NYC PLANNING

Planning a Resilient NEW YORK CITY

THE DEPARTMENT OF CITY PLANNING IS WORKING WITH OTHER AGENCIES AND WITH COMMUNITIES THROUGHOUT THE FLOODPLAIN TO PLAN A MORE RESILIENT NEW YORK CITY.

HURRICANE SANDY WAS A STARK REMINDER OF THE SERIOUS RISKS NEW YORK CITY FACES AS A COASTAL CITY. THE STORM ALSO SERVED AS A CALL TO ACTION TO MAKE SURE THAT THE CITY'S NEIGHBORHOODS, ECONOMY, AND PUBLIC SERVICES CAN WITHSTAND AND EMERGE STRONGER FROM FUTURE STORMS, AS WELL AS OTHER CLIMATE EVENTS.

MANAGING THESE RISKS AND INCREASING THE CITY'S RESILIENCY REQUIRES ACTION ON MANY FRONTS. WHERE FEASIBLE, COASTAL PROTECTION PLANS RESULT IN A FIRST LINE OF DEFENSE, WHILE BUILDING-SCALE RESILIENCY ENABLE PROPERTIES TO WITHSTAND RARE BUT MAJOR FLOOD EVENTS LIKE SANDY.

DCP'S WORK INCLUDES PROPOSING ZONING CHANGES THAT CAN BETTER ENABLE BUILDINGS TO MEET BUILDING CODE REQUIREMENTS FOR THE FLOOD ZONE, WHILE ALSO MEETING OTHER LONG-TERM PLANNING GOALS.

FOR MORE INFORMATION, VISIT: **www.nyc.gov/resilientneighborhoods**
TO GET INVOLVED, WRITE TO US AT: **resilientneighborhoods@planning.nyc.gov**

COASTAL PROTECTION

THE CITY CAN REDUCE THE VULNERABILITY OF COASTAL COMMUNITIES BY ENHANCING COASTLINES THROUGH FLOOD PROTECTION STRUCTURES, SUCH AS FLOODWALLS, LEVEES, OR BERMS, AS WELL AS THROUGH NATURAL FEATURES LIKE DUNES AND WETLANDS.

BREAKWATERS CAN HELP REDUCE THE FORCE OF WAVES AND COASTAL EROSION.

COMMUNITY FACILITY RESILIENT BUILDING

NON-RESIDENTIAL BUILDINGS, OR PORTIONS OF BUILDINGS, HAVE THE OPTION TO DRY FLOODPROOF BELOW THE FLOOD LEVEL.

DRY FLOODPROOFED GROUND FLOOR

WET FLOODPROOFED GROUND FLOOR

ACCESS

FLOOD LEVEL

RESIDENTIAL RESILIENT BUILDING

LIVING SPACES LOCATED ABOVE FLOOD LEVEL

FLOOD LEVEL

WET FLOODPROOFED GROUND-FLOOR

PARKING

STORAGE

RESILIENT BUILDINGS

BUILDINGS CAN BE DESIGNED TO BETTER WITHSTAND AND RECOVER FROM FLOODING. THIS CAN HELP KEEP CONTENTS SECURE AND ENABLE PEOPLE TO GET BACK INTO THEIR HOMES MORE QUICKLY.

RESIDENTIAL RESILIENT BUILDING

ALL RESIDENTIAL BUILDINGS NEED TO ELEVATE UNITS ABOVE THE FLOOD LEVEL.

LIVING SPACES LOCATED ABOVE FLOOD LEVEL

WET FLOODPROOFED GROUND-FLOOR

STORAGE

PARKING

FLOOD LEVEL

RESIDENTIAL RESILIENT BUILDING

LIVING SPACES LOCATED ABOVE FLOOD LEVEL

FLOOD LEVEL

PARKING

STORAGE

WET-FLOODPROOFED GROUND-FLOOR

COMMUNITY PREPAREDNESS

THE CITY PLANS AND PREPARES FOR EVACUATIONS IN ADVANCE OF SEVERE COASTAL STORMS. IT ALSO COORDINATES RESPONSE AND RECOVERY, AND COLLECTS AND DISSEMINATES EMERGENCY INFORMATION.

