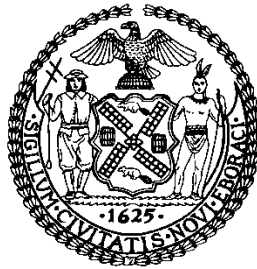


Resiliency & Waterfronts Committee  
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**THE NEW YORK CITY COUNCIL**

Jeffrey Baker, Legislative Director

**COMMITTEE REPORT OF THE INFRASTRUCTURE DIVISION**

Terzah Nasser, Deputy Director

**COMMITTEE ON RESILIENCY AND WATERFRONTS**

Hon. Justin Brannan, Chair

October 27, 2020

**OVERSIGHT: 8TH ANNIVERSARY OF SUPERSTORM SANDY AND THE 2020 HURRICANE SEASON**

## **INTRODUCTION**

On October 27, 2020, the Committee on Resiliency and Waterfronts, chaired by Council Member Justin Brannan, will hold an oversight hearing entitled “8<sup>th</sup> Anniversary of Superstorm Sandy and the 2020 Hurricane Season.” The Committee expects to hear testimony from the Mayor’s Office of Resiliency, New York City Emergency Management, climate experts, environmental and housing advocates, and interested members of the public.

## **BACKGROUND**

### SUPERSTORM SANDY

On October 29, 2012, Superstorm Sandy approached New York City from the southeast, causing high winds and a 14-foot storm surge.<sup>1</sup> Sections of Lower Manhattan, Staten Island, Brooklyn and Queens were inundated with seawater. The Superstorm flooded approximately 17% of New York City’s total land mass, or 51 square miles.<sup>2</sup> By the end of 2012, the Department of Buildings (DOB) identified approximately 800 buildings as damaged or destroyed and thousands of housing units were found to have suffered some amount of damage.<sup>3</sup>

Superstorm Sandy caused an estimated \$19 billion in losses in New York City.<sup>4</sup> Along with damage to residential and commercial property, the storm damaged critical city infrastructure and services. Close to 2 million people lost power at some point during the storm.<sup>5</sup> Con Edison’s steam system was unable to service one-third of its customers for nearly two weeks.<sup>6</sup> Flood damage at

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<sup>1</sup> Brian Kahn, "Sandy’s Surge Was Extreme. It Could Become Normal" CLIMATE CENTRAL (October 10, 2016), <http://www.climatecentral.org/news/sandys-surge-climate-change-20776>

<sup>2</sup> James Barron, "New York’s Next Nickname: The Big Sponge?" THE NEW YORK TIMES (September 27, 2018), <https://www.nytimes.com/2018/09/27/nyregion/new-york-flooding.html>

<sup>3</sup> NYC Special Initiative for Rebuilding and Resiliency Report, A Stronger, More Resilient New York, Foreword from Michael Bloomberg, <https://www1.nyc.gov/office-of-the-mayor/news/201-13/mayor-bloomberg-outlines-ambitious-proposal-protect-city-against-effects-climate-change>

<sup>4</sup> Id.

<sup>5</sup> PlaNYC, “Sandy and Its Impacts,” available at [http://www.nyc.gov/html/sirr/downloads/pdf/final\\_report/Ch\\_1\\_SandyImpacts\\_FINAL\\_singles.pdf](http://www.nyc.gov/html/sirr/downloads/pdf/final_report/Ch_1_SandyImpacts_FINAL_singles.pdf)

<sup>6</sup> Id.

critical facilities in Southern Manhattan, Red Hook, and the Rockaways disrupted landline and Internet service for up to 11 days.<sup>7</sup> Six hospitals and 500 buildings with doctors' offices, clinics, and other outpatient facilities were forced to close due to flooding.<sup>8</sup>

On October 8, 2018, the Intergovernmental Panel on Climate Change ("IPCC") released a special report on the impacts of global warming of 1.5°C above preindustrial levels.<sup>9</sup> According to the report, peak temperature increase beyond 2°C will lead to long-lasting and irreversible changes, such as ecosystem loss.<sup>10</sup> Climate change is expected to continue exacerbating extreme weather events, leading to stronger and more frequent storms like Superstorm Sandy.<sup>11</sup> At a City Council hearing in April 2018, the Director of the Mayor's Office for Recovery and Resiliency testified that by 2050, New York City's annual precipitation is "projected to increase between 4 and 11 percent" and that sea levels are "projected to rise between 11 inches and 21 inches, on top of a foot of sea level rise that we have already witnessed since 1900."<sup>12</sup> For New York City's waterfront communities, this is a life- and property- threatening reality. Further, extreme weather events could cost \$90 billion in damages in 2050, compared to the \$19 billion caused by Superstorm Sandy.<sup>13</sup>

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<sup>7</sup> Id.

