

RiskTopics

Guide to flood emergency response plans September 2017

While floods are a leading cause of property loss, a business owner can take actions to mitigate and even help prevent damage and costly business interruption. Knowledge of hazards that expose your facility and flood mitigation measures is essential. An effective flood pre-emergency plan can help ensure everything works as intended.

Introduction

Typical flood sources can include heavy rain, melting snow, tropical cyclones (hurricanes or typhoons) and obstructed waterway due to waterborne debris or ice. These sources often lead to flash flooding, surface water overflow, riverine flooding, tidal flooding and coastal storm surge. All of these forms of water flow across the ground are collectively known as “flood.”

While the origin of floods and the meteorological conditions that lead to flooding usually cannot be prevented, the effects of flooding and the extent of damage it can cause may be controlled or reduced. That’s where flood emergency response plans come in.

Flood emergency response plans are developed to help business owners reduce potential property damage as a result of a flood event. A flood emergency response plan not only should demonstrate commitment to understanding the risk of flooding, but can also help reduce property damage and business interruption as a result of flooding.



Building equipment exposed to riverine flood (source: The Zurich Services Corporation)

Discussion

Emergency response plan vs. business continuity plan

An **emergency response plan** is developed for coordinating response to a specific type of incident—in this case, a flood. The plan's actions are tactical in nature, since the majority of floods last a very short period of time and are brought under control rather quickly. Flood emergency response plans address actions to take before and immediately after a flood in order to help preserve property and return critical operations to a minimum level.

Business continuity and **recovery plans**, on the other hand, are strategic in nature. They are concerned with returning operations to normal as soon as possible after an incident. These plans address the aftermath of a critical incident and help to put the business in a position to operate and sustain a long-term recovery.

Business continuity and recovery plans address the loss of productivity and any physical damage resulting from an incident while normal services and operations are being restored.

Flood emergency response plan overview

Developing a flood emergency response plan is an opportunity to gain an understanding of the risk and vulnerabilities associated with flooding at a particular site. The plan should recognize the time, staffing and resources needed to implement an emergency response in advance of the flood event. In addition, it should consider all shifts, staffing limitations, potential mandatory evacuations before the flood, resources and supplies needed, and any potential obstacles to adequate completion of the emergency preparations.

An effective flood emergency response plan should cover flood preparation, mitigation and recovery. Any checklists and action items included in the plan should be printable and detachable from the formal response plan document.

Guidance

Who needs a flood emergency response plan?

Flood exposures can be present almost anywhere. Whether a business is located in a mountain valley, in a basin, along a lake, river, channel, ditch or adjacent to the sea, the potential of flooding needs to be considered.

Every facility or site that is exposed to the 1 percent (100-year) and 0.2 percent (55-year) probability of flooding should have a flood emergency response plan. For business owners located in the United States, a plan is also encouraged for facilities in FEMA's Shaded Zone X, where even low-depth flooding could impact equipment or machinery located near or below grade level.



Exposure to drainage ditch (source: The Zurich Services Corporation)

Key points for a flood emergency response plan

Recognizing the risk of flooding is a key foundation of a flood emergency response plan. It is important that the plan adequately addresses the key points in a manner that is understandable to both management and the facility's employees. Here are some points to consider addressing in the plan:

- Identify and explain the typical weather event(s) that might trigger the flooding, surface water or storm surge.
- Identify and explain where and how flood water may enter the site or facility.
- Include local flood maps showing the site location and the corresponding flood exposure to the site or the buildings.
- Recognize and describe the type of flooding and the behavior of the water as it enters and exits the site. Will the water have a high velocity? Will there be wave action? Will the flooding bring debris and contaminants onto the site?
- Identify the amount of lead time or warning time before the flooding occurs, including best- and worse-case scenarios.
- Recognize and report on the expected depth of water on the site and within buildings for flood levels of various probabilities, including 1 percent (100-year) and 0.2 percent (500-year or storm surge).
- Recognize the probable duration of the flood water levels on the site (flash flooding, storm surge, longer duration riverine flooding, etc.).
- Provide finished floor elevations of key buildings or infrastructure (utilities, sewers, storm drains, fire pumps, generators) and compare them to the expected flood levels.
- Designate the person responsible for the creation, maintenance, supervision and implementation of the plan, along with alternates. Authorize personnel, as appropriate, to help prevent property loss and business interruption associated with flooding.
- Keep the foundation and key actions of the pre-flood plan simple. They can be expanded, as needed, to better correspond with the complexity of the flooding event and the site operations.