BEING PREPARED TO EVACUATE IS IMPORTANT IN THE EVENT OF AN APPROACHING STORM.

WETLANDS HELP LIMIT FLOODING FROM HEAVY RAINS, AND MAY HELP TO SLOW DOWN FLOOD WATERS FROM COASTAL STORMS.

INDUSTRIAL RESILIENT BUILDING

INDUSTRIAL BUSINESSES OFTEN NEED TO ELEVATE VALUABLE EQUIPMENT ABOVE THE FLOOD LEVEL.

ELEVATED MECHANICAL SYSTEMS

WET FLOODPROOFED GROUND-FLOOR

FLOOD LEVEL

ELEVATED IMPORTANT EQUIPMENT

ELEVATED OFFICE SPACE

INFRASTRUCTURE HARDENING

PROTECTING CRITICAL SYSTEMS FROM FLOODING HELPS PREVENT DISRUPTION TO POWER, COMMUNICATIONS, AND TRANSPORTATION NETWORKS WHEN STORMS OCCUR.

MIXED USE RESILIENT BUILDING

LIVING SPACES LOCATED ABOVE FLOOD LEVEL

COMMERCIAL GROUND FLOOR

FILLED-IN SUBGRADE SPACE

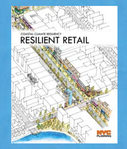
DRY FLOODPROOFED GROUND FLOOR

DRY FLOODPROOFED MECHANICAL ROOM

#ONENYC

WORK INCLUDES:

Retrofitting for Flood Risk
Detailed guidance on resilient retrofitting strategies for a range of residential building types found in New York City.



Resilient Retail
Assessment of strategies to help businesses and the neighborhoods they serve withstand and recover quickly from future storms and flood events.

Resilient Industry
Identifies physical mitigation strategies, as well as operational and preparedness best practices that industrial businesses can pursue to minimize flood damage.

Resilient Art Spaces
Guidance and resources on practical adaptation measures for arts-related businesses located in the floodplain to plan for, mitigate, and recover from flooding.

Visit:
www.nyc.gov/resilientneighborhoods
For more information.

RESILIENT BUILDINGS

The **Department of City Planning** is seeking input on how zoning rules throughout the floodplain that can help reduce flood risks and support the city's long-term vitality and resiliency.

We want to hear from you:

Have you and your neighbors encountered any issues or regulatory barriers when doing construction work in the floodplain?

What would you like to see improved about recent construction in the floodplain?

How do you envision the future of your neighborhood in the floodplain?

Want to
get involved?

WRITE TO US!

Write to us at:
resilientneighborhoods@planning.nyc.gov

PLANNING A RESILIENT NYC

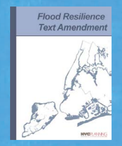
ONENYC
is the City's plan for
multiple lines of protection
to build the city's resiliency to flooding and climate change.

- *COASTAL PROTECTION*
- *INFRASTRUCTURE HARDENING*
- *COMMUNITY PREPAREDNESS*
- *RESILIENT BUILDINGS*

THE **DEPARTMENT OF CITY PLANNING**

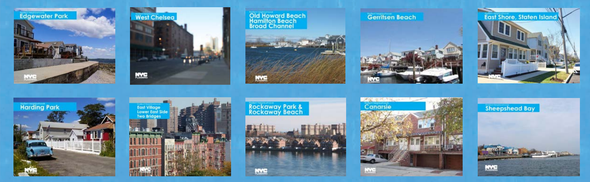
Flood Resilience Text Amendment

This citywide zoning text amendment was adopted on a temporary basis in 2013 to enable buildings to be more flood resilient. These rules address the most urgent zoning barriers to elevating and floodproofing. Work is underway now to refine and make these rules permanent.



Resilient Neighborhoods

City Planning has been working directly with coastal communities in 10 study areas to identify neighborhood specific strategies, including zoning and land use changes, to support the vitality and resiliency of communities in the floodplain and to prepare them for future storms.



Flood Risk in NYC

NYC is highly vulnerable to flooding from coastal storms due to its extensive coastal geography and highly used waterfront. Floods have the potential to destroy homes and businesses, impair infrastructure, and threaten human safety. With climate change and sea level rise, these risks are expected to increase in the future, but will most adversely affect low-lying neighborhoods.

