Regional Adaptation Program

BC Agriculture & Food Climate Action Initiative

British Columbia, March 2020

Farm Flood Readiness Toolkit

Fact Sheets and Worksheets

Farm Flood Readiness Toolkit

Prepared by ***Upland Agricultural Consulting***,
under project FV08 of the ***Regional Adaptation Program***,
a program delivered by the ***BC Agriculture & Food Climate Action Initiative***.

Published by BC Agriculture & Food Climate Action Initiative, 2020.

Learn more at
www.bcagclimateaction.ca/project/fv08
www.bcagclimateaction.ca/regional/overview/

This toolkit was prepared by Upland Agricultural Consulting (*Ione Smith*, Project Lead; *Kazlyn Bonnor*, Research Analyst), with assistance from Ebbwater Consulting Inc and Interwoven Editing. The cover photo is provided by *Ione Smith*.

Funding for this project has been provided in part by Fraser Valley Regional District and in part by the governments of Canada and British Columbia under the Canadian Agricultural Partnership, a federal-provincial-territorial initiative. Funding is administered by the Investment Agriculture Foundation of BC and the BC Agricultural Research & Development Corporation.

Agriculture and Agri-Food Canada and the BC Ministry of Agriculture are committed to working with industry partners. Opinions expressed in this document are those of the author and not necessarily those of Agriculture and Agri-Food Canada, or the BC Ministry of Agriculture. The Government of Canada, the BC Ministry of Agriculture, and their directors, agents, employees, or contractors will not be liable for any claims, damages, or losses of any kind whatsoever arising out of the use of, or reliance upon, this information.

FOR CITATION, IN-TEXT
Upland Agricultural Consulting 2020

FOR CITATION, REFERENCE LIST
Upland Agricultural Consulting. 2020. *Farm Flood Readiness Toolkit*. BC Agriculture & Food Climate Action Initiative. www.bcagclimateaction.ca

Farm Flood Readiness Toolkit Overview

The *Farm Flood Readiness Toolkit* [Toolkit] is intended to assist agricultural producers to assess flood risk and asset vulnerabilities, and to identify suitable farm-level strategies for reducing potential impacts associated with flooding.

This Toolkit will help you to:

- Increase your understanding of potential flood scenarios for your operation.
- Identify the areas and infrastructure on your farm that is most vulnerable to floods.
- Become familiar with how governments communicate and respond to flood events.
- Understand measures you can take to defend your farm against flooding.
- Create a *Farm Flood Readiness Plan* for your operation.

The Toolkit contains the following 8 Fact Sheets and 8 Worksheets:

Fact Sheets

1. Creating Your Farm Flood Readiness Plan
2. Determining Your Farm's Flood Risk Level
    - Regional Snapshot: The Fraser Valley
3. Reducing Flood Impacts: Permanent Floodproofing Measures
4. Reducing Flood Impacts: Temporary Floodproofing Measures
5. Flood Evacuation Alerts and Evacuation Orders
6. Protecting Livestock During a Flood
7. Dairy Operations: Relocation Considerations
8. Insurance, Risk Management, and Disaster Recovery

Worksheets

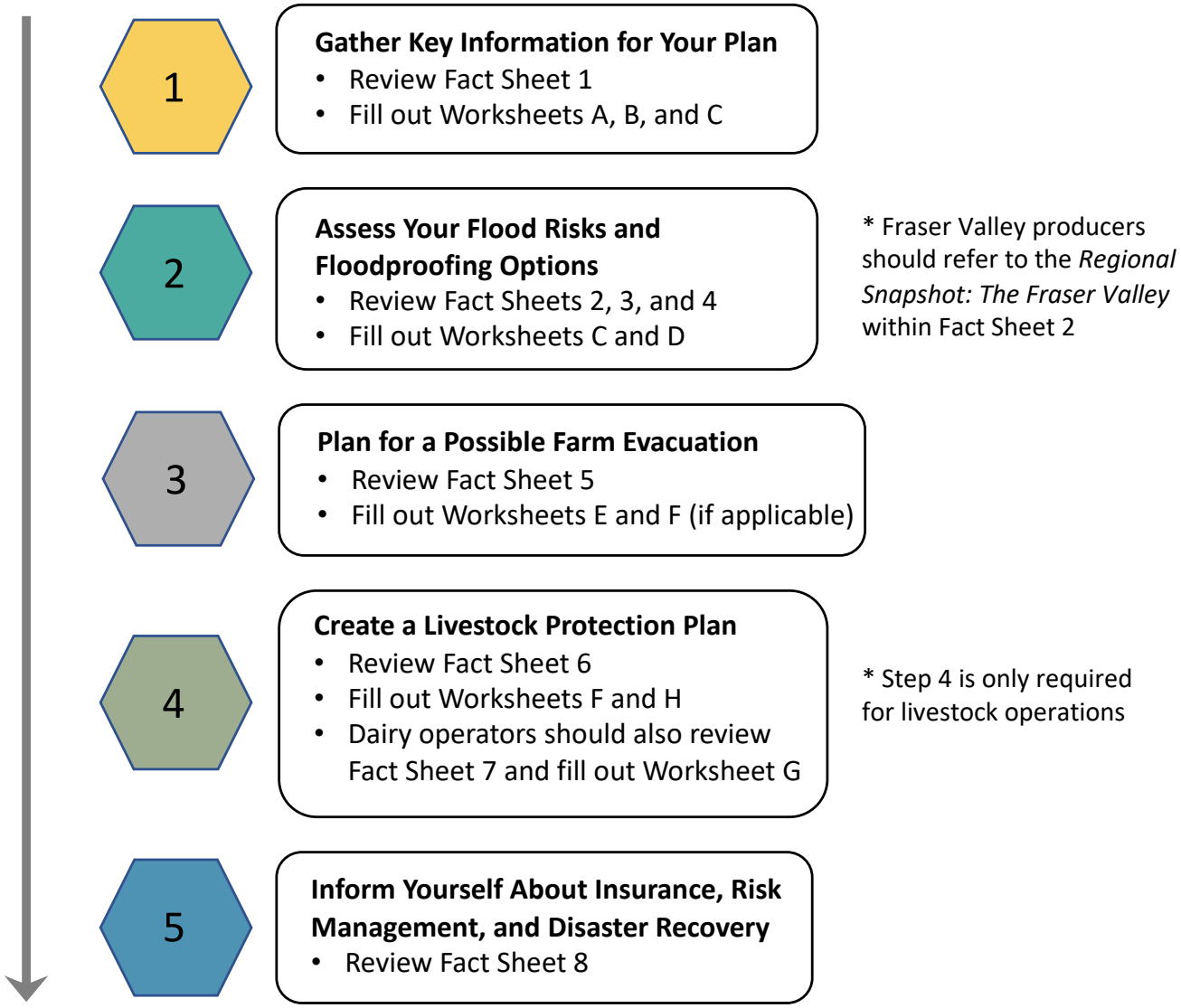
A. Farm Information
B. Emergency Contacts
C. Preparing Your Agriculture Operation Map
D. Farm Asset Risk Assessment
E. Farm Evacuation
F. Livestock Protection Plan
G. Milk Share Agreement
H. Sample Host Farm Agreement

The Fact Sheets are brief informational resources on specific topics. The Worksheets enable active planning and decisions—specific to your operation. The Worksheets can be found at the end of the Toolkit and are provided as fillable PDF forms, which can also be printed and filled in manually. A completed set of Worksheets will create your *Farm Flood Readiness Plan*. Once completed, the Worksheets, and any additional materials, should be printed and stored in an accessible and central location; some Worksheets—where indicated—should have additional copies kept in strategic locations.

Your plan should be updated annually, or sooner if your farm operation's key information changes.

The Fact Sheets and Worksheets are intended to be used together, with the Fact Sheets helping to inform your planning and decision-making. The following chart indicates which Worksheets connect to each Fact Sheet. Some Worksheets appear more than once because their content relates to multiple key topics. While not all Fact Sheets and Worksheets will relate to your operation, it is recommended that you review the full Toolkit and determine which materials are most pertinent to your situation.

Use this Toolkit to build your *Farm Flood Readiness Plan* in 5 easy steps



Creating Your Farm Flood Readiness Plan

Fact Sheet 1

This fact sheet outlines the key elements of a Farm Flood Readiness Plan. Keep it handy while you complete your plan using the worksheets.

Completing a plan before a flood emergency means that you know—and can communicate to others—the steps required to safeguard employees, protect livestock, and minimize damage to farm assets.

Figure 1.1 Flooded fields in Delta, BC. Credit: I. Smith.

Key Components of Your Plan

1. Agriculture Operation Information
2. Agriculture Operation Map
3. Evacuation Plan
4. Livestock Protection Plan

1. Agriculture Operation Information

An up-to-date emergency contact list will help to ensure that you and your employees can easily identify and make contact with individuals who might assist in an emergency (e.g., your veterinarian, plumber, neighbour). Update this list annually and keep a printed copy in a location that is visible to employees (as well as on your computer/phone).

Fill out **Worksheet A: Farm Information** and **Worksheet B: Emergency Contacts** to complete this step.

