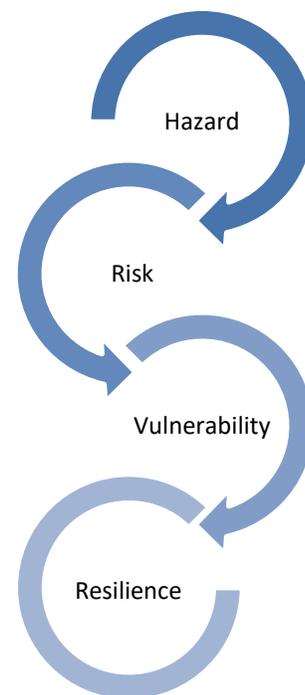


HAZARD, RISK AND VULNERABILITY ANALYSIS (HRVA)

FOR LOCAL AUTHORITIES AND FIRST NATIONS

COMPANION GUIDE FOR THE HRVA TOOL



2nd Edition, Fall 2020



Emergency
ManagementBC

**PROCESS TO DEVELOP A HRVA, USING THE HRVA TOOL,
INVOLVES 9 STEPS:**



CONTENTS

- INTRODUCTION5
 - What is HRVA?..... 6
 - Why is HRVA important? 7
 - Who is this tool for? 8
 - About this tool 9
 - How to use the HRVA Tool..... 10
 - How to use this companion guide..... 11
- 1. GETTING STARTED 12
 - 1.1 Become familiar with the HRVA process..... 13
 - 1.2 Identify and obtain the necessary resources 14
 - 1.3 Define the HRVA endorsement and approval process..... 19
 - 1.4 Identify a project team and project champion 20
 - 1.5 Complete an inventory of existing assessments & documents..... 22
 - 1.6 Identify and engage partners and subject matter experts..... 23
- 2. HAZARD IDENTIFICATION.....25
 - 2.1 Gather hazard information 25
 - 2.2 Select hazards 26
 - 2.3 Hazard list..... 28
- 3. UNDERSTANDING COMMUNITY RISK & RESILIENCE29
 - 3.1 Describe existing risk reduction measures..... 30
 - 3.2 Gather or generate community maps..... 32
 - 3.3 Identify critical assets and infrastructure 33
 - 3.4 Identify vulnerabilities 34
 - 3.5 Consider underlying disaster risk drivers..... 36
 - 3.6 Write hazard scenarios..... 46
- 4. ASSESSING HAZARD LIKELIHOOD48
 - 4.1 Gather and apply knowledge..... 48
 - 4.2 Determine historical likelihood score:..... 52
 - 4.3 Understanding and documenting changing likelihood..... 53



4.4 Predicting future likelihood..... 54

5. ASSESSING CONSEQUENCES..... 55

5.1 Review consequence categories and rating system..... 55

5.2 Rate and document consequences..... 57

6. BUILDING A RISK PROFILE..... 61

6.1 Generate your report 61

6.2 Analyze your risk results 62

6.3 Interpreting the risk matrix table..... 63

6.4 Interpreting the consequence stacking table 64

6.5 Prioritizing hazards..... 65

7. IDENTIFYING RISK REDUCTION STRATEGIES 66

7.1 Review risk reduction measures already in place..... 69

7.2 Recommend new risk reduction measures..... 73

8. GENERATING & ASSEMBLING YOUR REPORT 77

8.1 Generate report 77

8.2 Assemble & review report 78

9. REVIEWING & APPROVING YOUR REPORT..... 80

9.1 Obtain feedback from partners..... 80

9.2 Determine a maintenance schedule..... 80

9.3 Publish & submit for official approval 81

9.4 Document feedback..... 82

APPENDIX 1 - GLOSSARY OF TERMS..... 83

APPENDIX 2 - GLOSSARY of ACRONYMS..... 92

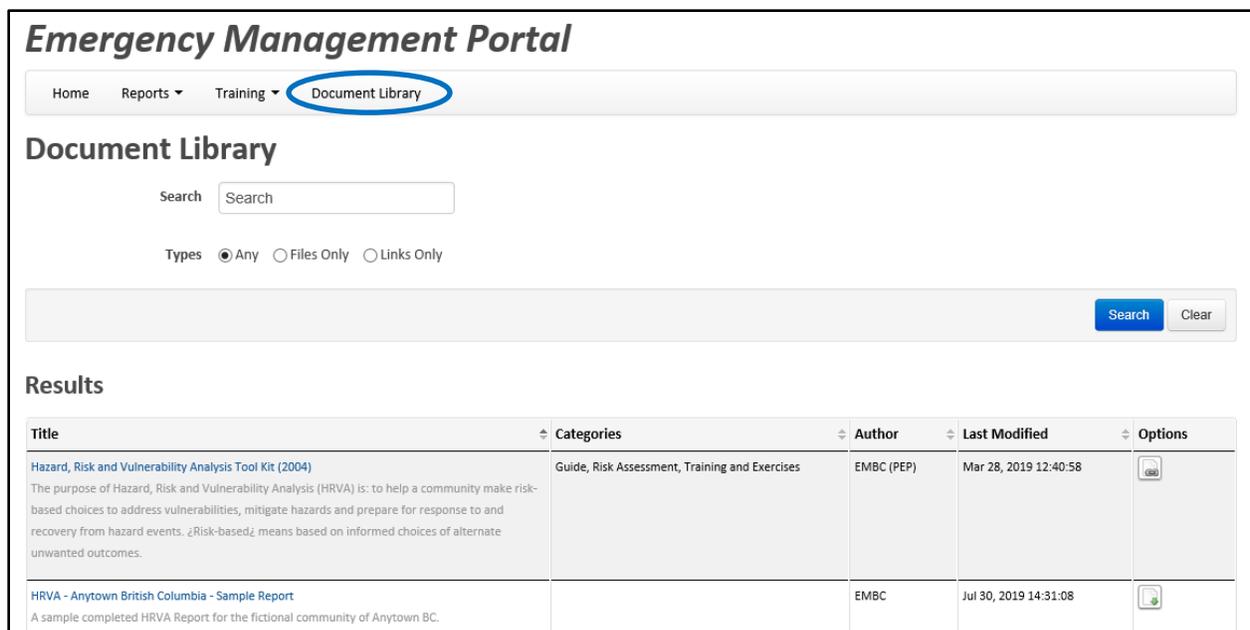
APPENDIX 3 - EMBC MAP, REGIONS, OFFICES & CONTACT INFORMATION..... 95

INTRODUCTION

A **Companion Guide** to the HRVA was developed as a support document to the Hazard, Risk and Vulnerability Analysis tool for Local Authorities and First Nations (**HRVA Tool**). It is intended to help facilitate HRVA activities by providing a comprehensive breakdown of the individual tasks, as well as expanded information on each step of the HRVA process. It is a stand-alone document intended to be updated more regularly than the HRVA Tool.

The HRVA Tool is also supplemented by the **Hazard Reference Guide**, which is designed to assist Local Authorities and First Nations by providing terminology, definitions, data sources, and subject matter expert guidance for hazards affecting their community.

This Companion Guide also contains examples of several templates, tables, and worksheets that may be useful in completing an HRVA. A complete listing of these companion documents is available in the Document Library, which can be found within the tool itself as well as on the **HRVA Web Page**.



The screenshot shows the 'Emergency Management Portal' with a navigation menu where 'Document Library' is highlighted. Below the menu is a search bar and filter options. The results section contains a table with two entries:

Title	Categories	Author	Last Modified	Options
Hazard, Risk and Vulnerability Analysis Tool Kit (2004) 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. <i>“Risk-based”</i> means based on informed choices of alternate unwanted outcomes.	Guide, Risk Assessment, Training and Exercises	EMBC (PEP)	Mar 28, 2019 12:40:58	
HRVA - Anytown British Columbia - Sample Report A sample completed HRVA Report for the fictional community of Anytown BC.		EMBC	Jul 30, 2019 14:31:08	

Document Library within the HRVA Tool

WHAT IS HRVA?

A Hazard, Risk and Vulnerability Analysis (HRVA) is an assessment of:

- **Hazards:** These are sources of potential harm, or situations 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.
- **Risk:** This refers to the likelihood that a hazard will occur, as well as the severity of possible impacts to health, property, the environment, or other things of value.
- **Vulnerability:** This refers to the people, property, infrastructure, industry, resources, or environments that are particularly exposed to adverse impact from a hazardous event.

The purpose of the HRVA is to help a community make risk-based choices to address vulnerabilities, mitigate hazards and prepare for response to, and recovery from, a range of hazard events. An HRVA assists communities in answering the following questions:

- ✓ What hazards are likely to occur in my community?
- ✓ How resilient is my community?
- ✓ How is climate change affecting the likelihood of hazards?
- ✓ How severe will the impact be on the community's population, infrastructure, property, and environment?
- ✓ What risk reductions strategies can I implement in my community?

A completed HRVA will provide an assessment of the risks that may exist within a community and provide recommendations for action.

→ Training Courses are available to help you prepare for the HRVA Process.

- The [Justice Institute of British Columbia \(JIBC\)](#) is one organization that offers a course in Conducting a HRVA.
- Your local educational provider may also offer relevant emergency management training.

The screenshot shows the JIBC Course Catalogue page for 'Courses: Conducting Hazard, Risk & Vulnerability Analyses (HRVA)'. The page includes a navigation menu with 'Menu', 'Browse', and 'View' options. The course details section states: 'This course guides students through the process of identifying hazards, assessing risks, analyzing vulnerabilities, and assessing impacts of disasters on communities and their local authorities; mitigation and the related prioritization and general management of hazards, risks and vulnerabilities. COURSE FORMAT: This interactive two-day course features applied scenarios and activities to be returned within one month of completing the class. OTHER INFO: Text books will be provided in class; however students will be required to bring additional course materials such as maps. A detailed list of additional course materials will be emailed to students prior to the class. For more information on these materials, please contact the program representative at emergency@jibc.ca. Management Division courses require 100% attendance.' Below the details, the course code is listed as EMRG-1120, the department as Emergency Management, and the prerequisite as EMRG-1100.

WHY IS HRVA IMPORTANT?

Emergency planning cannot take place without first understanding what you are planning and preparing for. The HRVA report is the foundation document for community emergency programs and should inform both strategic and emergency plans. Additionally, an effective HRVA will ensure the community can make planning and land use decisions that consider hazard mitigation.

The [United Nations Sendai Framework for Disaster Risk Reduction](#) identifies “understanding disaster risk” as the number one priority for global action. Canada is a signatory and British Columbia has formally adopted this global framework. By completing a local or regional HRVA, communities are contributing to global priorities.



For Local Authorities, the [Local Authority Emergency Management Regulation](#) mandates conducting a HRVA. [Section 2\(1\)](#) of this regulation requires Local Authorities to prepare emergency plans that reflect the Local Authority's assessment of the relative risk of occurrence of emergencies or disasters and the potential impact on people and property.

EMBC acknowledges that First Nations on-reserve communities have diverse governance structures and are not bound to the Emergency Program Act (EPA), though may choose to voluntarily follow the EPA and may benefit from understanding the context for neighbouring Local Authorities.

Additionally, many disaster prevention, mitigation, or recovery grant programs may require the completion of a current risk assessment prior to consideration for funding. This HRVA Tool can assist in meeting this risk assessment requirement.

WHO IS THIS TOOL FOR?

The HRVA Tool is designed for anyone leading the development of a HRVA at the community level. The target audience is the person tasked with emergency management within a Local Authority or First Nation, but could also be used by another member of the government such as a Planner, Chief Administrative Officer, Band Administrator or other Community Leader.

Regardless of who leads, the HRVA process should be guided by a working group of representatives from a variety of departments and should engage subject matter experts and representatives from across the community and surrounding region.



Understanding risk and applying risk reduction measures is a shared responsibility across an entire community, from individuals and businesses to those responsible for governance, planning and land use, emergency management, infrastructure development and operations. Involving partners early in the process will encourage ownership and endorsement when implementing the recommendations of the report.

The Four Pillars of Emergency Management:





ABOUT THIS TOOL

The HRVA Tool was designed by Emergency Management BC with the support and advice from subject matter experts from Local Authorities, First Nations and the Provincial Government.

The methodology is adapted from the Ontario Hazard Identification and Risk Assessment Program Methodology Guidebook. The web application is an adaptation of the Alberta Emergency Management Agency (AEMA)'s online risk assessment tool. EMBC is grateful for the collaboration and generosity of its partners.



The HRVA Tool provides a step-by-step process to develop a community-led HRVA and a web application that allows users to input, save and analyze data. Throughout the process, risk is examined by looking at community resilience, vulnerability, as well as the hazard likelihood, change and consequences.

→ EMBC is committed to ensuring the tools provided to communities meet the users' needs. Please pass along any feedback to your [EMBC Regional Office](#):

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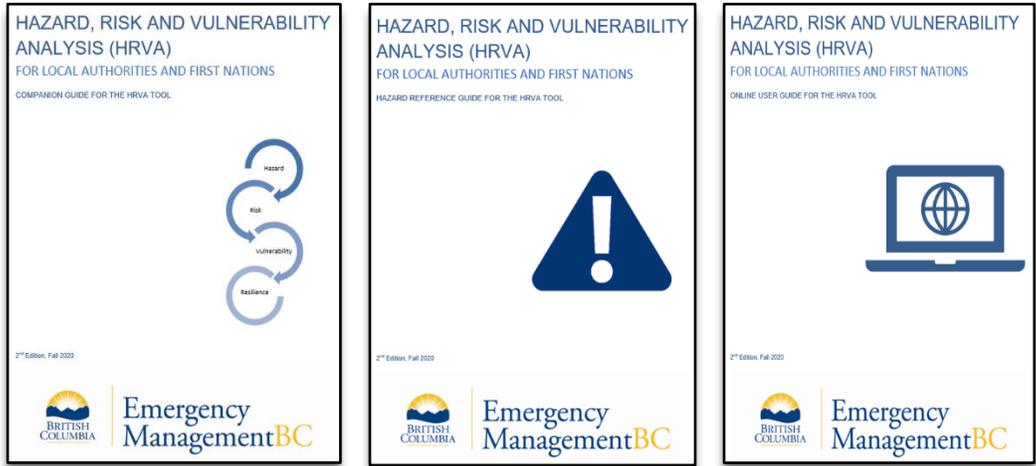
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HOW TO USE THE HRVA TOOL

The HRVA Tool provides a step-by-step process for a community to lead the development of a HRVA. While the process is designed to be community-led, local leaders can contact EMBC Regional Managers for support along the way. It is recommended to first become familiar with the tool and read its related documents.



Some steps of the HRVA will encourage users to submit information to be saved directly into the web application. Other activities will generate information that can be kept as annexes to the final report. It is important to note that developing a HRVA will take people, time, and energy. Starting the process with this understanding will facilitate a more successful outcome.

- To keep the tool streamlined, additional content is available as separate documents which will be linked throughout.
 - **For example:** in addition to this Companion Guide, the [Hazard Reference Guide](#) includes a full glossary, hazard definitions, and links and resources that can support hazard-specific analysis.
 - All related documents and companion guides can be found in the Document Library, both in the HRVA Tool and on the [HRVA Web Page](#).

HOW TO USE THIS COMPANION GUIDE

This guide contains 9 sections which aligns with the 9 steps needed to develop a HRVA using the HRVA Tool. The Guide also includes appendices:

- 1** • **Getting Started** - Provides a quick reference guide to initiating the HRVA process, and an assortment of worksheets to help you build a team & work plan
- 2** • **Hazard Identification** - Contains a matrix that can be used to analyze existing risk strategies & mitigation measures against current & future threats
- 3** • **Understanding Community Risk & Resilience** - Provides information on identification & assessment of vulnerabilities, including a Climate Change Adaptation primer
- 4** • **Assessing Hazard Likelihood & Change to Likelihood** - Assists with determining historic likelihood & assessing the potential change to current and future likelihood
- 5** • **Assessing Consequences** - Assists with the assessment & rating of 11 consequence categories
- 6** • **Building a Risk Profile** - Helps determine specific and overall risk levels & assign hazard priorities
- 7** • **Identifying Risk Reduction Strategies** - Offers guidelines & support for the development of new risk reduction & mitigation strategies
- 8** • **Generating & Assembling Your Report** - Provides a guide to generating & assembling a draft report with appropriate supporting material
- 9** • **Reviewing & Approving Your Report** - Offers an outline of a typical review & approval process
- A** • **Appendices** - Includes a Glossary of Terms; Glossary of Acronyms; EMBC Map, Regions, Offices, Contact Information

1. GETTING STARTED

There is no single way to conduct a HRVA in a community. However, academic research and advice from practitioners emphasize the value of the conversations that occur among a diversity of people and groups. It is this shared understanding that will build a picture of risk that will allow the community to take resilience and risk reduction seriously.

Much of the work of an HRVA involves gathering and compiling information and knowledge on the community that already exists. However, it is important to be realistic regarding the time and energy required to engage community members and subject matter experts effectively. This section provides some recommendations on organizing your project, engaging people and groups, and ensuring the appropriate resources are in place to facilitate a successful HRVA process from the start.

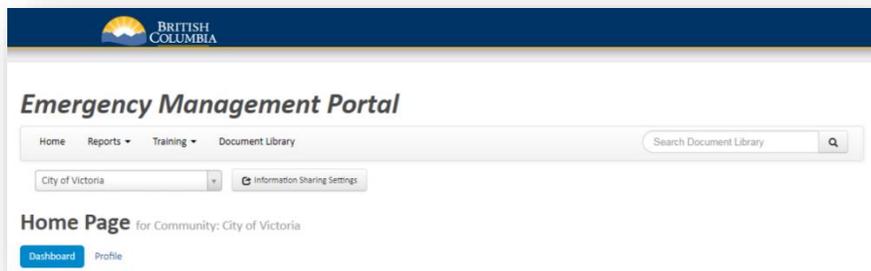
- There are a number of established tools that can assist you with the process of Hazard Assessment in your community. This HRVA Tool provided by EMBC is one option available to Local Authorities & First Nations in British Columbia.
- There are other notable examples of risk assessment tools and frameworks that you may want to review or consider before beginning your HRVA.
 - [The Aboriginal Disaster Resilience Planning \(ADRP\) Tool](#) – JIBC
 - [The Hazard Identification Risk Assessment \(HIRA\)](#) – Ontario
 - [The United Nations National Disaster Risk Assessment \(NDRA\)](#) – UNISDR
 - [Preliminary Strategic Climate Risk Assessment](#) – British Columbia

1.1 BECOME FAMILIAR WITH THE HRVA PROCESS

Before starting the HRVA, consider reading the entire HRVA process and familiarizing yourself with the content and web features. The [User Guide to the HRVA Tool](#) can assist you with the access, navigation, and functions of the online tool. It includes information on how to obtain login credentials, location of companion documents and worksheets, and how to obtain assistance with either the HRVA process or technical questions about the tool itself.