Current Flood Risks

Hurricanes, tropical storms, nor'easters, intense rain storms, and even extreme high tides are the primary causes of flooding in NYC. For building code, zoning, and planning purposes, **flood risk in NYC is represented on FEMA's 2015 Preliminary Flood Insurance Rate Maps (PFIRMs).**

- **PFIRMs** show the **extent and the elevation** to which flood waters are expected to rise during a flood event that has a **1% annual chance of occurring**, also known as the 100-year floodplain.
- However, this term is misleading since these floods can occur multiple times within 100 years. **In the 1% annual chance floodplain, there is a 26% chance of flooding over the life of a 30-year mortgage.**
- The elevation shown in the **PFIRMs** maps is denoted as the Base Flood Elevation (BFE).

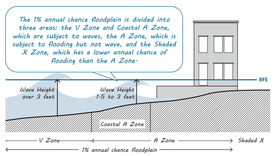
For flood insurance purposes, refer to the Federal Emergency Management Agency (FEMA) 2007 Flood Insurance Rate Maps (FIRMs). All property owners of buildings in the 1% annual chance floodplain with a federally insured mortgage are mandated by law to purchase flood insurance.

Approximately who and what is affected by the 1% annual chance floodplain?*

Residents	400,000
Jobs	291,000
Buildings	72,000
1-4 Family Buildings	53,000
Multifamily Buildings	5,000
Residential Units	183,000
Floor Area (Sq. Ft.)	532M

The number of New Yorkers living in the city's floodplain is higher than the entire population of Cleveland, OH, Tampa, FL, or St. Louis, MO.

* These numbers are based on FEMA's 2015 PFIRMs. In October 2016, FEMA announced that the City won its appeal of the PFIRMs and has agreed to revise New York City's flood maps. For now, the 2015 PFIRMs are in use for building code, zoning, and planning purposes, while the 2007 FIRMs remain in use for flood insurance. For more information on the appeal visit www.nyc.gov/floodmaps.



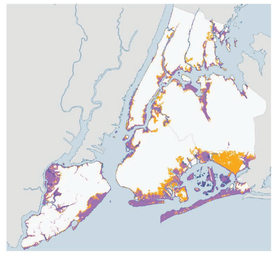
Future Flood Risks

With climate change, the risk of coastal storm surges, intense rain, and high tides will increase.

- **Sea levels in NYC have already risen a foot** over the last 100 years.
- According to the New York City Panel on Climate Change, **sea levels are expected to increase between 8 to 30 inches by the 2050s**, and as much as 15 to 75 inches by the end of the century.
- **Sea level rise will lead to frequent, potentially daily, tidal inundation** in some especially low-lying neighborhoods. This type of flooding causes less damage than extreme storms, but can be a nuisance and has significant long-term impacts on public safety and City services.

Higher sea levels mean the future 1% annual chance flood will cover a larger area and affect more people.

- By the 2050s, the number of people living in the 1% annual chance floodplain could more than double.
- The annual chance of major storms will also increase. **What is a 1% annual chance storm today will have nearly a 3% annual chance of occurring in the 2050s.**



Data Sources: Current floodplain impacts based on 2015 FEMA PFIRMs and NYC MapPLUTO version 13. Future flood risk data and information from the New York City Panel on Climate Change (2015); analysis of future flood zone impacts based on 90th percentile projections for SLR and MapPLUTO version 13.

In the event of a flood or flood warning, move your valuables to high ground and follow evacuation orders. For more information on locating a storm evacuation center, visit: **maps.nyc.gov/hurricane**

Terms to Know

1% Annual Chance Floodplain: area that has a 1% chance of flooding in any given year, as designated on FEMA's Flood Insurance Rate Maps.

Base Flood Elevation (BFE): the computed elevation in feet to which floodwater is anticipated to rise during the 1% annual chance storm as shown on FEMA's Flood Insurance Rate Maps.

Coastal Storm: includes nor'easters, tropical storms, and hurricanes.

Low-lying Neighborhoods: neighborhoods that have a low elevation relative to sea level and are particularly vulnerable to flooding.