2. Agriculture Operation Map

Key locational information about your operation must be summarized so that it can be shared quickly with others (e.g., employees, emergency responders) for planning or during an emergency. An agriculture operation map will help to capture and communicate a number of important aspects of your operation including location of buildings, hazardous materials, equipment, and livestock.

The information can also aid you in assessing the vulnerability of your assets and guide your decisions about asset protection.

Use **Worksheet A: Farm Information** and **Worksheet C: Preparing Your Agriculture Operation Map** to complete this component of your Farm Flood Readiness Plan.

Emergency Tube

Store your Farm Flood Readiness Plan in an "emergency tube". The tube can be attached to a utility pole or gatepost at the entry of your farm or ranch. Be sure to consider privacy needs when choosing a location.

For more information on emergency tubes visit: Rural Emergency Plan (Government of Alberta).

3. Evacuation Plan

When an Evacuation Order is issued, all persons must leave the defined area. A basic evacuation plan for your operation will help to ensure that all staff are prepared to leave. Re-entry permits are issued by local governments, and their availability and process may differ between jurisdictions. Considerations for evacuation include:

- Identifying key roles and responsibilities.
- Addressing any communication barriers (e.g., language).
- Awareness of WorkSafeBC regulations for employees.
- Identifying routes, exits, and assembly areas.
- Confirming emergency shut-off procedures.
- Establishing processes to account for staff and visitors.

Worksheet E: Farm Evacuation provides a more specific set of considerations and enables you to provide details for your evacuation plan.

4. Livestock Protection

Planning for how you will manage livestock in a flood/emergency will help to ensure you have taken all necessary advance actions.

Key steps in livestock protection planning include an inventory (see **Worksheet A: Farm Information**) and determining the most suitable protection options (e.g., sheltering in place instead of relocating). You may wish to have a contingency plan in case your first choice is not possible. You may also wish to have different plans in place for different types of animals.

Use **Fact Sheet 6: Protecting Livestock During a Flood** to get more information and complete **Worksheet F: Livestock Protection Plan** as part of your Farm Flood Readiness Plan.

Communication is Key

During a flood—or any emergency—communication is key!

This includes communication with local authorities, family members, and staff.

- Be sure to share your completed plan with employees, family, and neighbours.
- If available, sign up to receive emergency alerts from your local government.
- Know the website, general inquiries phone number, and social media feeds (e.g., Facebook, Twitter) for your local government. These resources will provide the most up-to-date information and contact details during an emergency.

BC Ministry of Agriculture Emergency Management Response Planning Guides

The Government of BC has developed a number of agricultural Emergency Management Response Planning Guides for small mixed farms and pork, beef, dairy, and poultry producers. These guides can be downloaded from their website.

Determining Your Farm's Flood Risk Level

Fact Sheet 2

Assessing flood risk will help you to identify potential impacts, as well as preparedness and/or flood mitigation measures. This fact sheet outlines a stepwise process for evaluating flood risk.

Flooding and Climate Change

Your farm may be exposed to various types of floods. Flooding can occur:

- When rivers have high flows (or ice jams) and water overtops riverbanks (riverine flood).
- When coastal storms and high tides flood coastal areas (coastal flood).
- When high levels of precipitation or snowmelt cause overland flow and stormwater ponding.
- When a dike fails as a result of overtopping or failure of the dike structure (dike breach).
- When water rises from the underlying water table to cause flooding (groundwater flooding).

Climate change is leading to more extreme rainfall, more rapid snowmelt, higher seasonal river flows, and more intensive and frequent coastal storm events. What once was a rare flood in the past may occur more frequently in the future, and flood extents and depths are becoming greater.

Three Steps to Evaluating Your Flood Risk

Step 1: Determine if your farm property is located within a flood hazard area.

Gather Resources

You may already know that your farm is located in an area prone to flooding and understand the types of flooding you are most likely to experience. However, if you are unsure or you would like to know more:

- Contact your local government planning department or check their website for information about flood maps.
- Find historical flood extent maps through the BC Ministry of Environment's website.

Assess Likelihood and Frequency of Flooding

To understand your flood risk, it is helpful to know how likely it is that your property may flood (i.e., how frequently flooding events may occur). Most flood maps in BC show the flood extents that are associated with a flood that has a 0.5% probability to occur, or be exceeded, in any given year—this is called the 0.5% Annual Exceedance Probability (AEP) flood and represents the regulatory flood extents in many jurisdictions. This annual flood likelihood can also be framed as an encounter probability over a specific time period. For instance over a 25-year period (typical mortgage span), there is a 12% chance that such a flood may occur. However, there could also be more frequent smaller floods that cause damage to farm property.

If there is no flood map available for your region, you may qualitatively assess if your property may be prone to flooding. For this, you will want to consider if your farm:

- Is close to a creek, stream, river, dugout, holding pond, dam, or other waterbody.
- Has low-lying areas with poor drainage (areas where water tends to pond).
- Is located near a dike. Properties located near dikes have relatively high flood hazard. Although dikes are protective infrastructure, all dikes have the potential to fail or overtop.

If any of the above is true for your farm, your property might be prone to flooding.

Step 2: Determine the vulnerability and priority level of your key farm assets.

Worksheet C: Preparing Your Agriculture Operation Map and **Worksheet D: Farm Asset Risk Assessment** can be completed with guidance from this fact sheet.

List Farm Assets

Listing your farm assets and evaluating their vulnerability will help you to think through the impacts of flooding, and to link this to actions you can take to reduce damages.

Determine Priority Levels of Assets

Rank the level of priority of your operation's assets for protection (e.g., a residence or milking barn would be top priority, a storage shed might be low priority).

Assets include:

- Residences
- Barns and other farm buildings
- Croplands
- Livestock and poultry
- Fences and gates
- Drainage and irrigation infrastructure
- Pump houses
- Power sources

Determine Vulnerability of Assets

Rank the level of vulnerability (i.e., how sensitive the asset is to floodwater damage) and how exposed the asset is to flooding (i.e., where it is located relative to the flood hazard area). Consider these key questions:

- Has any floodproofing of buildings or structures been undertaken?
- Is the asset insured?
- Is there machinery or equipment that may be damaged by water?
- What is the elevation of the asset in comparison to creeks and/or rivers in the area?
- Are there existing flood protection or mitigation systems that may defend the asset (e.g., the potential to utilize berms)?

Step 3: Determine your flood risk.

Use the information from the previous steps to determine your level of risk for the farm as a whole, and the extent of necessary action for each asset. Table 2.1 below provides an example of how to combine your flood likelihood risk and asset vulnerability to determine the risk level and action required.

Table 2.1. Illustration of linkage between flood risk assessment and required actions.

Flood Hazard—Property Location		Asset Priority, Vulnerability, and Exposure	Risk Level	Action
In flood hazard area with **high** likelihood to flood, in front of or close behind dike, or **very close** to a waterbody at lower elevation.	OR	Many high priority and vulnerable assets exposed at low elevation in flood hazard area.	**Extreme**	Extensive
In flood hazard area with **high to lower** likelihood to flood, **close** to a waterbody at lower elevation.	OR	Many high/moderate priority and vulnerable assets exposed in flood hazard area.	**High**	Moderate
In flood hazard area with **lower** likelihood to flood, **relatively** close to a waterbody at lower elevation.	OR	Some moderate priority and moderately vulnerable assets exposed in flood hazard area.	**Moderate**	Moderate
Relatively close to (but not in) flood hazard area boundary, and/or at **slightly higher elevation**.	OR	Most assets not exposed to flood hazard (e.g., at higher elevation).	**Low**	Minor
Far from any flood hazard area boundary and waterbodies, at **high elevation**, and soil has good drainage (no ponding).	OR	No assets exposed to flood hazard (e.g., at higher elevation).	**Very Low**	Limited

Regional Snapshot: The Fraser Valley

This snapshot provides an overview of flood risk and resources specfic to Fraser Valley producers.

Agricultural operations in the Fraser Valley are exposed to varying levels of flood risk, largely depending on their location. Factors that will influence the flood hazard at a farm include:

- Its proximity to waterbodies. The Fraser River presents a significant flood risk, but other rivers (e.g., Chilliwack, Nooksack, and Sumas) and even smaller creeks or streams can flood surrounding areas under certain conditions.
- Its proximity to dikes. Properties located near dikes have relatively high flood hazard. Although dikes are protective infrastructure, all dikes have the potential to fail or overtop.
- If its location is prone to flooding from upland areas, overland flow, and stormwater ponding (this depends on its soil, land cover, surrounding topography, etc.).
- The depth of its underlying groundwater table (if prone to rising water tables and groundwater flooding).

Recent research has estimated the potential agricultural losses from a severe Fraser River flood event at $1.6 billion from a combination of lost farm-gate sales, damage to farm infrastructure, and equipment and crop losses. More localized events can also impact individual farm businesses and result in substantial financial losses.

Climate Change Projections and Fraser Valley Flood Hazard

Climate change is anticipated to increase the magnitude and frequency of Fraser River annual peak flows and shift their occurrence earlier in the spring. Recent studies project that **peak flows in the Fraser River will increase in the order of 16% by the 2050s***. This means that in the event of a freshet flood, floodwaters will be deeper and spread farther.