Once you are comfortable accessing and navigating the online environment, there are a number of companion documents associated with the tool that can help you conduct your workshops and exercises. These forms and worksheets are linked within the online tool, or can be accessed from the Document Library within the tool or on the [EMBC Web Page](#). You can use the fillable PDF forms to prepare your data and summaries prior to inputting them into the online environment. The information you input into the online-form fields will be included in the final report automatically generated by the tool, so it can be helpful to consolidate and review your summaries in the various worksheets first.



The order of activities in the tool is a recommendation but not a rule. Your community may find that additional activities will be required or that tasks should take place in a different order. For

example, you may be far along into the process and discover an additional hazard not previously considered. Every stage of the HRVA process can be re-entered at any time.

1.2 IDENTIFY AND OBTAIN THE NECESSARY RESOURCES

You will need appropriate endorsement, funding and staffing to develop an HRVA. Be careful not to underestimate the time and resources required to give the HRVA the appropriate attention. Comprehensive all-hazard HRVA's can take a full year or more to complete with regular committee meetings, community interviews, targeted workshops, and general correspondence with subject matter experts. Periodic reviews can often be completed in shorter timeframes, and you may find it useful to break your HRVA up into categories to help complete the process in smaller, more manageable pieces.

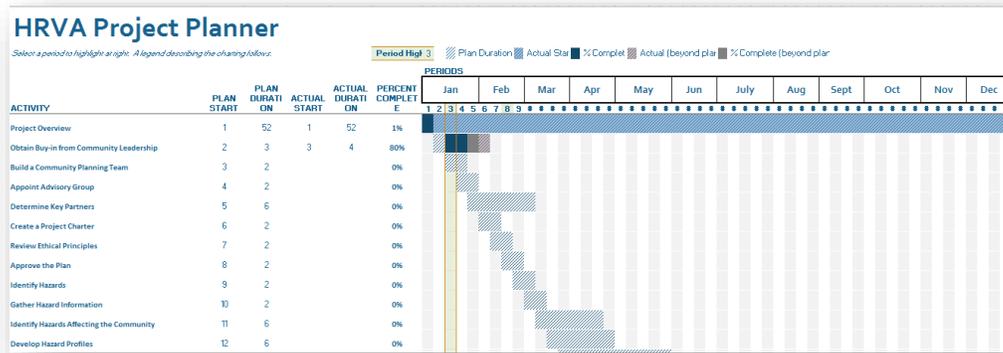
Regardless of the initial approach you take, you may determine that it is more sustainable to complete regular, smaller reviews, on an annual or continuous cycle. The online HRVA Tool can be used for targeted single-hazard assessments, as well as exhaustive all-hazards initiatives. Consider:

- ✓ Staff time from your own team and other departments
- ✓ Time needed from subject matter experts and partners
- ✓ Facilities
- ✓ Equipment
- ✓ Financial and staff resources to write, communicate, and review the HRVA
- ✓ Sources of potential funding

→ When seeking funding and approval for an HRVA, it can be helpful to have a project work plan to lay out an overall timeline and schedule individual steps of the process.

- To help build a project schedule, track your progress, and assign responsibilities, you may consider utilizing the HRVA Project Planner (a spreadsheet designed like a Gantt chart to plan your work and track your progress), and/or the HRVA Project Work Plan
- Both documents are available in the Document Library and can be customized to suit your specific needs.

The HRVA Project Planner is available in the Document Library (HRVA Forms - Step 1 - HRVA Project Schedule Gantt Chart - Worksheet) or HRVA Web Page



The HRVA Project Work Plan is available in the Document Library (HRVA Forms - Step 1 - Work Plan - Checklist) or HRVA Web Page:

HRVA Project Work Plan

Community: _____ Date: _____

Activities & Deliverables	Start Date	End Date	Duration	Assigned To	Done
---------------------------	------------	----------	----------	-------------	------

Pre-Requisites: Community Commitment

Obtain Commitment for Planning, Resources, & Staff Time from Community Leadership / Local Authority					<input type="checkbox"/>
---	--	--	--	--	--------------------------

Step 1 Getting Started

1.1	Become Familiar with The HRVA Tool				<input type="checkbox"/>
1.2	Identify & Obtain the Necessary Resources				<input type="checkbox"/>
1.3	Define the HRVA Endorsement & Approval Process				<input type="checkbox"/>
1.4	Identify a Project Team & Project Champion				<input type="checkbox"/>
1.5	Complete an Inventory of Existing Assessments & Other Documents				<input type="checkbox"/>
1.6	Identify & Engage Partners & Subject Matter Experts				<input type="checkbox"/>
Opt.	Consider consultants or regional collaboration with other communities in order to maximize resources and information.				<input type="checkbox"/>
	Key Deliverable: Establish Project Team				<input type="checkbox"/>



Activities & Deliverables	Start Date	End Date	Duration	Assigned To	Done
---------------------------	------------	----------	----------	-------------	------

Step 2 Identify Hazards

- 2.1 Gather Hazard Information
- 2.1a Conduct Hazard Identification Workshops
- 2.1b Conduct Hazard Identification Interviews
- 2.2a Select Applicable Hazards from 57 Hazards List
- 2.2b Define Any Unique Local Hazards
- Opt. Provide a Progress Report to the Executive Committee

					<input type="checkbox"/>
					<input type="checkbox"/>
					<input type="checkbox"/>
					<input type="checkbox"/>
					<input type="checkbox"/>
					<input type="checkbox"/>

	Key Deliverable: Completed Hazard List					<input type="checkbox"/>
---	---	--	--	--	--	--------------------------

Step 3 Understand Community Resilience

3.1	Describe Existing Risk Reduction Measures					<input type="checkbox"/>
3.2	Gather or Generate Community Maps					<input type="checkbox"/>
3.3	Identify Critical Assets & Infrastructure					<input type="checkbox"/>
3.4a	Identify Social & Economic Vulnerabilities					<input type="checkbox"/>
3.4b	Identify Physical & Environmental Vulnerabilities					<input type="checkbox"/>
3.5	Identify Underlying Risk Drivers					<input type="checkbox"/>
3.6	Write Hazard Scenarios					<input type="checkbox"/>
Opt.	Conduct a Hazard Scenario Workshop					<input type="checkbox"/>

	Key Deliverable: Create Hazard Scenarios					<input type="checkbox"/>
---	---	--	--	--	--	--------------------------

Step 4 Assess Hazard Likelihood

4.1	Gather & Apply Knowledge					<input type="checkbox"/>
4.2	Determine Historical Likelihood Score					<input type="checkbox"/>
4.3	Understand & Document Changing Likelihood					<input type="checkbox"/>
4.4	Assess Future Likelihood					<input type="checkbox"/>
Opt.	Conduct a Hazard Likelihood Assessment Workshop					<input type="checkbox"/>

	Key Deliverable: Assign Hazards Likelihood Ratings					<input type="checkbox"/>
---	---	--	--	--	--	--------------------------

Step 5 Assess Consequences

5.1	Review Consequence Categories & Rating System					<input type="checkbox"/>
5.2	Rate & Document Consequences					<input type="checkbox"/>
Opt.	Conduct a Hazard Consequence Assessment Workshop					<input type="checkbox"/>

	Key Deliverable: Assign Hazard Consequence Ratings					<input type="checkbox"/>
---	---	--	--	--	--	--------------------------

Activities & Deliverables	Start Date	End Date	Duration	Assigned To	Done
Step 6 Review Risk Profile					
6.1 Read About Risk Matrices					<input type="checkbox"/>
6.2 Generate Risk Level					<input type="checkbox"/>
6.3 Generate Risk Matrix & Consequence Graph					<input type="checkbox"/>
6.4 Review Hazard Priority Levels					<input type="checkbox"/>
Opt. Provide a Progress Report to the Executive Committee					<input type="checkbox"/>
Key Deliverable: Rank Hazard Priorities					<input type="checkbox"/>
Step 7 Identify Risk Reduction Strategies					
7.1 Review Risk Reduction Measures Already in Place					<input type="checkbox"/>
7.2 Recommend New Risk Reduction Measures					<input type="checkbox"/>
Opt. Conduct a Risk Reduction Measures Workshop					<input type="checkbox"/>
Key Deliverable: Determine Risk Reduction Strategies					<input type="checkbox"/>
Step 8 Generate & Assemble Your Report					
8.1a Generate Preliminary Report					<input type="checkbox"/>
8.1b Assemble Companion Documents					<input type="checkbox"/>
8.2 Assemble & Review Final Report (Draft)					<input type="checkbox"/>
Opt. Present the HRVA Report to your Management Committee					<input type="checkbox"/>
Key Deliverable: Generate Draft Report					<input type="checkbox"/>
Step 9 Review & Approve Your Report					
9.1 Obtain Feedback from Partners					<input type="checkbox"/>
9.2 Determine a Maintenance Schedule					<input type="checkbox"/>
9.3a Submit Report for Official Approval					<input type="checkbox"/>
9.3b Publish & Share Final Report					<input type="checkbox"/>
Opt. Provide Document Feedback					<input type="checkbox"/>
Key Deliverable: Submit Report for Review & Approval					<input type="checkbox"/>

1.3 DEFINE THE HRVA ENDORSEMENT AND APPROVAL PROCESS

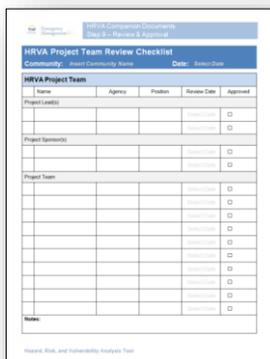
Near the end of the HRVA process you will need to obtain official approval to finalize your HRVA report. Defining who will sign off can help understand the scope and timeline of the project. This also helps determine the audience of the final report and may help guide the level of detail and background information you wish to include. In some communities, this will be a director-level position while others will want to have the board and council, mayor, or chief(s) sign off officially.



It is also recommended that you circulate the final draft of your report amongst the working group and partners that will contribute along the way. This allows participants to validate their contributions and correct any errors made, as well as provide useful feedback on the overall process and final report.

- To assist you in documenting the actions required to complete your HRVA approval, the Review & Approval Worksheet contains 3 templates:
- HRVA Project Team Checklist – to record your steering committee/team members
 - HRVA Contributor Review Checklist – to record external contributors and subject experts
 - HRVA Project Approval – to document the official adoption of the HRVA

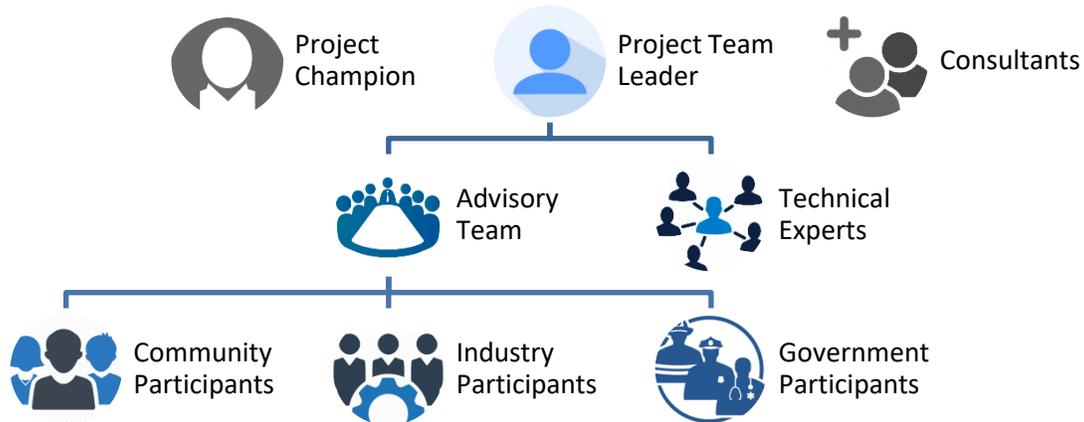
A Review & Approval Worksheet is available in the Document Library (HRVA Forms - Step 9 - Review & Approval - Worksheet) or HRVA Web Page:





1.4 IDENTIFY A PROJECT TEAM AND PROJECT CHAMPION

The HRVA will require a small working group or committee to lead the process as well as a project champion that can give high-level endorsement of the project.



Project Team

This group will provide overall project management to the HRVA process which will include gathering the information necessary to assess community risk, engaging partners, writing materials, and making recommendations for risk reduction. The team should include people who have skills related to community engagement, leadership, research, writing, and project management.

Consider the following participants:

- ✓ Person responsible for emergency management
- ✓ Long-term community member or Elder with extensive knowledge of the community and its people
- ✓ Person responsible for planning, land use, infrastructure development or operations
- ✓ Representative from the finance department

The emergency program committee or other committees may already exist and could be used to lead the HRVA.

Key tasks of the HRVA project team include:

- ✓ Lead the HRVA working group
- ✓ Provide training on the HRVA process
- ✓ Manage project tasks and timelines
- ✓ Prepare work plans, delegate tasks, and prepare progress reports
- ✓ Engage subject matter experts in the HRVA process
- ✓ Facilitate meetings and prepare and give presentations to the community and elected officials

Project Champion

A project champion should be someone within a leadership position in the community who can ensure the HRVA project receives the appropriate attention it requires. This could be an elected official, CAO, band administrator or other respected leader. The Project Team may report directly to the Project Champion, or they can simply be an informed advisor.

The Project Champion can be a useful ally to help support the policy, financial, and time commitments of the project. It is important they are well briefed at the start of the HRVA, and aware of the expectations and preliminary schedule. They may be able to assist the team along the way with any hurdles or unforeseen resources required to complete the analysis.

Regardless of the specific role the project champion chooses to play, they should be kept informed throughout the HRVA process. This can be done with regular casual communications or through the use of status reports at pre-determined intervals. The [HRVA Project Work Plan](#) contains optional status report prompts that may be used as an initial template.

Consultants

Some communities may choose to hire a consultant to conduct or guide their overall HRVA, or simply advise specific portions of the project. It is also common for a region or group of communities to come together to share the cost of hiring a consultant. This can sometimes be an efficient use of available funds and resources and may help facilitate communication and coordination between independent authorities within a close geographic area, or where shared hazards exist.

While this may be the best solution for communities without the capacity in-house, the HRVA process needs to be closely owned by the community. If a consultant is hired, it is important that the project team and project champion work closely with them to ensure the process and final report remain relevant to the community, and that the HRVA still provides enough individual detail to meet the particular needs of each participating group.

→ The [Partner Engagement Worksheet \(HRVA Forms - Step 1 - Partner Engagement - Worksheet\)](#) can be used to record the members of the advisory group, as well as any consultants, advisors, or subject matter experts engaged throughout the process.

HRVA Partner Engagement Tracking		
Community: - Insert Community -		Date:
<small>HRVA Committee Member</small> <input type="checkbox"/>	Partner Organization	Contact Information
	<i>Community</i>	
	- Insert Name or Organization -	- Insert Contact Information -

1.5 COMPLETE AN INVENTORY OF EXISTING ASSESSMENTS & DOCUMENTS

Many communities already have a HRVA, hazard-specific risk assessments, and other documents that can help inform the HRVA process. Collecting these will provide insight into what the community already has in place. They will also become helpful for informing various steps of the HRVA process.

Collect existing documents such as:

- ✓ Existing and out-of-date emergency management plans for your community
- ✓ Official Community Plan, Regional Growth Strategy, Comprehensive Community Plan, or Zoning Bylaw
- ✓ Hazard-specific risk assessments such as flood plain maps, LIDAR, earthquake maps, or site-specific assessments that have taken place for development permitting
- ✓ HRVA reports completed by neighboring communities or regions



→ To help identify what documents may already exist within your community that will support the HRVA process:

- See the [⚠️ Hazard Reference Guide](#)

1.6 IDENTIFY AND ENGAGE PARTNERS AND SUBJECT MATTER EXPERTS

One individual cannot accomplish the HRVA process nor should the process exist only within the emergency program department. To be successful the process should include input from a diversity of people, departments, partner groups and subject matter experts. Engagement with others can occur in a number of different ways, depending on community needs and capacity. Some common groups or individuals to engage may include:

Community

- Community leaders and advocates
- Indigenous leaders, elders and story tellers
- Faith-based leaders and community members
- Non-profit partners or non-governmental organizations/community groups
- Representatives of minority, under-served, or marginalized groups

Local Government

- Public health employees
- Utility operators (municipal)
- City or environmental planners
- Policy experts
- Social Services or support system employees
- Local, regional/provincial, or federal agencies

Emergency Professionals

- Emergency management staff
- First responders
- Hospital and healthcare providers
- NGO or non-profit response organizations (i.e. Canadian Red Cross, etc.)

Private Industry

- Chamber of Commerce
- Local economic drivers (major employers)
- Private utility, power, and telecommunications operators
- Oil and gas partners, pipeline operators
- Financial services
- Food and equipment retailers and suppliers

Subject Matter Experts

- Infrastructure operators
- Cyber/IT professionals
- Scientists, academics, and researchers



- Engineers and architects/designers

→ To help identify the groups and people that may need to be engaged, see the following:

- Downloadable [Partner Engagement Worksheet \(HRVA Forms - Step 1 - Partner Engagement - Worksheet\)](#)
- The [Hazard Reference Guide](#) provides information on subject matter experts listed according to hazard
- Consider collaborating regionally with other communities in order to maximize resources and information

A Partner Engagement Worksheet is available in the Document Library.

HRVA Partner Engagement Tracking																																					
Community:	Date:																																				
<small>HRVA Committee Member</small>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #d9e1f2;"> <th style="width: 45%; padding: 5px;">Partner Organization</th> <th style="width: 55%; padding: 5px;">Contact Information</th> </tr> </thead> <tbody> <tr> <td colspan="2" style="padding: 5px;"><i>Community</i></td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/></td> <td style="padding: 5px;"></td> </tr> <tr> <td colspan="2" style="padding: 5px;"><i>Local Government</i></td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/></td> <td style="padding: 5px;"></td> </tr> <tr> <td colspan="2" style="padding: 5px;"><i>Emergency Professionals</i></td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/></td> <td style="padding: 5px;"></td> </tr> <tr> <td colspan="2" style="padding: 5px;"><i>Private Industry</i></td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/></td> <td style="padding: 5px;"></td> </tr> <tr> <td colspan="2" style="padding: 5px;"><i>Subject Matter Experts</i></td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/></td> <td style="padding: 5px;"></td> </tr> <tr> <td colspan="2" style="padding: 5px;"><i>Other Groups & Representatives</i></td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/></td> <td style="padding: 5px;"></td> </tr> </tbody> </table>	Partner Organization	Contact Information	<i>Community</i>		<input type="checkbox"/>		<input type="checkbox"/>		<i>Local Government</i>		<input type="checkbox"/>		<input type="checkbox"/>		<i>Emergency Professionals</i>		<input type="checkbox"/>		<input type="checkbox"/>		<i>Private Industry</i>		<input type="checkbox"/>		<input type="checkbox"/>		<i>Subject Matter Experts</i>		<input type="checkbox"/>		<input type="checkbox"/>		<i>Other Groups & Representatives</i>		<input type="checkbox"/>	
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2. HAZARD IDENTIFICATION

The first step in the HRVA is to identify which hazards could affect your community. The hazard list that you identify now will carry forward throughout the process.

