Flood Preparedness

April showers bring May flowers, but they also can cause serious flooding. There have been 1,161 federal disaster declarations for flooding since 1954 and 300 since January 2000. One of six federally declared disasters this decade has been the result of flooding. The economic and human impact is also significant. Flooding causes more damage in the United States than any other severe weather related event—on average $5 billion a year. Over the past 30 years (1978 – 2007), 99 lives have been lost each year in floods.

Residents boating down a flooded street in Munster, IN on Sept 13, 2008 (Photo credit: FEMA)

Flooding is caused when bodies of water (e.g., rivers, streams, lakes, oceans, etc.) overflow their normal boundaries. Flooding can also occur as storm water runoff accumulates in normally dry areas.

Melting snow can combine with rain in the winter and early spring; severe thunderstorms can bring heavy rain in the spring and summer; or tropical cyclones can bring intense rainfall to the coastal and inland states in the summer and fall.

Flash floods occur within six hours of a rain event, or after a dam or levee failure, or following a sudden release of water held by an ice or debris jam.

Flood preparedness begins with site selection. Choose building sites that are not within a 500-year flood zone, not subject to flash foods, and not located where access roads, bridges, and critical infrastructure (e.g., utilities) will be disrupted by flood waters. Flood preparedness for existing buildings includes conducting a flood hazard analysis (risk assessment), mitigating the potential impacts of flood waters, development of a flood emergency plan, and development of a recovery plan to restore damaged equipment and reopen buildings.

Flood Hazard Analysis

There are many resources for assessing flood inundation. Flood Insurance Rate Maps (FIRMs) can be created on demand from FEMA's online Map Service Center. Hard copies can be obtained at local municipal offices.

FEMA Flood Insurance Studies provide background information on the development of flood maps and describe the flood history of a community. Consult with local officials about past flooding and development in the vicinity of your buildings. Check the National Inventory of Dams to identify substandard dams that could fail causing flash flooding. Review recent development and changes to drainage or flood control efforts that could increase or decrease the potential for flooding.

The goal of the flood hazard analysis is to identify areas subject to flooding, maximum anticipated flood elevations, and whether flood waters will restrict access to the property or shutdown utilities that are required to run the facility. The maximum flood elevation should be compared to site and finished floor elevations to determine the buildings, storage, machinery, or utilities that could be inundated by flood waters. Keep in mind that flood surveys and flood maps are not perfect, and areas not thought to be subject to flooding are flooded, and "100 year" floods can occur in successive years.

Flood Mitigation

Flood mitigation begins with evaluation of the site's storm water management. Site layout, grading, and storm-water drainage should be sized and arranged to direct 100 year level flood waters away from important buildings, process equipment, outside storage, and utilities. Protect against soil erosion, and use grates, curbs, or

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other means to prevent drains from becoming clogged by debris.

Install backflow preventers on discharge lines connected to wastewater and storm-water runoff sewer systems, on floor drains, and any other equipment that have a history of backups.

Protect existing building entry points with barriers to keep water out as long as possible. Install ramps or stairways to go over the barriers. Locate or elevate critical machinery, equipment, and storage above the 500 year flood elevation. Securely anchor outside storage tanks and process equipment that could break away during flooding.

Flood Emergency Plan

A flood emergency plan should be developed for all facilities that are subject to flooding. The plan should address protection of buildings or portions of buildings (e.g., below-grade or first floor) that are below the maximum flood elevation. The plan should also address the relocation, removal, temporary elevation of, or protection in place of raw materials and finished goods, production machinery and equipment, and utilities that could become flooded. Don't forget to warn employees about the dangers of flood waters and never to drive into flooded roadways.

Ensure that maintenance and engineering facilities, spare parts, and engineering drawings, vital records, and restoration procedures are located in a safe area or relocated prior to a flood. This ensures that resources and information needed to recover from flood damage are immediately available after flood waters recede.

The flood emergency plan should include an organization that vests authority in a leader who is thoroughly familiar with the flood hazard, available resources, and the flood emergency plan. The plan should define roles and responsibilities and actions to be taken when flood watches and flood warnings are issued.

Monitor the National Weather Service's River Forecasts and local emergency management officials' forecasts of flooding in the area.

The plan should identify all resources (and how to procure all resources) to prepare for and recover from flooding. This includes the required complement of personnel and material handling equipment to complete flood preparations before evacuation is mandated or flood waters threaten. Periodically verify that all resources are available and in good condition.

The flood emergency plan should include the timing and shutdown procedures for gas and electric utilities, machinery, and equipment and the relocation of movable furniture, equipment, and storage to higher elevation.

A business continuity plan should define strategies and the resources needed to continue critical business operations for the maximum duration of any shutdown.

Recovering After the Flood

The flood emergency plan should also address repair and restoration of damaged buildings and equipment after flood waters recede. Contract for, or procure in advance, generators, pumps, and equipment to remove water, clean up mud and debris, and check and repair damaged utilities and equipment. Document manufacturer's instructions or best practices for restarting water damaged systems and equipment in the plan, so work can begin as soon as it is safe. Review the "Directories of Products & Services," "Machinery & Equipment Restoration," and "Cleanup" resources on the Preparedness, LLC website for access to technical documents and resources.

Additional Resources

Links to dozens of documents to help you with your flood emergency plan as well as your full emergency response and business continuity program can be found on the "Resources" page of the Preparedness, LLC website.

Check out our blog if you are interested in developments in national standards, industry best practices, current events, and what it means for your preparedness program.

About Preparedness, LLC

Preparedness, LLC is a client-focused risk consulting company. Our mission is to assist our clients safeguard people, protect property and minimize business interruption. Our vision is to thoroughly understand each client's business and become a long-term, trusted advisor.

If you would like a copy of our self-assessment checklist; have questions; or need assistance with the development, implementation, or evaluation of your preparedness program, please contact us.

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