Climate change is also creating more unpredictable localized flooding. The increasing frequency of extreme/severe rain events, which can occur with little or no warning, also increases the risk of localized flooding. This underscores the need to be prepared to respond quickly to different types of flood risks within the Fraser Valley.

Fraser River Flood Maps

Reviewing flood maps can be helpful for better understanding your risk—particularly in a changing climate. Both simple interactive and detailed flood maps are available; these can be used to assess how a flood event might affect your property and the surrounding area.

For more information about Fraser River flood mapping and to see alternative flood scenarios please visit: Fraser Basin Council regional flood maps.

*Northwest Hydraulic Consultants (NHC) for the Fraser Basin Council. *Hydraulic Modelling and Mapping in BC's Lower Mainland: A Lower Mainland Flood Management Strategy Project*. North Vancouver, BC. 2019.

Fraser Valley Flood Planning and Mitigation

Local governments, First Nations, and others in the Fraser Valley are participating in the Lower Mainland Flood Management Strategy (led by the Fraser Basin Council), an initiative working to reduce flood risk and improve flood resilience for communities along BC's Lower Fraser River and south coast.

This long-term strategy will address flood mitigation priorities, structural and non-structural options, and funding and decision-making options. More information can be found at: www.floodstrategy.ca. As part of this strategy, flood hazard maps were updated in 2019 and will become available online at this website in the near future.

Each local government has its own approach to planning for, and addressing, flood risk. The ability of local governments to invest in efforts to reduce flood risk is dependent on planning and available funding resources. Key contacts are provided in Table 3.1 for you to keep informed about local flood planning, management, and mitigation efforts.

In the event of an emergency, refer to your local government's website and social media feeds (e.g., Facebook, Twitter) for the most up-to-date information and contact numbers.

Figure 2.1. Mission, BC. Credit: I. Smith.

Flood Monitoring and Emergency Resources

Real-time river monitoring data for the Fraser River is available through the River Forecast Centre, and the City of Chilliwack website also provides up-to-date information. The River Forecast Centre also provides generalized forecasts to warn of localized flooding based on weather patterns and forecasts. Flow and water-level forecasts are used to determine when to issue flood advisories, Evacuation Alerts, and Evacuation Orders. (See **Fact Sheet 5: Flood Evacuation Alerts and Evacuation Orders** for more details.)

In the event of an emergency, a local government may activate an Emergency Operations Centre (EOC). An EOC is the communications and coordination hub for all emergency-related planning activities within a local government's jurisdiction. If you are seeking information or advice during periods of flood threat or flood emergency, your key contacts are your local government general inquiries phone number or the contacts identified on your local government website and social media feeds. See Table 3.1 for contact information.

In the event of an emergency where your health, safety, or property is in jeopardy and immediate action is required, please call 911.

Table 2.2. Key flood resources and contacts for the Fraser Valley.

Organization	Resources and Contacts
Fraser Valley Regional District (electoral areas)	Contact number: 604-702-5000 Facebook: @MyFVRD Twitter: @FVRD1 Website
City of Abbotsford	Contact number: 604-853-2281 Emergency Coordinator: 604-853-3566 Facebook: @CityofAbbotsford Twitter: @City_Abbotsford Website
City of Chilliwack	Fraser River Flood Protection Contact number: 604-792-9311 Emergency Coordinator: 604-792-8713 Freshet Information Line: 604-793-2757 Facebook: @Chilliwack Twitter: @City_Chilliwack Website
District of Mission	Fraser River Flood Preparedness and Response Plan Contact number: 604-820-3793 Facebook: @DistrictofMission Twitter: @Mission_BC Website
District of Kent-Agassiz	Contact number: 604-796-2235 After Hours Emergencies: 1-866-951-3718 Facebook: @DOKAgassiz Twitter: @ KentBC1 Website
Village of Harrison Hot Springs	Contact number: 604-796-2171 After Hours Emergencies: 1-866-924-5173 Facebook: @VillageofHarrisonHotSprings Website
District of Hope	Contact number: 604-869-5671 After Hours Emergency: 604-869-6020 Facebook: @DistrictofHope Twitter: @DistrictofHope Website
BC Agriculture and Food Climate Action Initiative	Freshet flooding and Fraser Valley Agriculture: Evaluating Impacts & Options for Resilience Fraser Valley Regional Adaptation Program
BC Ministry of Agriculture	AgriService BC: 1-888-221-7141 Flood Resources for Agriculture
Fraser Basin Council	Lower Mainland Flood Management Strategy or www.floodstrategy.ca. Lower Mainland Dike Assessment

Reducing Flood Impacts: Permanent Floodproofing Measures

Fact Sheet 3

This fact sheet outlines a number of **permanent measures** for protecting your farm buildings, equipment, and infrastructure from flooding. It can be used in conjunction with **Fact Sheet 4: Reducing Flood Impacts: Temporary Floodproofing Measures**.

Explanations and descriptions of each measure are provided, along with links to resources with more detailed technical guidance.

It is recommended that farm operators consult local bylaws and work with qualified technical experts (e.g., engineers, plumbers, electricians) prior to undertaking any measures identified in this fact sheet.

Floodproofing Measures

Floodproofing measures can be:

- Permanent: Always in place, requiring no action if flooding occurs.
- Temporary: Installed immediately before a flood, but requiring pre-flood event planning for techniques, materials, and labour needs.

For permanent flood protection measures, you will want to consider whether you have buildings that are suitable for wet floodproofing or dry floodproofing.

- Wet floodproofing allows floodwaters to inundate structures because they are built with materials that resist flood damage. Allowing water to enter equalizes pressure on the walls and floors, and in most cases, results in less structural damage.
- Dry floodproofing creates a watertight structure. Dryproof buildings must have the structural capacity to resist the pressure of floodwaters. The advantage is that the contents of the building are kept dry and clean-up is minimized.

These approaches can be used individually or in combination. For example, dry floodproofing may be used for a farm building with valuable equipment (e.g., milking parlour). Wet floodproofing may be more appropriate for a storage building that can easily be emptied out ahead of time.

1. Measures to Protect Farm Buildings

The measures you take will depend on your level of flood risk, as well as the value of the building and its contents.

Elevate Buildings

This dry floodproofing approach ensures that buildings are at a higher elevation than the minimum expected flood levels. Existing buildings can be elevated by lifting the structure and creating a new foundation, or extending the existing foundation using methods such as piling, pad and posts, or piers. New buildings can be built on higher foundations using the same methods. The area around buildings should be graded to slope towards ditches and ponds.

- Elevating Your House. Example by the Federal Emergency Management Agency (FEMA) in the US; note some terminology/guidance differs from BC. This document provides detail as to how to elevate houses, but can also be applied to farm structures.

Ensure Adequate Building Setbacks

Any new construction should be set back from a floodway to avoid flooding and erosion using local and provincial guidelines. The setback distance is measured from the natural boundary of the waterbody and the distance depends on the type of waterbody (e.g., lake, river, human-made waterbodies, etc.).

- Flood Construction Levels and Setbacks for Farm Building Situations. BC Ministry of Agriculture.

Select and Install Water-Resistant Building Materials

Water-resistant building materials can be utilized during new construction or renovations or retrofitting. This includes using concrete-slab flooring, lime-based or cement-based plasterboard, and waterproof insulation. These measures may be especially cost-effective for farm buildings that contain expensive equipment (e.g., milking parlour) or that need to be used immediately after water has retreated (e.g., livestock barns).

Select and Install Watertight or Water Resistant Windows and Doors

Doors and windows can be sealed (made watertight) and/or can be installed using water resistant materials (such as steel). These measures can be done well in advance of a flood.

Install Floodwalls or Berms

Floodwalls and berms are permanent barriers designed to keep water away from buildings (a form of dry floodproofing). A floodwall is typically constructed with concrete, whereas berms are constructed using soil or fill. This measure may be suitable to protect buildings from overland flooding, but it will not prevent groundwater seepage from entering a building. Further, floodwalls and berms may breach or be overtopped, or their condition may deteriorate, during flooding. Consideration must also be given to drainage within the floodwall or berm that can be addressed by installing a one-way drain valve. Pumps may be required to drain excess pooled water from precipitation or seepage.

- Homeowner's Guide to Retrofitting: Barriers. Example by the Federal Emergency ManagementAgency (FEMA) in the US; note some terminology/guidance differs from BC.

Anchor Buildings in Place

Anchoring is a form of wet floodproofing that prevents building flotation, collapse, or movement as a result of a current in the floodwaters. Anchoring can take different forms, from cables connected to concrete pads to hurricane clips attached to a foundation.

Install Enhanced Drainage

Drainage systems can expedite the flow of water out of and away from buildings and should be designed to also divert floodwaters away from wells and potential sources of contamination (e.g., manure, compost piles).

- Farm Practice: Drainage. BC Ministry of Agriculture.
- BC Farm Practices & Climate Change Adaptation: Drainage. BC Climate Action Initiative.

2. Measures to Protect Farm Equipment

How you choose to protect equipment will likely depend on its value, whether it can be moved, and whether the costs of the associated measures make sense for your operation.