<sup>8</sup> Id.

<sup>9</sup> Intergovernmental Panel on Climate Change, "Global Warming of 1.5°C: Summary for Policymakers" at 3 (October 2018), <http://ipcc.ch/report/sr15/>

<sup>10</sup> Id.

<sup>11</sup> Union of Concerned Scientists. The Science Connecting Extreme Weather to Climate Change. <https://www.ucsusa.org/sites/default/files/attach/2018/06/The-Science-Connecting-Extreme-Weather-to-Climate-Change.pdf>

<sup>12</sup> Testimony of Jainey Bavishi, "New York City Council Hearing of the Environmental Protection Committee," (April 12, 2018), <http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3427962&GUID=850E9004-2D8A-41C6-A453-873D06F8D594&Options=&Search=>

<sup>13</sup> Id.

## A. Flooding

A report by the National Oceanic and Atmospheric Administration (NOAA) finds that by 2100, "high tide flooding will occur 'every other day' (182 days/year) or more often under the Intermediate Low Scenario within the Northeast and Southeast Atlantic. . ."<sup>14</sup> The report also projects that the low and high end estimates of high tide flood frequency along the coast of the Northeast Atlantic "will reach on average about 235 and 365 days/year (with 95 and 100% from tides)" respectively.<sup>15</sup> New York City's waterfront communities face significant threats from extreme weather events and high tides, and projections show that these communities will experience greater and more frequent damage because of climate-related weather events and sea level rise. Neighborhoods such as Broad Channel, Howard Beach, Hamilton Beach,<sup>16</sup> Rosedale, Far Rockaway, Coney Island, Stapleton, Arrochar, and Midland Beach,<sup>17</sup> where eight New Yorkers drowned in Sandy's floodwaters,<sup>18</sup> already regularly experience tidal inundation, a trend that will only be exacerbated by continued sea level rise. (See Figure 1)

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<sup>14</sup> National Oceanic and Atmospheric Administration (NOAA), Patterns and Projections of High Tide Flooding Along the U.S. Coastline Using a Common Impact Threshold," (February 2018) at ix, [https://tidesandcurrents.noaa.gov/publications/techrpt86\\_PaP\\_of\\_HTFlooding.pdf](https://tidesandcurrents.noaa.gov/publications/techrpt86_PaP_of_HTFlooding.pdf)

<sup>15</sup> Id. at 25

<sup>16</sup>Nathan Kensinger. In Queens, chronic flooding and sea-level rise go hand in hand. October 12, 2017. Curbed NY. <https://ny.curbed.com/2017/10/12/16462790/queens-climate-change-jamaica-bay-flooding-photos>

<sup>17</sup> Amy Plitt. These NYC Neighborhoods Experience Chronic Street Flooding. December 3, 2018. Curbed NY. <https://ny.curbed.com/2018/12/3/18015910/new-york-weather-street-flooding-rainfall>

<sup>18</sup> Id.

Figure 1: Potential progression of monthly tidal flooding from present through 2100<sup>19</sup>

