

Climate Change Risk Assessment for Manitoba Northern Businesses

Climate Change Risk Assessment training tailored to Manitoba Northern Businesses.

December 15, 2021



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Supported by Natural Resources Canada's Building Regional
Adaptation Capacity and Expertise (BRACE) Program

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Who This Training Is For



- This course was developed to provide foundational concepts in CCRA to all Manitoba BRACE MCRT Sectors.
- This course is intended to follow the MCRT Courses:
 - Climate Change Impacts to Northern Business
 - CCRA Core Principles



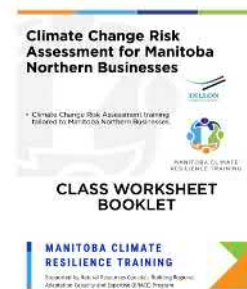
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Class Worksheet Booklet



- We will be working through demonstrated inputs to **Class Worksheets** in this class.
- **Participants are not expected to complete these during the class.**
- You can download the PDF of the Class Worksheet Booklet and use them in your own assessment planning.
- The Worksheets were mailed out in our reminder email today, also included in the email invitation to our post-class survey.
- The Worksheet Booklet also contains guidance on the steps to complete this Tier 1 CCRA process.



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Today's Class: Structure



1. Climate Vulnerability for Northern Manitoba Business
2. Why Do CCRA?
3. Case Study Example: Details
4. CCRA – Overview of Key Steps
5. Walking Through the CCRA Steps
6. Where to From Here?

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CLIMATE VULNERABILITY FOR NORTHERN MB BUSINESS



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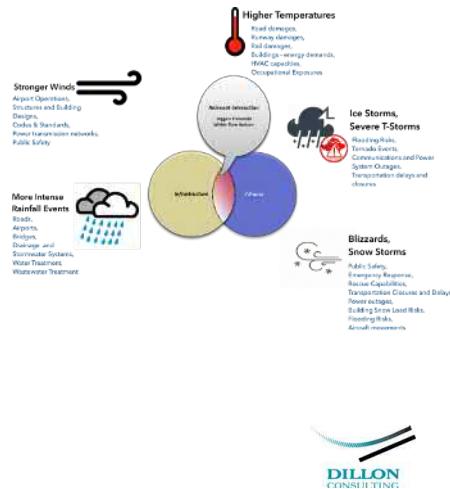
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Climate Vulnerability for Manitoba Northern Businesses



- Changes in climate create significant shifts in normal operating ranges and extreme weather events.
- See the course module **“Climate Change Impacts to the MB Northern Business Sector”** for full details on these impacts.
- Climate impacts lurk within the interactions that take place when a built system responds to changes in the climate those systems operate in.



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Climate Vulnerability for Manitoba Northern Businesses



- Critical infrastructure and services are affected by direct and indirect impacts.
- Disruption in critical infrastructure translates to impacts to businesses who rely on these systems for:
 - Supply chains
 - Energy
 - Movement of goods, staff, services, customers/clients



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WHY CONDUCT CLIMATE CHANGE RISK ASSESSMENT?



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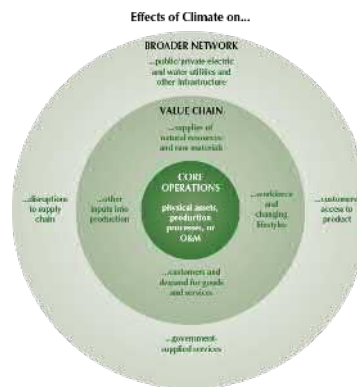


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What Is Climate Change Risk Assessment?

- CCRA is a process used to help organisations identify their climate change-induced risks from emerging climate change impacts:
 - **Identify Climate Hazards and Anticipated Impacts** across your core operations, value chain and broader business network
 - **Prioritise Risks, then**
 - **Planning to Reduce Identified Risks**



Source: Pew Centre on Global Climate Change 2009

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Why Conduct CCRA on your Business?

- Weather already affects your business.
 - Extreme weather events already cause disruption and added cost to doing business
 - Climate change means extreme weather will happen more often and will likely bring higher extremes.
 - Planning for CC impacts helps business recover faster.
 - Returning to normal business can be impacted by:
 - Loss of customers who were also impacted by the event
 - Changes in demand from these customers
 - Delays due to rebuilding, restoration or insurance
 - Lack of available financing to recover



Image Sources: Wpg Free Press, CBC Manitoba

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Key Business Benefits for conducting CCRA

- Planning ahead is proactive, and often means less cost, less impact vs **no plan and responding reactively.**
- Proactive planning benefits are:
 - **Cost Savings:** understanding climate risks to operational performance **allows lower costs in the long-term. It can also reduce insurance and borrowing costs**
 - **Business Continuity:** addressing climate risks will give your business **better chance of continued operations, meeting customer demand** - minimizing degree and duration of extreme weather disruption
 - **Competitiveness:** Identifying business opportunities (e.g. longer tourism season), **ways to manage climate risks are differentiators for businesses.**
 - **Reputational:** Demonstrates to clients and shareholders that **impacts of climate change are being managed - conveys responsibility, stability and reliability** for your business.



Image: CBC

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CASE STUDY EXAMPLE: NORTHERN MANITOBA BUSINESS



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Case Study Example: Northern Manitoba Business (hypothetical company)



- **BuildIT Project Partners (BPP)** is a medium-sized business (less than 500 staff) that manages construction projects, cargo transport/logistics and coordinates infrastructure and building construction projects.
- BPP developed a specialty in delivering these projects to remote communities in Manitoba



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Case Study Example: Northern Manitoba Business (hypothetical company)



- BPP's business caters to the ongoing infrastructure and residential development needs of remote northern communities in Manitoba,
- BPP also handles community cargo transport and logistics

BPP has established a transmodal shipping hub in Thompson, Manitoba.



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Business Case Study...



- The BPP transmodal shipping hub's purpose is to **establish a northern Manitoba hub for receiving, processing and transfer of cargo**
- Hub handles materials, supplies, equipment, and is a staging site for work crews.
- **After arriving at BPP's Thompson hub, cargo and crews are then transported to remote communities in the region:**
 - by Rail,
 - by Provincial Highway and Winter Road Network and
 - by Air, via Thompson's Airport
- **Winter road communities nearby:** Thicket Portage, Pikwitonel, Split Lake Cree First Nation, and York Factory First Nation



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Anticipated areas of climate impact sensitivities for BuildIT Project Planners...



BuildIT Project Partners' Thompson Operations involve:

Assets:

- Buildings
- Vehicles
- Equipment

Goods/Materials:

- Construction materials, replacement parts/components
- Perishable foods, medical supplies
- Feedstocks, critical supplies

People:

- Staff health and safety
- Clients, supplier and public health and safety

Cargo Movement/Supply Chain:

- Provincial Highway and Winter Road Network
- Rail
- Thompson Airport



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CCRA PROCESS OVERVIEW OF KEY STEPS



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CCRA – Step 2: Analysing Your Risks

- We will need **two factors** to calculate risk level:

1. Severity Scale Rating

- this value is set by discussion with your team, stakeholders.
- "When the impact occurs, how bad will it be..?"*

2. Likelihood Scale Value

- This value is set either by calculation from climate data or by subjective assessment of historical **and emerging trends**
- "We already see this hazard occasionally, but in the future trends for the region expect this to occur more often and with more intensity.."*



Severity
Value Score

Probability/Likelihood
Value Score



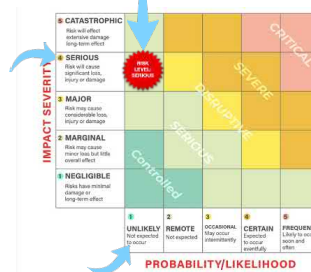
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CCRA – Step 3: Evaluating Your Risk Levels



$$\begin{array}{c} 1 \\ \text{Probability/Likelihood} \\ \text{Score=1 (Unlikely)} \end{array} \times \begin{array}{c} 4 \\ \text{Severity} \\ \text{Score=4 (Serious)} \end{array} = \begin{array}{c} 4 \\ \text{Risk Level=4} \\ \text{(Serious)} \end{array}$$



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CCRA – Step 3: Evaluating Your Risks...