Flood Insurance

Flood insurance covers damages to property or personal contents from flooding caused by excessive rainfall, tidal flooding, or wind-driven storm surges. Changes to flood maps and reforms to the National Flood Insurance Program will lead to increases in flood insurance rates over time. In addition to flood resilient construction, insurance is another strategy for reducing flood risk.

Why is Flood Insurance Important?

- **Floods can cause significant damage** to your most valuable asset: your home or business.
- **Homeowner and property insurance do not cover damage by flooding**. You must buy a separate policy.
- **Federal assistance is not guaranteed in the event of a flood.**
- Many property owners are **required to purchase and maintain flood insurance.**

Properties with a federally backed mortgage in a high-risk flood zone and those that have received federal disaster assistance must maintain flood insurance up to the NFIP coverage limits, or the outstanding mortgage balance, whichever is lower. Failure to do so may lead mortgage servicers to purchase a policy for the property—possibly at a higher price—and pass on the cost through monthly mortgage bills.

Homeowners without a federally-backed mortgage or outside a high flood risk zone can carry up to the maximum policy limit of $250,000 with additional contents coverage available up to $100,000 for owners or renters. Co-ops, larger multifamily buildings and businesses can be covered up to $500,000. Business owners and tenants can also purchase up to $500,000 in contents coverage.

Flood Insurance Premium

Most flood insurance policies are administered by the National Flood Insurance Program (NFIP), a federal program run by FEMA. NFIP policies are separate from homeowners or property insurance, but are often sold through the same agents. A few private insurers also offer flood insurance, but these policies tend to be more expensive and less available.

Flood Zone: The higher risk your flood zone, the higher the flood insurance base premium will be.

Building Type: Single-family homes, two- to four-family homes, apartment buildings, and other non-residential buildings may have different base rates.

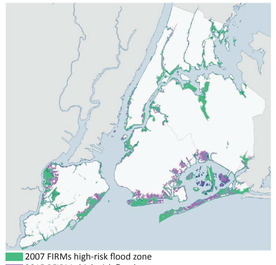
Elevation of Lowest Floor: The higher the lowest inhabited floor (any floor not used solely for storage, access, or parking) is elevated relative to the Base Flood Elevation (BFE), the lower the premium may be.

Amount of Insurance: The more insurance coverage you buy, the higher your premium.

Deductible: A higher deductible may lower your insurance premium.

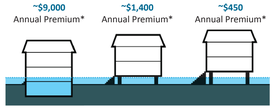
Flood Insurance Requirement

Purchase of a flood insurance policy is required for buildings in the floodplain as shown on the 2007 FIRMs, but may expand based on updated FIRMs. The 2015 PFIRMs, are the best available data for planning purposes. Coverage for buildings outside of the 2007 FIRMs is available at a lower cost.



Why are Flood Insurance Rates Increasing?

FEMA is in the process of updating the city's FIRMs. Once these maps are adopted, properties may have higher flood insurance premiums over time. In addition, the federal reforms to make NFIP more financially stable will cause steady increases in premiums until the policies reflect the full risk to flooding. Property owners can reduce their insurance premiums by utilizing certain flood resilient construction methods.



* Projected rates based on the BFE shown here are for illustrative purposes.

In October 2016, FEMA announced that the City won its appeal of the PFIRMs and has agreed to revise New York City's flood maps. For more information on the appeal visit www.nyc.gov/floodmaps.

What Should I Do?

1. Learn about your risk and flood insurance requirements:

Identify your property's flood zone on FEMA's FIRMs by visiting **Region2Coastal.com** or **FloodHelpNY.org** (which also provides a rate estimate by using the calculator).

Request an Elevation Certificate by hiring a licensed engineer or surveyor to determine the height of the lowest occupied floor relative to the BFE.

2. Purchase flood insurance:

Call at least 3 agents listed on floodsmart.gov or call (888) 435-6637 for quotes. Homeowners or property insurance does not cover damage from floods and federal assistance is not guaranteed in the event of a flood.