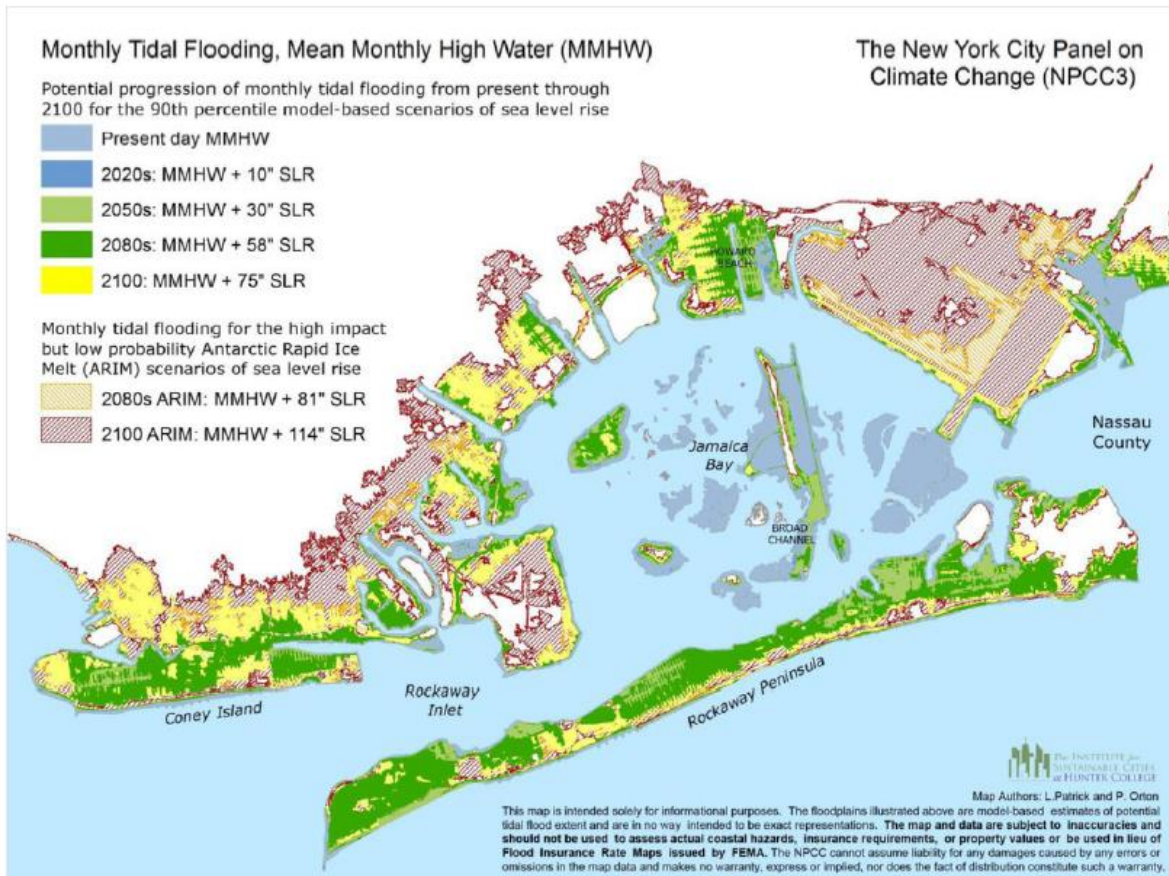


Figure 1 shows the areas around Jamaica Bay and Coney Island that flood during monthly tidal flooding and how those areas will increase and expand landward through 2100.

## B. Sea Level Rise

With 520 miles of coastline bordering the ocean, rivers, bays and inlets, New York City is particularly vulnerable to the impacts of sea-level rise, storm surge, and high-tide or sunny-day

<sup>19</sup> Orton et al. New York City Panel on Climate Change 2019 Report Chapter 4: Coastal Flooding. New York Academy of Sciences. <https://nyaspubs.onlinelibrary.wiley.com/doi/10.1111/nyas.14011>

flooding.<sup>20</sup> According to a Union of Concerned Scientists study published in 2018, New York State ranks third in the nation for most homes at risk of coastal inundation by the end of the century.<sup>21</sup> The East and Gulf Coasts of the United States are undergoing some of the fastest rates of sea level rise, with coastal flooding rates in 2012 averaging once every three months, up from once every five years in the 1950's.<sup>22</sup> Nationally, more than 300,000 homes with a collective value of \$117.5 billion dollars, and 14,000 commercial properties valued at \$18.5 billion dollars are at risk of chronic flooding within the next 30 years.<sup>23</sup> In the state of New York, 15,500 homes representing a population of approximate 42,000 people and valued at approximately 8.5 billion dollars, mostly clustered in Long Island (Hempstead, Babylon), and Queens, risk chronic inundation by 2045.<sup>24</sup> By 2100, 143,000 properties housing approximately 366,000 people, and valued at approximately 98 billion dollars, risk the same fate.<sup>25</sup> The homes at risk by 2045 contributed about 170 million dollars in tax revenue by 2018 figures, and those at risk by 2100 represent 2 billion dollars of tax revenue.<sup>26</sup> The 2,700 homes at risk in Queens by 2045 are largely concentrated in environmental justice communities.<sup>27</sup>

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<sup>20</sup> Sunny day flooding, also known as tidal flooding, is the temporary inundation of low lying areas due to exceptionally high tide events.

<sup>21</sup> New Study Finds 143,000 New York Homes Worth \$98 Billion will be at Risk from Tidal Flooding. <https://www.ucsusa.org/press/2018/new-study-finds-143000-new-york-homes-at-risk-from-tidal-flooding>

<sup>22</sup> Dahl, K.A. et al.. Effective inundation of continental United States communities with 21st century sea level rise. *Elem Sci Anth*, 5, p.37. 2017 DOI: <http://doi.org/10.1525/elementa.234>

<sup>23</sup> New Study Finds 143,000 New York Homes Worth \$98 Billion will be at Risk from Tidal Flooding. <https://www.ucsusa.org/press/2018/new-study-finds-143000-new-york-homes-at-risk-from-tidal-flooding>