- Different Risk Levels call for different actions
- Once our risks are prioritised, plans to “treat” or reduce those risks are developed.
- A good approach is to reduce the higher risks first. They are the highest priority.
- Build your risk-reduction “to-do” list strategically
 - What limits do you work within?
 - Money? Staff to implement risk reduction measures?

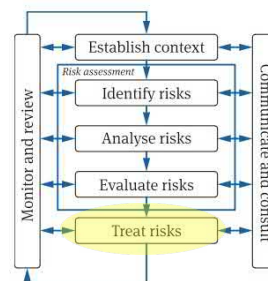


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Climate Risk Management Process: Treat Your Climate Risks

- Develop a strategy to systematically reduce risk for climate impacts that result in high risk levels.
- Identify options (adaptations) to reduce those climate risks.
- Sometimes, adjusting a procedure can reduce risk to acceptable levels
 - Modify vegetation management on company property to reduce wildfire hazards
- Risk reduction measures can be physical (retrofit or new resilient design), operational (change a procedure to lessen impact). Backup plans are also risk reduction measures.



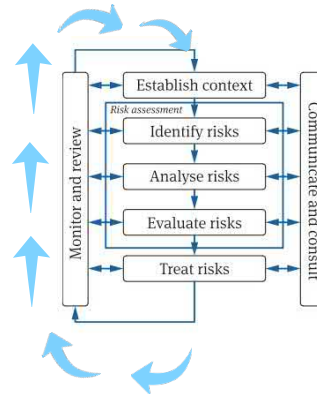
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Climate Risk Management Process: An Ongoing Process



- Notice the loop that exists in the process.
- After you treat risks, then monitor and review how your risk reduction measures are working, you repeat the process every few years to refine it.
- Refinements are possible through:
 - Availability of improved climate models or climate data
 - Impact monitoring information
 - Risk reduction performance information.



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Working Through the CCRA Steps: Thinking About Past Climate Extreme Events



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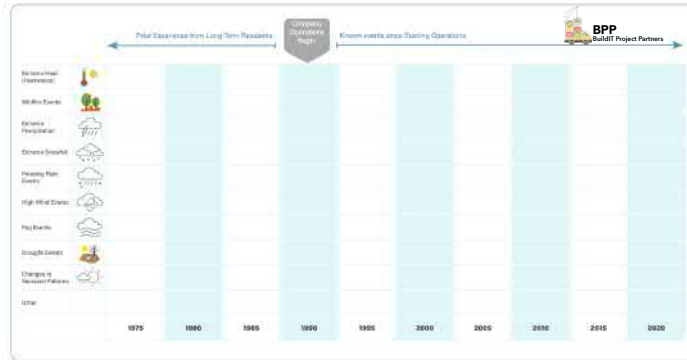
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CCRA: Explore Past Climate, Extreme Events for Your Site

WORKSHEET 1: PAST CLIMATE EXTREME EVENTS

Documenting Past Climate Extremes in your Operating Region



- BuildIT Project Partners business was established here back in 1994:
 - 2 events identified in the region as very disruptive to community before BPP was established:
 - freezing rain event and extended drought event
 - 3 events identified in the 30 years this business opened there:
 - Extreme Rainfall event
 - Extreme Heat events
 - Wildfire events

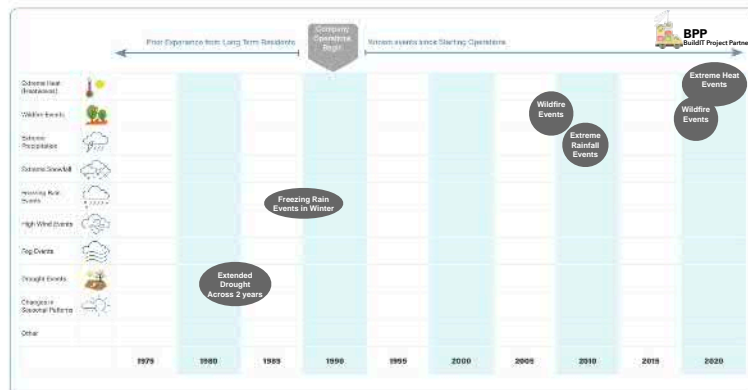
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Worksheet 1 inputs: Mapping Prior Events

WORKSHEET 1: PAST CLIMATE EXTREME EVENTS

Documenting Past Climate Extremes in your Operating Region



When we map those events for BPP's Thompson Hub operations on **WORKSHEET 1**, it looks like this.

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Quiz



Q: Where would you go for info on historical climate hazards?

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Quiz



Q: Where would you go for info on historical climate hazards?

A: Multiple Sources are available:

- 1) Your **Worksheet 1 Results**
- 2) Local Community Knowledge holders
- 3) Public, online climate portals (Climate Atlas)
- 4) Local news media archives, social media postings
- 5) Your business' staff – operations, maintenance, incident logs

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Working Through the CCRA Steps: Past Climate Extreme Events and Prior Business Impacts



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CCRA: Past Climate Events and Prior Business Impacts

- In the previous activity, we talked about **past** climate hazards and extreme events
- Now, in **Worksheet 2**, we need to focus on **HOW** these hazards and extreme events impacted us, and where...

**WORKSHEET 2:
PAST CLIMATE IMPACTS FOR YOUR BUSINESS:
DETAILS ON HOW YOUR BUSINESS WAS AFFECTED.**

Business Name: _____

Date: _____

PART A

YES NO

Did extreme weather events in the past cause work-related health and safety issues for your staff and customers? (e.g. extreme high temperatures affecting worker health and ability to perform duties)

In your operations in the past, was your business affected by extreme events? (refer back to your Worksheet 1 answers to guide your thinking)

In your business operations in the past, was your business affected by secondary impacts of extreme climate events? (e.g. your staff, premises and assets were not directly impacted by extreme events, but your operations were affected due to disruptions in your supply chain)

Thinking about the past, was your business continually affected by extreme climate events? For example, did your business experience damage to its premises, or to its inventory or other assets? Did a loss in revenue occur with potential to threaten your financial situation?

If any of the above answers were YES, describe details on HOW it impacted your business.

PART B

Extreme Heat (Heatwaves)	Wildfire Events	Extreme Precipitation	Extreme Drought	Freezing Rain Events	High Wind Events	Fog Events	Drought Events	Changes in Seasonal Patterns	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Worksheet 2 PART A



WORKSHEET 2: PAST CLIMATE IMPACTS FOR YOUR BUSINESS: DETAILS ON HOW YOUR BUSINESS WAS AFFECTED.