In order to create a hazard list, you will need to conduct research as well as engage community members and subject matter experts through the use of engagement sessions, workshops, or one-on-one interviews.

Note: Further into the HRVA process you may discover additional hazards that were not previously considered. You are encouraged to come back to the section as necessary throughout your assessment.

2.1 GATHER HAZARD INFORMATION

EMBC has provided a list of hazards that is adapted from the Emergency Program Management Regulation. Additional hazards not identified in the regulation have been added. The hazard list, definitions, and additional hazard resources are found in the [Hazard Reference Guide](#).

A Note about Climate Change:

Climate change impacts both the frequency and intensity of many hazards. It may also cause new hazards to emerge. In this HRVA methodology, climate change is not indicated as a separate hazard; however, those hazards identified as being impacted by climate change are indicated with a special symbol. e.g. Drought 

Please see the BC [Preliminary Strategic Climate Risk Assessment](#) for more information on climate risks in British Columbia. Additional guidance can also be found in section 3 of this guide. 'Underlying Risk Drivers'

To determine whether a hazard could pose a risk in your community, you will need to gather information from two general categories: Documents and People. You will have already gathered some of the following examples in Step 1.5.

Documents:

- ✓ Former HRVA documents and emergency plans
- ✓ Other risk assessments completed within the region
- ✓ Historical archives and news articles
- ✓ External data sources, such as the [Canadian Disaster Database](#)

People:

- ✓ Elders and other community members who have access to oral or written historical records on disasters that have taken place in the past
- ✓ Subject matter experts within and external to your community

2.2 SELECT HAZARDS

Whether you are starting the HRVA process for the first time, or updating an existing assessment, you will most likely discover new or changing risks within your community. Sections 4, 5, and 6 of the HRVA Tool are designed to help you assess the frequency, severity, and consequence of specific hazards, uncover any underlying factors that may influence your results, and ultimately create a risk profile that you can use to rank your priorities.

Local needs and staffing limitations may dictate that you prioritize your hazards early to determine the best investment of your time and resources, and you may decide that you must focus on a single or small number of projects at a time. The HRVA Tool is designed to be scalable, and can be used frequently for smaller assessments of a single or targeted hazard group, or during a larger more comprehensive project to review and analyze all the hazards identified during the review process.

Selecting Hazards in the HRVA Tool:

<input checked="" type="checkbox"/> 01. Air Quality*	<input type="checkbox"/> 29. Mine Incident
<input checked="" type="checkbox"/> 02. Extreme Heat*	<input type="checkbox"/> 30. Nuclear Incident
<input type="checkbox"/> 03. Extreme Cold*	<input type="checkbox"/> 31. Oil or Gas Pipeline Spill
<input type="checkbox"/> 04. Fog*	<input type="checkbox"/> 32. Space Debris
<input type="checkbox"/> 05. Freezing Rain or Drizzle*	<input checked="" type="checkbox"/> 33. Drought*
<input type="checkbox"/> 06. Space Weather*	<input type="checkbox"/> 34. Seiche
<input type="checkbox"/> 07. Hail*	<input type="checkbox"/> 35. Storm Surge*
<input type="checkbox"/> 08. Hurricane/Typhoon/High Wind Event*	<input checked="" type="checkbox"/> 36. Lake, River, and Stream Flooding*
<input checked="" type="checkbox"/> 09. Lightning*	<input type="checkbox"/> 37. Coastal Flooding*
<input type="checkbox"/> 10. Snowstorms and Blizzards*	<input type="checkbox"/> 38. Storm Water Flooding (urban, local, pluvial)*
<input type="checkbox"/> 11. Tornado*	<input type="checkbox"/> 39. Flash Flooding*
<input type="checkbox"/> 12. Animal Disease*	<input type="checkbox"/> 40. Dam and Spillways Failure*
<input checked="" type="checkbox"/> 13. Human Disease (Including Pandemic and Epidemic)*	<input type="checkbox"/> 41. Dike Failure*
<input type="checkbox"/> 14. Plant Disease and Pest Infestation*	<input type="checkbox"/> 42. Structure Failure*
<input type="checkbox"/> 15. Public Health Crisis	<input type="checkbox"/> 43. Electrical Outage*
<input type="checkbox"/> 16. Structure Fire	<input type="checkbox"/> 44. Food Source Interruption (supply chain, or community food stores)*
<input checked="" type="checkbox"/> 17. Wildfire*	<input type="checkbox"/> 45. Telecommunications Interruption*
<input type="checkbox"/> 18. Avalanche*	<input type="checkbox"/> 46. Transportation Route Interruption*
<input checked="" type="checkbox"/> 19. Landslide/Debris Flow*	<input type="checkbox"/> 47. Wastewater Interruption*
<input type="checkbox"/> 20. Land Subsidence (and Sinkholes)*	<input type="checkbox"/> 48. Water Service Interruption (Includes shortage and contamination)*
<input type="checkbox"/> 21. Submarine Slides	<input type="checkbox"/> 49. Fuel Source Interruption*
<input type="checkbox"/> 22. Earthquake	<input type="checkbox"/> 50. Cyber Security Threat
<input type="checkbox"/> 23. Liquefaction	<input type="checkbox"/> 51. National Security Threat
<input type="checkbox"/> 24. Tsunami (Telegenic and Terrestrial)	<input type="checkbox"/> 52. Public Disturbance
<input type="checkbox"/> 25. Ash Fall	<input type="checkbox"/> 53. Major Planned Event
<input type="checkbox"/> 26. Volcanic Flow (Pyroclastic, Lava and Lahars)	<input type="checkbox"/> 54. Aircraft Incident
<input type="checkbox"/> 27. Explosions	<input type="checkbox"/> 55. Marine Vessel Incident
<input type="checkbox"/> 28. Hazardous Materials Spill	<input checked="" type="checkbox"/> 56. Motor Vehicle Incident
	<input checked="" type="checkbox"/> 57. Rail Incident

If capacity permits, there can be value in completing a preliminary or high-level review of all the hazards identified in section 2 of the HRVA Tool before settling on your top project priorities. You may identify opportunities to combine your efforts and tackle multiple hazards under one initiative, partner with regional neighbours, or include a lesser hazard within a more complex project.

By coordinating your meetings and engagement efforts you may be able to save time and resource investment in the long run, while maximizing your opportunity to access funding grants and other support programs.

→ Record your local hazards in the hazard checklist field within the online tool, or on the [Hazard List Worksheet \(HRVA Forms - Step 2 - Hazard List - Worksheet\)](#) located in the document library.

→ Both the online tool and Hazard List Worksheet have a feature and space to add unique hazards that may be applicable for your community.

2.3 HAZARD LIST

This list is an adaptation of hazards identified in the BC Emergency Management Regulation. Climate change is recognized as having impacts on the frequency and intensity of many hazards and may also cause new hazards to emerge. Those hazards identified as being impacted by changing climatic conditions are indicated with a ↗

Atmospheric

1. Air Quality ↗
2. Extreme Heat ↗
3. Extreme Cold ↗
4. Fog ↗
5. Freezing Rain or Drizzle ↗
6. Space Weather ↗
7. Hail ↗
8. Hurricane/Typhoon/High Wind Event ↗
9. Lightning ↗
10. Snowstorms and Blizzards ↗
11. Tornado ↗

Disease and Epidemic

12. Animal Disease ↗
13. Human Disease (Including Pandemic & Epidemic) ↗
14. Plant Disease and Pest Infestation ↗
15. Public Health Crisis

Fire

16. Structure Fire
17. Wildfire ↗

Geological

18. Avalanche ↗
19. Landslide/Debris Flow ↗
20. Land Subsidence (and Sinkholes) ↗
21. Submarine Slides

Seismic

22. Earthquake
23. Liquefaction
24. Tsunami (Telegenic and Terrestrial)

Volcanic

25. Ash Fall
26. Volcanic Flow (Pyroclastic, Lava, Lahars)

Hazardous Materials and Explosions

27. Explosions
28. Hazardous Materials Spill

29. Mine Incident
30. Nuclear Incident
31. Oil or Gas Pipeline Spill
32. Space Debris

Hydrological

33. Drought ↗
34. Seiche ↗
35. Storm Surge ↗

Flooding

36. Lake, River, and Stream Flooding ↗
37. Coastal Flooding ↗
38. Storm Water Flooding (urban, local, pluvial) ↗
39. Flash Flooding ↗

Infrastructure Failure

40. Dam and Spillways Failure ↗
41. Dike Failure ↗
42. Structure Failure ↗

Interruptions to Critical Services

43. Electrical Outage ↗
44. Food Source Interruption (supply chain, or community food stores) ↗
45. Telecommunications Interruption ↗
46. Transportation Route Interruption ↗
47. Wastewater Interruption ↗
48. Water Service Interruption (Includes shortage and contamination) ↗
49. Fuel Source Interruption ↗

Security

50. Cyber Security Threat
51. National Security Threat
52. Public Disturbance
53. Major Planned Event

Transportation

54. Aircraft Incident
55. Marine Vehicle Incident
56. Motor Vehicle Incident
57. Rail Incident

3. UNDERSTANDING COMMUNITY RISK & RESILIENCE

An HRVA contributes to building resilience to disasters by understanding risk, risk drivers, and risk reduction strategies. There are many ways to assess risk & resilience in a community.

Resilience: The ability of a system, community or society exposed to hazards to resist, absorb, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management.

This step includes several suggested activities to develop an understanding of community capacity, strength and exposure and vulnerability to hazards, all of which contribute to a community's resilience in the face of disasters. The goal is to describe what your community is already doing to manage specific hazards and generate enough understanding of the community in order to develop realistic hazard scenarios.

→ For additional information on community resilience and risk reduction and some examples of broader initiatives, see the following programs:

- The United Nations Office for Disaster Risk Reduction (UNISDR) provides the *Disaster Resilience Scorecard for Cities*, which is structured around the *Sendai Framework for Disaster Risk Reduction*: <https://www.unisdr.org/campaign/resilientcities/home/toolkitblkitem/?id=4>
- *Resilient-C*, an initiative of the University of British Columbia provides a tool based on a Hazard Vulnerability Similarity Index which is applicable for coastal communities: <https://resilient-c.ubc.ca/>
- The *City Resilience Index* project provides a tool to conduct a city resilience assessment for your community: <https://www.cityresilienceindex.org/#/>



The hazard scenarios based on the current context of the community's resilience will be used to assess likelihood and consequence in Steps 4 and 5.

3.1 DESCRIBE EXISTING RISK REDUCTION MEASURES

Your community likely already has measures in place to protect people, property, and the environment from the identified hazards. Examples include:

- ✓ Response Plans
- ✓ Structural Mitigation (e.g. dikes)
- ✓ Early Warning Systems (e.g. tsunami sirens)
- ✓ Public Education (e.g. promotion of developing personal preparedness kits)
- ✓ Notification Systems (e.g. tsunami sirens, phone alerts)
- ✓ Training and capabilities of response personnel
- ✓ Building code enforcement
- ✓ Community or neighbourhood preparedness networks
- ✓ Prepositioning of response resources
- ✓ Zoning by-laws around hazardous areas

→ The **Aboriginal Disaster Resilience Planning Tool** provides a number of community-based activities to assess community resilience.

- These include the Aboriginal Resilience Index which focuses on various community resilience factors, and the “Skills and Knowledge Inventory” which can help the community understand the knowledge, skills and abilities available within. It is most applicable to small communities. <https://adrp.jibc.ca/resources>





→ Include your findings in the Existing Risk Reduction Measures summary field within the online tool, or on the Risk Reduction Measures Worksheet (HRVA Forms - Step 7 - Risk Reduction Measures - Worksheet) located in the document library.

Your list will appear again in Step 7: 'Identify Risk Reduction Strategies', where you will assess whether the risk reduction measures in place are sufficient or whether there may be further recommendations to increase your community's resilience to each hazard.

A Risk Reduction Measures Worksheet is available in the Document Library.



HRVA Companion Documents Step 7 - Risk Reduction Measures Worksheet

New & Existing Risk Reduction Measures

Community: Insert Community Name

Date: Select Date

Specific Hazard(s)		Prevention Actions	Reduction Actions	Response Actions
Sample Considerations	Examples	(Risk Avoidance / Prevention)	(Risk Mitigation / Control)	(Risk Acceptance / Sharing / Reaction)
Natural Environment	Crown Land, Sensitive Ecosystems, Flood Plains			
Managed Environment	Parkland, Agricultural Land & Livestock, Community Forests			
Critical Infrastructure	Water Systems, Power Grid, Communications Systems, Pipelines			
Transportation Systems	Highways, Roadways, Railways, Airports, Public Transit, Accessibility Programs			
Health & Care Facilities	Hospitals, Clinics, Care Facilities, Group Homes, Prisons / Jails			
Housing	Residential Communities, Transient Accommodation (Hotels), Shelters			
Government Facilities	Town Hall / Offices, Department Staffing, Emergency Services			
Business Continuity	Local Government Operations, Regional Employers, NGO's, Community Groups			
Partner Communities	Shared Resources & Infrastructure, Mutual Aid Agreements			
Supply Chain	Food & Fuel Supply, Equipment & Resources			
Social Programs	Education, Childcare, Social Workers, Welfare / Charity			
Mental Health & Wellness	Psychological Support Systems, Public & Responders			
Vulnerable Persons	Homeless Persons, Disadvantaged Communities, Immigrants, Mental Health, Physically Disabled, Elderly			
Cultural Protection	First Nations Sites, Religious Infrastructure, Heritage Sites			

3.2 GATHER OR GENERATE COMMUNITY MAPS

To identify the people, property, infrastructure and environment that may be vulnerable or exposed to hazards, as well as the community capacity and assets, you will need to compile and review community maps. Mapping or Geographic Information System (GIS) services may exist in your community to support this activity.

Consider:

- ✓ Hazard maps (e.g. floodplain maps, tsunami/seismic/liquefaction maps)
- ✓ Critical infrastructure and assets (See section 3.3)
- ✓ Vulnerable populations, environments, and structures (See section 3.4)
- ✓ Emergency services locations
- ✓ Sites and items of cultural and historic importance

If your community does not have access to GIS staff or resources, you can create your own base map from a number of sources. A few sources to get you started with Community Mapping are linked below.

- ✓ iMapBC - <https://maps.gov.bc.ca/ess/hm/imap4m/>
- ✓ Google Earth - <https://www.google.com/earth/>
- ✓ Google Maps - <https://www.google.ca/maps/about/mymaps/>
- ✓ B.C.'s Map Hub - <https://governmentofbc.maps.arcgis.com/home/index.html>

→ Consider holding a mapping exercise with the working group and a broader set of partners to help build a shared understanding of the community's context.

- For a resource on participatory community mapping, see the Aboriginal Disaster Resilience Planning Guide Resources: [Community Mapping](#)

- Include your findings in the Community Mapping summary field within the online tool, or on the [Community Mapping Summary Worksheet](#) located in the document library

A [Community Mapping Summary Worksheet \(HRVA Forms - Step 3 - Community Mapping Summary - Worksheet\)](#) is available in the Document Library.

Mapping Summary

The following is an inventory of maps and GIS resources used in the current HRVA process:

Enter a list of mapping resources used during the HRVA process...

3.3 IDENTIFY CRITICAL ASSETS AND INFRASTRUCTURE

Understanding what infrastructure and assets are exposed to hazards is key to understanding how an event might affect the community.

Critical Infrastructure: Assets that are essential for the functioning of government and society, namely, water, food, transportation, health, energy and utilities, safety, telecommunications and information technology, government, finance, and manufacturing.

- ✓ List and map all the critical assets which service the community
- ✓ Consider infrastructure that is owned and operated by the community as well as the region, province or private sector
- ✓ Your community may already have a community asset management plan that can be used as a starting point
- ✓ If Business Impact Analysis (BIA) have been developed for your community, its departments, or for specific pieces of infrastructure, they can be used to inform this section. If not, consider identifying BIAs as potential risk reduction measure in Step 7

A more advanced version of understanding critical infrastructure involves understanding the dependencies that exist between assets. EMBC, in partnership with Defence Research and Development Canada and the Justice Institute of BC developed the Critical Infrastructure Assessment Tool as a resource to assist communities with the analysis of CI in the context of hazard scenarios. This is an optional activity that will enhance understanding of the assets owned by the community and the dependencies that exist between these assets, including external services.

→ For a comprehensive toolkit to assist you in identifying and assessing your critical assets, see the EMBC [Critical Infrastructure Assessment Tool](#)

→ Include your findings in the CI summary field within the online tool, or on the [Critical Assets & Infrastructure Summary Worksheet \(HRVA Forms - Step 3 - Critical Asset & Infrastructure Summary - Worksheet\)](#) located in the document library.

A Critical Asset & Infrastructure Worksheet is available in the Document Library.

Critical Asset & Infrastructure Summary

The following is an inventory of critical assets, infrastructure, and services identified during the HRVA Process:

Enter a list of critical infrastructure in the community...

3.4 IDENTIFY VULNERABILITIES

In order to understand how a hazard might impact your community, it is important to understand the factors that will affect what and whom are most impacted by a hazard. There are a number of types of vulnerability. In this step we consider:

- Social
- Economic
- Physical
- Environmental
- Underlying Disaster Risk Drivers
- Climate Change Adaptation Considerations

Social and Economic Factors:

You should list community groups or members that may be more vulnerable to emergencies in your region, and identify on your maps if there are locations where there are higher concentrations of at-risk individuals. Consider the following:

- ✓ People with mobility considerations, whether determined by age, health, medical conditions, or physical disability
- ✓ People who are dependent upon others, such as infants and seniors (e.g. infant-and-child-care facilities, residential care facilities, etc.)
- ✓ People who are not proficient in the dominant language
- ✓ People with minimal social networks, such a people who have recently arrived in the community, tourists, or seasonal workers
- ✓ People already displaced (e.g. people experiencing homelessness, and people in transition houses)
- ✓ People who commute outside of the community for work
- ✓ Significant or large labour forces employed in a single industry (e.g. pulp mill)
- ✓ Areas important for hunting, fishing, or other food harvesting

→ Include your findings in the Social & Economic Vulnerabilities summary field within the HRVA Tool, or on the [Social & Economic Vulnerabilities Summary Worksheet \(HRVA Forms - Step 3 - Social & Economic Vulnerabilities Summary - Worksheet\)](#) located in the document library.

A Social & Economic Vulnerability Worksheet is available in the Document Library.

Social & Economic Vulnerabilities

The following is a summary of the social & economic vulnerability factors identified during the HRVA Process:

Enter a list of social & economic factors in the community...

Physical and Environmental Factors:

In order to identify any physical and environmental factors that may affect your community’s risk levels, list areas such as structures and environments that may be more vulnerable to emergencies. Include these on your map:

- ✓ Unregulated land use, or areas outside of local jurisdiction or control
- ✓ Structures built prior to current building codes
- ✓ Structures built in hazardous areas (e.g. historical flood plain)
- ✓ Remote communities with limited access
- ✓ Hazardous industry or activities in your region
- ✓ Areas where there is only one ingress/egress route
- ✓ Areas identified as protected habitat
- ✓ Coastline and watersheds
- ✓ Areas previously impacted by a disaster
- ✓ Changes in ecosystem health or diversity
- ✓ Unsustainable resource management practices

→ Include your findings in the Physical & Environmental Factors summary field within the online tool, or on the [Physical & Environmental Vulnerability Summary Worksheet \(HRVA Forms - Step 3 - Physical & Environmental Vulnerabilities Summary - Worksheet\)](#) located in the document library.