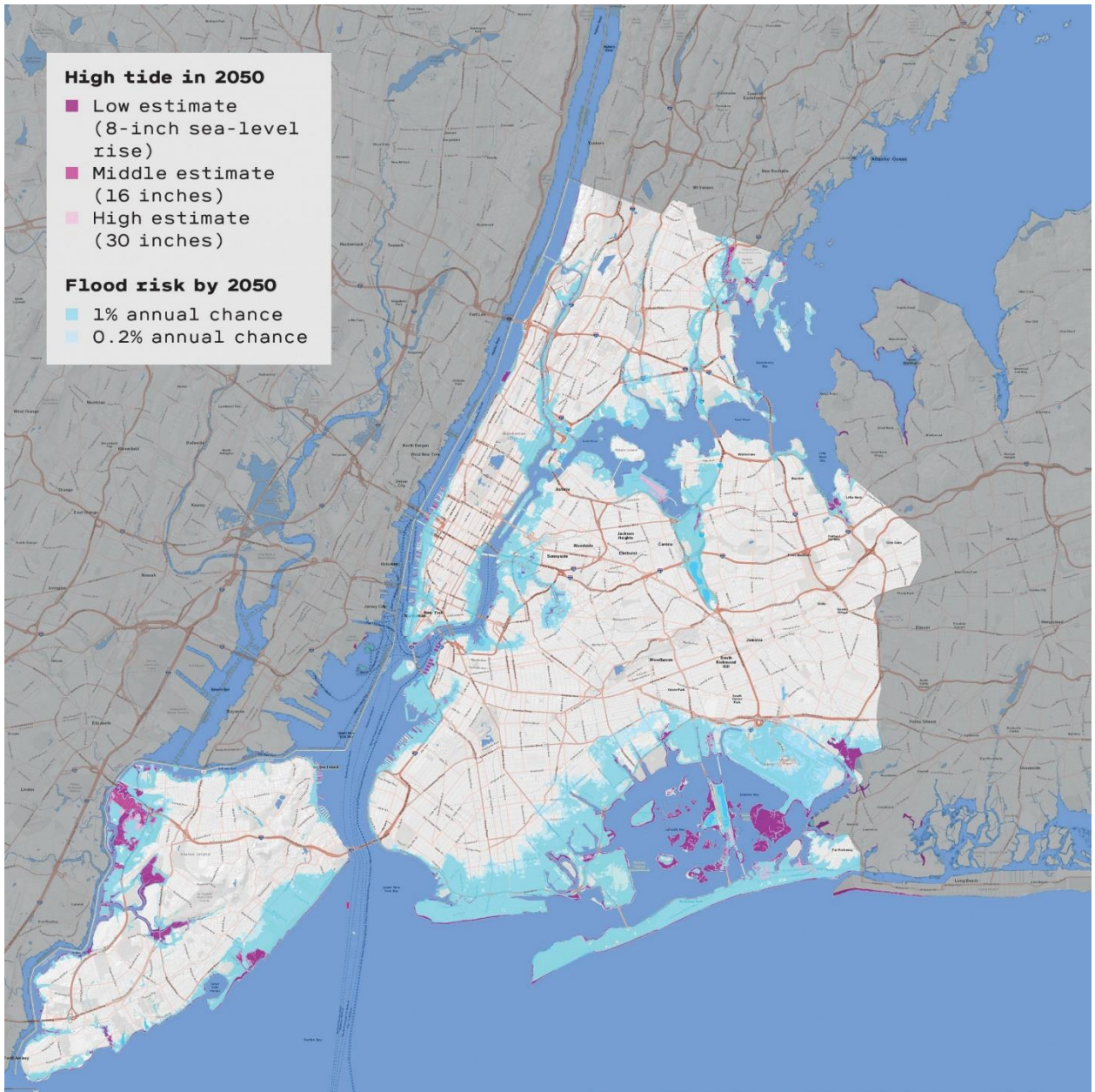
<sup>24</sup> Id.

<sup>25</sup> Id.

<sup>26</sup> Id.

<sup>27</sup> Id.

Figure 2: 100 Year Flood Plain in 2050<sup>28</sup>



<sup>28</sup> MIT Technology Review. The Mind Boggling Task of Protecting NYC from Rising Seas. <https://www.technologyreview.com/s/613329/the-mind-boggling-task-of-protecting-new-york-city-from-rising-seas/>

Figure 2 shows the areas of the City that will be within the 100-year flood zone and those areas that will be at risk of flooding from high tide events by 2050. Most of the city's coastline faces potential impacts.