Call the FEMA National Flood Insurance Advocate's Office for other questions: (202) 212-2186

Flood Resilient Construction

Flood resilient construction reduces potential damages from flooding and can lower flood insurance premiums. New buildings in the floodplain are required to meet flood resilient standards. Existing buildings can reduce their risk by retrofitting or rebuilding to meet these standards, or can take partial, short-term measures to address safety concerns.

Overview

There is a wide range of accepted flood resilient construction practices for buildings to better withstand floods and reoccupy more quickly following a storm. These include:

- **Elevating** the lowest floor and mechanical equipment such as electrical, heating, and plumbing equipment.
- **Wet floodproofing** by utilizing water resistant building materials and limiting uses below the Design Flood Elevation (DFE) to parking, building access, and minor storage. This method allows water to move in and out of uninhabited, lower portions of the building with minimal damage.
- **Dry floodproofing** which is a method designed to seal the building's exterior to flood waters. Removable barriers at all entrances below the expected level of flooding need to be deployed prior a storm. **This option is only available for non-residential ground-floors**, such as for commercial or manufacturing spaces.

NYC Building Code requires all new buildings, substantial improvements or horizontal enlargements within the 1% annual chance floodplain* to meet requirements for flood resilient construction.

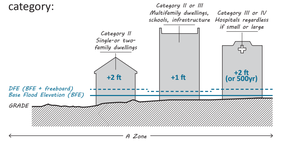
*This includes areas that are in the 100-year floodplain on either the 2007 FIRMs or 2015 PFIRMs.

New York City Requirements

In 1983, the City of New York joined the National Flood Insurance Program (NFIP), which is managed by the Federal Emergency Management Administration (FEMA) and adopted the Flood Insurance Rate Maps (FIRMs). Once the City joined the NFIP program, it had to adopt and enforce flood resilient construction regulations found within Flood Resistant Design and Construction, ASCE Standard 24. **These requirements were incorporated within the Appendix G of NYC's Building Code, and apply within the City's floodplain.**

NYC's Building Code also added an additional safety standard called freeboard, an extra margin of protection (usually one or two feet) beyond the BFE.

This new height standard is called the Design Flood Elevation (DFE) and differs depending on which flood zone the building is located and on its occupancy category:



Requirements for Existing Buildings

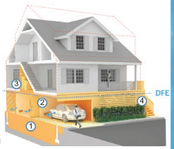
Retrofitting buildings will significantly reduce their vulnerability to damage from flooding, and could save homeowners thousands of dollars annually in flood insurance premiums. **For buildings that are not substantially improved, lower cost, short-term adaptation measures can help reduce risk to flood damage.** For example, elevating mechanical equipment can help to minimize damage, or installing backflow valves can prevent water from flowing in the reverse direction (back up through pipes). However, such incremental measures may not reduce flood insurance premiums, but can reduce vulnerability to flood damage.

Requirements for New Buildings

Residential buildings must elevate living spaces and may only use space below the DFE for parking, storage or building access. Mechanical systems must be elevated and enclosed walls must be wet floodproofed. Within the V Zone (areas subject to wave hazards), the space below the DFE must be either kept open to accommodate wave action or designed to break away during a storm. **Mixed-use or non-residential buildings can either elevate and wet floodproof** below de DFE, **or dry floodproof**, if the space is not used for residential purposes, such as residential units or as residential lobby space.

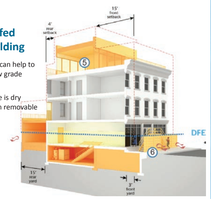
Wet floodproofed Residential building

1. Site is filled to the lowest adjacent grade;
2. Space below the DFE is for parking, building access or minor storage;
3. Mechanical systems are above the DFE;
4. Plants and stair turns improve the look of the building from the street but are not required by Building Code.



Dry floodproofed Mixed-use building

5. Rooftop addition can help to replace lost below grade space;
6. Commercial space is dry floodproofed with removable barrier.



Visit **www.nyc.gov/resilientneighborhoods** to see more examples in the Retrofitting for Flood Risk report.

Terms to Know

Design Flood Elevation (DFE): the minimum elevation to which a structure must be elevated or floodproofed, determined by adding the specified amount of freeboard, an additional height for more safety to the Base Flood Elevation.