Elevate Equipment

Mounting equipment on a platform is a wet floodproofing approach that can protect it from floodwaters. It may also facilitate efficient removal of equipment by forklift, tractor, or truck. The platform can be built using permanent materials, such as concrete, or more temporary materials, such as pallets.

Install Hoists in Buildings

Hoists and/or overhead suspension systems allow machinery, utility system components, fuel, storage containers, and other flood-sensitive items to be elevated as necessary. In appropriate structures, hoists can be a quick way to move sensitive equipment or materials above a flood. However, the building will need to be engineered to support the load.

3. Measures to Protect Farm Power and Water Infrastructure

Maintaining power and water during a flood or emergency event (or restoring it quickly) is a high priority.

Manage Hazardous Materials

Hazardous materials on a farm may include agricultural by-products, manures, pesticides, herbicides, fertilizers, and medicines. During a flooding event, these materials can create additional risk of contamination of soil, water, feed, or other assets, if they are not stored securely away from floodwaters.

To minimize the potential for contamination during a flood, ensure that hazardous materials are stored, maintained, and managed in accordance with BC's *Hazardous Waste Regulation* and the *Code of Practice for Agricultural Environmental Management*.

Install Electrical Wiring Above Flood Levels

This dry floodproofing method is achieved by installing electrical systems (sockets, fuse boxes, controls and wiring) above the flood level. Ventilation systems, automated watering and feeding systems, and automated climate control are all examples of electrical components in barns that could be vulnerable to flooding.

Seal Septic Systems

During flooding, escaped sewage can contaminate crops and water supplies and cause substantial damage to buildings. Sewer backup and leaching can be prevented by installing watertight entrances to septic tanks, plugging floor drains, and installing anti-backflow valves in sewer lines. This wet floodproofing approach requires that sewer lines and systems be shut down until flooding has subsided.

Protect Wells and Water Supply Lines

To ensure that wells do not become contaminated, water must be prevented from pooling around the well head. This can be achieved by maintaining a surface drainage gradient away from the well, keeping the casing above ground, and sealing them with heavy plastic and duct tape. Backflow prevention devices can be installed on all water supply lines.

- Water Wells – What to do before the Flood. (Agriculture and Agri-Food Canada.)

Equipment Supplier List

Note that this list was compiled in December 2019 and is not an exhaustive list of suppliers, and no particular supplier is endorsed. None of the materials have been vetted by the authors through a quality-control assessment or field testing.

Permanent Flood Resistant Doors

- **Fleming Door**, Port Moody, BC

Seals/Caps for Wells and Septic Systems

- **Most hardware stores:** Home Hardware, Home Depot, Lowe's, etc.

Protect Wells and Water Supply Lines: Backflow Protection Devices

- **Active Fire and Safety Services Ltd.**, Surrey, BC, https://www.activefire.ca/services/backflow-prevention-water-system/
- **BC Comfort**, Burnaby, BC, https://www.bccomfort.com/services/plumbing-medical-gas/

Figure 3.1. Rock Creek, BC. Credit: I. Smith.

Reducing Flood Impacts: Temporary Floodproofing Measures

Fact Sheet 4

This fact sheet outlines a number of **temporary measures** for protecting your farm buildings, equipment, and infrastructure from the damages associated with flooding. It can be used in conjunction with **Fact Sheet 3: Reducing Flood Impacts: Permanent Floodproofing Measures**.

Explanations and descriptions of each measure are provided, along with links to resources with more detailed technical guidance.

It is recommended that farm operators consult local bylaws and work with qualified technical experts (e.g., engineers, plumbers, electricians) prior to undertaking any measures identified in this fact sheet.

Floodproofing Measures

Floodproofing measures can be:

- Permanent: Always in place, requiring no action if flooding occurs.
- Temporary: Installed immediately before a flood, but requiring pre-flood event planning for techniques, materials, and labour needs.

Temporary floodproofing measures are most effective in areas expected to have relatively shallow floodwater depth and a slow rate of rise (e.g., groundwater, overland, and some riverine flooding events). These measures can be put into place on short notice and can be relatively low cost. However, most measures are also labour intensive and still require a pre-determined plan of action.

1. Measures to Protect Farm Buildings

The measures you choose to implement for protecting your farm buildings will depend on your level of flood risk, as well as the value of the building and its contents.

Figure 4.1. Temporary wall used as a flood barrier. Credit: Flood Control International.

Install a Temporary Wall

Temporary walls can be made of plastic, metal, brick, or wood barriers to prevent the passage of water through them.

Temporary walls are often covered by a plastic sheet, and a double layer of sandbags is placed at the base to reduce seepage and provide stability. Pre-made temporary walls can also be purchased and stored for future use.

Install Water-Inflated Barriers

Water-inflated tubing can be used as a temporary flood barrier around buildings, or between buildings and rising water levels. Water-inflatable barriers are easier to erect than sandbag levees or walls, take much less time to set up, and require minimal storage space when deflated. The barriers are available in varying sizes and shapes.

Install Flood Shields

Flood shields are removable barriers that prevent floodwaters from entering a structure. They have pre-installed mounting points for watertight gaskets and are constructed with durable impermeable materials (usually metal). Flood shields should be stored close to where they are going to be installed, colour-coded or numbered to easily identify their intended location and installation priority, and held in place by simple, quick-connect fasteners and latching devices.

- Floodproofing Non-Residential Buildings (Page see page 14 and following). Example by US FEMA; note some terminology differs.

Figure 4.2. Metal flood shield. Credit: Hydrological Solutions

Use a Sump Pump

A sump pump can be used to remove water that breaches a permanent or temporary barrier or from buildings if infiltration occurs. When purchasing a pump, be sure to consider capacity, head, and power source.

LAST RESORT: Build Sandbag Barriers

Sandbags—along with durable plastic sheeting—can be used to form a flood barrier. However, sandbags should be considered as a last resort—they are often breached, particularly if used for a prolonged period (1 week or more). Further, you will need to consider the amount of labour and cost required for sandbag cleanup after an event, as they are considered hazardous material and are costly to dispose of.

- Flood Fighting: How to Use Sandbags. Example from US Army Corps of Engineers.

2. Measures to Protect Farm Equipment

How you choose to protect equipment will depend on its value, whether it can be moved, and whether the costs of the associated measures are feasible for your operation. As with buildings, lower-cost temporary measures to protect equipment require sufficient warning time and labour.

Move Equipment to High Ground

If your farm has suitable high ground, you can plan to relocate equipment in advance of a flood event. Mount stationary equipment onto pallets in order to move it to the selected location. If no high ground is available, it may be possible to raise equipment on blocks or pallets.

Move Equipment Off Site

If flooding is expected, and you do not have suitable high ground, equipment can be relocated to an elevated and flood-protected location. If you are also relocating livestock, safe storage of your equipment can be arranged as a component of a host farm agreement (see **Fact Sheet 6: Protecting Livestock During a Flood**).

Place Smaller Equipment in Flood Bags

If flooding is expected imminently and equipment cannot be moved to high ground, consider placing smaller equipment into "Flood Bags". These are large impermeable bags that can be sealed and are designed to limit damage to equipment and small and medium vehicles.

3. Measures to Protect Farm Power and Water Infrastructure

Maintaining power and water supply during a flood or emergency event (or restoring power soon afterwards) is a high priority for many producers. Building services, such as power and heating/cooling systems, would ideally be permanently floodproofed. If that is not possible, then the following contingency efforts can be undertaken.

Purchase and Install a Back-Up Generator

Generators can help to ensure that power to critical components of the farm is maintained during an outage. Even if the farm itself is spared from flood damage, regional or local power systems may be damaged. Generators should be tested every 3 to 6 months to ensure they are functional when needed. Ensure that the generator in place has the capacity to meet the farm's power needs, particularly if there has been an automation upgrade (e.g., a conversion to robotics).

- Standby Electric Generators for Emergency Farm Use. Ontario Ministry of Agriculture, Food and Rural Affairs.

Store and Secure Extra Fuel

Extra fuel will be required to power back-up generators and pumps. Ensure the fuel is stored in an elevated area in accordance with regulations (see text box below). Where possible, install automatic shut-off valves on fuel tanks and activate them when flooding is imminent. If the farm area is also located within a wildfire risk area, be sure to minimize the length of time and the amount of extra fuel that is kept on the farm.

Floodproofing Hazardous Materials

Hazardous materials on a farm may include agricultural by-products, manures, pesticides, herbicides, fertilizers, and medicines. During a flooding event, these materials can contaminate soil, water, feed, or other assets, if they are not stored securely.

To minimize the potential for contamination during a flood, ensure that hazardous materials are stored, maintained, and managed in accordance with BC's *Hazardous Waste Regulation* and the *Code of Practice for Agricultural Environmental Management*.

Stockpile Potable Water

Farm operations should store enough water to satisfy drinking requirements for all people and livestock for at least 72 hours. The potable water should be elevated or otherwise secured so that it will not be contaminated during a flood.

- BC Agriculture Water Calculator – Estimating Annual Crop and Livestock Water Demand.
- Water Needs and Considerations During an Emergency. US Department of Homeland Security.

Figure 4.3. Delta, BC. Credit: I. Smith.