Figure 3: 500 Year Flood Plain in 2050<sup>29</sup>



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<sup>29</sup> New York City Office of the Comptroller, Scott Stringer. Safeguarding Our Shores Protecting New York City's Coastal Communities from Climate Change. <https://comptroller.nyc.gov/reports/safeguarding-our-shores-protecting-new-york-citys-coastal-communities-from-climate-change/>



Figure 3 shows the areas of the City that will be at risk of flooding by a 500-year storm by 2050. This area encompasses a majority of the neighborhoods surrounding Jamaica Bay, much of the north and east shores of Staten Island, and large swaths of land adjacent to the East River.

### C. Storm Surge

New York suffered unprecedented levels of storm surge during Superstorm Sandy.<sup>30</sup> At The Battery, a NOAA tide gauge on the southern tip of Manhattan, where tidal records go back to 1920, the storm tide reached 14.06 ft. above Mean Lower Low Water (MLLW), 4.36 ft. higher than the previous record set in December 1992.<sup>31</sup> Parts of Staten Island and Manhattan experienced above ground inundation levels of 4-9 feet due to storm surge, Brooklyn and Queens saw inundation levels ranging from 3-6 feet, and the Bronx saw inundation levels of 2-4 feet.<sup>32</sup> Storm surge related flooding was reported as far up the Hudson River as Albany, with many cities along the banks experiencing 4-5 feet of inundation above ground level.<sup>33</sup> Across the affected area, storm surge was responsible for 57% of the reported fatalities linked to Superstorm Sandy.<sup>34</sup>

### 2020 HURRICANE SEASON

In May, just weeks before the official June 1 start to the 2020 hurricane season, the NOAA Climate Prediction Center, a division of the National Weather Service, predicted a 60% chance of an above-normal hurricane season. They predicted 13 to 19 named storms (winds of 35 mph or higher), with 6 to 10 becoming hurricanes (winds of 74 mph or higher) and 3 to 6

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<sup>30</sup> National Oceanic and Atmospheric Administration. Tropical Cyclone Report Hurricane Sandy [https://www.nhc.noaa.gov/data/tcr/AL182012\\_Sandy.pdf](https://www.nhc.noaa.gov/data/tcr/AL182012_Sandy.pdf)

<sup>31</sup> Id.

<sup>32</sup> Id.

<sup>33</sup> Id.

<sup>34</sup> Id.

becoming major hurricanes (with winds of 111 mph or higher).<sup>35</sup> Two months after the season's official start, Colorado State University released updated storm predictions and called for an "extremely active" 2020 hurricane season, with 24 named storms and 12 hurricanes.<sup>36</sup>

2020 has so far been one of the most active hurricane seasons recorded.<sup>37</sup> In fact, the Greek Alphabet is now being used to name storms, only the second time in history other than 2005.<sup>38</sup> With less than two months remaining, the 2020 hurricane season has had a record breaking 27 named storms in the Atlantic, which doubles the average named storms for an entire hurricane season.<sup>39</sup> Of those 27 storms, ten have been hurricanes and ten storms have made landfall in the United States, surpassing the record of the 1916 hurricane season,<sup>40</sup> and close to breaking all of the records of the 2005 hurricane season, which saw 28 named storms.<sup>41</sup> On September 18, 2020, three named storms, Tropical Storm (TS) Wilfred, TS Beta and Subtropical Storm Alpha, formed within 24 hours, marking the second such occurrence on record.<sup>42</sup>

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<sup>35</sup> National Oceanic and Atmospheric Administration, Busy Atlantic hurricane season predicted for 2020, May 21, 2020, available at: <https://www.noaa.gov/media-release/busy-atlantic-hurricane-season-predicted-for-2020>.

<sup>36</sup> Colorado State University Department of Atmospheric Science, Forecast of Atlantic Seasonal Hurricane Activity and Landfall Strike Probability for 2020, Aug. 5, 2020, available at: <https://tropical.colostate.edu/Forecast/2020-08.pdf>.

<sup>37</sup> Bob Henson, Why the 2020 Atlantic Hurricane Season Has Spun Out of Control, The Washington Post, September 24, 2020, available at: <https://www.pressdemocrat.com/article/news/why-the-2020-atlantic-hurricane-season-has-spun-out-of-control/>

<sup>38</sup> Lauren Olesky, The 2020 Record-breaking Hurricane Season, CBS12, October 5, 2020, available at: <https://cbs12.com/news/local/the-2020-record-breaking-hurricane-season>

<sup>39</sup> Bob Henson, Why the 2020 Atlantic Hurricane Season Has Spun Out of Control, The Washington Post, September 24, 2020, available at: <https://www.pressdemocrat.com/article/news/why-the-2020-atlantic-hurricane-season-has-spun-out-of-control/>

<sup>40</sup> Lauren Olesky, The 2020 Record-breaking Hurricane Season, CBS12, October 5, 2020, available at: <https://cbs12.com/news/local/the-2020-record-breaking-hurricane-season>

<sup>41</sup> Jeff Berardelli, Tropical Storm Zeta Expected to Strengthen into Hurricane and Make Landfall on Gulf Coast, CBS News, October 25, 2020, available at: <https://www.cbsnews.com/news/tropical-storm-zeta-expected-to-strengthen-into-hurricane-and-make-landfall-on-gulf-coast/>.

