

What Building Owners and Tenants Should Know About Urban Flooding

This fact sheet describes urban flooding and how it can create unsafe conditions and damage buildings. It also describes actions that building owners, tenants, and communities can take to minimize damage from urban flooding. Urban flooding differs in some ways from the flooding shown on maps prepared by FEMA.

What is Urban Flooding?

Cities have many buildings and paved surfaces, such as streets, parking lots, and sidewalks. When rain falls on the ground, the water can soak in. But when rain falls on buildings and paved surfaces, it runs off without soaking in. When rainfall does not drain away from low-lying areas, or does not drain away quickly, the accumulated water is called **urban flooding**. Urban flooding also occurs when curbs and gutters cannot contain the flow. Other descriptions used for this type of flooding include stormwater flooding, local flooding, and nuisance flooding. Urban flooding is not the same as flood hazard areas shown on FEMA Flood Insurance Rate Maps, called “FIRMs.”

Storms that produce heavy and intense rainfall happen more often in recent years than they did in past decades. Many other factors can also make urban flooding severe enough to create unsafe conditions and cause problems.

Some of those factors are:

- Most urban stormwater drainage systems in the United States were not built to handle the amount of runoff from increasingly intense storms and associated heavy rainfall.
- Many stormwater drainage systems are decades old and may not be well maintained.
- Trash and leaves that accumulate in gutters, storm drains, and catch basins can block the flow of runoff, which sometimes prevents the water from draining away quickly.



What is a stormwater drainage system?

Stormwater drainage systems include curbs and gutters, inlets where water flows into catch basins, and the below-ground storm sewer pipes that are designed to carry runoff to a treatment plant, stream, river, or tidal body of water. Some urban systems use rain gardens, stormwater ponds, and other features to help runoff soak into the ground.



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Can Urban Flooding Cause Safety Risks?

Yes, there are some safety risks caused by urban flooding. Pedestrians and drivers sometimes encounter flooding that is risky. People should be cautious about walking in or driving through high water. Here are some possible risks from urban flooding:



Fast-flowing water can knock pedestrians off their feet.



Passenger cars may float in water only 12 to 24 inches deep, especially if it is flowing fast.



Stormwater collects in low spots on roads and streets, like underpasses. Cars and trucks can stall when engines get wet.



Stormwater might flow into subgrade parking garages and trap people and vehicles.



Stormwater might flow into basements. Flooded basements can trap, drown, and electrocute people, and damage buildings and their contents.



Depending on the drainage system, storm drain manhole covers might shift, causing pedestrians to trip or fall.

How Does Flooding Affect Buildings and Occupants?

Whether flooding is caused by coastal storm surges, high water in rivers and streams, or urban flooding, the floodwater can damage buildings and affect occupants. Even shallow flooding can cause damage by:

- Saturating wood floors and wood wall framing, which can warp and will usually need to be replaced
- Saturating wall coverings and insulation, which usually need to be removed and replaced
- Saturating furniture and belongings, which usually have to be replaced
- Inundating furnaces and water heaters, which usually have to be replaced
- Cracking basement walls and floors when the ground around the basement gets saturated
- Creating conditions that allow mold to grow, which can cause health risks

How is Urban Flooding Different than the Floodplains on FEMA Maps?

Whether your home or business is in or outside of a FEMA-mapped Special Flood Hazard Area does not indicate your level of risk from urban flooding. Urban flooding differs in several ways from the Special Flood Hazard Areas shown on the FEMA maps:

- Urban flooding happens more frequently than the severe flooding that inundates the areas shown on FEMA maps.
- Urban flooding can be a problem in any low-lying area, even if there is no body of water nearby. Many low-lying areas are not identified by FEMA as Special Flood Hazard Areas.

- Most communities with urban drainage problems do not regulate how buildings are built in areas where urban flooding can be severe enough to cause damage.

Learn more about New York City's stormwater resiliency and flooding.

AdaptNYC. AdaptNYC is the city's plan to adapt to climate change. It helps people understand the potential risks of flooding. Access the site at <https://climate.cityofnewyork.us/initiatives/adaptnyc/>.

Stormwater Flood Maps is an online tool to generate maps to show a range of scenarios to show how stormwater and coastal flooding patterns may change over time. Access the site at <https://climate.cityofnewyork.us/challenges/extreme-rainfall/>.

FloodHelpNY is a primary resource for New York residents and businesses to learn about flood risks, flood retrofits, stormwater flooding, and flood insurance. The Community Flood Action Toolkit is designed to help property owners make informed decisions to reduce flood risk and lower the cost of flood insurance. Access the site at <https://www.floodhelpny.org>.

Rainfall Ready NYC Action Plan. The plan explains actions the city takes to plan and prepare for urban flooding. Access the site to learn more and sign up for alerts at <https://www.nyc.gov/site/dep/whats-new/rainfall-ready-nyc.page>.

NYC Flood Hazard Mapper. The NYC Flood Hazard Mapper gives a full overview of the coastal hazards that threaten the city today. The Mapper also shows how those hazards are likely to increase in the future because of climate change. (The Mapper does not show areas where urban flooding occurs.) Access the Flood Hazard Mapper at <https://www.nyc.gov/site/planning/data-maps/flood-hazard-mapper.page>.

Learn more at www.fema.gov. Click on Flood & Maps to learn about federal flood insurance, floodplain management, flood maps and flood risks, including information for homeowners, renters, and business owners.

What Can Building Owners and Tenants Do to Minimize Problems from Urban Flooding?

The first step owners and tenants can take to minimize damage from urban flooding is to find out whether rainfall runoff can get into their buildings. You can use the checklist below to identify possible problems. If you identify ways that water can get into your building, you should talk to an architect, engineer, or someone with experience to learn about options to retrofit or modify your building. Some of the options noted in the checklist must be authorized by building permits before starting work. Talking with an experienced design professional is especially important if a building's subgrade areas are occupied because the residents could be at risk.