Equipment Supplier List

Note that this list was compiled in December 2019 and is not an exhaustive list of suppliers, and no particular supplier is endorsed. None of the materials have been vetted by the authors through a quality-control assessment or field testing.

Flood Shields

- **FloodShield**, California, US, https://floodshield.us/
- **Trademark Hardware**, New York, US, https://www.tmhardware.com/Door-Dam-Flood-Barrier-Shield.html?sku=TH72070A-12
- **Hydrological Solutions**, Texas, US, https://www.hydrologicalsolutions.com/metal-flood-barriers/

Water-Inflated Barriers

- **Rapid Barrier Systems**, Calgary, AB, https://rapidbarrier.ca/
- **Barricade Environmental**, Sylvan Lake, AB, http://barricadeenviro.com/waterbloc-flood-control/
- **AquaDam**, Vancouver, BC, https://www.layfieldgroup.com/AquaDam.aspx
- **Quick Dam Water Curb**, Rhode Island, US, https://quickdams.com/index.php/product/water-curb/ (Canadian retailers: Acklands Grainger, Amazon Canada, Home Depot, Walmart, Action Solutions Conseil.)

Rigid Frame Walls

- **Flood Control Canada**, Kelowna, BC, https://www.floodcontrolcanada.com/copy-of-inero-h50

Flood Barriers

- **Flood Barriers Canada**, Minnesota, US, https://floodbarrierscanada.ca/

Sandbag Barriers

- **Komol**, Port Coquitlam, BC, https://www.komolplastics.com/sandbags/
- **Coast Distributors**, Nanaimo and Kelowna, BC, https://kelowna.coastdistributors.com/category/0114C/sandbagsanti-skid

Sump Pumps

- **A.J. Pumps Water Treatment**, Chilliwack, BC, http://www.ajpumps.com/products/sewage-pumps/sump-pumps/
- **EMCO Plumbing and Heating Supplies**, locations across BC, https://www.emcobc.ca/product-overview/pumps-and-water-treatment/overview.htm
- **Home Depot**, locations across BC, https://www.homedepot.com/b/Plumbing-Water-Pumps-Sump-Pumps/N-5yc1vZbqjx

Box Walls

- **Texas Flood Bag**, Houston, US, https://www.texasfloodbag.com/?v=3e8d115eb4b3

Flood Evacuation Alerts and Evacuation Orders

Fact Sheet 5

This fact sheet outlines key information that agricultural producers need to know regarding roles and responsibilities, as well as the terminology used by local authorities, during flood emergencies.

Flood response and public communication are handled by local governments (e.g., a municipality and/or a regional district). If the local government does not have the capacity to manage the flood response, the provincial government will become involved.

The first priority during an emergency is always the health and safety of responders. Individual producers are ultimately responsible for their livestock, farm property, and equipment during a flood. Flood response and recovery assistance from government, whether physical or financial, is not guaranteed.

⚠ Local government priorities during a flood emergency are to safeguard:

1. Human life and health
2. Public infrastructure and property
3. The environment
4. Economic/social loss

When Flooding is Imminent or Occurring

It is the responsibility of local governments—often working closely with the BC River Forecast Centre—to determine if flooding is an imminent threat to people or property, and to inform the public.

BC Premises ID Program

Registering with the BC Premises ID program enables rapid identification and notification of livestock and poultry producers during an emergency.

For example, Premises ID has been an important element of temporary access permitting during recent wildfires.

If there is a threat of flooding, the local government will activate their **Emergency Operations Centre (EOC)**. Contact your local Emergency Coordinator (see your local government website or call their planning department) for up-to-date flood information and forecasts.

In areas where flooding may occur or is imminent, local governments may issue any one (or a combination) of the declarations outlined in the table on the following page.

Figure 5.1. Kettle River, BC. Credit: I. Smith.

Table 5.1. Key information regarding emergency declarations.

Declaration	Description	What You Need to Know
State of Local Emergency	This gives the local government emergency powers when there is imminent threat to people or property. The declaration facilitates the mandatory evacuation of people and livestock, and enables access to private property (if deemed necessary).	You may soon be receiving an Evacuation Alert or Order. Make sure your Farm Flood Readiness Plan is on hand. If available, sign up for emergency notifications from your local government. Otherwise, check your local government website and/or social media accounts to stay up to date. You may need to relocate your livestock before or after an alert stage. Consider the imminent risks and implement your relocation plan as necessary.
Flood Advisory	There is no flooding occurring, but flood risk is high, and the local government is monitoring the situation.	
Evacuation Alert	There is an imminent threat to life and property, and people are asked to be ready to leave on short notice. The impacted area (emergency zone) will be notified of the Evacuation Alert through social and traditional media, and/or public notification systems, and evacuation routes will be identified.	Put in place all the temporary floodproofing measures you have outlined in your plan. Relocate livestock and other animals before roads are needed for human evacuation. Check your local government website and/or social media accounts to stay up to date if you are seeking additional information or advice, contact your Regional Agrologist with the Ministry of Agriculture, or your producer association.
Evacuation Order	The population is determined to be at imminent risk and people must leave the area immediately. First responders will communicate Evacuation Orders by going door-to-door to the properties affected. The Evacuation Order will provide designated evacuation routes, identification of closed routes, and the location of Reception Centres. The area in question will have controlled access. People who remain in an area during an Evacuation Order cannot expect any assistance.	All people must leave the evacuation area. Transportation routes may be restricted for the use of human evacuation and may not be available for livestock transport. Contact your local government EOC to determine if transportation routes can still be used for livestock relocation. In some cases, producers may be allowed to return to their property for short periods for essential livestock and crop management activities, although this is not guaranteed. A "Temporary Access Permit" may be required to re-enter your property during an ongoing Evacuation Order. For livestock operations, a Premises ID may be needed to validate access location. **Note:** Registering with the BC Premises ID program must occur before a flood or other emergency.

Remember that some flood events may progress rapidly and may not allow time for an Evacuation Alert or Flood Advisory. In these cases, the declaration may proceed directly to an Evacuation Order.

When Risk of Flooding has Subsided

The local government will issue an Evacuation Rescind statement when it is safe for residents to return home. Livestock should be returned as soon as it is safe to do so. It is important to be aware that in some situations, the flood risk may reoccur and the potential for the reinstatement of the Evacuation Order remains.

Protecting Livestock During a Flood

Fact Sheet 6

This fact sheet will help you to review and consider the options for protecting livestock during a flood, including sheltering in place and relocation. You may wish to have contingency plans in place for various circumstances, or have different plans for different types of animals.

Figure 6.1. Chickens in Langley, BC. Credit: I. Smith.

In all cases, the decisions and actions for livestock protection will be more efficient to implement if you have prepared a plan in advance. Use this fact sheet along with **Worksheet F: Livestock Protection Plan**.

As a basic first step, register through the BC Premises ID program, as this allows for rapid identification and notification of livestock and poultry producers during emergencies. For example, Premises ID has been an important element of temporary access permitting during recent wildfires.

Option 1: Shelter Livestock in Place (On-Farm)

In some cases, sheltering in place may be the best strategy for your livestock, particularly for animals that are difficult to relocate (e.g., dairy animals in the milking line). This option involves keeping the animals in a structure—or at an outdoor location—on the farm where they can be protected during the flood. Ideally, the selected site would be above expected floodwater levels.

Temporary Access Permits

If an Evacuation Order is issued, it may be in place for many days, making it difficult to return, even temporarily, to care for livestock. Some local governments offer temporary access permits during flood Evacuation Orders. Check with your local government to explore this possibility.

Key considerations in determining if you have a suitable protected structure or outside location include:

- Multiple access points, so that you can still access the farm if one point is no longer available.
- Ability to use temporary flood protection measures (e.g., installation of flood shields), if needed.
- Availability of ample food and water.
- A back-up power source that is protected from flooding, if power is required for ventilation, feed/watering, or milking systems.
- Access to a temporary structure to protect animals from wind, rain, and sun.

If you are going to be sheltering animals in place, it is important to inform your local Emergency Operations Centre (EOC). EOC contact details will be made available through your local government at the time of an emergency.

Option 2: Relocate Livestock (Off-Farm)

If you are able to identify and prearrange off-farm sites for your livestock, relocation may be the most appropriate action. This may include moving livestock to rangeland or to another farm (i.e., a host farm). It is important to ensure you select off-farm locations that do not share the same flood risk and to have a contingency plan in place.

Relocations During Evacuation

Relocation of livestock should occur prior to an Evacuation Alert. Once an Evacuation Order is issued, the relocation of people will take precedence on evacuation routes.

Key considerations for advance planning for relocation include:

- Determine if animals can be sent to market early as an alternative to relocation. This option may be particularly relevant for poultry producers.
- Arrangements have been made between yourself and the host farm operator and/or landowner.
- Plans exist for transport of animals (e.g., routes, trucks, trailers, drivers, handlers).
- Animal care exists at the relocation site (e.g., feed, water, veterinary care, biosecurity protocols).
- Be prepared to mark livestock (e.g., ear tags, spray paint) to ensure ease of identification during relocation.