Business Name:

Date:

PART A

	YES	NO
Did extreme weather events in the past cause work-related health and safety issues for your staff and customers? (e.g. extreme high temperatures affecting worker health and ability to perform duties).	<input type="radio"/>	<input type="radio"/>
In your operations in the past, was your business affected by extreme events? (refer back to your Worksheet 1 answers to guide your thinking)	<input type="radio"/>	<input type="radio"/>
In your business operations in the past, was your business affected by secondary impacts of extreme climate events? (e.g. your staff, premises and assets were not directly impacted by extreme events, but your operations were affected due to disruptions in your supply chain).	<input type="radio"/>	<input type="radio"/>
Thinking about the past, was your business continuity affected by extreme climate events? For example, Did your business experience damage to its premises, or to its inventory or other assets? Did a loss in revenue occur with potential to threaten your financial situation?	<input type="radio"/>	<input type="radio"/>

- Review and answer the 4 yes/no questions
- Each explores the sensitivity of your business and your operations, supply chains, movements of goods and services to climate impacts.

Was your business affected by past climate impacts?

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Worksheet 2 PART A



WORKSHEET 2: PAST CLIMATE IMPACTS FOR YOUR BUSINESS: DETAILS ON HOW YOUR BUSINESS WAS AFFECTED.



Business Name: BuildIT Project Partners

Date: November, 2021

PART A

	YES	NO
Q1 Did extreme weather events in the past cause work-related health and safety issues for your staff and customers? (e.g. extreme high temperatures affecting worker health and ability to perform duties).	<input checked="" type="radio"/>	<input type="radio"/>
Q2 In your operations in the past, was your business affected by extreme events? (refer back to your Worksheet 1 answers to guide your thinking)	<input checked="" type="radio"/>	<input type="radio"/>
Q3 In your business operations in the past, was your business affected by secondary impacts of extreme climate events? (e.g. your staff, premises and assets were not directly impacted by extreme events, but your operations were affected due to disruptions in your supply chain).	<input checked="" type="radio"/>	<input type="radio"/>
Q4 Thinking about the past, was your business continuity affected by extreme climate events? For example, Did your business experience damage to its premises, or to its inventory, or other assets? Did a loss in revenue occur with potential to threaten your financial situation?	<input checked="" type="radio"/>	<input type="radio"/>



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For BuildIT Project Partners:

- **Q1: Yes** - freezing rain caused loss of power lines, extended drought triggered health impacts from wildfire smoke
- **Q2: Yes** - minor flooding on site due to extreme rain event
- **Q3: Yes** - smoke conditions closed the airport, affecting inbound and outbound shipments
- **Q4: Yes** - loss of revenue due to delay in cargo shipments to job site.

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Worksheet 2 PART B

- For each climate hazard that experienced by your business in **the past**, specify the impact (none, minor, or significant) to your business.
- Write descriptions of impacts for each climate hazard creating impacts to your business.

How bad was each past climate hazard's impact on your business?

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WORKSHEET 2:
PAST CLIMATE IMPACTS FOR YOUR BUSINESS:
DETAILS ON HOW YOUR BUSINESS WAS AFFECTED.

If any of the above answers are YES, then indicate details on HOW it impacted your business.

	NO IMPACT	MINOR IMPACT	SIGNIFICANT IMPACT	WRITE DESCRIPTION OF THE IMPACT(S)
Extreme Heat (Heatwaves)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Wildfire Events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Extreme Precipitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Extreme Snowfall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Freezing Rain Events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
High Wind Events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fog Events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Drought Events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Changes in Seasonal Patterns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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PAST CLIMATE IMPACTS FOR YOUR BUSINESS: DETAILS ON HOW YOUR BUSINESS WAS AFFECTED.

If any of the above answers are YES, then indicate details on HOW it impacted your business.

	NO IMPACT	MINOR IMPACT	SIGNIFICANT IMPACT	WRITE DESCRIPTION OF THE IMPACT(S)
Extreme Heat (Heatwaves)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lack of Air Conditioning meant staff had to bring fans, suspend some activities
Wildfire Events	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Minor health impacts to some staff due to wildfire smoke - breathing issues, eye irritation.
Extreme Precipitation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Seepage from overland flow and site runoff caused some damage in goods stored in yard.
Extreme Snowfall	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Site snow clearing and snow storage considerations
Freezing Rain Events	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temporary and intermittent loss of power
High Wind Events	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minor damage to a storage building - roof elements
Fog Events	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Drought Events	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Water supply issues, also periods of reduced activity due to increased wildfire restrictions
Changes in Seasonal Patterns	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Shorter, less reliable winter road season
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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Working Through the CCRA Steps: Current Climate Risks to Your Business



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Worksheet 3

- In **Worksheet 3**, we are looking at **CURRENT** climate risks, what was affected, where do risks currently reside for your business?
- **Have we taken steps to reduce these risks in the past?**
- **If so, were they effective?**

Is your business affected by CURRENT climate?

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WORKSHEET 3: CURRENT CLIMATE RISKS

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During the time since your region and your business were exposed to the weather events listed in WORKSHEET 1, has your business made any adjustments or taken any steps to minimize future impacts to your business?

If your answer above is YES, please list any actions you have taken to cope with these weather events below:

YES NO

Determine current climate-related risks to your business. Place a checkmark to respond to the questions of right:

YES, there are existing climate-related risks to my business. NO, there are no existing climate-related risks to my business.

If you think there are existing climate-related risks to your business, which of the following aspects of your business are currently at risk due to those impacts?

HEALTH AND SAFETY OF STAFF AND CUSTOMERS BUSINESS PREMISES BUSINESS SUPPLY CHAIN BUSINESS CONTINUITY

Have the actions that were taken in the past to reduce your climate risks worked?

Are any adjustments required to reduce present-day climate risks?



Worksheet 3



WORKSHEET 3: CURRENT CLIMATE RISKS

During the time since your region and your business were exposed to the weather events listed in WORKSHEET 1, has your business made any adjustments or taken any steps to minimize future impacts to your business?

If your answer above is YES, please list any actions you have taken to cope with these weather events below:

After recent extreme heat events, we defined a set of Extreme Heat Event Operating Procedures for our staff who work in tasks with exposure to high heat conditions

Determine current climate-related risks to your business. Place a checkmark to respond to the questions of right:

YES, there are existing climate-related risks to my business. NO, there are no existing climate-related risks to my business.

If you think there are existing climate-related risks to your business, which of the following aspects of your business are currently at risk due to these impacts?

HEALTH AND SAFETY OF STAFF AND CUSTOMERS BUSINESS PREMISES BUSINESS SUPPLY CHAIN BUSINESS CONTINUITY

Have the actions that were taken in the past to reduce your climate risks worked?

- Yes - Established procedures for staff working under Extreme Heat conditions
 - Promising - Looked at lot grading improvements to improve site drainage
 - Unproven - Set up working policy for conditions of wildfire smoke and low visibility after 2021 fire season

Are any adjustments required to reduce present day climate risks?

