Flood Resilience Zoning

Manhattan District Service Cabinet

May 19, 2017
A more resilient NYC is one where neighborhoods, buildings and infrastructure can withstand and recover quickly from flooding and climate events.

- **Coastal defenses** are strengthened as first line of defense against flooding and sea level rise.
- **Buildings** are designed to withstand and recover from flooding.
- **Infrastructure** is protected from climate hazards.
- **Residents and businesses** are prepared.
NYC’s flood risk is high.

The floodplain affects a large geography and most community and council districts.

100 Year Floodplain
FEMA 2015 PFIRM

Population: **400,000** 50 of 59 Community Boards
Buildings: **71,500** 45 of 51 Council Districts

- **Buildings**: 
  - 80% 1-4 units
  - 7% 5+ units
  - 13% nonresidential

- **Residential Units**: 
  - 30% 1-4 units
  - 70% 5+ units
FEMA Flood Map
Flood Risk in Manhattan

2015 PFIRMs

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<tbody>
<tr>
<td>Population in Floodplain</td>
<td>89,100</td>
</tr>
<tr>
<td>Buildings in Floodplain</td>
<td>3,100</td>
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### Future Flood Map
Flood Risk in Manhattan

<table>
<thead>
<tr>
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<th>2015 PFIRMs</th>
<th>2050s Projected</th>
<th>2050s Projected Increase</th>
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<tbody>
<tr>
<td>Population in Floodplain</td>
<td>89,100</td>
<td>214,500</td>
<td>140%</td>
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<tr>
<td>Buildings in Floodplain</td>
<td>3,100</td>
<td>5,900</td>
<td>90%</td>
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Buildings in the Floodplain in Manhattan
Flood resilience zoning
Projects at DCP

2013
“Flood Text”
initial temporary regulations to facilitate recovery

2018
“Flood Text II”
 improve upon, and make permanent, the Flood Text
How are buildings in the floodplain regulated?

**Flood Insurance Rate Maps (FIRMs)**
Determine where floodplain regulations apply

**National Flood Insurance Program**
Set up Insurance Rates depending on building elevation and other requirements

**Construction Standards (ASCE 24)**
Design minimum construction requirements for flood hazard areas

**Building Code (DOB)**
Requires new buildings and substantial improvements to meet FEMA standards

**Zoning Resolution (DCP)**
Zoning accommodates these regulations and improves neighborhood character
Flood resilient construction standards require certain buildings to elevate the lowest floor, as well as mechanical equipment, above the Design Flood Elevation (DFE).
Flood resilient construction
Required by DOB

Flood resilient construction standards require certain buildings to elevate the lowest floor, as well as mechanical equipment, above the Design Flood Elevation (DFE).
2013 Citywide Flood Text
Amended zoning in six key areas

1. Height
   Measured from flood elevation

2. Access
   Flexibility for stairs, ramps, lifts

3. Parking
   Flexibility to relocate parking

4. Systems
   Flexibility to relocate/elevate

5. Ground Floors
   Account for costs of new flood risk

6. Streetscape
   Require features to mitigate blank wall
Flood Text II

Need for a new citywide text amendment:

1. Make the provisions of the current, temporary 2013 Flood Text permanent

2. Fix and improve provisions based on studies and lessons learned

3. Begin to promote new development + proactive retrofitting to high resiliency standards
Flood Text II
Fix and improve provisions based on lessons learned

1. **Height**
   Homeowners may face the loss of subgrade spaces when retrofitting.

2. **Height**
   Properties owners may want to address future risk by over-elevating.

3. **Ground Floors**
   Current incentives to keep active ground floors may not be enough.

4. **Homes in M Districts**
   Existing homes in M. Districts, if damaged, may not be able to rebuild.
Commercial Ground Floors
Improvements and lessons learned

ISSUE

• Bad urban design outcomes due to “squishing” – dark, low-ceilinged establishments.
• Causes lower-grade commercial stock, limits the types of retail tenants and services that can locate in the building, such as restaurants.
• Doesn’t apply to at least half of the floodzone.
• Doesn’t create a zoning incentive to prefer dry floodproofing implementations over wet floodproofing (active over passive).

Example of ‘squished’ retail
(1809 Emmons Ave., BK)

Above-grade cellar
in the flood zone

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(1809 Emmons Ave., BK)

Above-grade cellar
in the flood zone

3
Ground Floors
Current incentives to keep active ground floors may not be enough
Flood Text II
Outreach

DCP plans a robust public engagement process:

As part of this outreach process, DCP will:

- Partner with stakeholders to educate and promote awareness of flood risk and resiliency issues
- Explain how zoning tools relate to resiliency
- Explore unique neighborhood issues through in-depth public presentations and workshops
- Develop a proposal through an iterative process that is shaped by feedback

* Schedule is tentative and subject to change
Outreach Resources

NYC Flood Hazard Mapper

www.nyc.gov/floodhazardmapper

Info briefs on Flood Resilience Zoning, Flood Risk, Flood Resilient Construction, and Flood Insurance

www.nyc.gov/resilientneighborhoods
Thank you!

