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Mayor's Office of Long-Term Planning and Sustainability  
c/o Flood Map Comments  
253 Broadway, 10th Floor  
New York, NY 10007

Federal Emergency Management Agency Region II  
26 Federal Plaza  
New York, NY 10278-0002

**Re: Federal Emergency Management Agency (FEMA) Preliminary Flood Insurance Rate Maps (FIRMs) and Preliminary Flood Insurance Study (FIS) for New York City**

Dear Mayor's Office of Long-Term Planning and Sustainability and FEMA Region II:

Thank you for the opportunity to comment on the Federal Emergency Management Agency (FEMA) Preliminary Flood Insurance Rate Maps (FIRMs) and Preliminary Flood Insurance Study (FIS) for New York City that was released in December 2013. These comments are submitted by the Natural Resources Defense Council (NRDC), which works on behalf of our more than 1.4 million members and online activists to ensure a safe and healthy environment for all living things. With offices in New York, Washington, D.C., San Francisco, Los Angeles, Chicago, Montana, and Beijing, our staff of more than 400 lawyers, scientists, policy analysts and others, works to protect the environment and public health through advocacy and education.

NRDC is supportive of FEMA's efforts to update its FIRMs for New York City. Up-to-date maps are essential for informing the public and local officials about the risks of flooding. More importantly, having a complete and accurate understanding of the city's current *and* future flood risks is necessary to ensure that the work to rebuild New York City in the wake of Hurricane Sandy will actually enhance communities' resilience to future flooding rather than continuously put lives and properties in harm's way.

However, New York City faces increasing flood risks due to climate change and the Preliminary FIRMs and FIS fail to take into account climate change impacts, such as anticipated sea level rise. The maps should therefore be revised to include climate change impacts, as well

as information from recent storms like Hurricane Sandy, before they are finalized. Moreover, in 2012, Congress required FEMA to consider climate change impacts when updating FIRMs. FEMA itself has already recognized the importance of integrating climate change adaptation into its programs and policies and is doing so in other areas of disaster preparedness. In addition, sea level rise data and other relevant local scientific information are readily available. For these reasons, and because failure to factor climate change-related risks into FIRMs will have significant impacts, we encourage FEMA to recalculate the city's flood maps using the most up-to-date and relevant information.

Thank you for considering our recommendations. Our detailed comments follow below.

## I. New York City Faces Increasing Flood Risks Due to Effects of Climate Change

As the climate warms, the nation's flood risks will increase. According to a 2013 FEMA report, rising sea level, coupled with stronger and more frequent storms, will put coastal communities, on average, at a 55% greater risk of flooding by 2100.<sup>1</sup> As such, New York City's communities are especially vulnerable to the impacts of climate change given its extensive low-lying coastal areas and tidally influenced rivers.

The reconvened New York City Panel on Climate Change (NPCC2) released a report in June 2013, stating that sea level rise that has already occurred over the last century increased the extent and the magnitude of coastal flooding in the New York City area during Hurricane Sandy.<sup>2</sup> Since 1900, sea level at New York City (the Battery) has risen 1.1 feet.<sup>3</sup> The NPCC2 report also made future climate projections for New York City. By 2020, sea level is anticipated to rise 4 to 8 inches under the middle range of projections, and 11 inches under a high estimate projection.<sup>4</sup> By 2050, sea level rise is anticipated to rise 11 to 24 inches under the middle range of projections, and 31 inches under a high estimate projection.<sup>5</sup> Furthermore, the NPCC2 Report went on to state, "Any increase in the frequency or intensity of storms would result in even more frequent future flood occurrences relative to the current 1-in10 and 1-in-100 coastal flood events."<sup>6</sup> The dire conclusion drawn from this is that future sea level rise coupled with more intense and frequent storms will increase the frequency, extent, and height of coastal flooding for New York City.<sup>7</sup>

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1 Federal Emergency Management Agency, *The Impact of Climate Change and Population Growth on the National Flood Insurance Program through 2100*, June 2013, 6-1, available at [http://www.aecom.com/deployedfiles/Internet/News/Sustainability/FEMA%20Climate%20Change%20Report/Climate Change Report AECOM 2013-06-11.pdf](http://www.aecom.com/deployedfiles/Internet/News/Sustainability/FEMA%20Climate%20Change%20Report/Climate%20Change%20Report%20AECOM%202013-06-11.pdf).