Preparation in advance of a flood event

When weather events forecasted indicate an increased potential for a flood, review your flood emergency response plan and alert the flood emergency response team.

Start with the “easy” actions, tasks you will not mind taking even if flood waters don’t affect your property. Actions may include:

- Fill fuel tanks serving emergency generators and other vital services.
- Verify that dewatering pumps are in service and working.
- Verify that outside drains and catch basins are clean.
- Verify that all fire protection systems are in service.

Mobilization

As the threat of flood increases, refer back to your flood emergency response plan and follow the lead time necessary to complete the “tough” actions. These are the actions you may want to take when there is some certainty that flood waters will threaten your location. Tough actions to take may include:

- Protect or relocate vital business records.
- Remove loose outdoor storage or equipment.
- Anchor portable buildings or trailers to the ground.
- Secure outdoor storage or equipment that cannot be moved.
- Start the installation of manual protection systems such as flood gates.
- Raise critical equipment off the floor.
- Move critical equipment from below-grade areas.
- Initiate an orderly shutdown of production equipment and systems that rely on normal power.
- Turn off fuel services.
- Turn off non-essential electrical systems.

Recovery following a flood event

The recovery following a flood event should be considered as part of the flood emergency response plan. There may be some actions of the recovery plan that duplicate or overlap portions of the business continuity plan.

As the water recedes, begin cleanup operations, removing or relocating debris, sediment and mud from important areas first. As water-saturated storage and furnishings are removed, dehumidification, washing, disinfecting and other cleaning operations can begin.

Always keep in mind that danger and risks at your site do not necessarily retreat as the water recedes. Floodwaters can dislodge storage, equipment and debris, creating unforeseen hazards. As such, training of

the emergency response team should include increased vigilance as the water recedes and recovery from the flood begins. After the flood event, your site may become an unfamiliar obstacle course that can hamper the response team. In addition, the potential for the release of energy, electrical shocks or impounded water should be examined and mitigated before personnel enter the flooded areas.

Survey the severity and extent of the damage caused by the flooding. If the initial portion of the flood emergency response plan adequately captures the levels of flooding at both the 1 percent and 0.2 percent levels, the flood response team members may already have a good concept of the scope and extent of the damage before the waters have receded.

Regroup, supplement the response team and begin to set priorities for the cleanup and recovery process. Begin to request any additional supplies and resources that may be needed.

Implement appropriate portions of your business continuity plan that will help minimize interruptions to production or other vital operations adversely affected by the flooding.

Any below-grade spaces, such as basements or equipment pits, may need portable pumps to begin the water removal process. For these low-lying areas, the removal of the water may be the easiest portion of the recovery. Where vital equipment has been damaged, utilize your in-house technical staff or outside specialists to determine if the equipment is salvageable after the flood. If new equipment is to be installed, consider relocating the equipment above flood level.

Practice your flood emergency response plan at the site and with local emergency response authorities on an annual basis. Other annual activities may include:

- Train the site's flood emergency response team.
- Review the plan with senior-level management and/or personnel.
- Update the plan as needed.
- Document inspection of movable protection devices, such as flood gates and other barriers.
- Practice installation of manual protection devices.

Conclusion

An effective flood emergency response plan covers flood preparation, mitigation and recovery. Any checklists and action items included in the plan should be printable and detachable from the formal response plan document.

References

FEMA 348, "Protecting Building Utilities from Flood Damage:

<http://www.fema.gov/media-library/assets/documents/3729>

FEMA, "Protect Your Property from Flooding" FEMA Flyer., May 2014.

<https://www.fema.gov/media-library/assets/documents/13261>

FEMA P-499 "Home Buidler's Guide to Coastal Construction" February 2015.