Need to look at vegetation management near our property, evaluate layouts of equipment and materials in storage yard for improved fire resistance

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CCRA Step 3: Past Climate Events and Prior Business Impacts

- So far, we've looked at **past** (historical) and **current** climate hazards and extreme events
- We have mapped these out for **4 broad areas of impact** for these hazards, across:
 - Health & Safety
 - Business Premises
 - Business Continuity
 - Supply Chains
- We next look at what challenges **future** climate can pose for our business

WORKSHEET 1: PAST CLIMATE EXTREME EVENTS

Documented by: BPP BuildIT Project Partners

Business Name: BuildIT Project Partners

Date: November, 2021

WORKSHEET 2: PAST CLIMATE IMPACTS FOR YOUR BUSINESS: DETAILS ON HOW YOUR BUSINESS WAS AFFECTED.

Did extreme weather events in the past cause work-related health and safety issues for your staff and customers? (e.g. extreme high temperatures affecting worker health and ability to perform duties)

In your operations in the past, was your business affected by extreme events? (refer back to your Worksheet 1 answers to guide your thinking)

In your business operations in the past, was your business affected by secondary impacts of extreme climate events? (e.g. your staff, premises and assets were not directly impacted by extreme events, but your operations were affected due to disruptions in your supply chain)

Thinking about the past, was your business continuity affected by extreme climate events? For example, Did your business experience damage to its premises, or to its inventory, or other assets? Did a loss in revenue occur with potential to threaten your financial situation?

WORKSHEET 3: PAST CLIMATE IMPACTS FOR YOUR BUSINESS: DETAILS ON HOW YOUR BUSINESS WAS AFFECTED.

PART A

Did extreme weather events in the past cause work-related health and safety issues for your staff and customers? (e.g. extreme high temperatures affecting worker health and ability to perform duties)

In your operations in the past, was your business affected by extreme events? (refer back to your Worksheet 1 answers to guide your thinking)

In your business operations in the past, was your business affected by secondary impacts of extreme climate events? (e.g. your staff, premises and assets were not directly impacted by extreme events, but your operations were affected due to disruptions in your supply chain)

Thinking about the past, was your business continuity affected by extreme climate events? For example, Did your business experience damage to its premises, or to its inventory, or other assets? Did a loss in revenue occur with potential to threaten your financial situation?

PART B

Did extreme weather events in the past cause work-related health and safety issues for your staff and customers? (e.g. extreme high temperatures affecting worker health and ability to perform duties)

In your operations in the past, was your business affected by extreme events? (refer back to your Worksheet 1 answers to guide your thinking)

In your business operations in the past, was your business affected by secondary impacts of extreme climate events? (e.g. your staff, premises and assets were not directly impacted by extreme events, but your operations were affected due to disruptions in your supply chain)

Thinking about the past, was your business continuity affected by extreme climate events? For example, Did your business experience damage to its premises, or to its inventory, or other assets? Did a loss in revenue occur with potential to threaten your financial situation?

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Climate Change Impacts.. As they Translate to Businesses



Climate Change Hazard	Impact on Small-Medium Businesses
Extreme Heat (Heatwaves)	<ul style="list-style-type: none"> Businesses may need cooling equipment for staff and for climate-sensitive industrial processes Changes to ability to work outdoors, health & safety
Wildfire	<ul style="list-style-type: none"> Damage to premises, staff and community, supply routes Air Quality impacts
Extreme Precipitation	<ul style="list-style-type: none"> Business may face overland flooding, drainage system failure, building seepage, road damages.
Extreme Snowfall	<ul style="list-style-type: none"> Higher snow loads and possible building roof impacts Site snow clearing, site snow storage

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Climate Change Impacts.. As they Translate to Businesses



Climate Change Hazard	Impact on Small-Medium Businesses
Freezing Rain Events	<ul style="list-style-type: none"> Slip and fall hazards to staff and customers Electrical distribution line failures
High Wind Events	<ul style="list-style-type: none"> Wind damages to buildings, vehicles, materials, tree limbs and power lines Dust and debris hazards
Fog Events	<ul style="list-style-type: none"> Low visibility transport hazards (road, marine, air). Incur delays in staff movements, shipping
Drought	<ul style="list-style-type: none"> Water supply constraints Higher wildfire risk
Changes in Seasonal Patterns	<ul style="list-style-type: none"> Shorter Winter Road season, shipment and supply chain delays, backup

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Examples of Business Sector-Specific Climate Risks



Business Sector	Potential Climate Impacts
Building Design and Construction	<ul style="list-style-type: none"> People: Excess heat -reduced worker productivity Premises: Drainage - extreme weather events Supply Chains: Extreme weather disrupts transport to site, Operations: Extreme weather disrupts construction, delays critical shipments
Retail	<ul style="list-style-type: none"> People: Extreme weather affects customer behavior Premises: Store, warehouse, equipment affected by extreme events (flood, wildfire, heatwave, etc.) Supply Chains: Extreme weather disrupts supply chains, flow of raw materials, distribution of products/services Operations: Extreme weather disrupts customer movements, deliveries, shipping times
Food and Beverage	<ul style="list-style-type: none"> People: increases in heat or storms deters customers from premises, affects customer behavior, health Premises: Loss of power can result in loss of perishable food stocks Supply Chains: shipments of perishables delayed, subject to higher spoilage Operations: Physical risks to water supply, raw materials

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Examples of Business Sector-Specific Climate Risks



Business Sector	Potential Climate Impacts
Rental, Hiring, Community Development	<ul style="list-style-type: none"> People: higher heat and smoke exposure may cause health impacts to staff, customers Premises: Higher temperatures may require modification of existing HVAC systems Supply Chains: disruptions to shipments of replacement components, spare parts. Operations: Physical impacts from extreme events (high heat, wildfire, extreme rainfall) may cause delays in construction for ongoing community development, leading to financial losses.
Resource Extraction	<ul style="list-style-type: none"> People: higher heat and smoke exposure may cause health impacts to staff, contractors Premises: Higher precipitation extremes may require changes in site drainage to combat localised flooding of site operations. Supply Chains: disruptions in shipments of critical materials, equipment and personnel Operations: Higher precipitation extremes may require waste containment lagoons to discharge more frequently, with potential impacts to local fisheries.

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CCRA - Future Climate and Identifying Anticipated Climate Risks

- We now focus our thinking on future trends from climate change on your climate hazards
- Look at Prairie Climate Centre's high level climate projections for **MB northern regions** and understand how future hazards are projected to change in your region.
- Think about how these **Future Climate Changes** may impact areas of your business
- In **Worksheet 4**, place checkmarks next to climate hazards with potential to impact your business.

