BR 1: CREATE & USE 2080 FLOOD MAP BASED ON CLIMATE CHANGE PREDICTIONS

New York City Charter; New York City Building Code
Proposal developed by the Climate Adaptation Committee

Summary

Issue:
Current flood maps are based entirely on historical data and do not account for the predicted sea-level rise due to climate change and the coastal flooding that would ensue.

Recommendation:
Develop flood maps that reflect sea-level rise and increases in coastal flooding through 2080. New developments susceptible to future 100-year floods should meet the same standards as buildings in the current 100-year flood zone.

Proposed Legislation, Rule or Study

Amendments to the New York City Charter:
1. Add a new Section 498 as follows:

Section 498. Flood Protection

a. The department of emergency management shall create, maintain, and regularly update a New York City Climate Change Flood Map, which shall map the New York City coastline at high tide and the projected flood plains and flood levels of the 100 year flood with a layer showing lots and blocks and the 100-year flood level averaged across each affected block. The coastline and flood projections shall be based on:

(1) The 90th percentile sea-level rise projections as developed by the New York City Panel on Climate Change, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, the Intergovernmental Panel on Climate Change or other scientific body designated by the Office of Long Term Planning and Sustainability;

(2) The 90th percentile storm surge projections developed by the New York City Panel on Climate Change, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, the Intergovernmental Panel on Climate Change or other scientific body designated by the Office of Long Term Planning and Sustainability; and

(3) The topography of the city of New York as documented in the current FEMA map or other map designated by the Office of Long Term Planning and Sustainability.

b. The first New York City Climate Change Flood Map shall be based on projected conditions in 2080, and updates shall be based on projected conditions no earlier than 2080 or 50 years in the future, whichever is later. The New York City Climate Change Flood Map shall be updated regularly, but no less often than every 10 years.

Amendments to Appendix G of the New York City Building Code:
1. Add a new paragraph (7) to Section G101.1 as follows:

7. Take into account the scientific projections of climate change impacts on flooding, including sea-level-rise and storm frequency and intensity.

2. Add new paragraphs (9) and (10) to Section G101.2 as follows:

9. Ensure that properties are habitable for a reasonable period in the event of service disruptions.
10. Decrease the period during which properties are not habitable after floods.

3. Add new paragraph (3) to section 102.2 as follows:

3. New York City Climate Change Flood Map

4. Amend sections G102.2, G102.3, G102.3.1 and G102.3.2 as follows:

G102.2 Establishment of areas of special flood hazard. The following flood hazard map and supporting data are adopted as referenced standards and declared to be a part of this appendix:

1. FEMA FIS 360497.
2. FEMA FIRMs 360497.
3. New York City Climate Change Flood Map (NYC CCM).

G102.2.1 Applicability of maps. The flood hazard map that results in the greatest degree of flood protection measures shall apply. Until such time as the Office of Emergency Management develops a New York City Climate Change Flood Map, the city’s 100-year flood plain requirements shall apply to developments and properties within the 500-year flood plain in the current FEMA map.

G102.3 Letters of map change. Map changes to FEMA FIRMs 360497 or NYC CCM shall be administered in compliance with Sections G102.3.1 and G102.3.2.

G102.3.1 Letters of map amendment (LOMA). Where FEMA FIRMs 360497 or NYC CCM indicates that a structure or tax lot is within a delineated area of special flood hazard, but the pre-FIRM ground elevations adjacent to the structure or throughout the tax lot are at or above the base flood elevation, the commissioner shall deem such structure or tax lot as being within the area of special flood hazard and shall not approve plans except in compliance with this appendix, unless a letter of map amendment (LOMA) is issued by FEMA removing such structure or tax lot from the area of special flood hazard.

G102.3.2 Letter of map revision based on fill (LOMR-F). Where FEMA FIRMs 360497 or NYC CCM indicates that a structure or tax lot is within a delineated area of special flood hazard, but post-FIRM compacted fill is proposed to be added adjacent to the structure or throughout the tax lot to an elevation at or above the base flood elevation, the commissioner shall deem such structure or tax lot as being within the area of special flood hazard and shall not approve plans except in compliance with this appendix, unless a conditional or final letter of map revision based on fill (LOMR-F) is issued by FEMA removing such structure or tax lot from the area of special flood hazard. The commissioner shall promulgate rules establishing procedures for processing letters of map revision based on fill (LOMR-F).