<http://www.fema.gov/media-library/assets/documents/6131?id=2138>

Appendix – Sample Plan

Flood Emergency Response Plans	
Table Heading	Table Heading
Understand your exposure to flood hazards	<p>Identify all potential sources of flooding to your site using local and regional flood maps and documents.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Determine intensity and depth of flood waters in comparison to the finished floor elevations of basements, ground floor areas, critical outdoor equipment, access roads, etc. <input type="checkbox"/> Identify areas where water can enter your building and incorporate flood protection measures as appropriate. <input type="checkbox"/> Identify the type of local or regional weather event that could trigger the flooding. <input type="checkbox"/> Estimate the amount of time that the flood waters will be present on your site. <input type="checkbox"/> Recognize the potential physical flood damages and potential business interruption that can occur as a result of the flooding. <input type="checkbox"/> Develop a monitoring protocol to recognize any increased risk of flooding due to increases in the water levels of the flood source or weather events that could trigger the flooding. <input type="checkbox"/> Develop a stepped or tiered system of watch, warning and action levels associated with the weather events or water levels that could cause flooding at your site.
Develop your plan	<ul style="list-style-type: none"> <input type="checkbox"/> Designate a clear chain of responsibility for all shifts and provide alternates for key positions or duties. <input type="checkbox"/> Decisions by the higher levels of management may be needed to actuate certain activities of the emergency response team, including shutdown of portions of production operations or vulnerable processes. <input type="checkbox"/> Allot staffing to complete the emergency actions on any production shift. Alternates should be provided for each position or key duties of the team. Do not limit the staffing of the emergency response team to maintenance staff members only. Ample staffing is needed to help assure success of the emergency preparations. <input type="checkbox"/> Have resources and supplies readily available or staged for the emergency response team members. <input type="checkbox"/> Develop concise actions to help prevent water entry into buildings and relocate stock or important equipment. <input type="checkbox"/> Prioritize actions and efforts to protect the most important and most valuable operations, stock or equipment at your facility.

Flood Emergency Response Plans	
Table Heading	Table Heading
	<input type="checkbox"/> Flash-type flooding will likely have a short window of time for effective emergency response, so more staffing or more permanent and reliable flood mitigation modifications to the site or the building may be needed.
Prepare and mobilize in advance of a flood event	<p>Start with the “easy” actions first:</p> <input type="checkbox"/> Fill fuel tanks serving emergency generators and other vital services. <input type="checkbox"/> Verify that dewatering pumps are in service and working. <input type="checkbox"/> Verify that outside drains and catch basins are clean. <input type="checkbox"/> Verify that all fire protection systems are in service. <p>Initiate “tough” actions as the threat of flooding increases:</p> <input type="checkbox"/> Protect or relocate vital business records. <input type="checkbox"/> Remove all loose outdoor storage or equipment. <input type="checkbox"/> Anchor portable buildings or trailers to the ground. <input type="checkbox"/> Secure outdoor storage or equipment that cannot be moved. <input type="checkbox"/> Start the installation of manual protection systems, such as flood gates. <input type="checkbox"/> Raise critical equipment off the floor. <input type="checkbox"/> Move critical equipment from below-grade areas. <input type="checkbox"/> Initiate an orderly shutdown of production equipment and systems that rely upon normal power. <input type="checkbox"/> Turn off fuel services. <input type="checkbox"/> Turn off non-essential electrical systems.
Recover following a flood event	<input type="checkbox"/> Survey extent of damage and develop a strategic plan or priorities to restore the most important areas or processes first. <input type="checkbox"/> Initiate clean-up operations when safe to do so. <input type="checkbox"/> Utilize additional personnel and specialized contractors and vendors to help speed clean-up and recovery operations. <input type="checkbox"/> Have all utilities checked by qualified personnel before use. <input type="checkbox"/> Contact utility companies to restore services. <input type="checkbox"/> Verify all fire protection systems are in service.

Flood Emergency Response Plans	
Table Heading	Table Heading
Manage change	<ul style="list-style-type: none"> <input type="checkbox"/> Be vigilant for any changes at the site that can impact the risk or severity of flooding at the site. <input type="checkbox"/> As changes occur, update the flood emergency response plan. <input type="checkbox"/> Review staffing or roster of response team members to address any changes in personnel, shift staffing and management. <input type="checkbox"/> Create practice sessions and training sessions to maintain skills and identify any potential gaps in the flood emergency response plan.

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