RCP 8.5: High Carbon climate future

GHG emissions continue to increase at current rates

Variable	Period	Mean	1976-2020			2021-2050			2051-2080		
			Low	Mean	High	Low	Mean	High			
Precipitation (mm)	annual	450	367	475	580	375	487	612			
Precipitation (mm)	spring	85	49	90	139	55	97	146			
Precipitation (mm)	summer	175	109	176	251	100	174	262			
Precipitation (mm)	fall	127	85	138	198	86	137	197			
Precipitation (mm)	winter	67	46	79	100	51	80	112			
Mean Temperature (°C)	annual	0.4	1.2	2.6	4.3	2.3	5.2	7.3			
Mean Temperature (°C)	spring	-0.4	-1.3	1.7	4.9	0.7	3.8	7.3			
Mean Temperature (°C)	summer	15.1	17.2	16.8	20.4	18.8	21	23			
Mean Temperature (°C)	fall	5	5.1	5.5	7.2	5.4	7.3	8.7			
Mean Temperature (°C)	winter	-18	-18.7	-15.1	-11.8	-15.5	-11.8	-8.2			
Tropical Nights	annual	1	8	9	11	4	16	30			
Very hot days (>30°C)	annual	3	1	7	15	5	20	38			
Very cold days (<0°C)	annual	33	2	11	33	5	3	5			
Days of Last Spring Frost	annual	May 26	April 30	May 13	May 25	April 19	May 5	May 19			
Days of First Fall Frost	annual	Oct 1	Sep 25	Oct 12	Oct 25	Oct 5	Oct 22	Nov 8			
Frost-free season (days)	annual	136	127	148	166	143	165	167			

Historical
Baseline
Climate

Projected
Future
Climate
Near-Term
Horizon

Projected
Future
Climate
Longer-
Term
Horizon

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CCRA - Future Climate and Identifying Anticipated Climate Risks

- Proceeding to **Worksheet 4**, we now focus our thinking on future trends from climate change on your climate hazards
- In **Worksheet 4**, place checkmarks next to climate hazards with potential to impact your business.



RCP 8.5: High Carbon climate future
GHG emissions continue to increase at current rates

Variable	Period	Mean	1976-2020			2021-2050			2051-2080		
			Low	Mean	High	Low	Mean	High	Low	Mean	High
Precipitation (mm)	annual	450	367	475	580	375	487	612			
Precipitation (mm)	spring	85	49	90	139	55	97	146			
Precipitation (mm)	summer	175	109	176	251	108	174	262			
Precipitation (mm)	fall	127	85	138	198	86	137	197			
Precipitation (mm)	winter	67	46	79	100	51	80	112			
Mean Temperature (°C)	annual	0.4	1.2	2.6	4.3	2.3	5.2	7.3			
Mean Temperature (°C)	spring	-0.4	-1.3	1.7	4.9	0.7	3.8	7.3			
Mean Temperature (°C)	summer	15.1	17.2	16.8	20.4	18.8	21	23			
Mean Temperature (°C)	fall	5	5.1	5.5	7.2	5.4	7.3	8.7			
Mean Temperature (°C)	winter	-18	-18.7	-15.1	-11.8	-15.5	-11.8	-8.2			
Frost-free days (days)	annual	1	8	9	11	4	16	30			
Very hot days (>30°C)	annual	3	1	7	15	5	20	38			
Very cold days (<0°C)	annual	33	2	11	33	5	3	5			
Days of Last Spring Frost	annual	May 26	April 30	May 13	May 25	April 19	May 5	May 19			
Days of First Fall Frost	annual	Oct. 1	Sep. 25	Oct. 12	Oct. 25	Oct. 5	Oct. 22	Nov. 8			
Frost-free season (days)	annual	136	127	148	166	143	165	167			

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WORKSHEET 4: FUTURE CLIMATE CHANGE OUTLOOK

Review the climate impacts below and consider how climate change can influence risk factors. To ensure key points on how climate change can influence this hazard, and place checkmarks beside the hazards that are relevant to your business.

Hazard	HOW CLIMATE CHANGE CAN INFLUENCE THIS HAZARD IN MANITOBA	PLACE A CHECKMARK IN THE BOXES RELEVANT TO YOU
Extreme Heat (Heatwaves)	In general, increases in average temperature are likely to increase the number of hot days and nights, and the duration of heatwaves.	<input type="checkbox"/>
Wildfire Events	Increased average temperatures, combined with dry conditions, increased drought and high winds increase the potential for wildfire events.	<input type="checkbox"/>
Extreme Precipitation	For every 1 degree of temperature increase in the atmosphere, that atmosphere can hold 7% more water, leading to potential for increases in short duration high intensity rainfall events.	<input type="checkbox"/>
Extreme Snowfall	Warmer temperatures can result in reduction in the amount of precipitation that falls as snow. At the same time, the potential for large falling wet snowfall events has increased for some regions.	<input type="checkbox"/>
Freezing Rain Events	Increases in average winter temperatures have resulted in increases of wetter precipitation falling as rain and more rain on snow events.	<input type="checkbox"/>
High Wind Events	Changes in winds are not easy to model for climate change. Changes of extreme winds are expected to increase as the potential for increased extreme weather events grows with a warming climate. Winds can cause damage to forests, power lines, and buildings. Wind can also increase the spread of wildfire.	<input type="checkbox"/>
Fog Events	Fog events create visibility concerns for transportation by water and on roads and airways. Increased fog events can disrupt modes of transportation and cause delays due to transportation safety concerns.	<input type="checkbox"/>
Drought Events	In Manitoba, climate change means there is potential for increased periods of drought. At the same time, short duration high intensity rainfall events are expected to increase. This creates the potential for drought and localized flooding in the same year.	<input type="checkbox"/>
Changes in Seasonal Patterns	Climate change, particularly increases in average temperature can affect the timing of seasons. This is expected to result in shorter spring seasons and an extension of the annual "shoulder" seasons in autumn and spring.	<input type="checkbox"/>
Other		<input type="checkbox"/>



Worksheet 4: Future Climate Outlook



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*With climate hazards
with potential to
impact your business
identified, we then
move to evaluating
HOW these hazards
impact your business.*

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WORKSHEET 4: FUTURE CLIMATE CHANGE OUTLOOK



Review the climate hazards below and consider how climate change can influence this hazard. Document key points on how climate change can influence this hazard, and place checkmarks beside the hazards that are relevant to your business.

HAZARDS	HOW CLIMATE CHANGE CAN INFLUENCE THIS HAZARD IN MANITOBA	PLACE A CHECKMARK BESIDE HAZARDS RELEVANT TO YOU
Extreme Heat (Heatwaves)	In general, increases in average temperatures are likely to increase the number of hot days and nights, and the duration of heatwaves.	<input checked="" type="checkbox"/>
Wildfire Events	Increased average temperatures, combined with dry conditions, ecological storms and high winds, increase the potential for wildfire events.	<input checked="" type="checkbox"/>
Extreme Precipitation	For every 1 degree of temperature increase in the atmosphere, that atmosphere can hold 7% more water, leading to potential for increases in short duration, high intensity rainfall events.	<input checked="" type="checkbox"/>
Extreme Snowfall	Warmer temperatures can cause a reduction in the amount of precipitation that falls as snow. At the same time, the potential for large, heavy, wet snowfall events has increased for some regions.	<input checked="" type="checkbox"/>
Freezing Rain Events	Increases in average winter temperatures have resulted in increases of winter precipitation falling as rain and more rain on snow events.	<input checked="" type="checkbox"/>
High Wind Events	Changes in winds are not easy to model for climate change. Ranges of extreme winds are expected to increase as the potential for increased extreme weather activity grows with a warming climate. Wind can cause damages to forests, power lines, and buildings. Wind can also increase the speed of wildfires.	<input checked="" type="checkbox"/>
Fog Events	Fog events create visibility concerns for transportation by motor vehicles, boats and aircraft. Prolonged fog events can disrupt modes of transportation and cause delays due to transportation safety concerns.	<input type="checkbox"/>
Drought Events	In Manitoba, drier spring means there is potential for increased periods of drought. At the same time, short duration high intensity rainfall events are expected to increase. This creates the potential for drought and localized flooding in the same year.	<input checked="" type="checkbox"/>
Changes in Seasonal Patterns	Climate change, particularly increases in average temperature can affect the timing of seasons. This is expected to result in shorter winter seasons and an extension of the annual "shoulder" seasons in autumn and spring.	<input checked="" type="checkbox"/>
Other	<input type="text"/>	<input type="checkbox"/>



Working Through the CCRA Steps: Assessing Future Climate Impacts



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Worksheet 5: Future Climate Impacts

WORKSHEET 5: FUTURE CLIMATE IMPACTS

Using the information you entered in **WORKSHEET 4** for Future Climate Change, consider how future hazards may impact your business and its operations. Be sure to think of all aspects of your business: staff, buildings, supply chain, business continuity, etc. Place a checkmark in the proper circle below to indicate No Impact, Minor Impact, or Significant Impact.