5. Add a new definition to G201.2 to read as follows:

NEW YORK CITY CLIMATE CHANGE FLOOD MAP (NYC CCM). The flood map or maps developed, maintained, and updated by the City of New York that depicts the coastline at high tide and the flood plains and flood levels of the 100-year flood based on the most current FEMA topographic maps and the scientific projections of climate change impacts a minimum of 50 years in the future.

Supporting Information

Issues – Expanded

New York City is facing real and significant risks due to climate change; with 580 miles of coastline, it will be impacted the most among US cities by sea level rise. To get a clear sense of how climate change will impact New York, in August 2008 the Mayor convened The New York City Panel on Climate Change (NPCC), a group of experts including climate scientists from NASA GISS. The NPCC projects that New York City’s climate will become more like present-day North Carolina’s as temperatures increase by an average of 4 to 7.5 degrees Fahrenheit toward the end of the century and annual precipitation increases by 5 to 10 percent. In addition, the City’s sea levels could rise by 12 to 23 inches by 2080, with a possibility of up to 41 to 55 inches in the extreme ice meltdown scenario.

FEMA’s Flood Insurance Rate Maps (FIRMs) are based on historic weather data (at least 20 years old) and inaccurate topography and bathymetry. In addition, these maps do not show how sea level rise will impact flooding. Without such accurate maps, the city cannot create a viable adaptation strategy.

The City is already updating its maps to reflect current conditions -- partnering with FEMA to develop updated FIRMs that will more accurately delineate flood zones in the city based on current weather information and improved topographical and bathymetrical data, including sea level rise that has already occurred. In addition, the City should develop maps based on the topography of the updated maps that will depict projected impacts of climate change, including sea level rise and an associated increase in coastal flooding, out to 2080. Climate change impact data specific
to New York City has been developed by the New York City Panel on Climate Change (NPCC)\textsuperscript{i}. New development projects, major renovations, extensions, and repurposing of existing buildings should be evaluated using these updated maps to determine if they are in the current 100-year flood zone or will be susceptible to future floods based on climate change projections. Such buildings or projects located within the 100-year flood zone of the NYC CCM should be required to meet the same standards as buildings or projects currently located within the FEMA 100-year flood zone.

**Environmental & Health Benefits**

Basing code requirements on scientific climate change predictions for 2080 will prevent loss of life and property when floods occur. It will also allow properties to recover more quickly and resume operation, thereby reducing economic losses due to loss of use. This measure will also prevent toxic spills, which can occur if hazardous chemicals within flood prone areas are not stored safely. Finally, this measure will protect buildings (and their inhabitants) located within these future flood zones from the negative health impacts of waterborne diseases and mold – both of which are prevalent during and after floods. Potential health effects and symptoms associated with mold exposures include allergic reactions, asthma, and other respiratory complaints.\textsuperscript{ii}

**Cost / Savings**

This proposal is for a study which will have no direct impact on construction costs.

**Precedents**

London, Seattle, San Francisco, and other major world cities are currently developing flood maps based on climate change and exploring the feasibility of tying the building code to these flood maps.

To help regional planning bodies and local planning authorities assess vulnerability to climate change and plan appropriate adaptation strategies, the UK government established the UK Climate Impacts Programme (UKCIP) which in a 2002 report published 4 scenarios providing alternative descriptions of how climate in the UK would evolve over the course of a century. Global mean sea level projections up to 2080 were taken from the Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report (TAR) high estimates. Reports have been updated yearly (most recently 2008).\textsuperscript{iii}

**LEED**

Newly updated maps may redefine the current floodplain location, which could negatively impact properties being eligible for LEED credits that address proximity to floodplains. These credits include LEED ND-SLL prerequisite 6 Floodplain Avoidance; LEED NC-SS cr.1 Site Selection; LEED for Schools SS cr.1 Site Selection; LEED for Homes LL cr.2 Site Selection.

LEED ND specifies that the floodplain is defined and mapped by the Federal Emergency Management Agency or state or local floodplain management entity, whichever has been done most recently. This proposal requires regular updates of flood maps by New York City, ensuring that LEED registrants will be referencing current information.

LEED does not recognize a projected floodplain. Therefore, studies taking into account potential future conditions would not affect LEED certification.

**Implementation & Market Availability**

There are no known implementation issues for this proposal.

**ENDNOTES:**


\textsuperscript{ii} Ibid.