A Physical & Environmental Vulnerability Worksheet is available in the Document Library.

Physical & Environmental Vulnerabilities
<p><i>The following is a summary of the physical & environmental factors identified during the HRVA Process:</i></p>
<p><i>Enter a list of physical & environmental factors in the community...</i></p>

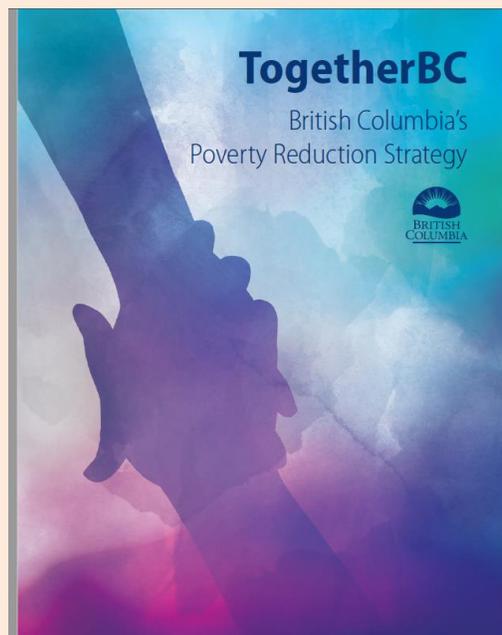
Poverty and Inequality

Poverty is considered both a driver and consequence of disasters, and numerous studies and research reveal that it is generally the poor who tend to suffer most from disasters¹. Often living in hazard-prone areas with susceptible infrastructure, reduced access to social support networks, and financial support tools like insurance or credit systems, disasters can have extensive effects on their ability to recover.

Inequality can also limit access to resources, support systems, and information necessary to navigate the post-disaster environment. Marginalized groups can be cut off from established support systems and further isolated during a disaster. Language or education barriers can also inadvertently hamper access to emergency information tools and assistance services.

It is important to consider the implications of poverty and inequality when investigating new disaster risk reduction and mitigation measures. The impact of disasters can, in addition to loss of life, injury and damage, cause loss of livelihoods, displacement, poor health, food insecurity, among other consequences.

→ The government of British Columbia has produced a [poverty reduction strategy](#) to reduce child and overall poverty across the province.



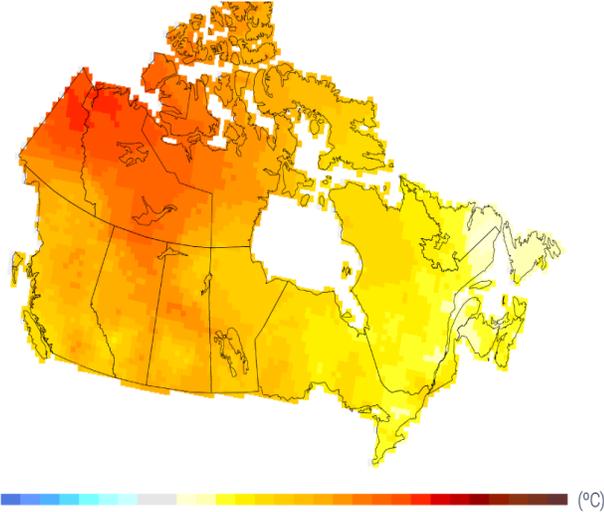
¹ DFID, 2004; Twigg, 2004; Wisner et al., 2004; UNISDR, 2009b.

Climate Change Considerations

The climate in British Columbia has changed and will continue to change in the future. This has implications for emergency management, as the climate conditions and related hazards that have been planned for in the past are not what we can expect to see in the present or future.

Since 1948, British Columbia has seen an annual average warming of 1.9°C. This is largest in winter (3.7°C) and smallest in fall (0.7° C).² This has the greatest impact on disasters during weather extremes, where changing climatic conditions will further intensify some weather.

Observed changes (°C) in annual temperature across Canada between 1948 and 2016, based on linear trends.³



As extreme hot temperatures become more frequent and more intense, there will be an increase in the severity of heatwaves, increased drought, and wildfire risks. More intense rainfalls will increase flood risks, coastal flooding may occur due to local sea level rise, and storms may cause increasing amounts of damage⁴.

The changes are also projected to intensify in the future so it's important to think about how and when to revisit the planning process to incorporate climate scenarios and emerging information.

Climate change adaptation involves learning about the risks from a changing climate and taking proactive measures to address those risks. It can include any activity that reduces the negative impacts of climate change or that builds resilience⁵.

Climate change is a risk driver, and is not included in this guide as a specific hazard. Those hazards identified as being impacted by changing climatic conditions are indicated on the hazard list (Section 2.3) with a ↗.

² Canada's Changing Climate Report: <https://changingclimate.ca/CCCR2019/chapter/8-0/>
³ From CCCR2019 - Chapter 4 Figure 4.3
⁴ Canada's Changing Climate Report: https://changingclimate.ca/site/assets/uploads/sites/2/2019/03/CCCR_HeadlineStatements.pdf
⁵ Adaptation Library: Resources for climate adaptation <http://www.adaptationlibrary.ca/new-to-adaptation/>

→ Climate Resources:

- [ClimateData.ca](#) - Climate Data for a Resilient Canada. The portal includes over 25 different indicators for temperature and precipitation across Canada, including extremes; historical and projected climate data at the daily level available to download at a resolution of about 10x10km; updated historical Intensity-Duration-Frequency (IDF) Curves; and a Health Sector Module, the first of a series which will include data, information and case studies relevant for specific sectors.
- [Plan2Adapt](#) - Pacific Climate Impacts Consortium. Climate change impacts do not affect every region of B.C. the same way. The Plan2Adapt tool generates maps, plots, and data describing projected future regional B.C. climate conditions.
- [Adaptation Library](#) - Natural Resource Canada. The Adaptation Library is a searchable collection of community, forestry, and energy related adaptation products. The goal of the Library is to connect community and industry users with relevant information related to climate change adaptation in Canada.
- [ReTooling for Climate Change](#) - Fraser Basin Council. Adaptation tools and resources for B.C. local governments, First Nations and the natural resource sectors to prepare for the impacts of climate change.
- [BC Climate Action Toolkit](#) - Green Communities Committee and Partners. Toolkit to inspire action in B.C.'s diverse local governments to advance emission reductions and adaptation planning.
- [PCIC data portal](#) - Pacific Climate Impacts Consortium. Provides access to B.C. data, high-resolution climatology & downscaled climate scenario data collected.
- [Climate Change Indicators](#) - Environmental Reporting BC. Information on indicators including changes in river flow, sea level, temperature, precipitation & more.

→ Climate Reports:

- [Canada's Changing Climate Report \(2019\)](#) - Environment and Climate Change Canada. This report is about how and why Canada's climate has changed and what changes are projected for the future.
- [Indicators of Climate Change for BC \(2016 Update\)](#) - Environmental Reporting BC. Updated report on key indicators of climate change in B.C.
- [Sea Level Rise Adaptation Primer \(2013\)](#) - Toolkit to build adaptive capacity on Canada's south coasts.

→ Climate Research Organizations:

- [Pacific Climate Impacts Consortium \(PCIC\)](#) - A regional climate service provider that conducts quantitative studies on the impacts of climate change and climate variability in the Pacific and Yukon region. Results from this work provide regional partners with the information needed to develop plans for reducing the risks associated with climate change.
- [Pacific Institute for Climate Solutions \(PICS\)](#) - Supporting solutions-oriented research to assist British Columbia with meeting the climate change challenge. Current initiatives include five major projects dealing with transportation, energy efficiency, forest carbon management, natural gas, and low carbon pathways.
- [The Columbia Basin Trust](#) - Helping communities in the Columbia Basin identify their vulnerabilities and develop adaptation plans.
- [The Fraser Basin Council](#) - Managing the BC Regional Adaptation Collaborative (RAC) - 21 collaborative projects across the province supporting decision-making on water allocation and use, forest and watershed management, flood protection and floodplain management and community planning.

Unplanned and rapid urbanization

Unplanned urbanization can have a costly effect on communities during a disaster. The impacts of extreme weather, hydrological, and geological events are often increased after major changes in land use. Stresses placed on infrastructure, social programs, and local governments during periods of rapid development can significantly impact the resiliency of a community.

→ Statistics Canada has produced a [Focus on Geography Series](#) of online tools to help collect and assess data gathered during the 2016 Census.

British Columbia – Census subdivisions with the highest population growth among those with 5,000-plus population				
Census subdivision (CSD) name	CSD type	Population		
		2016	2011	% change
Tsinstikeptum 9	IRI	7,612	5,872 †	29.6
Greater Vancouver A	RDA	16,133	12,988 †	24.2
Langford	CY	35,342	29,228	20.9
Whistler	DM	11,854	9,824	20.7
Ferne	CY	5,249	4,448	18.0

Demographic change

Changing population patterns can affect the vulnerability and resiliency of social systems. Disasters can have a different effect on certain communities, specifically those without the necessary resources to cope with and recover from such events. By understanding the demographic makeup of your community and the associated exposures, you can help reduce the risk, frequency, and intensity of those potential disaster effects.

→ Statistics Canada has produced a number of [Highlight Tables](#) to help assess data gathered during the 2016 Census.

Highlight tables, 2016 Census

Highlight tables provide information highlights by topic via key indicators for various levels of geography. The tables allow users to perform simple rank and sort functions.

Highlight tables are available for the following topics:

- [Aboriginal Peoples](#)
- [Age and Sex](#)
- [Education](#)
- [Families, Households and Marital Status](#)
- [Housing](#)
- [Immigration and Ethnocultural Diversity](#)
- [Income](#)
- [Labour](#)
- [Language](#)
- [Population and Dwelling Counts](#)
- [Type of Dwelling](#)

Need highlight tables from previous censuses? [2011 Census](#) [2006 Census \(Archived\)](#) [2001 Census \(Archived\)](#)

Lack of regulations and incentives for private disaster risk reduction investment

The Sendai Framework highlights a lack of regulation and incentive for private disaster risk reduction investment as an underlying risk driver. It states that addressing risk factors through informed public and private investments is more cost-effective than reliance on response and recovery, and contributes to sustainable development.⁶

→ The UNISDR has produced a report on **Incentives for Disaster Risk Management**



Non disaster risk-informed policies

Risk-informed policy pushes decision-makers to understand and acknowledge that all development choices involve the creation of uncertain risks, as well as opportunities. Non disaster risk-informed policy can increase vulnerability and exposure to human and financial harm.

→ The United Nations Development Program (UNDP) has produced a report on **Risk Informed Development**

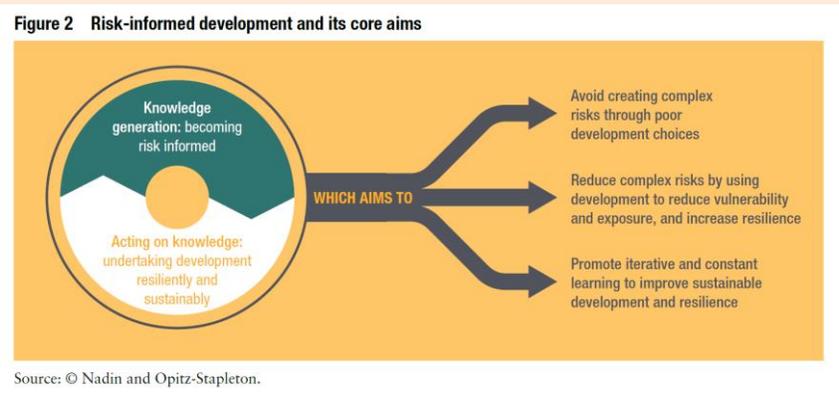


Figure 2 Risk-informed development and its core aims

Source: © Nadin and Opitz-Stapleton.

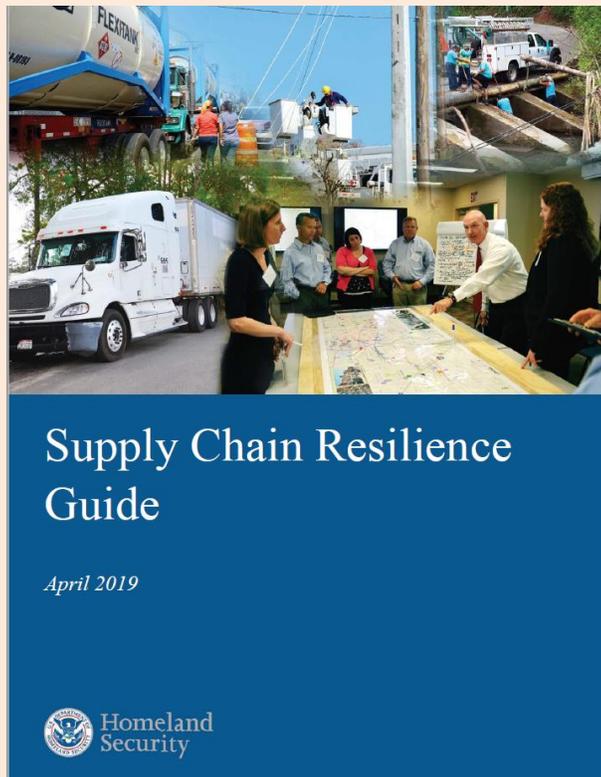
⁶ <https://www.unisdr.org/partners/private-sector>

Complex supply chains

Disasters disrupt pre-existing networks of supply. In many communities our reliance on just-in-time inventory practices, combined with the heavy use of technology to fulfill orders can result in supply gaps and significant delays in restoring services. This can cause panic among residents, failure to meet the health and medical needs of the population, and if unmanaged, turn an emergency into a disaster.

Communities require a solid understanding of the nature, capacity, and resilience of their local supply networks in order to mitigate the effects of a supply chain interruption.

- FEMA has produced a [supply chain resilience guide](#) to assist local governments and communities in assessing the vulnerability of their supply chains.



The limited availability of technology

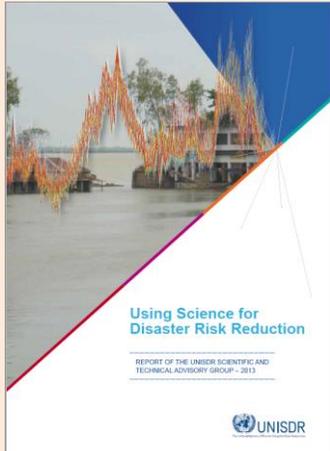
Science and technology play a critical role in disaster risk reduction by helping to prevent, prepare for, and respond to disasters⁷. Technology has proven value in a number of areas, from hazard mapping and risk assessment, to forecasting, early warning, and alerting, as well as during disaster response and recovery efforts.

Communities with limited access to modern tools and resources can be disadvantaged during hazard mitigation efforts. Ensuring communities have access to current information and technology can help inform policy and practice, provide early warning to the population, and improve the efficiency of response efforts.

Emergency Managers are encouraged to promote the integration of key technology into their disaster risk reduction efforts, ensuring the initiatives proposed are useful, usable, and consistently used⁸ at the local level. While the range of technologies applicable to DRR is broad, some examples of technologies and their applications in modern DRR include:

- ✓ GIS & Hazard mapping
- ✓ Drones, satellite imaging, LIDAR
- ✓ Evidence based analysis and decision making
- ✓ Disaster resilient building material and infrastructure
- ✓ Redundant communications systems
- ✓ Rainwater harvesting and solar energy production
- ✓ Sanitation technology and debris management
- ✓ River engineering and flood control systems
- ✓ Remote sensing and early warning systems
- ✓ Artificial Intelligence (AI) and data processing
- ✓ Doppler radar and forecasting services
- ✓ Disaster alerts through mobile phone networks
- ✓ Sirens and localized alerting systems
- ✓ Social networking services (SNS)
- ✓ Web based registration services and information sharing
- ✓ Mobile payment tools for distribution of funds after a disaster
- ✓ Indigenous DRR knowledge and technology
- ✓ Encouraging the exploration of innovations in DRR

→ The UNISDR has produced a report on the use of [Science and Technology for Disaster Risk Reduction](#).



⁷ UNISDR STAG Report 2013

⁸ Boaz & Hayden 2002

Unsustainable uses of natural resources

Natural Resource extraction and/or development are fundamental elements of many local economies in BC, and all communities rely on natural resources to sustain our population and standard of living. The practices used in the collection, processing, manufacturing, use, and disposal of those resources and subsequent products have a measurable impact on the community and environment. Economic stability, environmental sustainability, community growth, and social development all rely on efficient resource use and responsible stewardship of those natural resources.

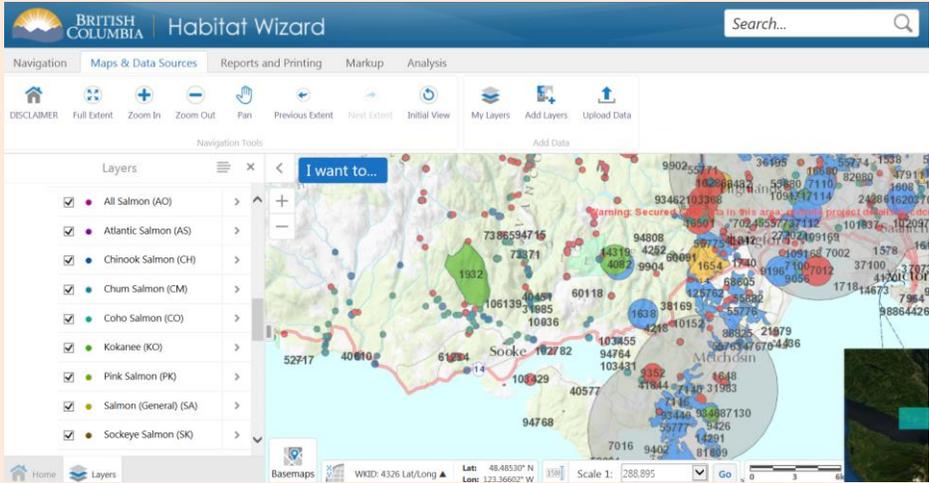
- The BC Government is developing the [Cumulative Effects Framework](#) to help communities, industry, and government identify the combined effects of past, present, and future human activities and natural processes.
- For more information on Natural Resource Management, see the [Natural Resource Stewardship Web Page](#).



Declining ecosystems

Biodiversity loss has significant and wide-ranging implications for our communities and our province. Declining ecosystems can be reflected in species loss, soil degradation, loss of fish stocks, deforestation, and pollution. The implications can include food insecurity, water shortages, natural resource supply shortages, and loss of cultural heritage and tourism values. If unmanaged, the broader implications to our population and communities can be dire.