HAZARDS	NO IMPACT	MINOR IMPACT	SIGNIFICANT IMPACT
Extreme Heat (Heatwaves)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wildfire Events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extreme Precipitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extreme Snowfall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Freezing Rain Events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High Wind Events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

For ONLY the Hazards that you have checked off as MINOR or SIGNIFICANT IMPACT, Document potential impacts for your business. All hazards indicated as "No Impact" are dropped from consideration.

Check those that apply, add brief description of each impact

Staff/Customer Health & Safety	<input type="checkbox"/>		
Business Premises	<input type="checkbox"/>		
Business Supply Chains	<input type="checkbox"/>		
Business Continuity Planning	<input type="checkbox"/>		
Staff/Customer Health & Safety	<input type="checkbox"/>		
Business Premises	<input type="checkbox"/>		
Business Supply Chains	<input type="checkbox"/>		
Business Continuity Planning	<input type="checkbox"/>		
Staff/Customer Health & Safety	<input type="checkbox"/>		
Business Premises	<input type="checkbox"/>		
Business Supply Chains	<input type="checkbox"/>		
Business Continuity Planning	<input type="checkbox"/>		
Staff/Customer Health & Safety	<input type="checkbox"/>		
Business Premises	<input type="checkbox"/>		
Business Supply Chains	<input type="checkbox"/>		
Business Continuity Planning	<input type="checkbox"/>		

- Use **Worksheet 5** to develop deeper detail on relevant climate hazards to your business.
- For each, decide if hazard poses **No Impact, Minor Impact, Substantial Impact**.
- Add impact descriptions to each and indicate which areas of your business are affected

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CCRA - Mapping Future Climate Impacts



HAZARDS	NO IMPACT	MINOR IMPACT	SIGNIFICANT IMPACT
Extreme Heat (Heatwaves)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wildfire Events	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

For ONLY the Hazards that you have checked off as MINOR or SIGNIFICANT IMPACT, Document potential impacts for your business. All hazards indicated as "No Impact" are dropped from consideration.

Check those that apply, add brief description of each impact

Staff/Customer Health & Safety	<input checked="" type="checkbox"/>	Heat exhaustion, fatigue in staff
Business Premises	<input checked="" type="checkbox"/>	Indoor air quality, occupational comfort
Business Supply Chains	<input type="checkbox"/>	
Business Continuity Planning	<input checked="" type="checkbox"/>	Temporary staff absences from work
Staff/Customer Health & Safety	<input checked="" type="checkbox"/>	Bad Air quality, eye and airway irritation
Business Premises	<input checked="" type="checkbox"/>	Threat of building damage from fire
Business Supply Chains	<input checked="" type="checkbox"/>	Flight disruption due to heavy smoke
Business Continuity Planning	<input checked="" type="checkbox"/>	Some interruptions in staffing and services

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Worksheet 5: Future Climate Impacts...

WORKSHEET 5: FUTURE CLIMATE IMPACTS

Using the information you entered in **WORKSHEET 4** for Future Climate Change, consider how future hazards may impact your business and its operations. Be sure to think of all aspects of your business: staff, buildings, supply chain, business continuity, etc. Place a checkmark in the proper circle below to indicate No Impact, Minor Impact, or Significant Impact.

HAZARDS	NO IMPACT	MINOR IMPACT	SIGNIFICANT IMPACT	Notes
Extreme Heat (Heatwaves)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Heat exhaustion, fatigue in staff Indoor air quality, occupational comfort Temporary staff absences from work
Wildfire Events	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Dead Air quality, eye and airway irritation Threat of building damage from fire Light disruption due to heavy smoke Some interruptions in staffing and services
Extreme Precipitation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Risk of virus, mould growth Seepage resulting in need to remove some drywall Pond and rot materials Delays in arrival of incoming shipments
Extreme Snowfall	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Road clearing to reduce risk of ice Delays in transporting shipments Disruption lead to parts shortages
Freezing Rain Events	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Downed power lines, slip accidents Loss of power, air and road transport disruption Transport delays, power outages
High Wind Events	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wind-borne debris - safety of staff Airborne particulate, dust, debris damages Outdoor activities can close during high wind events
Fog Events	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Drought Events	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Water supply constraints, elevated risk of wildfire Constraints to available water supply
Changes in Seasonal Patterns	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Changes in "shoulder season" operations on site Reduced or no road network, safety Delayed shipments due to disrupted winter roads
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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- For this business, several minor and significant impacts were identified, with indications on where those impacts could hit the business.
- One hazard was evaluated to have "No Impact", we drop this from further consideration in the process.

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Working Through the CCRA Steps: Defining PROBABILITIES/LIKELIHOOD



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Probability/Likelihood Values



Clarifying the language...

- **Probability** \neq **Likelihood**
- **Probability** is a quantitative (numerical) measure.
 - E.g. "There is a 50% chance of rain tomorrow".
- **Likelihood** is a qualitative (subjective) descriptions, such as high, medium, low
 - E.g. "There is a high likelihood of rain tomorrow."



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Establishing Likelihood Score Values



- In CCRA, you might not have the data available to complete numerical analysis of *Probabilities*.

- For Tier 1 CCRA, you can easily use qualitative, non-numerical assessment 5-point scales for Likelihood.
- Review your Likelihood Scale levels, select best match to determine likelihood scores qualitatively.

1	2	3	4	5
UNLIKELY Not expected to occur	REMOTE Not expected	OCCASIONAL May occur intermittently	CERTAIN Expected to occur eventually	FREQUENT Likely to occur soon and often

PROBABILITY/LIKELIHOOD

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Establishing Likelihood Score Values

- Review the past (historical) climate hazard events mapped out in **Worksheet 1**, this is your baseline
- Consult the projected climate information for your location
- Considering how often this hazard occurred **historically** – we can select a score from Likelihood Scale. **Here it is selected as “Occasional” or intermittent, with a Likelihood Score of 3.**



1	2	3	4	5
UNLIKELY	REMOTE	OCCASIONAL	CERTAIN	FREQUENT
Not expected to occur	Not expected	May occur intermittently	Expected to occur eventually	Likely to occur soon and often

PROBABILITY/LIKELIHOOD



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Quiz

- Review the projected climate summary information and apply the expected change (increase or decrease in frequency of climate hazard) to your baseline score.
 - We know that temperatures are projected to continue increasing in Northern MB, and droughts are projected to be an ongoing problem.
- How would you score the likelihood of **wildfire events** in the future climate? Would it be less often or more often than what you scored for historical (baseline) climate?