Substantial Improvement: any repair, reconstruction, rehabilitation, addition, or improvement with a cost equaling or exceeding 50% of the current market value of the building.

Horizontal Enlargement: any addition that extends beyond existing building such as, decks, or other appendages.

Flood Resilience Zoning

The Flood Resilience Zoning Text (the "Flood Text") is one part of a wide range of efforts by the City to recover from Hurricane Sandy, promote rebuilding, and increase the city's resilience to climate-related events, including coastal flooding and storm surge. To learn more about the Flood Resilience Zoning Text and other terms used here, visit: www.nyc.gov/floodtext.

Overview

NYC's zoning seeks to enable and encourage flood resilient building construction throughout designated floodplains by:

- **Modifying underlying zoning regulations** to remove regulatory barriers that hindered or prevented the reconstruction of storm-damaged properties.
- **Enabling new and existing buildings to comply with new, higher flood elevations** issued by the Federal Emergency Management Agency (FEMA), and to comply with new requirements in the New York City Building Code.
- **Introducing regulations to soften the effects** flood-resistant construction may have **in the public realm**.

The flood text was adopted in 2013 on a temporary, emergency basis and **is available to buildings located entirely or partially within the 1% annual chance floodplain***. These rules, if utilized, typically require the building to fully comply with flood-resistant construction standards by NYC Building Code. However, some provisions, such as elevation of mechanical spaces, are available to all buildings located in the floodplain, even if not fully compliant with Appendix G.

*This includes areas that are in the 100-year floodplain on either the 2007 FIRMs or 2015 PFIRMs.

Existing Buildings

The Flood Text provides special allowances to facilitate the retrofitting of existing buildings, which can often be more complex than building a new, flood resilient building. For example, zoning allowances are provided to existing single- and two-family homes to elevate in place, even if they do not match the current zoning envelope. These rules also allow the building to be shifted back on the lot to provide adequate space in the front yard for stairs, ramps, or lifts. In addition, mechanical systems can be relocated to portions of the rear or side yard as permitted obstructions. If a building is elevated, it must comply with requirements for streetscape mitigations, to soften any effects at the street level.

New and Existing Buildings

The Flood Text recognizes that buildings in the floodplain often cannot have subgrade spaces, such as basements or cellars. In residential buildings, ground-floor space is limited to parking, storage or access, since this space has to be wet floodproofed. Zoning also takes into consideration the high cost of dry floodproofing, which is generally the preferred option for commercial or mixed-use buildings, since it allows active uses to remain at grade and therefore encourages street-level activity. The Flood Text allows additional flexibility for buildings that meet flood resistance standards in order to help neighborhoods in the floodplain remain vibrant.

Summary of the Flood Text

Height: Height can be measured from the flood level to ensure they can fit their permitted floor area above the flood elevation. Where flood elevations are moderate, a few feet of additional height are allowed for usable space.

Access: Additional flexibility is provided for stairs, ramps, and entry areas as needed, in order to allow the access of elevated spaces.

Ground Floor Use: For existing buildings located in lower-density commercial areas, active, dry floodproofed commercial spaces are encouraged by not counting them toward limits on floor area.

Parking: More flexibility is allowed for the accommodation of off-street parking above grade.

Mechanical Systems: More flexibility is allowed for locating mechanical systems above flood levels.

Streetscape: Design elements are required when the first occupiable floor is elevated above moderate heights, in order to improve the way buildings are perceived at the street level.

Retrofitted Wet floodproofed Residential building

1. Height (regulated by the zoning envelope) can be measured from DFE;
2. Mechanical Systems can be relocated as permitted obstruction;
3. Elevated buildings may increase the degree of non-compliance;
4. Streetscape mitigation elements are required for elevated buildings.

New Dry floodproofed Mixed-use building

5. Height can be measured from a higher reference plane;
6. Mechanical systems can be located as permitted obstruction atop roofs;
7. Ground floors can be discounted from floor area;

Terms to Know

Flood Resistant Construction Elevation (FRCE): same as the Design Flood Elevation (DFE) from NYC Building Code.

Lowest Occupiable Floor: lowest habitable floor that is not used solely for parking, storage, building access or crawl space.