<sup>42</sup> Joe Mario Pederson, Hurricane Season 2020: One Nonstop Record-Breaking Year, Orlando Sentinel, September 24, 2020, available at: <http://www.orlandosentinel.com/weather/hurricane/os-ne-hurricane-season-2020-nonstop-record-breaking-year-20200924-7m6bf6fxqnbq5kxrmb26riu4ve-story.html>

## Tropical Storm Isaias

Tropical Storm (TS) Isaias was a Category 1 hurricane when it made landfall in North Carolina on August 3, 2020, and caused approximately \$4 billion in damages along the east coast of the United States.<sup>43</sup> Within a day of landfall, the storm was downgraded to a tropical storm and proceeded up the east coast of the United States. TS Isaias still delivered heavy rain and strong winds upon reaching New York City, New Jersey and Connecticut.<sup>44</sup> Strong winds were measured around New York City with gusts reaching up to 78 mph in Battery Park in Manhattan, 70 mph at John F. Kennedy Airport in Queens and 69 mph at LaGuardia Airport in Queens.<sup>45</sup>

TS Isaias destroyed some outdoor dining areas throughout the City, suspended railroad services and downed many trees and power lines.<sup>46</sup> The severe weather left nearly 267,000 New York City and Westchester County Con Edison customers without power, which surpassed the 204,000 outages caused by Hurricane Irene in 2011.<sup>47</sup> The borough of Queens had the most power outages with nearly 50,000 residents without power, and Staten Island residents were hit the hardest per capita with 36,000 without power after TS Isaias.<sup>48</sup> Further, approximately 22,700 customers did not have power in the Bronx, 10,057 in Brooklyn and 67 in Manhattan after the storm.<sup>49</sup> In fact, TS Isaias caused the second biggest power outage for customers in Con Edison's

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<sup>43</sup> "RMS Estimates Insured Losses from Hurricane Isaias at \$3-\$5 Billion," Insurance Journal (August 17, 2020), available at: <https://www.insurancejournal.com/news/national/2020/08/17/579240.htm>

<sup>44</sup> Mihir Zaveri and Ed Shanahan, "2.5 Million Lose Power and One Is Killed as Isaias Batters N.Y. Area," THE NEW YORK TIMES (August 4, 2020), available at: <https://www.nytimes.com/2020/08/04/nyregion/isaias-ny.html>

<sup>45</sup> Brandon Miller, "Powerful Winds Have Arrived in New York City," CNN (August 4, 2020), available at: <https://www.cnn.com/us/live-news/isaias-storm-08-04-2020/index.html>

<sup>46</sup> Troy Closson, "After Isaias, When Will Power Be Back?" The New York Times, (August 6, 2020), available at: <https://www.nytimes.com/2020/08/06/nyregion/power-outage-ny-nj-ct.html>

<sup>47</sup> Id.

<sup>48</sup> Clifford Michel, "Isaias Delivers Power Outages and Powerful Reminder of NYC's Vulnerability, Years After Superstorm Sandy," THE CITY (August 4, 2020), available at: <https://www.thecity.nyc/2020/8/4/21355163/isaias-power-outages-blackout-trees-superstorm-sandy>

<sup>49</sup> Spectrum New Staff, "Isaias Power Outages Second-Largest in Con Ed's History, Behind Only Sandy," Spectrum New NY1, (August 5, 2020), available at: <https://www.ny1.com/nyc/all-boroughs/news/2020/08/05/power-outages-in-nyc-today-tropical-storm-isaias-damage>

history behind Superstorm Sandy in 2012, which caused approximately 1.1 million<sup>50</sup> outages.<sup>51</sup> Con Edison stated that the storm brought down more than 7,000 wires throughout the City.<sup>52</sup> The storm also caused a vacant three-story building in Brooklyn to partially collapse.<sup>53</sup>

The City received nearly 22,000 tree-related Service Requests as a result of TS Isaias, including downed trees, downed tree limbs and dangling tree limbs.<sup>54</sup> Some downed trees blocked roadways, broke power lines, destroyed several parked cars and even killed a person in Queens who was sitting in his car when a tree crashed on top of it.<sup>55</sup> There were also reports of injuries from falling tree limbs throughout the City.<sup>56</sup>