- For information on identifying ecosystems at risk in your region, see the [Species & Ecosystems at Risk Web Page](#).
- The government of BC has produced the [BC Species & Ecosystems Explorer](#) tool to help you identify and examine data on threatened species in your region.



- Include your findings in the Underlying Disaster Risk Drivers summary field within the HRVA Tool, or on the [Underlying Disaster Risk Drivers Summary Worksheet \(HRVA Forms - Step 3 - Underlying Disaster Risk Drivers Summary - Worksheet\)](#) located in the document library.

An Underlying Disaster Risk Drivers Summary Worksheet is available in the Document Library.

Underlying Disaster Risk Drivers

The following is a summary of underlying disaster risk drivers identified during the HRVA Process:

Enter a summary of underlying risk drivers in the community...

3.6 WRITE HAZARD SCENARIOS

For each identified hazard, write a hazard scenario. This could be based on actual past events or based on potential foreseeable scenarios. The important part is that they are realistic. These scenarios will help guide you throughout the HRVA process and be very important as you move throughout the consequence assessment portion of the tool.



The scenarios will identify specific variables such as time of year, magnitude and location of the event. These scenarios are a key component to keep your discussions on track and keep your assessment in scope of what could realistically occur. Consider holding a workshop to check in with your working group or other partners to validate your findings.

- Consider whether hazard scenarios may already exist for your community. They may have been developed for training exercises or past HRVAs.
 - See the EMBC Hazard Scenario Development Instructions: https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/local-government/critical-infrastructure/ci_assessment_-_hazard_scenario_development_instructions.pdf
 - See the Hazard Reference Guide to identify subject matter experts who may be able to support this process.

→ Record your scenarios in the Hazard Scenario summary field within the online tool, or on the Hazard Scenario Worksheet (HRVA Forms - Step 3 - Hazard Scenario - Worksheet) located in the document library.



A Hazard Scenario Worksheet is available in the Document Library.

Impact Summary	
<i>Enter a summary of the anticipated impacts...</i>	
Related Vulnerabilities	
<i>Enter a summary of the related vulnerabilities...</i>	
Likelihood Ratings	Consequence Severity
<i>Choose a likelihood ranking</i>	<i>Choose a consequence score</i>
E – Almost Certain to Occur D – Likely to Occur C – Probable to Occur B – Unlikely to Occur A – Very Rare to Occur	4 – Extreme Impact 3 – High Impact 2 – Moderate Impact 1 – Low Impact 0 – No Impact

4. ASSESSING HAZARD LIKELIHOOD

Identifying the likelihood of the hazards you have selected will help the community understand which hazards should be given priority attention.

This section encourages you to explore a combination of scientific data and local knowledge to determine the likelihood of different hazards. It will look at likelihood based on historical, current, and future context.

- **Likelihood:** the chance of an event or an incident happening. It can be defined or measured objectively or subjectively.
- **Historical Likelihood:** is based on facts, data, stories and anecdotes of hazard events that occurred in the past.
- **Current Likelihood:** is an analysis of recent trends and short-term projections compared against historical information.
- **Future Likelihood:** is a forecast of long-term potential changes that may affect the likelihood of a hazard.

4.1 GATHER AND APPLY KNOWLEDGE

This HRVA Tool acknowledges that scientific data and local or traditional knowledge are both important sources for determining the likelihood of hazards.

Scientific Data

Scientific data helps provide a likelihood score based on either the frequency, sometimes referred to as “return period,” or the probability, which is the percent chance an event could occur annually. Sources of this information will vary from scientific articles and reports to subject matter expertise available within and external to your community.

A typical procedure for collecting historical data might include:

- **Step 1: Consult local, regional, or international databases**
- **Step 2: Request data from Government agencies or emergency management organizations**
- **Step 3: Conduct a literature search**
- **Step 4: Conduct an online media search**
- **Step 5: Conduct a newspaper and local library/archive/museum search**
- **Step 6: Community-based collection of disaster information (See Local Knowledge)**

→ See the [⚠ Hazard Reference Guide](#) for help in identifying data sources and subject matter experts for different hazards.

Local Knowledge

Local knowledge will help establish an understanding of the likelihood of a hazard based on historical emergencies and local experience of hazards. In cases where little to no scientific data exists, local knowledge is especially important. Local knowledge may come from:

- ✓ Analysis of recent emergencies occurring in community
- ✓ Historical knowledge of emergencies occurring in the distant and ancient past. This is often held by Elders, long-time residents, historians, and local records

A Note About Indigenous Knowledge:

This HRVA Tool recognizes Indigenous Knowledge (IK) as a holistic system of knowledge, embedded in culture and tradition, built through generations of living in close relationship with the land, which can carry spiritual significance. This knowledge belongs to First Nations and, while there is no expectation that sensitive information be shared in this HRVA Tool, communities are encouraged to consider IK and choose a likelihood rating that reflects this knowledge, regardless of whether it is inputted into the Local Knowledge field box below.

The Aboriginal Disaster Resilience Programs offers a [Traditional Knowledge Toolkit](#), which suggests that Indigenous Knowledge can be used not only to assess likelihood, but also to identify hazards, place hazards within a culturally relevant context, and inform effective activities to reduce risk.

The next step of the process involves consideration of both scientific and local knowledge, and choosing a likelihood score based on the scale available below.

Likelihood Scoring	A - Rare	B - Unlikely	C - Probable	D - Likely	E - Almost Certain
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Hazard: (Step 2)		Priority: (Step 6)			
Historical Likelihood Score:	(Step 4a)	Current Likelihood Score:	(Step 4b)	Future Likelihood Score:	(Step 4c)
Results of Historical Data & Local Knowledge Gathering		Adjusted Score Based on Current Change Factors⁹		Future Forecasting for Long-Term Planning Purposes	

⁹ Change to likelihood factors could include Climate Change, Local Development, Environmental Alterations, Economic or Demographic Shifts, etc.



- The likelihood scale used in this tool is based off BC's 2018 Strategic Climate Change 5-point Risk Assessment Scale. It provides a guide so that frequency, return period, or probability can be used in the determination of likelihood.
- You can document how you came to this determination with the [Hazard Likelihood Ranking Worksheet \(HRVA Forms - Step 4 - Hazard Likelihood Ranking\) Worksheet](#).

Likelihood Ranking Definitions Table:

Likelihood	Rating	Frequency	Percent Change (Probability)
Almost Certain	E	Event is expected to occur once every two years or more frequently	Annual chance \geq 50%
Likely	D	Event is expected to occur about once every 3-10 yrs.	10% \leq annual chance < 50%
Possible	C	Event is expected to occur about once every 11-50 yrs.	2% \leq annual chance < 10%
Unlikely	B	Event is expected to occur about once every 51-100 yrs.	1% \leq annual chance < 2%
Rare	A	Event is expected to occur less than once every 100 yrs.	Annual chance <1%

The following table provides a quick reference to the period definitions and special considerations for each category. Additional guidance on assessing individual likelihood periods will follow in the corresponding sections.

Likelihood Period Definition Table:

Historic Likelihood	Current Likelihood	Future Likelihood
Factual Data – Highly Accurate	Estimated Change – Reasonably Accurate	Long Range Forecast – Least Accurate
The measured frequency of the hazard based on scientific data and local knowledge of past events. <i>(Ideal measurement periods should be >50-100 years for most hazards, or the actual practical limits of recorded data.)</i>	The anticipated frequency of the hazard in the immediate-term (+/- 10-15yrs) based on short-term analysis including; recent rate of change (i.e. <25yr period), and similar short-term projections by subject matter experts.	The long-term projection based on predictive scientific models and anticipated changes to your community or region. <i>(i.e. urban development / demographic shifts / industry changes / etc.)</i>
<i>Infrequent but severe natural events like Volcanic Eruptions, Large Earthquakes, Tsunamis, etc., may not have occurred within the recent period of recorded data, including local memory and oral history. In these cases, you should determine your likelihood following consultation with subject matter experts.</i>	<i>The Current Likelihood may not differ from the Historic Likelihood unless affected by changing conditions like Climate Change or local development. You may also wish to slightly adjust the likelihood of some events as you approach or exceed the normal return period (i.e. the average time between occurrences). If no rate of change is known or anticipated, simply carry the value over from your Historic Likelihood column.</i>	<i>The 2050 period is often used, but the Future Likelihood for a specific hazard may be adjusted to align with the anticipated lifespan of new mitigation projects and critical infrastructure. i.e. A bridge or dyke intended to last for 80 years, should be built to accommodate the highest potential flood based on >100-year projections.</i>
<p>You may also find it useful to express a degree of confidence in your final ratings for the readers benefit; particularly where the level of uncertainty across a number of hazards can vary based on the available data or projection models. You can include a confidence level statement (i.e. Low / Medium / High Confidence) in your summary input field for any specific hazard category.</p>		

4.2 DETERMINE HISTORICAL LIKELIHOOD SCORE:

Historic Likelihood is based on facts, data, stories and anecdotes of hazard events that occurred in the past. While it is generally determined as a result of formal data analysis and interviews, it is important to recognize that there are always limitations to past data collection.

- Data is only as accurate as the methods used to collect and record it
- Measurement periods and records may not begin to approach the return period of major events (i.e. catastrophic earthquakes or volcanic eruptions may occur >500yrs or more, or well beyond the range of modern recordkeeping systems)
- Data measurements or lived experiences can vary greatly within the same geographic area

→ Include your findings in the Historic Likelihood Score field within the online tool, or on the [Hazard Likelihood Ranking Worksheet \(HRVA Forms - Step 4 - Hazard Likelihood Ranking - Worksheet\)](#) located in the document library.

A fillable is available in the Document Library.

Hazard	Scientific Data Likelihood Comments	Local Knowledge Likelihood Comments	Historical Likelihood Score
02. Extreme Heat*			E. Almost Certain <input type="button" value="v"/>
03. Extreme Cold*			A. Rare <input type="button" value="v"/>

HRVA Hazard Likelihood Ranking				
Community:		Date:		
A – Rare	B – Unlikely	C – Probable	D – Likely	E – Almost Certain
Hazard #	Hazard Name	Historic Likelihood	Current likelihood	Future Likelihood
1	Extreme Heat	E - Almost Certain <input type="button" value="v"/>	- Select - <input type="button" value="v"/>	- Select - <input type="button" value="v"/>
2	Extreme Cold	- Select - <input type="button" value="v"/>	- Select - <input type="button" value="v"/>	- Select - <input type="button" value="v"/>
		A - Rare <input type="button" value="v"/>	- Select - <input type="button" value="v"/>	- Select - <input type="button" value="v"/>
		B - Unlikely <input type="button" value="v"/>	- Select - <input type="button" value="v"/>	- Select - <input type="button" value="v"/>
		C - Probable <input type="button" value="v"/>	- Select - <input type="button" value="v"/>	- Select - <input type="button" value="v"/>
		D - Likely <input type="button" value="v"/>	- Select - <input type="button" value="v"/>	- Select - <input type="button" value="v"/>
		E - Almost Certain <input type="button" value="v"/>	- Select - <input type="button" value="v"/>	- Select - <input type="button" value="v"/>

4.3 UNDERSTANDING AND DOCUMENTING CHANGING LIKELIHOOD

In the previous step you determined the likelihood of each hazard based on scientific and local knowledge, which usually focuses on the historical record of hazards occurring. However, there are trends which may affect the likelihood of a hazard occurring in your community. This step is designed primarily to address changes in likelihood due to climate change, but can also be used to identify other drivers of change.

There are a number of drivers of change that could impact hazard likelihood including:

- ✓ Climate change
- ✓ Population changes such as growth, decline, or increased density
- ✓ New or expanding industry
- ✓ Changes in regulation

Change to Current Likelihood

Which hazards face a higher likelihood today that might be different from the past?

- ✓ Write these in the narrative box on “Changes Observed To-Date”
- ✓ Choose a new likelihood score based on those changes

Change to the Intensity of Hazards

It is not just the frequency of hazards that could be affected by climate change, but rather the intensity or magnitude of the hazard. For example, a heat wave might not be just more likely, but the temperatures and duration of the event may be more extreme than past events.

- ✓ Consider whether the hazards scenarios developed in section 3 might be different from past scenarios
- ✓ As necessary, go back to Step 2 and add additional hazards or scenarios which reflect any new intensity
- ✓ Document these findings

New Hazards

Climate change and other change factors may be presenting new or emerging hazards not previously considered.

- ✓ Return to Step 2 and add additional hazards that may not have been previously considered

→ Refer to local planning documents such as Official Community Plans, Regional Growth Strategies, or Comprehensive Community Plans.

→ Include your findings in the Current Likelihood Score field within the online tool, or on the [Hazard Likelihood Ranking Worksheet \(HRVA Forms - Step 4 - Hazard Likelihood Ranking - Worksheet\)](#) located in the document library.

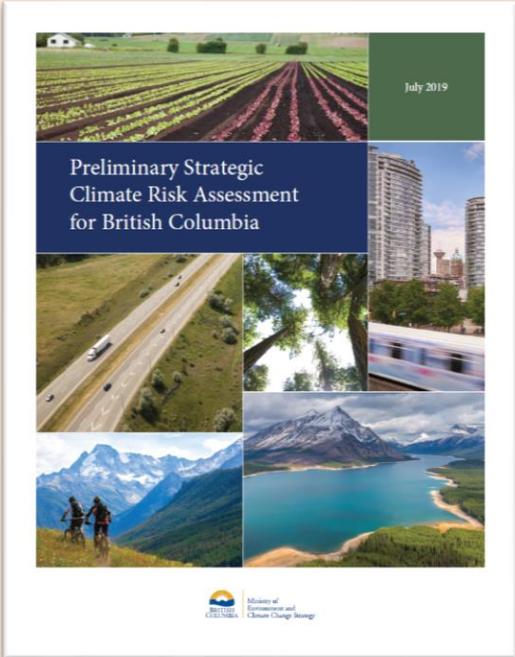
4.4 PREDICTING FUTURE LIKELIHOOD

In addition to considering which hazards may already have been impacted by change, consider how hazard likelihood will be different in the future.

- ✓ Identify which hazards will have changed due to climate related factors by 2050
- ✓ Write in the “Future Changes Expected” narrative box the changes that are anticipated
- ✓ Choose a new likelihood rating based on what the likelihood is expected to be by 2050
- ✓ Document any changes to hazard frequency accordingly

Note: The “Changes expected by 2050” is specified in order to accommodate the majority of the academic literature on climate change. The year “2050” may not line up with other timelines for change in your community. As such, in the narrative box, the date can be changed.

→ Refer to the [Preliminary Strategic Climate Risk Assessment for British Columbia](#) for information on expected trends and changes for a number of hazards in BC.



→ Include your findings in the Future Likelihood Score field within the online tool or on the [Hazard Likelihood Ranking Worksheet \(HRVA Forms - Step 4 - Hazard Likelihood Ranking - Worksheet\)](#) located in the document library.

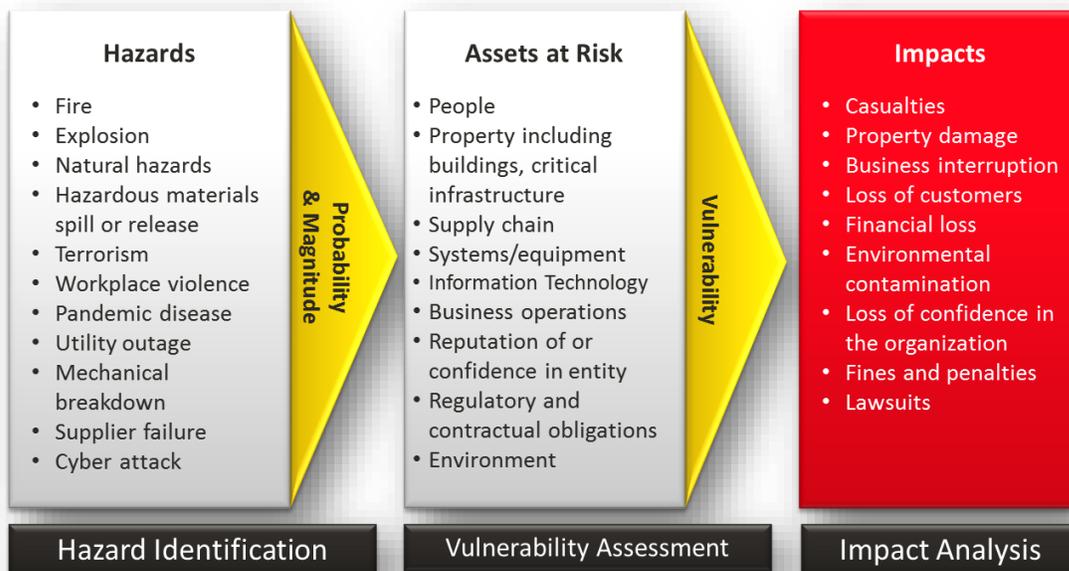
5. ASSESSING CONSEQUENCES

The next stage of the HRVA will involve assessing what consequences are estimated to occur if the identified hazard scenarios were to take place. This combination of likelihood and consequences will complete the HRVA risk profile.

5.1 REVIEW CONSEQUENCE CATEGORIES AND RATING SYSTEM

The HRVA Tool provides eleven consequence categories which assess disaster impact to communities in a holistic way.

Sample Risk Assessment Process - US Department of Homeland Security



10

When assessing consequences refer to the hazard scenarios developed and the discussions on resilience that took place in Step 3. Ensure you give particular attention to the vulnerable populations identified in section 3. Each hazard can be rated from 'None' to 'Extreme' consequence. Familiarize yourself with the consequences in advance and start with the ones that are most easily understood for your community.

Note: Even though Step 4 involved selecting a future likelihood value, the consequences should be assessed based on current context and current resilience levels, and not 2050.

¹⁰ <https://www.ready.gov/risk-assessment>

Consequence Category Definitions (also available in the Document Library: HRVA Forms - Step 5 - Consequence Category Definitions -Table):

1. Fatalities:	Potential number of people killed as a result of the hazard.
2. Injuries, Disease, or Hospitalization:	Potential number of people injured or ill because of the hazard.
3. Displacement:	Disruption to regular living situations, requiring people to either leave their home or be confined to their home without access to regular services. This includes short-term evacuation orders, self-evacuation, shelter-in-place as well as long term or permanent relocation of individuals, families or communities.
4. Psychosocial Impact:	Impacts to the emotional and social well-being of an individual, family group and/or community.
5. Support System Impact:	Loss of accessibility to supports/networks or community groups, community reciprocity, trust and cooperation between community members.
6. Cultural Impact:	Loss of cultural heritage and/or identity. May include loss of works, objects, places, practices and ecology that are directly associated with an important aspect or aspects of human history and culture.
7. Property Damage:	The direct negative consequences of a hazard on buildings, structures and other forms of property, such as crops and livestock
8. Critical Infrastructure Impact:	An impact to critical infrastructure, including its processes, systems, facilities, technologies, networks, assets, and/or services, that results in consequences to the health, safety, security or economic well-being of community members and the effective functioning of the government.
9. Environmental Damage:	The negative consequences of a hazard on the environment, including the soil, water, air and/or plants and animals.
10. Economic Impact:	Disruption or loss of ability for individuals, businesses and governments to generate income. This includes interruptions to the consumption, production, and trade of goods and services.
11. Reputational Impact:	A negative change in the perception of the government or organization, in the minds of the community, its partners and others who are vital to its success. This can result in socioeconomic damage or disruption such as loss of community or partners trust and an increase in negative media attention.

