



Commercial Series

WHERE IT RAINS, IT CAN FLOOD: PREPARE YOUR BUSINESS TO MINIMIZE DAMAGE

Recent, devastating floods underscore the power of water in both coastal and inland areas. In August 2017, Hurricane Harvey dropped more than 50 inches of rain and flooded approximately one-third of Houston, Texas. Less than a month later, Hurricane Irma hit Florida, Georgia, and the Carolinas, bringing heavy rains and flooding to areas hundreds of miles from where the storm made landfall. In May 2018, for the second time in two years, severe flash floods destroyed the historic downtown of Ellicott City, Maryland. And in July 2018, torrential rains put most of the state of Pennsylvania under a flash flood watch, and forced the state's most popular amusement parks, Knoebels and Hershey Park, to close.

Recognizing that floods can happen almost anywhere, businesses should prepare now to reduce damage and downtime. This should include consideration of backup power, flood protection for your building, a flood emergency plan, a business continuity plan, and the purchase of appropriate flood insurance. To get started, consider the flood principles listed below to determine your facility's exposure to flood waters and the type of protection needed.

Note: Many variables affect flooding and floods frequently happen outside of areas defined as "flood-prone." When evaluating flood exposure, guidance, concepts, and mitigation efforts should not focus on a defined hazard line or a single depth of water—instead, think more in terms of ranges. Flood waters do not always stop at a line on a map and it's important to include safety factors for depth such as protecting 3 feet above the estimated flood level.

KNOW YOUR FLOOD PRINCIPLES

DEPTH OF THE WATER

Knowing the flood depths provides the potential water entry points and the height and type of protection needed. Depending on the hazard exposing your business and the weather event, conditions can create flood waters that can range from several inches to several feet. Flood waters greater than 3 feet create hydrostatic pressure on walls that can cause cracks in masonry and greatly increase the potential of collapse to unreinforced masonry.



DURATION OF THE FLOOD

It is important to know if flood waters are expected to recede quickly or may be trapped, like in a soup bowl, due to the slope of the land. The longer a facility is exposed to flood waters, the greater potential for a breach in the floodproofing that is intended to protect your building.



Flash floods destroyed this business in downtown Ellicott City, Maryland, in May 2018.

"Governor Hogan Tours Old Ellicott City" by Maryland GovPics is licensed under [CC BY 2.0](https://creativecommons.org/licenses/by/2.0/)

FLOOD FLOW VELOCITY

As flood water velocity increases, so does the hydrodynamic pressure exerted on the building and any flood protection. Riverine flooding can be very fast-moving water at first and then may settle down. Coastal locations may be exposed to storm surge, which can cause extreme forces on a building and can be a silent killer. Storm surge also includes wave action, which further increases potential damage. Note: Storm surge associated with hurricanes depends on many variables, not just wind speeds, so businesses should be vigilant against even low-intensity storms.



WATER CONDITION AND ITS CONTENTS

Flood waters will be dirty, brackish or contaminated with biological and chemical materials including waste water, sewage, pesticides, industrial waste, toxic and nontoxic chemicals, or oils. Debris, including various types of underground and above-ground tanks—such as septic, waste disposal, chemical, and fuel storage tanks, such as diesel fuel and liquid propane gas (LPG) tanks—churning in the water can impact buildings and flood protection systems, create breaches in the protection and cause extensive damage. While all flood waters should be considered unsafe, it is important to know of any particular dangers in your area.



The checklists below, in combination with [EZ-PREP™](#), the IBHS severe weather emergency preparedness and response planning guide, will help business owners prepare for and respond after a flood event. Creating and implementing these measures can mean the difference between quickly resuming operations and remaining closed indefinitely or even permanently if a flood damages or destroys your property.