Written Agreements for Relocation

If you intend to move livestock to another farm, having a written agreement in place will help to clarify plans and avoid confusion or misunderstandings. Use **Worksheet H: Sample Host Farm Agreement** as a guide. Keep records and receipts of all costs associated with relocating livestock.

Assistance and Compensation

Emergency Management BC (EMBC) and the Ministry of Agriculture (AGRI) have developed a policy to support local governments with livestock relocations under specific conditions. Under the policy, a producer may request livestock relocation support for transportation, feed, or housing from their local government. AGRI provides information related to Provincial Support for Livestock Relocation on its website (including rate cards for relocation). The local government will only assist producers with livestock relocation during an emergency if:

- An EMBC task number has been issued for the emergency.
- An Evacuation Alert or Order has been issued.
- The farmer has requested assistance through the local government Emergency Operations Centre.
- The property is classified as a "farm" by BC Assessment.

EMBC will reimburse local governments for eligible response costs for activities related to emergency livestock relocation. The local governments will then reimburse the farm operators.

Option 3: Last Resort—Release Livestock

In very extreme situations, releasing livestock from buildings and fenced areas may be an option for animal protection. However, there may be legal implications associated with livestock release, and operators are responsible for any damages caused by their animals. Therefore, operators should be aware of regulations and species-specific restrictions (e.g., cervids, wildfowl) prior to release. Freed livestock can pose additional risks, such as impeding access for emergency responders and hindering public use of roads. These risks must be carefully evaluated, and livestock release should be considered only as a last resort. Note that the Emergency Operations Centre and/or emergency response crews should be informed before any animals are freed.

Dairy Operations: Relocation Considerations

Fact Sheet 7

Dairy operations face specific challenges with relocating their herds during flood events. While most dairy operators might prefer to shelter animals in place, it is not always feasible to provide a safe environment on the farm. This fact sheet, along with **Worksheet F: Livestock Protection Plan**, **Worksheet G: Milk Share Agreement**, and **Worksheet H: Sample Host Farm Agreement**, can help you to develop a relocation plan in advance of a flood emergency.

Figure 7.1. Dairy cows in Abbotsford, BC. Credit: I. Smith.

Relocation of dairy animals typically requires transporting the dairy herd to another dairy operation—often referred to as a host farm. A host farm must have the capacity to temporarily care for your herd in the event of a flood and should also be located in an area that does not have the same flood hazard as your operation. You may need to identify more than one host farm to accommodate your entire herd, or for contingency purposes.

Having a plan in place will assist you with safely transporting animals to the host farm, and should include details about how livestock will be transported. (See the **Worksheet F: Livestock Protection Plan** to complete these details.)

Host Farm Agreement and Milk Sharing Agreement

It is recommended that you develop and sign an agreement with your host farm well in advance of an emergency situation. The agreement should include details about maintaining the health and safety of both herds, as well as how feeding, watering, and labour needs will be met. See **Worksheet H: Sample Host Farm Agreement** for guidance. **However, both parties should seek legal expertise when crafting and signing a Host Farm Agreement.**

If you are relocating milking cows, you are also encouraged to complete a Milk Share Agreement with the host farm. This agreement should include items such as: whether milk tanks will be separated or shared, how milk payments will be delivered, milk quality measurements, and milk delivery logistics. **The Milk Share Agreement should be reviewed by a lawyer and a copy should be filed with the BC Milk Marketing Board. Worksheet G: Milk Share Agreement** is included in this toolkit.

Herd Health Considerations

There are various health conditions that commonly arise when two dairy herds are mixed (e.g., mastitis, diarrhea, pneumonia), and protocols regarding vaccinations and special handling of dry cows, calving, and euthanasia, should all be discussed ahead of time. Moving and mixing cattle may also result in injuries as members of the herd establish a social hierarchy. Adapting to a new environment (e.g., different stalls, bedding, milking parlour) may temporarily cause stress in the herd and affect milk production.

Insurance, Risk Management, and Disaster Recovery

Fact Sheet 8

Note: The information presented here was gathered in 2019 and is subject to change. Regardless of how well prepared you are, not all of the costs and damages associated with flooding are preventable.

Financial Protection Measures

Financial protection measures can play an important role in protecting you from high-consequence disasters such as floods. Although emergency government programs may be available to farm operators after a flood event, they are likely to be limited and should not be relied upon. There are three forms of financial protection summarized below:

1. Private Insurance
2. Government Financial Risk Management Programs
3. Government Disaster Recovery Programs

Figure 8.1. Rock Creek, BC. Credit: I. Smith.

1. Private Insurance

There are several insurance companies in BC that offer insurance for farm homes and businesses. However, prior to obtaining insurance, it is important to discuss in detail with a potential insurance provider exactly what is covered and excluded under their insurance policies.

Insurance for overland flooding is a relatively new product and is not yet universally available. Further, deductibles and/or premiums for farms in known high flood hazard areas may be prohibitive. This highlights the importance of taking measures to protect your farm assets from flooding. If private flood insurance is available (even if it has not been purchased) then government assistance will be limited. Therefore, if a farm chooses not to buy insurance when offered, they will not receive any financial compensation. Farms should carefully weigh this risk against the cost of insurance, however prohibitive it may seem.

A good resource for insurance information is the Insurance Bureau of Canada (IBC). The IBC is the national industry association representing Canada's private home, auto, and business insurers. The IBC can help farmers find available coverage for business losses through private insurance companies. For more information, call 1-844-2ask-IBC (1-844-227-5422) or check the IBC website.

2. Government Financial Risk Management Programs

Provincial Production Insurance is available for losses of some perennial crops and annual vegetables caused by specified natural disasters, including excessive rains, floods, and droughts. Production Insurance coverage varies depending on the crop or plant and the level of coverage that you opt to purchase. Production Insurance is not available for stored crops or livestock mortalities. The insurance can be tailored to meet the different operational needs of the farm. A full list of insurable crops can be found on the BC Ministry of Agriculture's Production Insurance website.

AgriStability and AgriInvest are joint programs of the provincial and federal governments.

AgriStability is a voluntary program that provides support when large income losses are experienced. Benefit calculations are based on program margins (income minus expenses adjusted for changes in purchased inputs, receivables, payables, and inventory) and reference margins (average allowable expenses over three years). Some producers have noted that low reference margins due to longer-term crop impacts (e.g., floods) can affect the ability to qualify. Recent (2019–2020) adjustments have been made to this program in an attempt to address some of these concerns, however it is unclear if these program changes will be temporary or permanent.

AgriInvest is a voluntary program designed to help producers manage small income declines and make investments to manage risk. Money deposited into an AgriInvest account will be matched by government contributions. The funds can be withdrawn as needed. AgriInvest deposits are based on a percentage of Allowable Net Sales, which are total allowable commodity sales and program payments minus total allowable commodity purchases and repayment of program benefits.

In order to benefit from these programs, producers must be enrolled prior to crop loss, unless emergency provisions are made by government. However, enrolment does not guarantee financial support. Program eligibility requirements for AgriStability and AgriInvest are available through an Agriculture and Agri-Food Canada online guide. Application forms are available through the BC Ministry of Agriculture.

3. Government Disaster Recovery Programs

Disaster Financial Assistance (DFA) is a provincial program that provides financial assistance to help individuals and communities recover from catastrophic events that are the result of uninsurable property and infrastructure damage. Assistance is provided only if the provincial government declares an event eligible, and may include overland flooding and groundwater seepage, depending on the severity of the event and the crop type. However, producers indicate that this is often unreliable. Futhermore, if losses could have been covered through Production Insurance, then crop damage is not be covered by DFA.

Insurable damages, such as sewer or sump pit backup, water entry from above ground including roofs, windows, or other areas of the building that are not at ground level are not eligible for DFA. For more information call 1-888-257-4777 or check the BC DFA website.

Agriculture Recovery (AR) is a disaster relief framework that allows federal, provincial, and territorial governments to work together on a case-by-case basis to assess disasters affecting Canadian farmers and to respond with specific programming when assistance beyond existing programs (AgriStability, AgriInvest, Agriculture Insurance, etc.) is required. After a severe flood, funding may become available through this program. For more information, call 1-888-332-3352 or check the Agriculture and Agri-Food Canada online guide.

BC Agri-Business Planning Program is a provincial government program offering support for disaster recovery planning to help producers implement an immediate and long-term disaster recovery plan. Eligible applicants can access up to $5,000 for individuals and up to $30,000 for groups for business planning services from a Qualified Business Consultant. A Disaster Recovery Planning project proposal may include a range of eligible activities from developing a business strategic plan to undertaking financial analyses. For more information call 1-888-221-7141 or check the BC Ministry of Agriculture website.

Worksheet A: Farm Information

This worksheet is a component of your Farm Flood Readiness Plan. Complete the following tables to provide documentation of essential farm operation information and key contacts. Locate printed copies in your farm emergency tube, office, with neighbours, and other relevant locations. Be sure to update this information annually, or more frequently if required.

Agriculture Operation Information

Complete this table to provide the essential information about your agriculture operation. For multiple parcels, additional copies may be required. This table should be printed and paired with ***Worksheet C: Preparing Your Agriculture Operation Map*** and located strategically on your operation.