5.2....RATE AND DOCUMENT CONSEQUENCES

Consequences are best assessed in a group setting with a diversity of people and groups represented. Consider holding a consequence assessment workshop to work through the consequences. Refer to your partner lists to ensure that the appropriate partners are represented at the table.



For ease of use, these consequences are divided into two pages, with the first focusing on human and social impacts and the second focusing on physical and economic impacts.

- ✓ For each category, outline the potential impacts of the hazard
- ✓ Use the descriptions in the scaling system below to prompt your discussion
- ✓ Record these impacts in the open field
- ✓ Assign a value to the consequence category

→ Refer to the [Consequence Category Definitions \(HRVA Forms - Step 5 - Consequence Category Definitions -Table\)](#), and the [Consequence Scale Ranking Guide \(HRVA Forms - Step 5 - Consequence Ranking Guide - Table\)](#) to help you assess your hazards

→ Record your consequence ratings for each hazard in the fields within the online tool, or on the [Consequence Ranking Worksheet \(HRVA Forms - Step 5 - Consequence Ranking - Worksheet\)](#) located in the document library.

Consequence Scale Ranking Guide:

Consequence Scale Ranking Guide						
Rank	FATALITIES	INJURY/ILLNESS	DISPLACEMENT	PSYCHOSOCIAL	SUPPORT SYSTEM IMPACT	CULTURAL IMPACT
None (0)	No directly related fatalities.	No directly related illness or injury.	No evacuation orders or self-evacuation.	Event is unlikely to result in any short- or long-term trauma.	Not likely to impact access to supports or networks. Community reciprocity, trust, and cooperation are unaffected.	Little to no impact.
Low (1)	Loss of life that is manageable within the scope of normal operations.	Illness or injury that is manageable within the scope of normal operations.	Low percentage of the population evacuated, self-evacuated, or sheltering in place. Supports are provided within community.	Direct impacts to a few individuals. Psychosocial impacts can be primarily addressed by Psychological First Aid. Additional supports to those directly impacted and their families can be provided by local mental health professionals.	Hours to days-long disruption to daily life. Likely to result in some localized reduced access to supports or networks. Community reciprocity, trust, and cooperation are affected.	Recovery from cultural impacts will take days to weeks.
Med (2)	Loss of life that is beyond the scope of normal operations and may require overtime and/or additional resources.	Illness or injury that is beyond the scope of normal operations and may require additional capacity and/or resources, and/or the activation of response systems and emergency plans.	Enough of the population is evacuated, self-evacuated or sheltering in place to require external supports to be brought in.	Localized loss of property and/or fatalities or serious injuries. Those directly impacted are likely to experience both short- and long-term psychosocial impacts. Local and outside mental health professionals will be needed to provide support and treatment.	Days-long disruption to daily life. Likely to result in reduced access to supports or networks. Community reciprocity, trust, and cooperation are affected.	Recovery from cultural impacts will take months.
High (3)	Loss of life severe enough for mass fatality procedures to be activated.	Extensive mass illness or injury requiring extra capacity and/or resources across multiple facilities in a health region and potentially specialized care from other health regions. Health authority response systems and emergency plans activated.	10-30% of the population evacuated or displaced.	Wide-spread loss of property and/or multiple fatalities or persons with serious injuries. Those directly impacted are likely to experience both short- and long-term psychosocial impacts. Local and outside mental health professionals will be needed to provide support and treatment.	Weeks or months-long disruption to daily life. Significantly reduced access to supports or networks. Community reciprocity, trust, and cooperation are severely affected.	Recovery from cultural impacts will take years.
Extreme (4)	Fatalities exceed the capacity of existing plans and capabilities. Provincial, Federal, and International resources may be required.	Extraordinary mass illness or injury. Provincial, Federal, and International resources may be required. Multiple health region response systems are active.	High percentage of residents are displaced for years or permanently.	Widespread and long-term psychosocial impacts beyond those who are directly affected by property loss or fatalities. Extensive external supports required.	Months to years-long disruption to daily life. Supports or networks may be permanently changed.	Recovery from cultural impacts will not be possible; destruction is permanent and irreversible (i.e. Destruction of irreplaceable knowledge or artifacts).

Rank	PROPERTY DAMAGE	CRITICAL INFRASTRUCTURE	ENVIRONMENTAL	ECONOMIC	REPUTATIONAL
None (0)	Not likely to result in property damage.	Not likely to disrupt critical infrastructure services.	Not likely to result in environmental damage.	Not likely to disrupt business or financial activities.	Not likely to result in political or reputational impacts.
Low (1)	Minor, mostly non-structural damage.	Low percentage of the population impacted by few service disruptions. Disruptions last hours to days.	Localized and reversible damage. Hours to days-long clean up possible.	Days-long disruptions to few businesses, financial activities, or livelihoods.	Limited or short-term political or reputational impacts.
Med (2)	Localized severe damage.	Either a high % of the population impacted by a few services OR a low % of the population impacted by a major or multiple service disruptions.	Full clean up possible, but may take weeks.	Weeks-long losses to businesses, industry, or livelihoods.	Some significant or long-term political or reputational impacts.
High (3)	Widespread structural damage. Repair may take months to years.	High % of the population impacted by a major or multiple service disruptions.	Major but reversible damage. Full clean up difficult and could take months or years.	Months long losses to business, industry, or livelihoods.	Significant and long term political or reputational impacts.
Extreme (4)	Widespread irreparable damage.	High percentage of the population is impacted by long-term outages.	Severe or irreversible damage. Full clean up not possible or could take decades.	Widespread or long-term loss of businesses, industry, or livelihoods.	Significant and irreparable political or reputational impacts.

6. BUILDING A RISK PROFILE

A key output of the HRVA is to understand which hazards pose the greatest risk in your community. This step provides information about conceptualizing risk and explains the outputs you will be generating.

Note: There are a number of ways to estimate and visualize risk using mathematical equations. However, there are limitations to how equations can be used in risk assessment. For complex problems such as disasters, there are too many unknown variables to estimate all values with certainty. In this tool, risk equations are used as visual metaphors, or helpful ways of understanding rather than hard and fast mathematical rules.

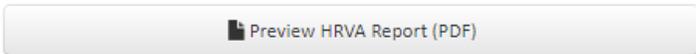
This tool uses a commonly accepted formula for visualizing risk which relates the assigned likelihood score and the total consequence score as follows:

$$\text{Risk} = \text{Likelihood} \times \text{Consequence}$$

The HRVA Tool uses the ratings you have assigned in the previous steps to plot the hazards on a series of visual scales. Use these scales to help analyze and compare the potential impacts on your community, and then rank the specific hazards according to your local priorities and concerns.

6.1 GENERATE YOUR REPORT

The online HRVA Tool will allow you to generate your preliminary report content automatically with the “Preview HRVA Report (PDF)” button.



At this point in the process the final report output is still incomplete, but the graphs and tables generated will help inform the final steps of the HRVA process.

Note: The HRVA report output will remain in draft form until you complete Step 8. Until that time, you can go back to any point in the process and modify your content or ranking scores to suit your specific needs, and then generate a new preview report.

→ The next section will assist you in interpreting your results, and adjusting your priority rankings.

6.2 ANALYZE YOUR RISK RESULTS

The Risk Table that appears in the HRVA preview report contains a high-level overview of the risk scoring that you have generated in steps 3-5.

Risk Summary Table:

Risk Level Colour Codes	Low Likelihood / Low Consequence	High Likelihood / Low Consequence	Med. Likelihood / Med. Consequence	Low Likelihood / High Consequence	High Likelihood / High Consequence
Likelihood Scoring	A - Rare	B - Unlikely	C – Probable	D – Likely	E – Almost Certain

Priority	Hazard List	Current Likelihood	Consequence Total	Risk Level	Future Likelihood
1	Wildfire	E	38	High Likelihood / High Consequence	E
		Select		High Likelihood / High Consequence	Select
		Select		Low Likelihood / High Consequence	Select
		Select		Low Likelihood / High Consequence	Select
		Select		Med. Likelihood / Med. Consequence	Select
		Select		Med. Likelihood / Med. Consequence	Select
		Select		High Likelihood / Low Consequence	Select
		Select		High Likelihood / Low Consequence	Select
		Select		Low Likelihood / Low Consequence	Select
		Select		Low Likelihood / Low Consequence	Select

The HRVA Tool will place the hazards with the highest Consequence Total at the top of the list by default. Step 6.5 allows you to adjust hazard rankings to reflect your community’s priorities prior to examining risk reduction strategies.

Note: The Current Likelihood score is used to plot the tables and graphs found in your preview report. While Future Likelihood is not used to directly calculate your risk level, it is an important factor to consider when evaluating risk reduction efforts.

6.3 INTERPRETING THE RISK MATRIX TABLE

The intersection of the likelihood rating and the sum of the 11 consequence categories will determine the specific hazard's location on the graph. The corresponding colour code and Likelihood / Consequence range will be reflected in the individual Hazard detail section of the final HRVA report.

A specific Hazard Risk Level is often expressed with the equation:

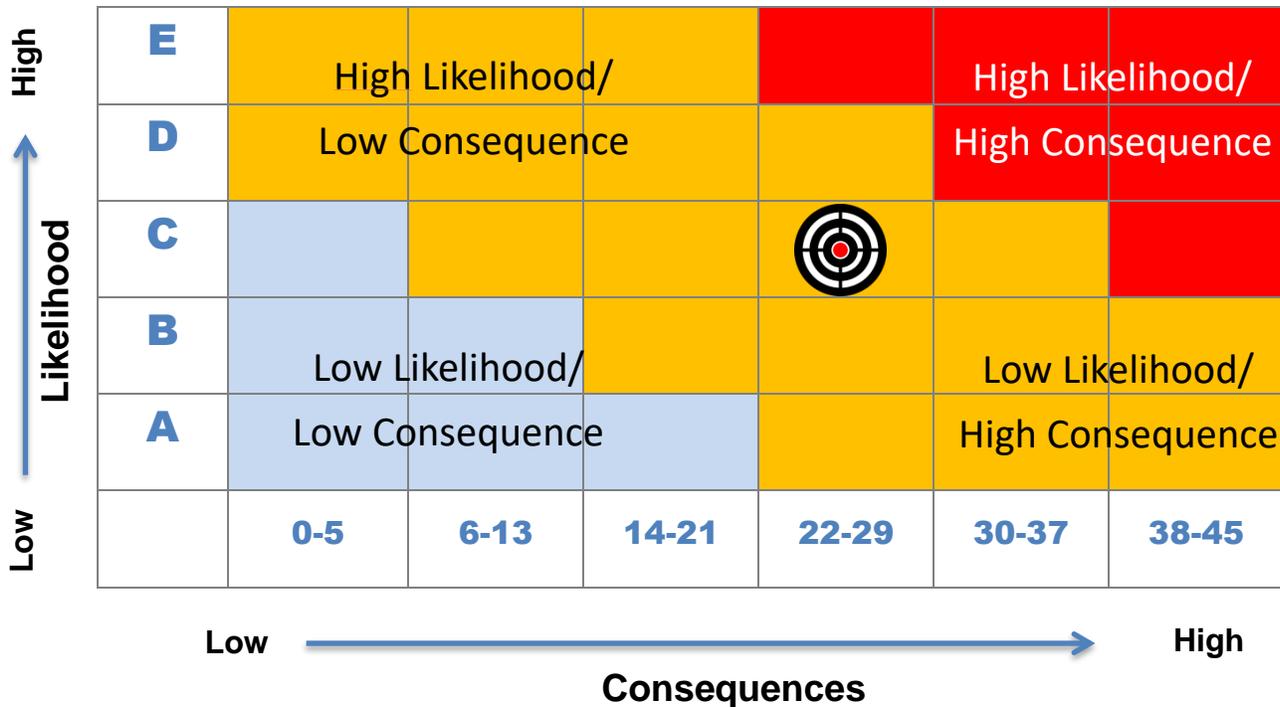
$$\text{Risk Level} = \text{Likelihood} \times \text{Consequence}$$

Where Likelihood refers to the frequency of the occurrence & consequence refers to the severity of the effects.

- Likelihood Scale:*
- E – Almost Certain
 - D – Likely
 - C – Probably
 - B – Unlikely
 - A – Rare

Consequence Rating: 0-4 per category x 11 categories in total = Consequence Total (0-44)

Risk Matrix Table:

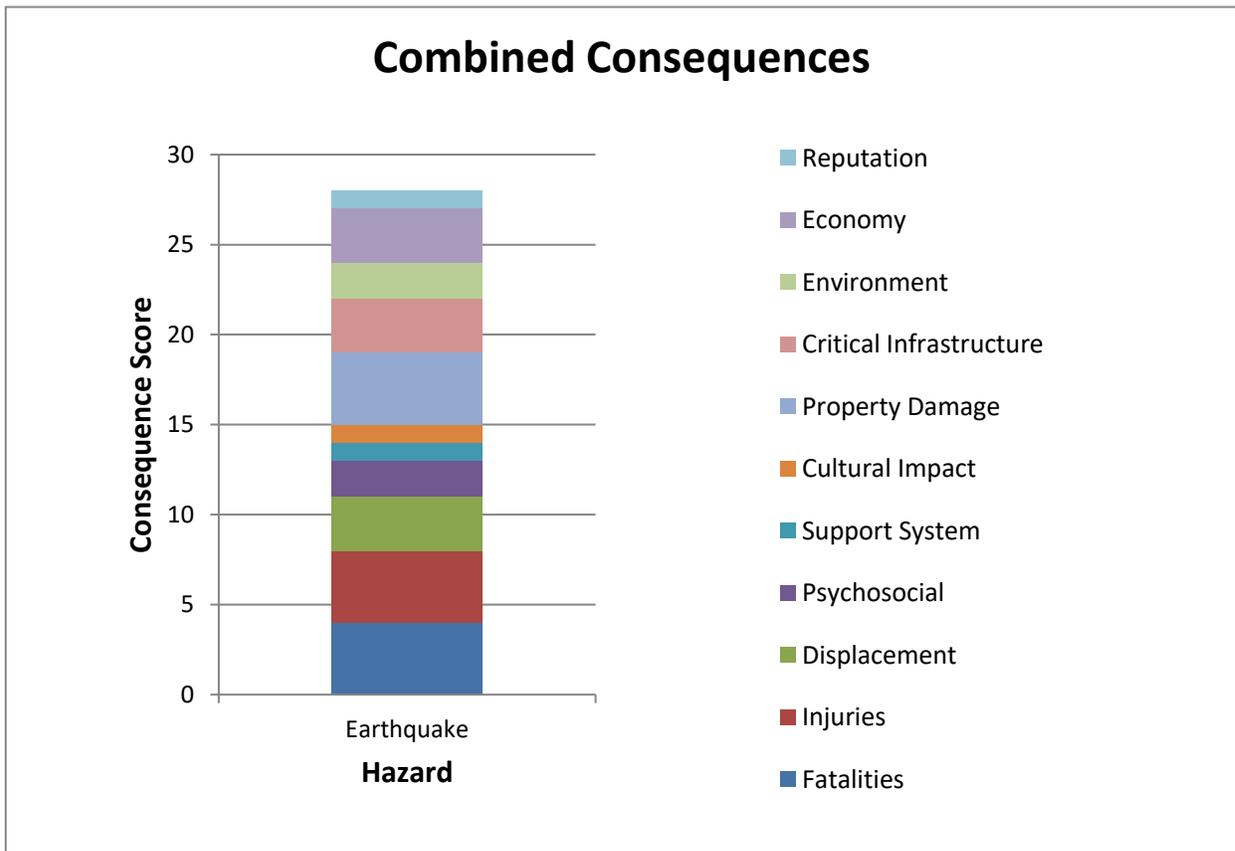


6.4 INTERPRETING THE CONSEQUENCE STACKING TABLE

The consequence stacking graph illustrates the relationship between each consequence category and the overall consequence score. The consequence categories and their corresponding colour are represented in the legend within the table. A consequence category with a score of zero will not be plotted on the graph.

Consequence Rating: 0-4 per category x 11 categories in total = Consequence Total (0-44)

Consequence Stacking Table:



6.5 PRIORITIZING HAZARDS

The last activity in this step is to assess the hazard rankings and make any adjustments as necessary. Changing a hazard’s priority does not alter hazard scores or individual graphs, it simply moves the selected hazards up or down the summary list. Any changes to the order of the summary list will also be reflected in the order of the hazards presented in the detail section of the final report.

Hazard Prioritization Table

Priority	Hazard	Current Likelihood Score	Consequence Total	Risk Level
1	 17. Wildfire*		2	Unknown
2	 33. Drought*	E	19	High Likelihood / High Consequence
3	 09. Lightning*	D	18	High Likelihood / Low Consequence
4	 43. Electrical outage*	D	20	High Likelihood / Low Consequence
5	 26. Pyroclastic flow, lava flow, lahar, mudflow	B	6	Low Likelihood / Low Consequence

You might adjust the priority of a specific hazard to better reflect your community’s unique values, or align your recommendations with a current strategic plan or funding opportunity (i.e. grouping several flood-related hazards together to help support a flood mitigation grant request). You may also find that you have selected a large number of community hazards in Step 2, and wish to prioritize your findings into a “Top-Ten” list for initial or short-term planning. Finally, you may have received direction at the beginning of the HRVA process to emphasize any results related to a certain subject, such as climate change impacts.

The ranking option will allow you to modify your results to meet any such requirement, and ensure that the information you deem most important is read first. Your final HRVA report will be a large document, and you might want to ensure that certain information does not get lost in the latter pages of your report.

7. IDENTIFYING RISK REDUCTION STRATEGIES

To support the analysis of existing risk management strategies as well as the development of new strategies in your community, it is helpful to review and understand the process of risk assessment.

Part 3 of the HRVA Tool provides a framework for assessing community resilience, including the identification of strategies and measures already in place in your community. Those strategies should be reviewed regularly to determine whether they remain current, effective, and adequate for the future growth and changes your community may experience. Climate Change considerations should also be a key part of your review process. Information on Climate Change Analysis and resources is included later in this section.

The International Standards Organization (ISO) has established a standard for conducting risk assessments known as ISO 31000:2018¹¹. The standard outlines the best practices for identifying and assessing risk within an organization, and places particular emphasis on incorporating a comprehensive risk management culture across an organization. This approach encourages participants to recognize the distinction between risk assessments and enterprise risk management.