2 New York City Panel on Climate Change, *Climate Risk Information 2013: Observations, Climate Change Projections, and Maps*, June 2013, 8, available at [http://www.nyc.gov/html/planyc2030/downloads/pdf/npcc climate risk information 2013 report.pdf](http://www.nyc.gov/html/planyc2030/downloads/pdf/npcc%20climate%20risk%20information%202013%20report.pdf) ("NPCC2 Report").

3 *Id.* at 7.

4 *Id.* at 18.

5 *Id.*

6 *Id.* at 20.

7 *Id.*

## II. The Accuracy of the FIS is Undermined by Not Using the Most Relevant Historical Data

### a. The FIS Failed to Incorporate Data from Hurricane Sandy

While the FIS incorporated new topographic data from 2010 and a new coastal analysis, the benefit of the updated FIRMs is undermined by the fact that they are based on historical data that does not include recent information from Hurricane Sandy. As explained in more detail below, historical data related to flood and storm events can no longer be relied upon as the *sole* predictors of future risks. That being said, the historical data that is used must, at a minimum, include the most recent, relevant information. The 2013 FIS was underway when Hurricane Sandy hit in October 2012 and it was decided that data from the event would not be included in the study.<sup>8</sup> This is a major flaw in the FIS. Data from recent events like Hurricane Sandy should not only be considered, but should be prioritized as it may capture some of the effects of climate change that have already occurred or are likely to in the near future. While the FIS envisions that maps and flood elevations will be amended periodically to reflect future changes<sup>9</sup>, the longer FEMA waits to update information, the longer people are at risk and the more infrastructure will be constructed that will provide insufficient levels of protection.

### b. Preliminary FIRMS May Not Show Areas Actually Inundated by Hurricane Sandy as High-Risk Flood Zones

Inundation data from Hurricane Sandy is available and should be used to inform final revisions to the Preliminary FIRMs. In comparing maps showing Hurricane Sandy storm surge<sup>10</sup> extent with the Preliminary FIRMs<sup>11</sup>, one can see areas of discrepancy that should be a cause for further review. For example, the inundation maps indicate the area around the Rockaway Beach Boardwalk (at Beach 98 St.) in Queens as having been flooded. However, the Preliminary FIRM designates this same area as an X flood zone, and therefore having a minimal or moderate risk of flooding and as being outside the 1-percent and .2-percent-annual-chance floodplains. These discrepancies further illustrate the need for FEMA to incorporate data from Hurricane Sandy before finalizing New York City's Preliminary FIRMs.

### c. The FIS Failed to Incorporate Recent Sea Level Rise for New York City

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8 Federal Emergency Management Agency, *Flood Insurance Study, City of New York, Bronx, Queens, New York, Kings, and Richmond Counties, New York*, 22 December 5, 2013 ("FIS").

9 *Id.* at 11.

10 2012 Sandy inundation map, available at

<http://www.arcgis.com/home/webmap/viewer.html?webmap=82a2fa929168434dabb6a3970e1d38e0>.

11 New York City Preliminary FIRM, available at

<http://apps.femadata.com/PreliminaryViewer/?appid=687703427dd347018b8fa2bb0adee979>.

The Coastal Analysis in the FIS appears to be based on information contained in FEMA's 2011 Model Validation for FEMA Region II Storm Surge Study (2011 Storm Surge Study).<sup>12</sup> For calibration and reporting purposes, the 2011 Storm Surge Study compared high water mark (HWM) data for historic storm events with the most current National Tidal Datum Epoch (NTDE) that is based on the 19-year period of 1983-2001. Therefore, the analysis and results for the 2011 Storm Surge Study, and thereby the FIS, are tied to sea level elevations that are no longer correct by not incorporating the most recent data on sea level rise. The 2013 NPCC2 Report found that the observed sea level rise in New York City has averaged 1.2 inches per decade since 1900.<sup>13</sup> While land subsidence is a contributing factor, the report also stated that approximately 45 percent of the observed sea level rise since 1900 is due to land subsidence, with the remaining sea level rise driven by climate-related factors.<sup>14</sup> As such, sea levels may have increased by as much as a quarter foot relative to the current NTDE.