Agricultural Operation name:			
Land classification on Property Assessment Notice:		*Farmer ID card number:*	
Parcel Identifier Number (PID):	*Folio Number:*	*Premises ID number:*	
Physical address:			
Directions (nearest crossroad):			
Owner name(s):			
Owner landline phone no.:	*Owner mobile phone no.:*	*Owner email address:*	
Lessee name(s) (if applicable):			
Lessee landline phone no.:	*Lessee mobile phone no:*	*Lessee email address:*	
Manager/operator(s) other than the owner, identify contact available to attend:			
Total number of individuals normally on the farm:	*# Family:*	*# Staff/Labour:*	*# Tenants:*
Additional operation information:			

Livestock Inventory

This information should also be completed, and may be duplicated, as a component of ***Worksheet F: Livestock Protection Plan***.

Livestock Type *E.g. dairy (lactating, non-lactating, young stock), bulls, poultry, swine, sheep, etc.*	**Number of Animals** *Provide possible range if applicable*	**Location of livestock** *e.g. main site, other parcels, specific location on property*

Additional livestock information:

Worksheet B: Emergency Contacts

This worksheet is a component of your Farm Flood Readiness Plan. Complete the following tables to provide documentation of your operation's key emergency contacts. Locate printed copies in your farm emergency tube, office, with neighbours, and other relevant locations. Be sure to update this information annually, or more frequently if required.

Emergency Contacts		
Name/Organization	**Telephone**	**Email**
Friends, Family, and Neighbours		
Off-Farm Contact #1:		
Off-Farm Contact #2:		
Technician and Professional Resources		
Water Purveyor (if not well-based):		
Electrician:		
Plumber:		
Fuel Dealer:		
Fencing Contractor:		
Feed Supplier (if applicable):		
Milk Truck Operator (if applicable):		
Veterinarian (if applicable):		
Livestock Hauler (if applicable):		
Other:		

Government Support Contacts	Telephone or Email	Website, Twitter, Facebook
Regional District or Municipal Government Emergency Management Information		
Ministry of Agriculture[1] Regional Agrologist Name:	*AgriService BC:* *1-888-221-7141*	*www.gov.bc.ca/agriservicebc*
Farmers' Institute or Industry Org.		
Canadian Food Inspection Agency (CFIA):		
Other:		
Risk Management		
Insurance Agent:		
Other:		

Emergency Kit and Farm Flood Readiness Plan	
Emergency Kit Location(s) Date Emergency Kit Last Updated:	Farm Flood Readiness Plan location(s): Date Farm Flood Readiness Plan last updated:

An **Emergency Flood Kit** should include: your updated *Farm Flood Readiness Plan*; First Aid kit and medications; battery-powered or hand crank radio; whistle; cell phone with chargers; supply of non-perishable foods; garbage bags and personal sanitation supplies; water; clothes and an emergency blanket.

[1] Note that provincial government contacts can be verified and updated as necessary by consulting the BC Government Directory at: http://dir.gov.bc.ca/

Worksheet C: Preparing Your Agriculture Operation Map

This worksheet is a component of your Farm Flood Readiness Plan. Follow the guidance below to produce your agriculture operation map(s). Locate copies of your map in your farm emergency tube, office, and other relevant locations. Be sure to update this information annually, or more frequently if required.

Creating your Agriculture Operation Map(s)

Maps are essential for preparing for, responding to, and recovering from emergencies. Maps are also very useful for engaging emergency services, utility response, and emergency response centres. An agriculture operation map can be a simple sketch on graph paper or can be overlain on printed aerial digital map imagery. To obtain this imagery you can:

- Contact or visit your local government for available mapping services (e.g. paper, digital, etc.)
- Visit the BC Assessment authority website and for your property by address, Roll Number, Plan Number or PID at: https://www.bcassessment.ca
- Use Google Earth (a free, downloadable program) to locate tag, label, and/or draw a boundary around a satellite image of your property. Download at https://www.google.com/earth/

Depending on your operation, maps at different scales might be required (e.g. a large-scale map for the full property/evacuation routes, and a scaled down map of the main infrastructure areas)

Key Elements to include on your agriculture operation map:

1. **Legend**
   - Define all map symbols
   - Describe any ranking systems
   - Map scale and compass

2. **Farm Access and Evacuation Points**
   - Road access and points of entry to the property
   - Evacuation routes
   - Livestock entry/exit points
   - Muster point
   - Parking areas

3. **Structures -** Identify buildings for protection using a numbering or colour coding system.
   - Houses
   - Barns
   - Greenhouses
   - Storage/Equipment Sheds
   - Other Outbuildings

4. **Safety Materials**
   - First aid supplies
   - Fire extinguishers
   - Flooding defense supplies/materials

5. **Water**
   - Waterways (creeks, rivers, streams)
   - Ponds, lakes
   - Water supply lines and wells

6. **Utilities**
   - Power lines and other electrical infrastructure (fuse boxes/breakers/main shutoffs)
   - Gas lines (main shutoffs)
   - Generator or other power sources

7. **Potential Hazards**
   - Compressed gases
   - Flammable liquids/materials
   - Poisonous/corrosive substances
   - Fertilizers and pesticides
   - Manure storage

8. **Livestock Infrastructure**
   - Fencing, gates and corrals/paddocks
   - Sheltering locations
   - Feed and water sources
   - Livestock loading areas
   - Veterinarian supplies

Sample Agriculture Operation Map
Source : OshMap, UK : https://www.oshmap.net

Worksheet D: Farm Asset Risk Assessment

This worksheet is a component of your Farm Flood Readiness Plan. Complete to following table to assist with assessing the risk of your farm assets and identifying actions to be taken to mitigate this risk. This worksheet should be revisited and updated as assets change, and actions are completed. Remember to note the location of your assets on the map you create through ***Worksheet C: Preparing Your Agriculture Operation Map.***

How to Use the Risk Assessment Table

Listing your farm assets and evaluating their vulnerability to flooding will help you to think through potential impacts of flooding, and to link this to any actions you can take to reduce damages. **Fact Sheet 2: Determining Your Farm's Flood Risk Level** will assist you in evaluating asset vulnerability.

The table on the following page will require you to assess the following characteristics:

Assets

List any asset of significance to your farm operation. This should include:

- All structures (houses, barns, greenhouses, etc.)
- Key infrastructure (water supply, irrigation systems, wells, power supply, generators, etc.)
- Equipment (tractors, vehicles, etc.)
- Crops and livestock

Priority

Determine the level of importance (High, Medium, Low) of each farm asset to your operation.

Vulnerability

Identify any characteristics of the asset that may make it more susceptible to flood impacts.

- **High**: if the asset is in an area below flood construction levels; cannot be moved; is in an area prone to flooding in the past; in front of a dike; close to a waterbody; cannot be moved; and/or is not amenable to floodproofing. Also consider whether the timing (season) of the flood will impact the farm.
- **Moderate**: if the asset is challenging to move; close to a dike; within a flood hazard area but far from a waterbody; difficult to relocate; and/or only some floodproofing is possible.
- **Low**: if the asset is easy to move; is in an elevated area; outside of a flood hazard area; can be relocated; and/or is already floodproofed.

Action(s) Required

For assets of high priority and/or vulnerability consider what actions could be taken to mitigate flooding impacts. Refer to other components of this toolkit – specifically **Fact Sheet 3: Permanent Floodproofing Measures** and **Fact Sheet 4: Temporary Floodproofing Measures** – to assist with identifying feasible actions.

Assets	Priority	Vulnerability	Action(s) Required

Worksheet E: Farm Evacuation

This form is a component of your Farm Flood Readiness Plan. Complete the following steps to enable safe and efficient evacuation of family, employees, and visitors. Keep an employee list and identification records centralized and ready in your emergency kit.

Key Actions/Responsibilities and Roles

Determine key actions needed for safe and orderly evacuation. Outline these actions in the table below, along with roles and responsibilities for implementation. This includes the primary and back-up decision makers/coordinators and roles for other participants appropriate to your operations. Consider steps such as securing vehicles for safely transporting farm workers.

Key Evacuation Action	**Personnel Responsible & Contact Information**

Emergency Routes, Exits, and Assembly Areas

Describe your evacuation routes, as well as muster and rendezvous locations below and/or clearly mark them on your farm map.

On-farm muster point:

Primary evacuation route:

Alternate evacuation route:

Off-farm muster point:

Emergency Shut-Off Procedures

Describe the shut-off locations and procedures for utilities and any other equipment or infrastructure:

Communication of Emergency Procedures

Describe how you will communicate evacuation procedures with (any relevant) groups. Be sure to include the method(s) of communication to be used (i.e. handouts, seasonal training) and any other specific details or considerations (e.g. language barriers).

Employees:

Visitors:

Local government/emergency operations:

Worksheet F: Livestock Protection Plan

*Use **Fact Sheet 6: Protecting Livestock During a Flood** to complete this worksheet. Different animals may require different response actions, depending on the situation, to achieve the lowest overall risk. Dairy producers should also consult **Fact Sheet 7: Dairy Operations: Relocation Considerations**.*

Livestock Inventory

An up-to-date livestock inventory will assist with advance planning, as well as sharing information during an emergency (see **Worksheet A: Farm Information**). Documentation will also be helpful if compensation claims are required.