***Risk Assessment vs Risk Management.*¹²**

Where risk assessments are:	Enterprise risk management is:
Narrowly focussed, considering a single program, process or project	Broadly focussed, considering risks across and through the organization
A moment in time	Ongoing and continuous
A tool to focus resources within a project	A tool to redistribute resources across an organization
Shared with immediate team and decision makers	Shared with Executive and senior leadership and informs business planning.
Typically operational in focus	Typically strategic in focus
Managed on a spreadsheet or simple table	Managed via a database for improved reporting
Championed by team or project leads	Championed by Executive and senior leaders

An HRVA is one element of a comprehensive risk management program within a community. It can help identify, analyze, and prioritize the key risks to your community or organization, and should help inform subsequent planning efforts. When utilized and referenced as part of broader risk reduction program, it can help guide many aspects of your business planning from policy development, to staffing considerations, and ultimately service delivery.

¹¹ Standards Council of Canada (SCC) – CSA Group

¹² Risk Management Guideline for the BC Public Sector

Understanding Disaster Risk Management

Disaster Risk Management (DRM) involves the careful consideration of three core elements¹³:

1. Prospective Risk Management (Prevention)
2. Corrective Risk Management (Reduction)
3. Compensatory Risk Management (Response)

Prospective Risk Management - sometimes known as risk avoidance, involves **preventative** actions that help avoid the development of new risks or increased disaster risks. This includes actions like better land use planning, climate proofing new infrastructure and services to make them more resilient, and applying strategies and innovations that increase the effectiveness and resilience of new projects.

Corrective Risk Management - also known as risk mitigation, includes **reduction** actions intended to remove or control existing disaster risks. Examples of this include retrofitting critical infrastructure and buildings, or relocating populations or assets that cannot be adequately protected. This might also involve housing improvement projects, or addressing deficits in basic infrastructure and services.

Compensatory Risk Management - a combination of risk acceptance and transfer, applies **preparedness** and **response** actions that **strengthen** community resilience in the face of disaster risks that cannot be effectively reduced or eliminated (sometimes called *residual risk*). It consists of emergency preparedness, response capacity, and recovery activities, but also includes a mix of financing and funding instruments such as contingency funds, insurance, and social-safety nets.

Emergency Managers, Local Authorities, and First Nations Communities should consider and include all three elements of risk management when reviewing existing measures, or beginning to develop a new Disaster Risk Reduction Strategy for a particular hazard.

Examples of Applying DRM Principles:

Identified Hazard	Prospective (Prevention)	Corrective (Reduction)	Compensatory (Response)
River Flooding	Land Use Planning, Development Restrictions	Flood Plain Restoration, Diking, Infrastructure or Occupant Relocation	Response Plans, Contingency Funds, Insurance, Disaster Financial Assistance
Wildfire - Urban Interface	Land Use Planning, Critical Infrastructure Design	Forest Management, FireSmart Practices, Public Education	Public Information System, Fire Protection Resources, Mutual Aid Partnerships

¹³ UNISDR - Implementation guide for local disaster risk reduction and resilience strategies

Part 2 of the HRVA Process - Identifying Hazards - reveals that many individual hazards are often related to one another, and/or a larger event. Emergency Managers and Community Planners should ensure they periodically compare their various risk reduction plans and strategies. This can identify opportunities to combine policy and initiatives to both maximize time and resource investment, and improve community resilience.

7.1 REVIEW RISK REDUCTION MEASURES ALREADY IN PLACE

Part 3 of the HRVA Process - Understanding Community Resilience - involves documenting existing Risk Reduction Measures in your community. The list you create should be reviewed carefully to determine if the measures in place are current, adequate, or must be enhanced or upgraded.

The analysis process can be aided by discussion with Subject Matter Experts (SME's), Consultants, and through engagement with communities facing similar challenges. When reviewing existing strategies and plans, or developing new strategies, it can be useful to chart your findings, and compare that list to a set of values and priorities that meet the particular needs of your community.

Considerations for Disaster Risk Reduction Policy:



The [Risk Reduction Measures Worksheet](#) (also available in the Document Library: [HRVA Forms - Step 7 - Risk Reduction Measures - Worksheet](#)) on the following pages provides an outline of general considerations that may apply to a broad range of hazards. Existing risk measures previously identified in Section 3 of the HRVA Tool can be input and then analysed to determine whether or not they provide a comprehensive strategy that includes prevention, reduction, and response actions for each hazard. Ideally the table is filled left to right; with preventative strategies and policies being developed first, and then risk reduction and response plans created as needed to manage the residual risk.

It is entirely possible that a good prospective prevention strategy virtually eliminates the need for corrective or compensatory actions, but relying primarily on reactive plans may indicate a potential gap in planning and ultimately a barrier to community resilience

A Risk Reduction Measures Worksheet is available in the Document Library.

NEW & EXISTING RISK REDUCTION MEASURES					
Specific Hazard(s):		Prevention Actions	Reduction Actions	Response Actions	
Sample Considerations	Examples	(Risk Avoidance / Prevention)	(Risk Mitigation / Control)	(Risk Acceptance / Sharing / Reaction)	
Natural Environment	Crown Land, Sensitive Ecosystems, Flood Plains				
Managed Environment	Parkland, Agricultural Land & Livestock, Community Forests				
Critical Infrastructure	Water Systems, Power Grid, Communications Systems, Pipelines				
Transportation Systems	Highways, Roadways, Railways, Airports, Public Transit, Accessibility Programs				
Health & Care Facilities	Hospitals, Clinics, Care Facilities, Group Homes, Prisons / Jails				
Housing	Residential Communities, Transient Accommodation (Hotels), Shelters				
Government Facilities	Town Hall / Offices, Department Staffing, Emergency Services,				
Business Continuity	Local Government Operations, Regional Employers, NGO's, Community Groups				

NEW & EXISTING RISK REDUCTION MEASURES

Specific Hazard(s):		Prevention Actions	Reduction Actions	Response Actions
Sample Considerations	Examples	(Risk Avoidance / Prevention)	(Risk Mitigation / Control)	(Risk Acceptance / Sharing / Reaction)
Partner Communities	Shared Resources & Infrastructure, Mutual Aid Agreements			
Supply Chain	Food & Fuel Supply, Equipment & Resources			
Social Programs	Education, Childcare, Social Workers, Welfare / Charity			
Mental Health & Wellness	Psychological Support Systems; Public & Responders			
Vulnerable Persons	Homeless Persons, Disadvantaged Communities, Immigrants, Mental Health, Disabled, Elderly & Shut-ins			
Cultural Protection	First Nations Sites, Religious Infrastructure, Heritage Sites			

7.2 RECOMMEND NEW RISK REDUCTION MEASURES

Risk reduction measures will include activities ranging from promoting personal preparedness, major structural mitigation projects, policy shifts, and small but significant actions that can be taken within regular operations of a government.

Risk Reduction Measures: Actions, projects, and policies aimed at reducing disaster risks through efforts to analyse and reduce the causal factors of a disaster including reducing exposure to hazards, lessening vulnerability of people and property, wise management of land and the environment, and improving preparedness and early warning for adverse events.

Note: Sometimes referred to as disaster risk reduction strategies, risk treatment measures, control measures, and mitigation measures. Climate change adaptation strategies also overlap.

Now that you have identified hazards, documented your existing mitigations efforts, and examined the underlying factors affecting your community, you can begin to develop new strategies and update existing ones. This involves further engagement and cooperation between your partners and subject matter experts to determine which strategies are the most practical, achievable, and sustainable for your community.

→ Consider holding a “Disaster Risk Reduction (DDR) Strategies” workshop to review the risk profile and collectively identify measures to improve the community’s resilience to the outlined risks. It is possible that the HRVA process identified gaps that some community members or staff have already been inspired to act on.

You can utilize a simple analysis table as found in the previous section of this document to brainstorm and record your recommendations, ensuring you attempt to incorporate all three core elements of disaster risk management into your overall strategy:

1. Prospective (Prevention)
2. Corrective (Reduction)
3. Compensatory (Response)

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You can utilize a simple analysis table as found in the previous section of this document to brainstorm and record your recommendations, ensuring you attempt to incorporate all three core elements of disaster risk management into your overall strategy:

4. Prospective (Prevention)
5. Corrective (Reduction)
6. Compensatory (Response)

A Risk Reduction Measures Worksheet is available in the Document Library.

SAMPLE RISK MEASURES ANALYSIS TABLE					
Specific Hazard(s):		Prevention Actions	Reduction Actions	Response Actions	
Sample Considerations	Examples	(Risk Avoidance / Prevention)	(Risk Mitigation / Control)	(Risk Acceptance / Sharing / Reaction)	
Partner Communities	Shared Resources & Infrastructure, Mutual Aid Agreements				
Supply Chain	Food & Fuel Supply, Equipment & Resources				
Social Programs	Education, Childcare, Social Workers, Welfare / Charity				

This is also a good time to apply your current knowledge of climate change impacts¹⁴ to any new strategies, and to ensure your suggestions will align with any other local government or community initiatives you may be voluntarily participating in such as Gender Based Analysis (GBA+)¹⁵, or the Sendai Framework for Disaster Risk Reduction¹⁶.



¹⁴ BC Climate Action Toolkit – Climate Action Charter
¹⁵ Treasury Board of Canada Secretariat
¹⁶ UNISDR – Sendai Framework for Disaster Risk Reduction

A Risk Reduction Measures Worksheet is available in the Document Library.

NEW & EXISTING RISK REDUCTION MEASURES					
Specific Hazard(s):		Prevention Actions	Reduction Actions	Response Actions	
Sample Considerations	Examples	(Risk Avoidance / Prevention)	(Risk Mitigation / Control)	(Risk Acceptance / Sharing / Reaction)	
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Government Facilities	Town Hall / Offices, Department Staffing, Emergency Services,				
Business Continuity	Local Government Operations, Regional Employers, NGO's, Community Groups				

NEW & EXISTING RISK REDUCTION MEASURES

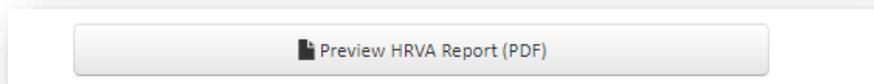
Specific Hazard(s):		Prevention Actions	Reduction Actions	Response Actions
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Vulnerable Persons	Homeless Persons, Disadvantaged Communities, Immigrants, Mental Health, Disabled, Elderly & Shut-ins			
Cultural Protection	First Nations Sites, Religious Infrastructure, Heritage Sites			

8. GENERATING & ASSEMBLING YOUR REPORT

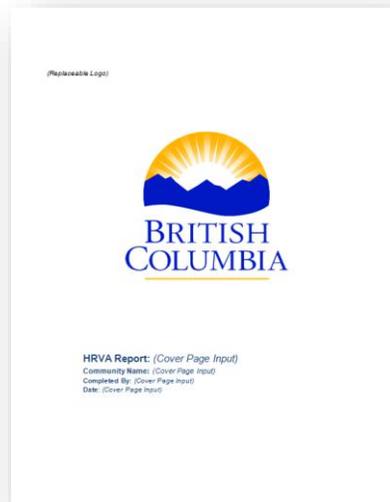
In order to complete the HRVA process you will need to generate, process, and distribute a final report.

8.1 GENERATE REPORT

The HRVA Tool has a reporting feature that will automatically generate a report based on the information entered into the system. You can view your report by clicking the “Preview HRVA Report (PDF)” button located at the bottom of Step 8:



The contents in your report can still be edited if needed. Some of the information on the title page can also be edited. In Step 1.7, you entered a report name which automatically appears after “HRVA Report:” on the title page. The logo also appears automatically and originates from “Profile” on the “Home Page”. Both report name and the logo can still be edited.



Note: The HRVA report output will remain in draft form until you complete Step 8. Until that time, you can go back to any point in the process and modify your content or ranking scores to suit your specific needs.

8.2 ASSEMBLE & REVIEW REPORT

After reviewing and editing your draft report, if needed, you can combine the report with any of the supplemental documents you have assembled for formal review.

The HRVA Tool is not intended to be the final repository of the communities' HRVA. It is simply a tool to help you understand the risk analysis process, collect data, and generate some useful content that can be used throughout your comprehensive HRVA project. It is also intended to help you complete regular reviews of community hazards and vulnerabilities, or make incremental adjustments to ongoing risk reduction strategies.

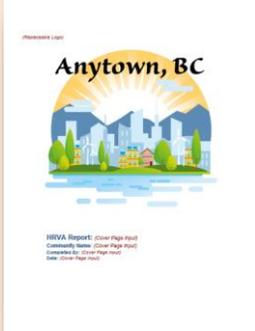
In the next step, you will distribute your report for final review and endorsement by your working group, and then submit the report for approval and acceptance by your community leaders or local authority. You can also identify the format and location in which you wish to store your completed reports for future reference and sharing. Finally, you can publish your report to save a permanent record of your data within the tool.

Throughout the HRVA you will likely have gathered information that can be added as additional narrative in the summary fields of each table, or as an annex to the report with a worksheet. You can generate additional content in your preferred local format, or a number of fillable PDF Worksheets from the [Document Library](#).

Some common documents to attach to your final report may include:

1. Fillable table of contents
2. Project team & partner worksheets
3. Scenario worksheets
4. Community and hazard maps
5. Hazard likelihood ranking worksheet, consequence scale ranking guide and worksheet, risk matrix table
6. Other worksheets, reference documents, or contributing reports as required
7. Fillable appendix list

→ Click Here to See a Sample Complete Report Created for Anytown BC



79

9. REVIEWING & APPROVING YOUR REPORT

9.1 OBTAIN FEEDBACK FROM PARTNERS

A number of partners were engaged throughout the HRVA process. Ensuring your partners have an opportunity to review their input will increase the validity and endorsement of the final report. This is particularly important for anyone tasked with moving risk reduction measures forward.

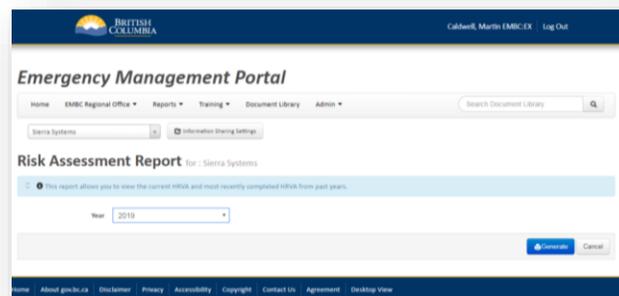
It can be useful to create a distribution list, and track the feedback received from your partners, working group, or committee for final edits.

9.2 DETERMINE A MAINTENANCE SCHEDULE

Ideally, the HRVA will be reviewed regularly to identify whether there are any new risks, or changes to your communities' risk or vulnerabilities. Consider what sections of your HRVA need to be reviewed annually and which ones can undergo a more thorough review on a multi-year cycle.

The HRVA Tool allows communities the option to complete simplified or targeted reviews and updates on a more frequent schedule than the traditional comprehensive process. Conducting smaller updates and analysis on an annual or semi-annual basis can help ensure that mitigation measures aren't orphaned or abandoned as staff and programs change.

The tool also maintains a record of previously completed assessments. These can be found in the "Reports" tab on the "Home Page". You can view or reprint past HRVAs at any time, and it is recommended to review prior results at the start of any new project.

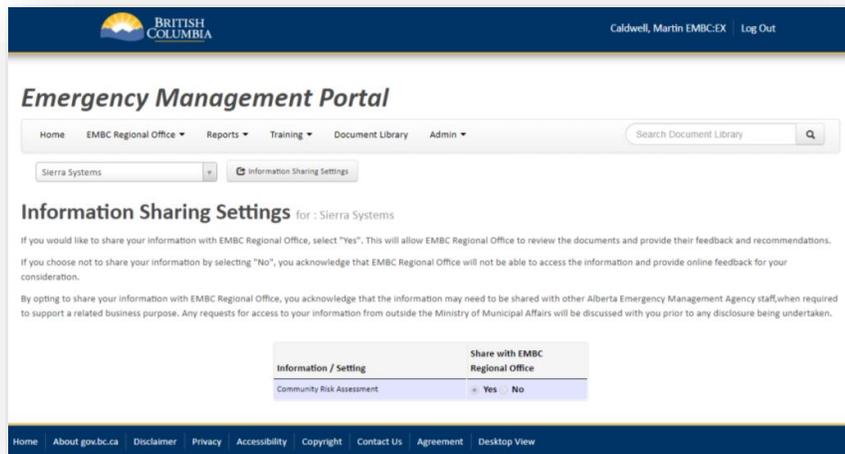


→ Consider including this maintenance schedule within your final HRVA report for approval by your Community Leaders or Local Authority.

9.3 PUBLISH & SUBMIT FOR OFFICIAL APPROVAL

In Step 1.3, you defined who will sign off on the final report (HRVA Forms - Step 9 - Review & Approval - Worksheet). Review what was decided and develop a plan to process and submit the report. Once your review cycle is complete and you are ready to submit your report, you can use the “Complete Assessment” button at the bottom of the tool to permanently save a record of your data within the tool, and optionally share your findings with your EMBC Regional Office.

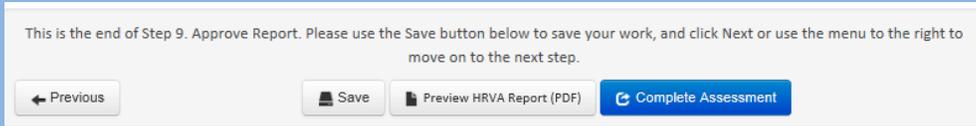
Note: Information Sharing Settings are automatically set to share with your EMBC Regional Office. These settings can be changed on the “Profiles” tab located on “Home Page”.



The HRVA report should not be left forgotten on a shelf. Rather, it is a dynamic document which can continue to inform and influence a variety of initiatives within the community. Furthermore, the HRVA report can be used to communicate risk with the public. Consider sharing the final report with the following partners:

- ✓ All partners involved or consulted during the HRVA process
- ✓ The public, via a website or other means
- ✓ EMBC Regional Managers
- ✓ Neighbouring First Nations, Municipalities, and Regional Districts

→ When you are ready to publish and share your final report, please click the “Complete Assessment” button at the bottom of the page.



9.4 DOCUMENT FEEDBACK

The HRVA process has likely been full of learnings. In order to ensure any lessons are truly learned, consider capturing them in a *Lessons Learned* document. This will be especially important to ensure continuity if someone else were to pick up the process years later.

→ EMBC is eager to receive any feedback or suggested changes to the HRVA Tool. Please submit these comments to your [EMBC Regional Office](#). Thank you!

APPENDIX 1 - GLOSSARY OF TERMS

The following terms are commonly used in the HRVA process and emergency management.