On August 5<sup>th</sup>, Governor Andrew Cuomo declared a State of Emergency in Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk and Westchester Counties.<sup>57</sup> As a result of the volume of outages that occurred, there were delays in restoring power, leaving some residents without power for days. In fact, almost 4,000 Con Edison

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<sup>50</sup> “Tropical Storm Isaias Causes Con Edison’s Second Largest Storm-Related Outage In History,” CBS News, (August 4, 2020), available at: <https://newyork.cbslocal.com/2020/08/04/con-edison-outage-tropical-storm-isaias/>

<sup>51</sup> Spectrum New Staff, “Isaias Power Outages Second-Largest in Con Ed’s History, Behind Only Sandy,” Spectrum New NY1, (August 5, 2020), available at: <https://www.ny1.com/nyc/all-boroughs/news/2020/08/05/power-outages-in-nyc-today-tropical-storm-isaias-damage>.

<sup>52</sup> “Tropical Storm Isaias: Officials Say More Than 7,000 Power Lines Came Down In NYC,” CBS News (August 5, 2020), available at: [https://newyork.cbslocal.com/2020/08/05/tropical-storm-isaias-new-york-city-power-outages-bayside-queens/#:~:text=linkedin-.Tropical%20Storm%20Isaias%3A%20Officials%20Say%20More%20Than%207%2C000,Lines%20Came%20Down%20In%20NYC&text=NEW%20YORK%20\(CBSNewYork\)%20%E2%80%94%20The,damage%20across%20the%20five%20boroughs](https://newyork.cbslocal.com/2020/08/05/tropical-storm-isaias-new-york-city-power-outages-bayside-queens/#:~:text=linkedin-.Tropical%20Storm%20Isaias%3A%20Officials%20Say%20More%20Than%207%2C000,Lines%20Came%20Down%20In%20NYC&text=NEW%20YORK%20(CBSNewYork)%20%E2%80%94%20The,damage%20across%20the%20five%20boroughs).

<sup>53</sup> “1 Dead When Tree Falls On Car as Tropical Storm Isaias Hits New York City,” CBS News (August 4, 2020), available at: <https://newyork.cbslocal.com/2020/08/04/new-york-city-tropical-storm-isaias/>

<sup>54</sup> Jacob Kaye, “Governor Declares State of Emergency as Queens Sees Highest Number of Downed Trees and Power Outages After Tropical Storm Isaias,” Queens.com, (August 5, 2020), available at: <https://qns.com/story/2020/08/05/queens-sees-highest-number-of-downed-trees-and-power-outages-after-tropical-storm-isaias/>

<sup>55</sup> Id.

<sup>56</sup> “1 Dead When Tree Falls On Car as Tropical Storm Isaias Hits New York City,” CBS News (August 4, 2020), available at: <https://newyork.cbslocal.com/2020/08/04/new-york-city-tropical-storm-isaias/>

<sup>57</sup> Press Release, “Governor Cuomo Declares State of Emergency After Tropical Storm Isaias” (August 5, 2020), available at: <https://www.governor.ny.gov/news/governor-cuomo-declares-state-emergency-following-tropical-storm-isaias#:~:text=by%20Utility%20Companies-.Governor%20Andrew%20M.,wake%20of%20Tropical%20Storm%20Isaias.&text=%22The%20State%20is%20working%20closely.get%20back%20on%20their%20feet>.

customers in the Bronx, Brooklyn and Queens remained without power close to a week after TS Isaias during extreme temperatures.<sup>58</sup> Areas such as the East Bronx, College Point, Queens and East New York were slower to regain power.

### Future Storm Projections

Global warming is expected to cause sea level rise and storms to intensify in New York City.<sup>59</sup> A study by climate experts estimates that over the next 300 years, there will be higher seas, large storm surge and more frequent, intense hurricanes.<sup>60</sup> In today's warmer climate, 7.5 foot floods are projected to happen every 25 years as opposed to 7.5 foot floods occurring only a few times per millennium in the past.<sup>61</sup> Predictions state that by 2030, these floods will occur every five years.<sup>62</sup>

The New York City Panel on Climate Change (NPCC), an advisory body formed by local law to regularly review and report on scientific climate data, has suggested that if climate change begins to follow the Antarctic Rapid Ice Melt (ARIM) projections,<sup>63</sup> portions of Coney Island, Red Hook, Howard Beach, the Rockaway Peninsula, the east and west coasts of Staten Island, the Lower Manhattan waterfront and areas around the Gowanus Canal, Newtown Creek and Pelham Bay may be permanently inundated with water by 2080 if coastal protections are not put in place.<sup>64</sup>

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<sup>58</sup> Con Edison, Con Edison Continues Focus on Westchester in Post-Isaias Customer Restoration, August 10, 2020, available at: <https://www.coned.com/en/about-us/media-center/news/20200810/con-edison-continues-focus-on-westchester>.