### **III. Climate Change Impacts Should Be Incorporated Before Finalizing New York City FIRMs**

#### **a. Pursuant to the Biggert-Waters Flood Insurance Reform Act of 2012 ("Biggert-Waters"), FEMA is Now Required to Consider Climate Change Impacts When Updating FIRMs**

Traditionally, FEMA has used only historical storm information to determine where flood zones should be mapped. This mapping practice was changed after the passage of the Biggert-Waters Flood Insurance Reform Act<sup>15</sup> ("Biggert-Waters") in 2012, which directs FEMA to use "any relevant information... relating to the best available science regarding future changes in sea levels, precipitation, and intensity of hurricanes" when updating flood maps. While the process of updating the New York City's flood maps began in 2010, and thus before the passage of Biggert-Waters, FEMA should nevertheless comply with the mapping mandate of Biggert-Waters. Accounting for the future effects of climate change when updating and revising FIRMs is the only way to ensure that maps reflect the true extent of a community's flood risk. To do anything less would result in putting billions of dollars and millions of lives at stake.

#### **b. The FIS Failed to Consider the Effects of Climate Change on New York City's Flood Risks**

The purpose of the FIS is to revise and update previous FIRMs based on new information and thereby enable local and regional planners to further promote sound land use and floodplain development. However, the accuracy and long-term benefit of the FIS is undermined

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12 Draft Report Redefinition of the Coastal Flood Hazard Zones in FEMA Region II: Analysis of the Coastal Storm Surge Flood Frequencies Summary and Background of Restudy. August 2011. Available at [https://www.rampp-team.com/documents/region2/storm\\_surge/Supporting%20Documents%202011\\_11\\_10.pdf](https://www.rampp-team.com/documents/region2/storm_surge/Supporting%20Documents%202011_11_10.pdf)

13 NPCC2 Report at p. 11.

14 *Id.*

15 The Biggert-Waters Flood Insurance Reform Act of 2012, Pub. L. No: 112-141., § 100216(b) (H.R. 4348, 112th Cong., 2012), available at <http://www.gpo.gov/fdsys/pkg/PLAW-112publ141/pdf/PLAW-112publ141.pdf>.

by the fact that the supporting analyses did not take into account anticipated sea level rise or projected increases in the frequency and severity of future storms and precipitation events when it updated New York City's FIRMs. For example, the discussion on New York City's coastal flooding risks was limited to a description of the coastal flood damage in and around the city that was caused by the November 1950, November 1953, September 1960, March 1962, and December 1992 storms.<sup>16</sup> Moreover, as described in the FIS, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for the study.<sup>17</sup> However, the FIS goes on to state, "The acceptability of all assumed hydraulic factors, cross sections, and hydraulic structure data was checked by calibrating computed flood profiles to known *historic* [emphasis added] flood profiles."<sup>18</sup> As a result, flood zones were plotted on maps using solely historical data and without any forward-looking analysis.

Past flood records are no longer reliable predictors of future risks as our rapidly warming climate is quickly changing the probabilities of rare and unusual natural disasters. Use of historical data must be coupled with credible projections of future conditions. FEMA's reliance on historical data, as a result, would likely lead to an underestimation of New York City's flood risks, even if using the latest and most advanced hydrologic and hydraulic modeling technologies.<sup>19</sup>

As discussed above, New York City will experience more and higher coastal floods as a result of climate change. In order for FEMA to develop maps that capture New York City's growing vulnerability to coastal flooding – and thereby reflect the city's true extent of future flooding – the agency must factor in the effects of climate change, including anticipated sea level rise and more frequent and intensified storms.

**c. FEMA has Already Recognized the Importance of Integrating Climate Change Adaptations into the Agency's Programs, Policies, and Operations; Sea Level Rise Data for New York City is Readily Available**

On December 23, 2013, FEMA issued guidance through its Regional offices to state, local, tribal, and territorial partners on the ability to incorporate sea level rise estimates in Hazard Mitigation Assistance (HMA) project grant applications.<sup>20</sup> Pursuant to the instructions outlined in the President's Executive Order – Preparing the United States for the Impacts of

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16 FIS at 10.

17 *Id.* at 13.

18 *Id.* at 18.

19 Philip Orton, a physical oceanographer at the Stevens Institute of Technology and who served as a technical reviewer on the recently released New York City FIRMs, believed that if future sea level rise had been taken into account, the flood zone would likely have been much larger. See Katherine Bagley, "Climate Change Impacts Absent from FEMA's Redrawn NYC Flood Maps", *InsideClimate News*, February 6, 2013, available at <http://insideclimatenews.org/news/20130204/climate-change-global-warming-flood-zone-hurricane-sandy-new-york-city-fema-federal-maps-revised-sea-level-rise>.