Term	Definition	Source
ACTION PLANNING	A means of capturing and communicating the overall incident response priorities in a concise and coherent way.	British Columbia Emergency Management System (BCEMS)
AFTER ACTION REVIEW (AAR)	A professional discussion of an event that focuses on performance standards and enables those involved in the event to review what happened and why, and discuss how to maintain identified strengths and address identified weaknesses. [Adapted from: Keyes, Jessica, <i>Enterprise 2.0: Social Networking Tools to Transform Your Organization</i> , CRC Press, 2012.]	BCEMS
ALL-HAZARDS APPROACH	An approach to emergency management that “increases efficiency by recognizing and integrating common elements across all hazard types, and then supplementing these common elements with hazard-specific sub-components to fill gaps only as required.” [from <i>Emergency Management Training: The Core Participant Guide</i>]	BCEMS
BUSINESS CONTINUITY	An ongoing process supported by senior management and funded to ensure that the necessary steps are taken to determine the impact of potential losses and maintain viable recovery strategies, recovery plans and continuity of services.	BCEMS
CAPACITY	The combination of all the strengths, attributes and resources available within an organization, community or society to manage and reduce disaster risks and strengthen resilience.	United Nations Office for Disaster Risk Reduction (UNISDR)
CASCADING EVENT	Events that occur as a direct or indirect result of an initial event.	FEMA
COMMUNITY	Everyone who is, or could be affected by an emergency/disaster. This includes all levels of government, agencies, not-for-profit organizations, businesses and individuals.	BCEMS

Term	Definition	Source
COMMUNITY RESILIENCE CENTRE	A model that may be used to assist individuals through the recovery process. The community resilience centre provides the space for and coordination of the various agencies and groups offering guidance, advice and assistance to those affected by an emergency/disaster. (Also known as community recovery office and/or community recovery centre).	BCEMS
CONSEQUENCE	The physical/environmental, social, economic, and political impact or adverse effects that may occur as the result of a hazardous event.	Adapted from BCEMS
CONTEXT	The circumstances in which an emergency/disaster may occur. It includes factors such as geographical location, population, and available funding, resources, and capabilities. These circumstances have an effect on the impact of the emergency/disaster and thus help determine the scope of the emergency plan, the range and types of activities the plan covers, and what can be expected of the target populations in terms of engagement and participation.	BCEMS
CONTINUITY OF OPERATIONS	The initiative that ensures that agencies are able to continue operating their essential functions under a broad range of circumstances, including all hazard emergencies and national security emergencies.	BCEMS
CRITICAL INFRASTRUCTURE	Assets that are essential for the functioning of government and society, namely, water, food, transportation, health, energy and utilities, safety, telecommunications and information technology, government, finance, and manufacturing.	BCEMS
CRITICAL INFRASTRUCTURE IMPACT	An impact to critical infrastructure, including its processes, systems, facilities, technologies, networks, assets, and/or services, that results in consequences to the health, safety, security or economic well-being of community members and the effective functioning of the government.	Adaption of Ontario Hazard Identification and Risk Assessment (HIRA) 2018
CULTURAL IMPACT	Loss of cultural heritage and/or identity. May include loss of works, objects, places, practices and ecology that are directly associated with an important aspect or aspects of human history and culture.	Adaption from Parks Canada
CSA Z1600	A comprehensive standard for emergency management and business continuity programs developed by the Canadian Standards Association (CSA).	BCEMS

Term	Definition	Source
DISASTER	“A calamity that (a) is caused by accident, fire, explosion, or technical failure or by the forces of nature, and (b) has resulted in serious harm to the health, safety, or welfare of people, or in widespread damage to property.” [<i>Emergency Program Act</i>]	BCEMS
DISASTER FINANCIAL ASSISTANCE (DFA) PROGRAM	A program administered by EMBC that provides financial assistance to those affected by a disaster in situations where the losses could not be insured or where other assistance programs are not available.	BCEMS
DISASTER RISK REDUCTION	Measures taken to decrease the potential for future losses arising from emergencies/disasters.	BCEMS
ECONOMIC IMPACT	The negative economic consequences of a hazard, including those that impact businesses, industries or regional economies.	Ontario HIRA
EMERGENCY	“A present or imminent event or circumstance that (a) is caused by accident, fire, explosion, technical failure, or the forces of nature, and (b) requires prompt coordination of action or special regulation of persons or property to protect the health, safety, or welfare of a person or to limit damage to property.”	BCEMS
EMERGENCY MANAGEMENT BC (EMBC)	The provincial government’s lead coordinating agency for all emergency management and business continuity activities. It is responsible for reviewing BCEMS every four years to ensure that the system continues to reflect best practice and meet the needs in the field.	BCEMS
EMERGENCY MANAGEMENT PROGRAM	A specific department or group within an organization that assumes overall responsibility for emergency planning and facilitates the implementation of activities during each phase of the emergency management process.	BCEMS
EMERGENCY OPERATIONS CENTRE (EOC)	A facility where key personnel can gather to coordinate, plan, and manage overall response activities. It provides support to the site by facilitating long-term operations, providing centralized access to information, and assisting in the identification, prioritization, and allocation of resources.	BCEMS
EMERGENCY PLAN	A document that describes the actions that will be taken when an emergency/disaster occurs. It describes how people, property, and the environment will be protected in an emergency/disaster.	BCEMS
EMERGENCY PROGRAM ACT	Provincial legislation that provides a framework for emergency management in the province and requires the province and local authorities to develop emergency plans.	BCEMS

Term	Definition	Source
EMERGENCY PROGRAM COORDINATOR	The person responsible for the day-to-day management of an organization’s emergency management program. May also be referred to as planner, manager, or director.	BCEMS
EMERGENCY PROGRAM MANAGEMENT REGULATION	Provincial regulation that describes the roles and responsibilities of the Provincial Emergency Program (PEP), Emergency Management British Columbia (EMBC), and government ministries and corporations in regard to emergency management planning at the provincial level.	BCEMS
ENVIRONMENTAL DAMAGE	The negative consequences of a hazard on the environment, including the soil, water, air and/or plants and animals.	Ontario HIRA
EXERCISE PROGRAM	An organization’s opportunity to enhance its emergency management operational readiness through structured and scheduled testing of its emergency plan. The exercise program helps ensure that the plan is workable and helps identify – before an emergency/disaster occurs – any implementation issues that must be resolved.	BCEMS
EXPOSURE	People, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas.	UNISDR
FATALITIES	Potential number of people killed as a result of the hazard.	Ontario HIRA
FREQUENCY	The number of occurrences of an event in a defined period of time.	Public Safety Canada (PSC)
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.	BCEMS
HAZARD AND VULNERABILITY IDENTIFICATION	The process of recognizing that a hazard exists and defining its characteristics, and identifying current vulnerabilities in the community or organization.	BCEMS

Term	Definition	Source
HAZARD, RISK, AND VULNERABILITY ANALYSIS (HRVA)	<p>An assessment of:</p> <ul style="list-style-type: none"> • Hazards: These are sources of potential harm, or situations 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. • Risk: This refers to the likelihood that a hazard will occur, as well as the severity of possible impact to health, property, the environment, or other things of value. • Vulnerability: This refers to the people, property, infrastructure, industry, resources, or environments that are particularly exposed to adverse impact from a hazardous event. 	BCEMS
IMPACT	The physical/environmental, social, economic, and political consequences or adverse effects that may occur as the result of a hazardous event.	BCEMS
INJURIES, DISEASE, OR HOSPITALIZATION	Potential number of people injured or ill because of the hazard.	Ontario HIRA
INTEROPERABILITY	The ability of emergency personnel to communicate between jurisdictions, disciplines, and levels of government, using a variety of systems as needed and authorized.	BCEMS
LAND-USE PLANNING	The process by which lands are assessed so that informed decisions can be made regarding their use and development.	BCEMS
LIKELIHOOD	The chance of an event or an incident happening. It can be defined or measured objectively or subjectively.	Adapted from PSC
LOCAL AUTHORITY EMERGENCY MANAGEMENT REGULATION	Provincial regulation that outlines the legislated requirements for local authority emergency plans within the province and lists the specific components that must be included in a local authority's emergency plan.	BCEMS
LONG-TERM RECOVERY STRUCTURE	A recovery model that is supported by the Recovery Steering Committee under the direction of the recovery director and the policy group of the Recovery Operations Centre until such time that the Recovery Operations Centre is deactivated or demobilized.	BCEMS
MITIGATION	The phase of emergency management in which proactive steps are taken to prevent a hazardous event from occurring by eliminating the hazard, or to reduce the potential impact of such an event before it occurs.	BCEMS

Term	Definition	Source
MITIGATION PLAN	A document that sets forth the long-term measures that a community or organization will take in order to eliminate hazards, thus preventing an emergency/disaster from occurring, or to reduce the effects of an emergency/disaster should one occur.	BCEMS
MUTUAL AID AGREEMENT	An agreement or contract between groups or agencies that defines the terms under which these parties agree to provide each other with assistance in an emergency/disaster. The agreement describes the services to be provided, insurance and liability arrangements, workers' compensation coverage for personnel, and compensation and reimbursement arrangements.	BCEMS
PREPAREDNESS	The phase of emergency management during which action is taken to ensure that individuals, businesses, and the jurisdiction/organization are ready to undertake emergency response and recovery.	BCEMS
PROBABILITY	A measure of the chance of an event or an incident happening.	Adapted from PSC
PROPERTY DAMAGE	The direct negative consequences of a hazard on buildings, structures and other forms of property, such as crops and livestock.	Ontario HIRA
PROVINCIAL CENTRAL COORDINATION LEVEL	The response level that prioritizes provincial government objectives and leads the overall provincial response. It also serves as the coordination and communication link with the other response levels and the federal disaster support system. Central coordination and provincial leadership are provided by the Provincial Emergency Coordination Centre (PECC).	BCEMS
PROVINCIAL REGIONAL COORDINATION LEVEL	The response level that provides and coordinates provincial support for local authorities and First Nations within designated regional boundaries. Support and coordination at this level are provided by a Provincial Regional Emergency Operations Centre (PREOC).	BCEMS
PSYCHOSOCIAL	Psychological and sociological aspects of the well-being of an individual, family group, organization, and/or community.	BCEMS
PSYCHOSOCIAL IMPACT	Impacts to the emotional and social well-being of an individual, family group, and/or community.	Disaster Psychosocial
PSYCHOSOCIAL SERVICES	Efforts to provide, after a disaster, the necessary support for people to re-establish their ability to meet their emotional and psychological needs as well as those of others.	BCEMS

Term	Definition	Source
PUBLIC/PARTNER EDUCATION	Efforts geared towards empowering the members of a community or organization to understand risks and hazards, prepare themselves for an emergency/disaster, participate meaningfully in emergency management initiatives, and develop the skills they need to mitigate their personal risk.	BCEMS
RECOVERY	<p>The phase of emergency management in which steps and processes are taken/implemented to:</p> <ul style="list-style-type: none"> • Repair communities affected by a disaster • Restore conditions to an acceptable level or, when feasible, improve them • Restore self-sufficiency and increase resilience in individuals, families, organizations, and communities 	BCEMS
REPUTATIONAL IMPACT	A negative change in the perception of the government or organization, in the minds of the community, its partners, and others who are vital to its success. This can result in socioeconomic damage or disruption such as loss of community or partner trust and an increase in negative media attention.	Adaptation from CSA Z1600
RESILIENCE	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management.	UNISDR
RESOURCES	Equipment, supplies, personnel, volunteers, and facilities available for assignment or staging in support of emergency management activities.	BCEMS
RESPONSE	The phase of emergency management during which actions are taken in direct response to an imminent or occurring emergency/disaster in order to manage its consequences.	BCEMS
RISK	A concept that takes into consideration the likelihood that a hazard will occur, as well as the severity of possible impact to health, property, the environment, or other things of value.	BCEMS
RISK ANALYSIS	The systematic use of information to estimate the chance and severity of injury or loss to people, property, the environment, or other things of value.	BCEMS

Term	Definition	Source
RISK AVOIDANCE	Effectively removing the exposure to a risk. With risk avoidance, a decision is made to completely remove the sources of a particular risk or remove oneself from a particular risk.	BCEMS
RISK ACCEPTANCE	Doing nothing and accepting the risk. Risk acceptance is an explicit or implicit decision to accept the consequences of a given risk.	BCEMS
RISK CONTROL/REDUCTION/MITIGATION	Reducing the likelihood of a threat or hazard being experienced; reducing the likelihood that damage will result should the hazard or threat be experienced; or minimizing harm once a hazard or threat has been experienced.	BCEMS
RISK EVALUATION	The process by which a risk is examined in terms of a cost/benefit analysis and evaluated in terms of whether it is an “acceptable” risk based on the needs and concerns of partners.	BCEMS
RISK REDUCTION MEASURES	<p>Actions, projects, and policies aimed at reducing disaster risks through efforts to analyse and reduce the causal factors of disaster including reducing exposure to hazards, lessening vulnerability of people and property, wise management of land and the environment, and improving preparedness and early warning for adverse events.</p> <p><i>Note: Sometimes referred to as disaster risk reduction strategies, risk treatment measures, control measures, and mitigation measures. Climate change adaptation strategies also overlap.</i></p>	Adapted from UNISDR
RISK TOLERANCE	The willingness of an organization to accept or reject a given level of residual risk. Note: Risk tolerance may differ across an organization, but must be clearly understood by those making risk-related decisions.	PSC
RISK TRANSFER	Shifting some or all of the risk to another entity, asset, system, network, or geographic area. Risk transfer may not reduce the overall likelihood of a particular threat or hazard being experienced but it should make the consequences easier to bear.	BCEMS
SCALABILITY	The ability to adapt to increasing demands.	BCEMS
SCENARIO	A narrative description of a hypothetical situation that may impact the community.	EMBC

Term	Definition	Source
SHELTER	In the context of the recovery phase, housing that is provided during the initial emergency response phase. It involves the shortest period of time, typically ranging from three to six months maximum.	BCEMS
SITUATIONAL AWARENESS	Knowing what is going on and what has happened with respect to the current incident, what could go on in terms of future impact or outcomes, and what options exist in terms of response actions.	BCEMS
SUBJECT MATTER EXPERT (SME)	Regional experts with knowledge on specific hazard(s) likelihood, consequences, environmental and economic impacts.	IPREM
SUPPORT SYSTEM IMPACT	Loss of accessibility to supports/networks or community groups, community reciprocity, trust, and cooperation between community members.	Adapted from Ontario HIRA
UNDERLYING DISASTER RISK DRIVERS	Processes or conditions, often development-related, that influence the level of disaster risk by increasing levels of exposure and vulnerability or reducing capacity.	UNISDR
VOLUNTEERS	People who offer their services without expecting financial compensation and are a critical component of emergency management.	BCEMS
VULNERABILITY	The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.	UNISDR

APPENDIX 2 - GLOSSARY OF ACRONYMS

AAFC	Agriculture and Agri-Food Canada
ADRP	Aboriginal Disaster Resilience Program
AGRI	Ministry of Agriculture
BCCDC	British Columbia Centre for Disease Control
BCEMS	British Columbia Emergency Management System
BCNEP	British Columbia Nuclear Emergency Response Plan
CEPF	Community Emergency Preparedness Fund
CFIA	Canadian Food Inspection Agency
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CNSC	Canadian Nuclear Safety Commission
CSCD	Ministry of Community, Sport and Cultural Development
DEP	Dam Emergency Plan
DFA	Disaster Financial Assistance
DFO	Department of Fisheries and Oceans
DIP	Drought Information Portal
ECCC	Environment and Climate Change Canada
EMBC	Emergency Management BC
EOC	Emergency Operation Centre
EPA	Emergency Program Act
EPC	Emergency Program Coordinator
ESA	European Space Agency
ESS	Emergency Support Services
FADES	Foreign Animal Disease Emergency Support Plan

FLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
FNHA	First Nations Health Authority
FSR	Forest Service Roads
FUS	Fire Underwriters Survey
GIS	Geographic Information Systems
HECC	Health Emergency Coordination Centre
HRVA	Hazard, Risk, and Vulnerability Analysis
ICS	Incident Command System
IEPC	Inter-Agency Emergency Preparedness Committee
INSET	Integrated National Security Enforcement Team
INAC	Indigenous and Northern Affairs Canada
INSET	Integrated National Security Enforcement Team
JTFP	Joint Task Force Pacific
LiDAR	Light Detection and Ranging
MAH	Ministry of Municipal Affairs and Housing
MOECCS	Ministry of Environment and Climate Change Strategy
MoE	Ministry of Environment
MoTI	Ministry of Transportation and Infrastructure
MROC	Ministry Regional Operation Centre
MSC	Meteorological Service of Canada
NASA	National Aeronautics and Space Administration
NDMP	National Disaster Mitigation Program
NOAA	National Oceanic and Atmospheric Administration
NRCAN	Natural Resources Canada
OFC	Office of the Fire Commissioner

PECC	Provincial Emergency Coordination Centre
PHCC	Provincial Highway Condition Centre
PNSN	Pacific Northwest Seismic Network
PREOC	Provincial Regional Emergency Operation Centre
PSC	Public Safety Canada
PSTA	Provincial Strategic Threat Analysis
RCMP	Royal Canadian Mounted Police
RFC	River Forecast Centre
SAR	Search and Rescue
TAC	Ministry of Tourism, Arts, and Culture
TSB	Transportation Safety Board of Canada
VAAC	Volcanic Ash Advisory Center
WHO	World Health organization
WSC	Water Survey of Canada
WUI	Wildland Urban Interface

APPENDIX 3 - EMBC MAP, REGIONS, OFFICES & CONTACT INFORMATION

EMBC has its headquarters in Victoria (Saanichton) and six regional offices. During emergencies, one or more of the PREOCs will activate as required, in support of Local Authorities, First Nations and provincial ministries. PREOCs are responsible for the provision and coordination of provincial support for Local Authorities and First Nations within designated regional boundaries.

The following map illustrates EMBC regional boundaries:



EMBC Regions:

Region	PREOC Location	Regional Districts within Regional Boundaries
Vancouver Island	Victoria	Capital; Cowichan Valley; Nanaimo; Alberni-Clayoquot; Powell River; Comox Valley; Strathcona and Mount Waddington
Southwest	Surrey	Sunshine Coast; Squamish Lillooet; Greater Vancouver and Fraser Valley.
Central	Kamloops	Thompson - Nicola; Okanagan -Similkameen; Central Okanagan; North Okanagan; District of Lillooet and a portion of Columbia-Shuswap
Southeast	Nelson	Kootenay Boundary; Central Kootenay; East Kootenay; and a portion of Columbia-Shuswap
Northeast	Prince George	Northern Rockies; Peace River; Fraser-Fort George; Cariboo and Central Coast.
Northwest	Terrace	Bulkley-Nechako; Kitimat-Stikine; Skeena-Queen Charlotte and Stikine (unincorporated).

EMBC Offices, Contact Information:

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<p>South East Region 101-333 Victoria Street Nelson, B.C. V1L 4K3 Tel: 250 354-5904 Fax: 250 354-6561 EMBC.SEAAdmin@gov.bc.ca</p>	<p>North East Region 3235 Westwood Drive Prince George, B.C. V2N 1S4 Tel: 250 612-4172 Fax: 250 612-4171 EMBC.NEAAdmin@gov.bc.ca</p>
<p>North West Region Suite 1B - 3215 Eby Street Terrace, B.C. V8G 2X8 Tel: 250 615-4800 Fax: 250 615-4817 EMBC.NWEAdmin@gov.bc.ca</p>	<p>Vancouver Island Region Block A - Suite 200 2261 Keating Cross Road Saanichton B.C. V8M 2A5 Tel: 250 952-5848 Fax: 250 952-4304 EMBC.VIRAdmin@gov.bc.ca</p>
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