1	2	3	4	5
UNLIKELY	REMOTE	OCCASIONAL	CERTAIN	FREQUENT
Not expected to occur	Not expected	May occur intermittently	Expected to occur eventually	Likely to occur soon and often

PROBABILITY/LIKELIHOOD

1	2	3	4	5
UNLIKELY	REMOTE	OCCASIONAL	CERTAIN	FREQUENT
Not expected to occur	Not expected	May occur intermittently	Expected to occur eventually	Likely to occur soon and often

PROBABILITY/LIKELIHOOD



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Quiz Discussion...

- Temperature increases are projected to continue in northern Manitoba
- Droughts are projected to be a continuing problem.
- Higher temperatures can lead to lightning storms, lightning storms during dry conditions are a mechanism for wildfires.
- Higher temperatures and drought also lead to drier vegetation and landscapes. This leads to increased likelihood of wildfire from human activity (ATVs, careless smoking, etc.)
- It is reasonable to conclude that likelihood of wildfire will not remain same in future, nor should it lessen.



1	2	3	4	5
UNLIKELY	REMOTE	OCCASIONAL	CERTAIN	FREQUENT
Not expected to occur	Not expected	May occur intermittently	Expected to occur eventually	Likely to occur soon and often

PROBABILITY/LIKELIHOOD

1	2	3	4	5
UNLIKELY	REMOTE	OCCASIONAL	CERTAIN	FREQUENT
Not expected to occur	Not expected	May occur intermittently	Expected to occur eventually	Likely to occur soon and often

PROBABILITY/LIKELIHOOD

These considerations
would justify a
Likelihood Score of 4

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Working Through the CCRA Steps: Impact Severity Assessment



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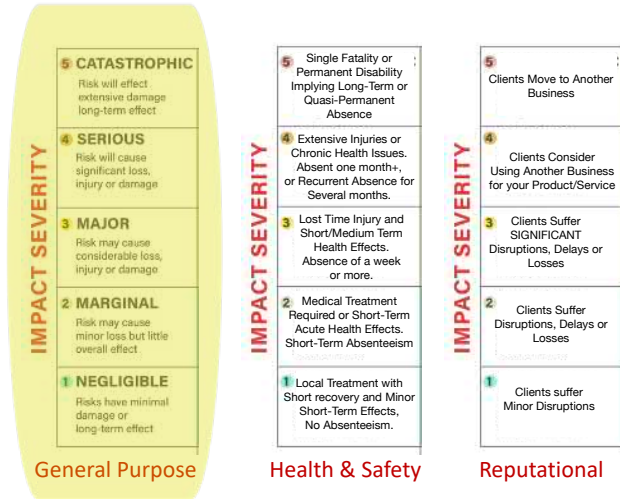


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Impact Severity Assessment: How Bad Is It When It Happens?

- Consequence Evaluation:
 - Can look at Impact Severity in one or more areas:
 - Health & Safety**
 - Reputational**
 - Operational
 - Environmental
 - Financial
 - Legal
 - Community and other stakeholders

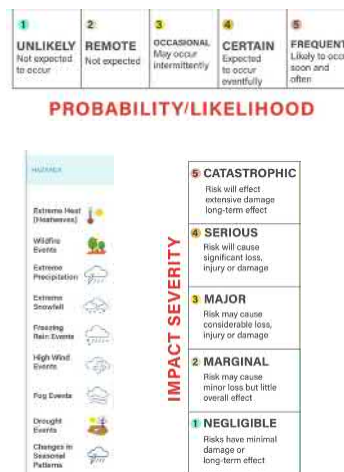


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Setting Up Information for Risk Evaluation

- We can combine key details on climate hazards in **Worksheet 6**:
 - Climate hazards
 - Likelihood Scores for Hazards
 - Impact Severity Scores
 - Impact Areas



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WORKSHEET 6: Assessing Severity of Anticipated Impacts

WORKSHEET 6: IMPACT ASSESSMENT

Climate Hazard	Likelihood Score	Impact Severity		Impact Areas				Comments
		Minor	Significant	Staff/Customer Health & Safety	Business Premises	Supply Chains	Business Continuity	
Extreme Heat (Heatwaves)	4	<input type="checkbox"/>	<input type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	
Wildfire Events	5	<input type="checkbox"/>	<input type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	
Extreme Precipitation	4	<input type="checkbox"/>	<input type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	
Extreme Snowfall	3	<input type="checkbox"/>	<input type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	
Freezing Rain Events	3	<input type="checkbox"/>	<input type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	
High Wind Events	4	<input type="checkbox"/>	<input type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	
Fog Events	4	<input type="checkbox"/>	<input type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	
Drought Events	5	<input type="checkbox"/>	<input type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	
Changes in Seasonal Patterns	5	<input type="checkbox"/>	<input type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	
Other		<input type="checkbox"/>	<input type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	
Other		<input type="checkbox"/>	<input type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	

Impact Severity: 1 Negligible 2 Marginal 3 Major 4 Serious 5 Catastrophic

1 UNLIKELY Not expected to occur	2 REMOTE Not expected	3 OCCASIONAL May occur intermittently	4 CERTAIN Expected to occur eventually	5 FREQUENT Likely to occur soon and often
--	-----------------------------	---	--	---

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PROBABILITY/LIKELIHOOD



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Worksheet 6: Completed inputs

WORKSHEET 6: IMPACT ASSESSMENT

Climate Hazard	Likelihood Score	Impact Severity		Impact Areas				Comments
		Minor	Significant	Staff/Customer Health & Safety	Business Premises	Supply Chains	Business Continuity	
Extreme Heat (Heatwaves)	4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	Impacts to operations from tasks suspended during extreme heat
Wildfire Events	5	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	Smoke/Visibility, Wildfire encroaches site

IMPACT SEVERITY

5 CATASTROPHIC
Risk will effect extensive damage long-term effect

4 SERIOUS
Risk will cause significant loss, injury or damage

3 MAJOR
Risk may cause considerable loss, injury or damage

2 MARGINAL
Risk may cause minor loss but little overall effect

1 NEGLIGIBLE
Risks have minimal damage or long-term effect

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Quiz

Your Turn To Assess Impact Severities



Impact Severity				Impact Areas										
Climate Hazard	Likelihood Score	Minor	Significant	Staff/Customer Health & Safety		Business Premises		Supply Chains		Business Continuity		Comments		
Extreme Precipitation	4			1	2	3	4	5	1	2	3	4	5	Potential for road washouts Site drainage issues Transport Delays, routing Short term disruption likely

IMPACT SEVERITY	5 CATASTROPHIC	Risk will effect extensive damage long-term effect
	4 SERIOUS	Risk will cause significant loss, injury or damage
	3 MAJOR	Risk may cause considerable loss, injury or damage
	2 MARGINAL	Risk may cause minor loss but little overall effect
	1 NEGLIGIBLE	Risks have minimal damage or long-term effect

- For each of the 4 impact areas shown above, consider how severe the **Extreme Precipitation climate hazard** will impact BPP's transmodal hub and its operations.
- Use the [Impact Severity 5-Point Scale](#) shown here to guide your scoring for each of the 4 impact areas.

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Quiz Discussion...