GENERAL FLOOD GUIDANCE CHECKLIST

- As with any severe weather event, backup electrical power can be critical for reducing recovery time. Plan in advance for backup power needs for vital equipment needed to resume operations. Consider power for mechanical equipment such as your air conditioning systems too, since this can reduce humidity and moisture levels, which will help dry materials and inhibit mold growth. As with all electrical equipment, ensure backup power and related equipment is elevated and/or protected from flood waters.
- Determine if your building is located in a flood-prone area and how close you are to various bodies of water so you can better understand your flood risk and prepare properly. See local flood maps by visiting [FEMA's Flood Map Service Center](#), by contacting your local building department, or hiring a licensed surveyor. FEMA maps show high-hazard zones for flooding, yet there are medium-to-low hazard areas as well that are not depicted. For coastal locations, you can also refer to storm surge maps available at [NOAA's National Storm Surge Hazard Maps](#). Note: These maps should serve as guidance only; if a business is located just beyond the limit of a particular hazard line, they should not conclude they are not at risk. As noted in the title of this document, under the right conditions, flooding can happen just about anywhere, so err on the side of caution when it comes to obtaining flood insurance and protecting your business from flood.
- If the maps show your building is located in a flood zone, determine if the elevation of your building's lowest finished floor is above or below the published base flood elevation (BFE) and 500-year flood level if available. Structures built 1 to 3 feet above BFE will fare better during flood events. If your building is exposed to or near a flood-prone area, consider utilizing "dry floodproofing" techniques based on your building's exposure. Dry floodproofing entails making a structure watertight to prevent floodwaters from entering. This content focuses on dry floodproofing techniques; see sidebar for an overview of "wet floodproofing."
- Know the location of disconnect valves and cut-off points (gas, water, electricity).
- Create a flood emergency response plan for your business by using IBHS' [EZ-PREP guide](#). EZ-PREP can be customized to include specific action items that can be taken when floods threaten, during a flood emergency, and immediately afterwards.

WET FLOODPROOFING

According to FEMA, wet floodproofing allows floodwaters to enter and exit openings in a structure's lower area, such as parking garages, crawlspaces, and unfurnished or unoccupied areas. Generally, this includes properly anchoring the structure, using flood-resistant materials below the Base Flood Elevation (BFE), protecting mechanical and utility equipment, and using openings or breakaway walls.



FINANCIAL PROTECTION

Commercial flood coverage is offered by The National Flood Insurance Program (NFIP) and private insurance companies. The NFIP makes flood insurance available to commercial owners and renters. As is the case with residential property, costs vary depending on how much insurance is purchased, what it covers, and the property's flood risk. NFIP coverage limits are up to \$500,000 for a commercial building, and up to \$500,000 to protect its contents. Insurance coverage also may be available from private insurance companies, depending on your business's location, building and business characteristics, and property value. The best way to learn more about flood insurance benefits, costs, and options is to contact your insurance agent.



IBHS developed this severe weather emergency preparedness and response planning toolkit to help keep small businesses "open for business."

[DISASTERSAFETY.ORG/EZ-PREP](https://disastersafety.org/ez-prep)

ADVANCED MITIGATION PLANNING CHECKLIST

- Discuss flood protection options with qualified flood protection companies to make informed decisions on the best way to protect your property.
- Maintain a list of flood restoration specialists in your area. Consider setting up a service agreement in advance of a flood event.
- Landscape with native plants and vegetation, which can help prevent soil erosion and allow flood waters to drain more efficiently.
- Avoid storing valuable equipment, documents, or inventory in any crawlspace or basement where flooding is possible.
- Properly anchor fuel and storage tanks, to help prevent the tank from breaking free and fuel from contaminating the building. Unanchored fuel tanks outside your building can be swept away by flood waters, damaging your building or other properties downstream. The supply line to an unanchored tank in your basement also can tear free and fuel can contaminate your basement.
- Verify that other types of outside structures (transformers, emergency generators, etc.) are anchored to secure foundations.
- Purchase or arrange to lease a portable sump pump and have it connected to a generator or battery backup. Consider installing a sump pump backup, which automatically begins pumping during power outages, when the main pump fails or when water flow exceeds the capacity of the main pump. Regularly test the backup power system, and make sure batteries are always fresh.
- Install backflow valves (which are designed to prevent return flow into the building) on main sewage drain pipes that are connected to equipment that is below the potential flood level. If this is not practical, individual valves may be needed for interior floor drains, sinks, toilets, and any other sewer/septic connections.
- Use flood-resistant materials where possible, including floor coverings, wall coverings, and wall insulation. Most flood-resistant materials can withstand direct contact with water for at least 72 hours without being significantly damaged.
- Apply a waterproof coating or membrane to exterior and/or basement walls, particularly to where leaks have occurred.
- Seal cracks by using high-quality, urethane-based caulk to seal cracks and utility pipe penetrations.
- Ensure downspouts funnel water away from the building to prevent rainwater from accumulating near the building's perimeter and evaluate the property's drainage to make sure the ground slopes away from the building.