Livestock Type *E.g. dairy (lactating, non-lactating, young stock), bulls, poultry, swine, sheep, etc.*	**Number of Animal** *Provide possible range if applicable*	**Location of livestock** *E.g., main site, other parcels, specific location on property*

If livestock numbers vary widely during the year, describe variation (e.g., poultry flock cycles, lambing season, etc.):

When to Take Action

Your decision to shelter your livestock in place or evacuate your livestock will depend on many factors. There are various resources you can turn to during a flood event that can trigger you to make your decision.
See **Fact Sheet 5: Flood Evacuation Alerts and Evacuation Orders**, **Fact Sheet 6: Protecting Livestock During a Flood,** and **Fact Sheet 7: Dairy Operations: Relocation Considerations** for more information on when to take action.

Assistance During Livestock Protection

List personnel involved in livestock protection, including their role and contact information:

Name of alternate person in charge if you are not present at the farm:_____

Phone number:_____ Email:_____

Livestock Protection Options

You may need to complete several of these worksheets for different types of livestock. You may also wish to fill out information for all 3 options and then choose which option to enact at the time of the flood.

Option 1: Shelter Livestock in Place (On-Farm)

Animals will remain in a protected barn, moved to a protected structure, or moved to a safe outdoor area.

The type of animals that will shelter in place are: _____

Location Selection

Location selected for protecting livestock:_____

Do any animals need to be moved on-farm? If so, how long will moving them take? _____

Barn/Structures or Outdoor Location Protection

What structures or locations will be used for animal protection, and what additional protection measures are required? Identify any specific actions needed to protect structures.

Feed, Water, and Power
Outline measures to ensure that animals sheltered on-farm have sufficient feed and water for at least 72 hours. Be sure to consider measures required if power or other infrastructure (equipment, etc.) is unavailable to cover emergency feeding and alternative sources of drinking water.

Option 2: Relocate Livestock (Off-Farm)

Animals are relocated away from the operation. A suitable off-site location has been pre-identified and prearranged. You will want to ensure that your transport plans comply with CFIA regulations.

The type of animals that will be relocated are: _____

Relocation Site Contacts

Primary site contact for receiving livestock

Name:_____

Physical address:_____

Phone number:_____

Email address:_____

Secondary site contact for receiving livestock

Name:_____

Physical address:_____

Phone number:_____

Email address:_____

Prioritization of Livestock Relocation
If time is short, the priority animals for relocation off site are:

Priority Level	Type of Livestock	Number of Animals
High		
Medium		
Low		

Hauling Logistics
Consult with your local government (municipality or regional district) ahead of time (or with the Emergency Operations Centre during an emergency) to determine routes that are safe to use for animal hauling:

Location on your farm for loading livestock loading:_____

Estimated time required to load livestock:_____

Livestock Care

How will animals being relocated be identified (e.g., ear tags, collars, etc.)? List all:

How will animals be protected from harm and potential exposure to diseases? (e.g., separation of animal types, vaccinated vs. unvaccinated animals, etc.)?

How will you ensure there is sufficient food and water at the off-site location?

Have you checked with your farm vet or the CFIA to discuss your relocation plan to ensure that it would be in compliance with livestock movement rules? Note the name of the person and the date you spoke to them.

CFIA/vet contact name:_____ Date:_____

Option 3: Last Resort—Release Livestock

Release livestock IF SAFE TO DO SO. In selecting this option, you have determined that you have no options available to shelter animals safely on site or to safely relocate them. This is the least desired option, but you should be prepared to execute this option if necessary.

The type of animals to be freed are:_____

Identification of Released Livestock

What identification methods will be used for any animals that will be released? List all:

Location of Gates, Fences, Locks and Keys

Identify any gates that should be opened or fences that should be cut to allow animals to be released. These should also be clearly identified on the farm map, noting any specific considerations (e.g., information regarding lock and key locations, gate closure instructions, tools needed, etc.):

Do you have a Poultry and/or Livestock Carcass Disposal Plan?

Ensure that you have a plan to dispose of mortalities. Producers must ensure that compliance requirements are met and authorizations are obtained. See the BC Ministry of Agriculture carcass disposal website for more information.

Worksheet G: Milk Share Agreement

This is a **SAMPLE** Milk Share agreement between a host and guest farm. It can be filled out digitally or printed and filled out manually.
The signees **MUST** provide a copy to the BC Milk Marketing Board (BCMMB) Quota Officer. A digital copy can be emailed or a hard copy can be mailed. Up-to-date email contact is available at: https://bcmilk.com/producers/quota/
Mailing address: BC Milk Marketing Board (BCMMB)
200 - 32160 South Fraser Way, Abbotsford, BC V2T 1W5
Phone: 604-854-4481 - Fax: 604-556-7717

Effective Date of Milk Share Agreement *(if known)*: _____

MILK QUALITY

1. It is agreed that a single milk component sample will be used for butterfat, protein and other milk solids.

AND

2. It is agreed that a single milk quality test for plate loop count and somatic cell count will be used.

AND

3. It is agreed that a positive inhibitor test result for shared milk will be *(circle one that applies)*:

◯ a. Applied to both producers in the event that neither producer claims the infraction.

Initials: _____ _____

OR

◯ b. Applied only to the producer that claims the infraction and advises the board of this.

Initials: _____ _____

AND

4. It is agreed that the quality bonus will be paid according to the agreed volume split, as per below.

MILK MEASUREMENT

5. It is agreed that shared milk will be split in the following manner *(circle and initial one of the following):*

◯ a. Milk volume measurements must be recorded at each milking and reported by IRMA number to the BCMMB Milk Pay Officer on the 1st and 16th of each month.

Initials: _____ _____

OR

◯ b. Agreed fixed volume will be paid to host farm and balance will be paid to guest farm:

Fixed volume for host farm: _____ *Initials:* _____ _____

OR

◯ c. Agreed percentage split between host and guest:

Host: _____ % Guest: _____ % *Initials:* _____ _____

OR

◯ d. Other (please specify:

Initials: _____ _____

OTHER CHARGES AND CREDITS

6. If the host farm is train-accessible, the discount will apply to both producers.

AND

7. The volume discount is not calculated on the total shared milk volume.

AND

8. If every day pick-up is required, the additional charges will be applied to (please choose one):

◯ a. The Guest and Host Farm will share the additional charges equally.

Initials: _____ _____

OR

◯ b. The additional charges will be applied to the Guest Farm.

Initials: _____ _____

OR

◯ c. The additional charges will be applied to the Host Farm.

Initials: _____ _____

<u>The signatures below authorize the BCMMB to determine milk payments, charges and discounts.</u>

HOST FARM:

Farm Name: _____

IRMA #: _____

Producer Name: _____ Witness Name: _____

Producer Signature: _____ Witness Signature: _____

Date: _____ Date: _____

GUEST FARM:

Farm Name: _____

IRMA #: _____

Producer Name: _____ Witness Name: _____

Producer Signature: _____ Witness Signature: _____

Date: _____ Date: _____

Worksheet H: Sample Host Farm Agreement

*This worksheet may be a component of your Farm Flood Readiness Plan and pre-arranging a host farm for your livestock can be an important element of your livestock protection plan (**Fact Sheet 6: Protecting Livestock During a Flood** and **Worksheet F: Livestock Protection Plan**). Preparing an agreement in advance can help streamline livestock relocation and avoid confusion. Use – and modify as needed – the following sample agreement to develop a host farm agreement. Dairy farms should also prepare a Milk Share Agreement (**Worksheet G**).*

This document is a sample and is not a legally-verified document.

Agreement

This agreement between:

Host Farm	Guest Livestock Owner
*Farm Owner/Manager:*_____	*Farm Owner/Manager*_____
*Business Name:*_____	*Business Name:*_____
*Address:*_____	*Address:*_____

Serves to acknowledge/outline the expectations and conditions for the hosting of livestock by the host farm during an emergency event.

Declarations

Number and type of livestock that the host farm agrees to host:

Method/s for identifying guest livestock:

Plan for provision of guest livestock to be fed and watered- including feed source (host farm or imported), type, quantities and feeding method:

Agreed upon location for livestock (at the host farm) including the physical location and whether any additional infrastructure or materials will be required (e.g. temporary fencing, bedding, etc.):

Any specific health considerations or concerns for either the host farm or guest farm livestock, especially if mixing of livestock will occur (e.g. transmittable disease, vaccination status, medication needs):

Plan for execution of animal care, labour and management – specifically who will be responsible (host farm, guest farm or other) and who will make key decisions (health, records, etc.):

Compensation

If compensation will be paid by the guest farm to the host farm, the compensation plan will be as follows (this could be in cost/day/animal, or by hours of labour or feed):

Any costs resultant from damage, clean-up or other unforeseen impacts to the host farm will be determined and compensated as follows:

Host Farm Waiver

The guest livestock owner acknowledges that _____ *(host farm)* is not liable for any loss, injury, sickness, death or loss of production of any livestock received.

Guest Livestock owner: *Signature* _____

Date _____

Host farmer: *Signature* _____

Date _____