Impact Severity				Impact Areas									
Climate Hazard	Likelihood Score		Minor	Significant	Staff/Customer Health & Safety	Business Premises	Supply Chains	Business Continuity	Comments				
Extreme Precipitation	4		<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	2	3	5	1	2	3	5	Potential for road washouts Site drainage issues Transport Delays, routing Short term disruption likely

IMPACT SEVERITY	5 CATASTROPHIC	Risk will effect extensive damage long-term effect
	4 SERIOUS	Risk will cause significant loss, injury or damage
	3 MAJOR	Risk may cause considerable loss, injury or damage
	2 MARGINAL	Risk may cause minor loss but little overall effect
	1 NEGLIGIBLE	Risks have minimal damage or long-term effect

- Staff Health & Safety:** Little overall effect.
- Business Premises:** Considerable loss, damage (water damages)
- Supply Chains:** Potential for significant damage, transport flow due to route disruption
- Business Continuity:** Potential for significant, but short-term disruption resulting from overland runoff flows

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Working Through the CCRA Steps: Risk Matrix and Risk Levels



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The Risk Matrix in CCRA



IMPACT SEVERITY	5 CATASTROPHIC Risk will affect extensive damage long-term effect					Critical
	4 SERIOUS Risk will cause significant damage, injury or damage					Severe
	3 MAJOR Risk may cause considerable loss, injury or damage					Disruptive
	2 MARGINAL Risk may cause minor loss but little overall effect					Serious
	1 NEGLIGIBLE Risks have minimal damage or harm-effect					Controlled
	1 UNLIKELY Not expected to occur	2 REMOTE Not expected	3 OCCASIONAL May occur occasionally	4 CERTAIN Expected to occur eventually	5 FREQUENT Likely to occur soon and often	
						PROBABILITY/LIKELIHOOD

- The Risk Matrix is a **standard tool for considering probability and impact severity to assess risk** for a given hazard.
- Each Risk Level has a different colour in the matrix. Each level has an action assigned to it.

SCORE	RISK LEVEL	RESPONSE
1-2	CONTROLLED	Limited Monitoring Only
3-6	SERIOUS	Active Monitoring
8-9	DISRUPTIVE	Investigation Needed
10-16	SEVERE	Rapid Action Required
20-25	CRITICAL	Immediate, Critical Priority



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Working Through the CCRA Steps: Putting It All Together



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Inputs to the Risk Matrix: Listed Assessed Climate Hazards

From our prior steps, we have completed key CCRA tasks:

- In **Worksheet 1**, we identified past and emerging climate hazards
- In **Worksheet 6**, we assembled info on the likelihood of these hazards going forward
- Also in **Worksheet 6**, we assessed the impact severity for each hazard, across 4 impact areas of the business, should they occur.

- Now, we plot these on a Risk Matrix (**Worksheet 7**) to define Risk Levels

Climate Hazard	Area of Impact	Likelihood Scale (P) Factor	Severity of Impact Score (S)
Extreme Heat	Staff/Customer Health & Safety	4	4
Extreme Heat	Business Premises	4	2
Extreme Heat	Supply Chains	4	2
Extreme Heat	Business Community	4	3
Wildfire Events	Staff/Customer Health & Safety	5	4
Wildfire Events	Business Premises	5	5



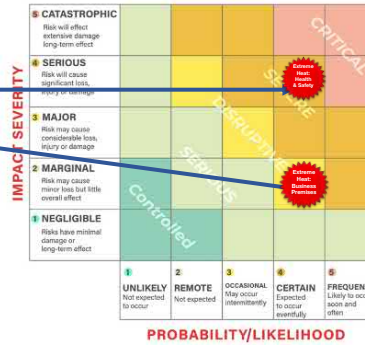
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Plotting your data into Worksheet 7



Climate Hazard	Area of Impact	Likelihood Scale (P) Factor	Severity of Impact Score (S)
Extreme Heat	Staff/Customer Health & Safety	4	4
Extreme Heat	Business Premises	4	2
Extreme Heat	Supply Chains	4	2
Extreme Heat	Business Community	4	3
Wildfire Events	Staff/Customer Health & Safety	5	4
Wildfire Events	Business Premises	5	4

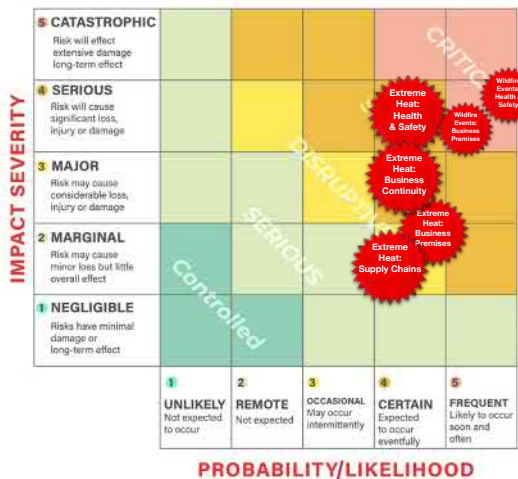


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Obtaining Risk Levels using Worksheet 7



Climate Hazard	Area of Impact	Likelihood Scale (P) Factor	Severity of Impact Score (S)
Extreme Heat	Staff/Customer Health & Safety	4	4
Extreme Heat	Business Premises	4	2
Extreme Heat	Supply Chains	4	2
Extreme Heat	Business Community	4	3
Wildfire Events	Staff/Customer Health & Safety	5	4
Wildfire Events	Business Premises	5	4

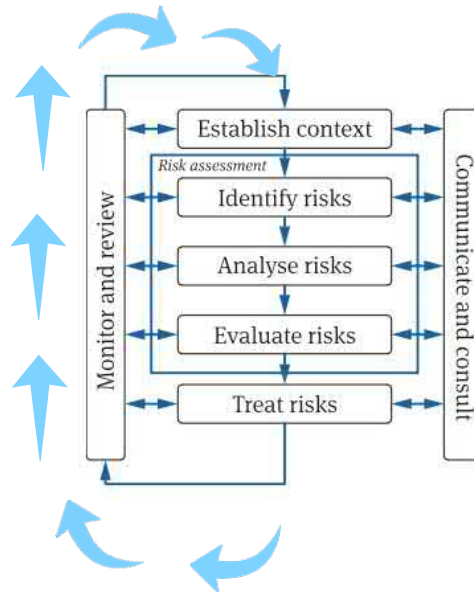
SCORE	RISK LEVEL	RESPONSE
1-2	CONTROLLED	Limited Monitoring Only
3-6	SERIOUS	Active Monitoring
8-9	DISRUPTIVE	Investigation Needed
10-16	SEVERE	Rapid Action Required
20-25	CRITICAL	Immediate, Critical Priority

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CCRA - Schedule to Repeat CCRA Process



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Where to From Here?



- For Business Sector participants, proceed to the
 - **Business Continuity Planning and Climate Change Module. Register now for the broadcast on January 12 @ 1pm CST.**
- For design professionals, proceed to the
 - **Infrastructure Climate Risk Assessment Featuring the PIEVC Process Module. Register now for the broadcast on January 26 @ 12 pm CST.**

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Feedback



Post-Class Participation Survey:

- Your feedback is extremely important to us, critical understanding how you may use these concepts in your own resilience planning.
- Links to a Survey Monkey **post-class survey** will be emailed to you within 24 hrs of this class. **You will also receive the Worksheet Booklet in this email.**

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Thank You.



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