Hire a Professional

- Hire a licensed electrician to raise electric components (switches, sockets, circuit breakers, and wiring) and any backup power devices such as generators or batteries, at least 3 feet above the BFE or the 500-year flood level, if known. This will help prevent damage to the electrical system and avoid the potential for fire from short circuits in flooded systems.
- Protect your well from contamination. The wellhead should be above flood levels (3 feet above the BFE or above the 500-year flood level). A licensed well drilling contractor can inspect your well and suggest improvements.
- Hire a licensed contractor to:
 - ✓ Move heating, ventilation and cooling (HVAC) equipment to an upper floor or build a floodproof wall around the equipment
 - ✓ Raise fire pumps, controllers and related equipment above the estimated flood heights (3 feet above the BFE or the 500-year flood level)
 - ✓ Hardwire active water management system elements, such as sump pumps and waste water lift stations, to a backup generator in the event of a power failure

Dry Flood Protection Options

- Keep a supply of flood-protective materials/products on hand to help divert water away from the building such as water-absorbent barriers or sandbags, or plastic sheeting/tarps for relatively shallow flooding.
- Install watertight shields over all doors and windows at least 3 feet above the BFE or the 500-year flood level, if known. The type of barrier used will depend on the size and type of opening.
- For temporary protection of large sections of a building such as large commercial doors or entranceways that may be exposed to deeper flood waters, water-filled barriers can be interconnected and stacked to divert water away from openings.
- Install moveable flood gates, permanent swing flood doors or submarine doors (the latter two options provide permanent flood protection for deeper water) if feasible.
- For repetitive deep and prolonged flooding, permanent flood walls that surround the property may be considered.

BEFORE FLOOD EVENT CHECKLIST

Take the following actions when there is advance warning of a flood.

Exterior

- Elevate and protect low-level/outdoor equipment and machinery.
- Move outdoor furniture, signs and other objects inside; anchor heavier objects per manufacturer specifications.
- Install dry flood protection materials and products selected from the above list.

Interior

- Shut off electrical service at the main breaker if the electrical system and outlets could possibly be under water.
- Elevate and protect low-placed indoor equipment by placing it on masonry blocks or concrete.
- Roll up area rugs and get them off the floor to reduce the chance they will become wet and grow mold or mildew.
- Elevate all office electronics such as computers and printers.

AFTER FLOOD EVENT CHECKLIST

Acting quickly can increase the chance of salvaging usable materials, reduce the amount of rust and mold that might develop, and limit the likelihood of structural problems.

- Pictures, pictures, pictures! Take many pictures of the damaged areas and contact your insurance agent to report the flood. It is very important to follow the guidance of your claims adjuster.
- Timeliness is key! Quickly remove as much standing water as possible and any water-damaged materials as soon as you can. Wet materials can quickly promote mold growth, which can cause greater, wider-spread damage than the initial water intrusion. It's not just the materials on the floor; for example, water can "wick" (move vertically) up walls. You may need to hire a licensed, qualified professional to remove flood water, particularly if the water is deep, has penetrated walls, or may have been contaminated with chemicals such as pesticides, oil residue, waste water, sewage, industrial waste, or toxic and nontoxic chemicals, or oils.
- When safe to do so, disconnect all affected electronics/ electrical equipment and move it to a dry location. Depending on the situation, this may need to be done by a qualified electrician.
- Ventilate with fans or use dehumidifiers to dry out interior spaces.
- Take reasonable steps to protect your property from further damage. This could mean boarding up windows and salvaging undamaged items.