For more information, and to stay involved, email resilientneighborhoods@planning.nyc.gov
Appendix
Flood insurance rates
Set by FEMA

Raising or retrofitting your home will reduce costs

FEMA’s flood insurance premiums are lowest when the lowest inhabited floor (any area not used solely for storage, access or parking) is elevated above the Base Flood Elevation (BFE).

- **4 FEET OR MORE BELOW BFE**: ~$9,000 Annual premium
- **AT BFE**: ~$1,400 Annual premium
- **3 FEET OR MORE ABOVE BFE**: ~$450 Annual premium
The reference for height was changed from grade to the flood level.

This change in how zoning envelopes are measured was intended to ensure that a new building in the flood zone need not be significantly smaller than the same building (in the same zoning district) outside of the flood zone. While the average flood elevation above grade is 3’ to 5’, in some areas this change allowed 13’ of extra height.
Bump-up: where DFE is moderate, additional height was given

To ensure the utility of spaces subject to flooding, further height ("the bump-up") is available

**Residential buildings:**

Where the DFE is between 5’-10’ above grade, you can “bump-up” all heights to 10’

**Commercial / mixed buildings:**

Where the DFE is between 5’-12’ above grade, you can “bump-up” all heights to 12’ *(depicted at right)*

This extra height is designed to promote a full, floodproofed, at-grade story – as opposed to an elevated story at the DFE.
Penalties for complying with new code requirements were lifted

New buildings have a number of new design challenges that existing, grandfathered buildings did not face – these include having to provide ample access to elevated levels (stairs, ramps, and lifts) and locating vital mechanical equipment somewhere other than a cellar. To ensure these did not create a ‘zoning penalty’ these components were exempted from floor area.
To incentivize the costly retrofitting and floodproofing of old buildings, a floor area incentive was provided.

A building owner could floodproof their bottom story, and then **add an additional story** (or equivalent amount of space) elsewhere in their building, helping to finance a retrofit.
To offset the cost of floodproofing, a floor area incentive was offered

In some areas, where the flood elevation is moderate-to-high above grade, the entire ground floor can be exempted from floor area, without limitation, if it is wet or dry floodproofed, by virtue of a changed definition of a “cellar”. (Cellars are generally exempt from floor area)
Certain zoning design requirements were updated

Elements of zoning which predate the new FEMA PFIRM and did not take significant flood levels (and flood resistant construction difficulties) into account were updated to ensure that new buildings could comply with these requirements while complying with Appendix G – these include street wall location requirements (below)
Certain zoning design requirements were updated

Elements of zoning which predate the new FEMA PFIRM and did not take significant flood levels (and flood resistant construction difficulties) into account were updated to ensure that new buildings could comply with these requirements while complying with Appendix G – these include transparency requirements (depicted below) and ground floor use requirements.
Streetscape mitigations

When the DFE >10’, or when the bump-up has been used, any new or enlarged building must provide streetscape mitigations. For residential buildings, this involves a glazed, at-grade lobby. For **mixed-use or commercial buildings**, we require:

For **mixed-use buildings** in commercial districts:
ZR 64-64 requires 50% transparency between 2’-12’ above curb level.
Prohibitions on rebuilding grandfathered buildings (non-conforming uses) after 50% destruction were lifted, and given extensive vesting

Most non-conforming uses (such as a store in a Residence District, or a three-family home in a 1- or 2-family district) were permitted to be completely rebuilt, provided they were damaged by Hurricane Sandy, and given 10 years from the adoption of new flood maps to complete this work.

This was not extended to Residential buildings in M Districts – largely an issue in Brooklyn, though there are a few non-conforming residential buildings in normal M Districts:
A number of other changes were made to facilitate recovery work. The relevant changes in Manhattan:

- Changes were made to the **required slopes of landscape** in view corridors along waterfront public access.

- A new **BSA Special Permit** (SP 64-92) was created to allow for modifications to zoning laws, without needing a variance, to accommodate unforeseen situations and problems.
  - 35 single or two-family homes have utilized this permit since 2013, to reduce yard, floor area, or parking location problems.
  - All registrants were part of the Build it Back program.
Dry floodproofing issues

To incentivize the floodproofing of at-grade spaces the 2013 Flood Text redefined “cellar” to exempt at-grade stories in certain cases.

ISSUE

• Ongoing uncertainty regarding acceptable dry floodproofing methods:

- Non-NFIP compliant (e.g. “Aquafence”; allowed for Pre-FIRM buildings)
- Deployable floodgate (currently allowed only at doors and operable windows)
- Integrated floodproofing (‘aquarium-grade’ glass for glazing or curtain-wall systems)
To incentivize the floodproofing of at-grade spaces the 2013 Flood Text redefined “cellar” to exempt at-grade stories in certain cases.

**ISSUE**

• Ongoing uncertainty regarding acceptable dry floodproofing methods:

- Deployable floodgate (currently allowed only at doors and operable windows)
- Deployable floodgate (allowed at perimeter only for pre-FIRM buildings)