Checklist to Identify Possible Building Damage from Urban Flooding

Answer these questions:	Then decide what to do:
<input type="checkbox"/> Are nearby street gutters and catch basins blocked by trash and leaves?	If yes, check the city street sweeping schedule. Clean up trash and leaves before the next storm.
The next time it rains, watch where the runoff flows: <input type="checkbox"/> Could runoff flow toward your building? <input type="checkbox"/> Has your building had water in it before?	If the answer to either question is yes, answer the next question about how water might get into your building.
Are there any obvious places where water could flow into your building? Answer the following questions:	Walk around your building, take notes on what you see, and take photographs. Use this checklist to identify possible problems.
<input type="checkbox"/> Are any window wells, exterior basement stairways, or loading bays below the ground level? Do driveways or parking garage ramps slope down below the surrounding ground level?	Does it seem feasible to permanently block any opening where water can enter? Could you use a barrier to block openings in an emergency, such as properly placed sandbags with plastic sheeting? How will occupants know when to block those openings?
<input type="checkbox"/> Are there cracks between the building and the sidewalk or paving that might allow water to flow down the outside of the basement wall?	Could caulking be added or should old caulking be removed and replaced?
<input type="checkbox"/> Are any doorways at or near the ground level where water could enter even if the water is only 1 or 2 inches deep?	Would placing a watertight barrier help keep water out? If yes, consult with an architect or engineer to see if a barrier can be installed in the doorway. Alternatively, check with your city to learn the correct way to fill and stack sandbags with plastic sheeting to hold back the water.
<input type="checkbox"/> Look in all parts of your basement. Can you see any cracks in the walls, the floor, or where the walls join the floor? Is there evidence of water seeping through cracks?	Cracks could indicate existing damage due to lateral earth pressure on the outside of the wall. Some older homes have unreinforced basement walls that can buckle or collapse. Solutions to these problems usually require the advice of an architect, engineer, or experienced contractor.
<input type="checkbox"/> Does your basement have a sump pump? Has water ever backed up through the floor drain?	Talk to an experienced plumbing contractor about whether a backflow preventer or backwater valve would help.
<input type="checkbox"/> If the basement is occupied, do the occupants know to heed storm warnings, monitor possible street flooding, watch for water coming in to the basement, and to leave immediately?	Update your emergency preparedness plans to include flood safety. Make sure that basement occupants realize they are at risk if they stay in a basement when heavy rainfall and potential flooding is anticipated.
<input type="checkbox"/> If the basement is unoccupied, can flooring and wall coverings be removed? Can those materials be replaced with flood damage-resistant materials?	Read FEMA Technical Bulletin 2, Flood Damage-Resistant Materials Requirements , which lists typical construction materials. These materials range from those that are highly resistant to flood damage, to those that have no resistance.

Do Communities Regulate Development in Areas with Urban Flooding Problems?

Most communities do not regulate areas with known urban flooding problems. Although most cities keep reports of urban flooding problems, few prepare maps to show where those problems occur. Some areas with urban flooding problems are also shown on FEMA maps as Special Flood Hazard Areas. In those areas, enforcing the floodplain management regulations will also reduce damage by urban flooding.

To protect new buildings that are proposed in areas with urban flood problems, communities can adopt requirements. They can specify that lowest floors must be a certain height above the nearest storm drain inlet or crown of the nearest road. They can require builders to direct rainfall runoff away from buildings. Another option is to prohibit basements and subgrade areas unless the buildings are floodproofed to keep rainfall runoff out of those areas. Communities can consider ways to encourage the owners of at-risk existing buildings to evaluate options to keep water out of their buildings.

What Flood Hazards are Shown on FEMA FIRMs?

FEMA produces studies and maps to identify normally dry lands along streams, rivers, lakes, coastal waters, and some low-lying areas that are expected to flood. The maps are Flood Insurance Rate Maps (FIRMs). They show Special Flood Hazard Areas that are expected to be under water when a “base flood” occurs. The base flood has one chance in 100 of being equaled or exceeded in any given year. Sometimes, this flood is called the “100-year flood,” but that is misleading, because severe flood events can happen more frequently.

Cities, towns, and counties that participate in the National Flood Insurance Program (NFIP) use FEMA studies and maps to regulate development in Special Flood Hazard Areas. Those communities adopt and enforce specific floodplain management requirements for buildings and structures to reduce the amount of building damage when floods occur. The requirements specify that the lowest floors of new buildings (and some older buildings, when those buildings are improved or repaired) must be elevated to at least the flood elevation shown on the FEMA maps. Also, residential buildings must not have subgrade (basement) areas.

Do NFIP Flood Insurance Policies Cover Damage Caused by Urban Flooding?

Damage caused by urban flooding might be covered by NFIP flood insurance policies. NFIP policies pay claims when damage is caused by a “general condition of flooding,” which is defined as flooding that covers two or more acres of normally dry land area and affects two or more adjacent properties. The NFIP offers flood insurance coverage for all buildings in communities that participate in the program. NFIP policies can be purchased for buildings that are not in the Special Flood Hazard Areas shown on FEMA maps. The coverage has some limitations, including what is covered in basements and other subgrade areas.

Building owners can purchase policies to cover flood damage to buildings, contents, and personal property. Unit owners and tenants can purchase policies to cover flood damage to contents and personal property. Most standard property insurance policies available from private insurance companies do not cover flood damage. However, many property insurance companies partner with the NFIP to provide flood insurance.

Buy an NFIP policy by contacting your insurance company or agent. Or go to www.floodsmart.gov or call NFIP Direct Customer Care at 800-638-6620.