20 FEMA Hazard Mitigation and Sea Level Rise, available at <http://www.fema.gov/media-library/assets/documents/89659>.

Climate Change, this initiative shows FEMA's commitment to incorporate climate change adaptations into its programs, policies, and operations. This commitment, however, should not be limited to FEMA's HMA grant programs; instead, the agency needs to recognize the importance of integrating climate change considerations into *all* aspects of its agency planning, including its Flood Hazard Mapping Program. Given our nation's increasing flood risks due to projected sea level rise and increases in storm intensity and frequency, FEMA must take into account such anticipated effects in its flood maps in order to effectively prepare the nation for the impacts of climate change.

Moreover, FEMA's decision to allow HMA grants to include consideration of future sea level rise represents a new and important opportunity for communities to receive funding to prepare for climate change. Previously, if an HMA applicant wanted to make repairs or improvements that took into account sea level rise, any additional costs could not be factored into FEMA's benefit-cost analysis and therefore may not be covered. Now, such improvements can receive funding and help communities become more resilient to the impacts of sea level rise and climate change.

To help state and local jurisdictions include sea level rise data into their HMA applications, FEMA recommends the following federal government sources for relative sea level rise data along coastal areas:

- The National Oceanic and Atmospheric Administration Center for Operational Oceanographic Products and Service' Mean Annual SLR Trend Data;
- The U.S. Army Corps of Engineers Climate Adaptation Sea Level Change Curves; and
- Globalchange.gov, which provides more information specific to New Jersey and New York.<sup>21</sup>

As listed above, ample data on anticipated sea level rise for New York City already exists. Thus, FEMA has no excuse but to use this readily available information in order to consider the effects of rising sea levels on the city's flood risks, and update FIRMs accordingly.

#### **d. Failure to Factor Climate Change-Related Risks Into FIRMs Will Have Significant Impacts**

The updated maps are intended to help New York officials determine the best policies for rebuilding in the wake of Hurricane Sandy. However, if the maps do not account for projected impacts of climate change, they may be underestimating the flood risks facing New York City's communities. As a result, property owners will be wasting money and putting their

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21 Incorporating Sea Level Rise (SLR) into Hazard Mitigation Assistance (HMA) Benefit Cost-Analysis Frequently Asked Questions (FAQs), available at <http://www.fema.gov/media-library-data/1387903260455-e6faefb55a3f69d866994fb036625527/HMA+Sea+Level+Rise+FAQ+12-23-2013.pdf>.



lives and properties at risk by either rebuilding in equally or more vulnerable areas as before or by accommodating structures to meet building codes that will have to be revised in a few years. Furthermore, failure to consider how future conditions will increase the risk of flooding may lead to construction of flood protection and resiliency projects that are inadequate to protect people and properties both now and into the future. In either scenario, it means that communities will continue to live in harm's way and face repetitive flooding all because of inadequate information that fails to capture the true risks of flooding.

Given that the National Flood Insurance Program is approximately \$28 billion in debt<sup>22</sup>, FEMA cannot afford to keep ignoring the climate change impacts on the nation's flood risks. Instead, FEMA must develop flood maps that accurately reflect the true extent of the city's coastal flood risks. To do so, FEMA must factor in the effects of climate change, including future sea level rise and more changes in storm frequency and intensity, and assess how these impacts may affect the type and spatial extent of the city's current flood zones.

The growing vulnerability to flooding that New York City faces is just one example of how climate change is affecting communities across the country. FEMA must integrate climate change preparedness planning into its overall flood risk management strategy to prevent avoidable future flood damages and potential loss of life. As a first step, FEMA should revise New York City's Preliminary FIRMs to reflect the increasing flood risks that its communities face as a result of rising seas and climate change.

Thank you for the opportunity to comment on FEMA Preliminary FIRMs and Preliminary FIS for New York City. We strongly urge FEMA to adopt our recommendations set forth above to ensure that New York City residents can be best protected from future flood hazards and damages. If you should have any questions, please do not hesitate to contact us.

Sincerely,

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22 Shiva Polefka, *Moving Out of Harm's Way*, Center for American Progress (December 12, 2013), 4.