<sup>59</sup> Robinson Meyer, Climate Change Will Bring Major Flooding to New York Every 5 Years, The Atlantic, October 24, 2017, available at: <https://www.theatlantic.com/science/archive/2017/10/climate-change-nyc-floods/543708/>

<sup>60</sup> Id.

<sup>61</sup> Id.

<sup>62</sup> Id.

<sup>63</sup> The Antarctic Rapid Ice Melt (ARIM) scenario, which is an upper-end, but low-probability, projection based on advances in the understanding of ice sheet behavior. ARIM signifies an increase in long-term risk and so was not projected to fall outside the ranges of the NPCC's general projections until the 2080s.

<sup>64</sup> See, Securing Our Future: Strategies for New York City in the Fight Against Climate Change, The New York City Council, March 2020, available at: <http://council.nyc.gov/data/wp-content/uploads/sites/73/2020/03/Securing-our-Future-Report-2020.r4.pdf>

In the NPCC's 2019 report, it reviewed existing climate science data and used new methods to determine whether, and in what ways, the City would experience extreme temperatures, heavy downpours, drought, sea level rise, and coastal flooding.<sup>65</sup> The NPCC projects that the City will be subjected to increasing multi-hazard risks, including sea level rise, precipitation and extreme temperature, "some of which may exacerbate the impacts or severity of others."<sup>66</sup>

The impacts of sea level rise on the City's built environment would most directly appear through coastal storm flooding, regular tidal flooding, or land inundation.<sup>67</sup> Under the ARIM scenario, which projects 114 inches (9.5 feet) of sea level rise by 2100, the permanent loss of land to inundation would occur by 2100 in some low-lying areas. However, the more likely scenarios are the middle range projections (25<sup>th</sup> to 75<sup>th</sup> percentile) that, while projecting significantly less sea level rise than the ARIM scenario, still mean that the City could face monthly tidal flooding of some areas by the 2050's.<sup>68</sup> NOAA projects that in the 2030's there will be 20-40 flood days, and by the 2050's there will be 50-135 flood days annually for The Battery.<sup>69</sup> This means that, in the future, for over a third of the year Lower Manhattan might suffer tidal flooding.<sup>70</sup>

## **1. BUILD IT BACK**

On November 9, 2012, Mayor Michael Bloomberg announced the start of the Rapid Repairs Program to assist homeowners by using FEMA grants to fund basic repairs so that residents could shelter in their homes while awaiting more extensive repairs or rebuilding.<sup>71</sup>

To achieve permanent home repairs and rebuilding, the City announced the Build It Back ("BIB") program on June 13, 2013. BIB is designed to help multi-family and single family homes

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<sup>65</sup> Id.

<sup>66</sup> Id.

<sup>67</sup> Id.

<sup>68</sup> Id.

<sup>69</sup> Id.

<sup>70</sup> Id.

<sup>71</sup> NYC Recovery: Rapid Repairs, found at: <http://www.nyc.gov/html/recovery/html/resources/rapid.shtml>.

by using funds from the United States Department of Housing and Urban Development's (HUD) Community Development Block Grant Disaster Recovery (CDBG-DR) program. The New York City Housing Recovery Office (HRO) administers the BIB program.<sup>72</sup>

BIB offers multiple pathways to homeowners impacted by the storm: repairing, repairing and elevating, or rebuilding damaged homes; reimbursement for repair work; and offers of acquisition for severely damaged homes.<sup>73</sup> The vast majority of applicants to the BIB program are single family homeowners.<sup>74</sup>

Although BIB was created to swiftly and efficiently assist New Yorkers whose homes were destroyed by Superstorm Sandy, there were issues with the program from its inception. The City encouraged everyone to register for BIB by calling 311 or registering on-line.<sup>75</sup> 20,275 homeowners registered for the program.<sup>76</sup> However, since 2014 that number dropped significantly to approximately 8,300 applicants; some applicants were deemed ineligible, did not properly complete paperwork or dropped out because of frustrating delays. At a September 2017 hearing, Amy Peterson, Director of HRO, testified that 4,900 applicants did not take the next step to complete an application, 5,000 applicants started an application at the center but dropped out before selecting a program option and 1,100 applicants were deemed ineligible for such reasons as the property was not a primary residence or lack of compliance with flood insurance requirements.<sup>77</sup>

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<sup>72</sup> NYC Housing Recovery webpage, "Welcome to NYC Housing Recovery" available at: <http://www.nyc.gov/html/recovery/html/home/home.shtml>

<sup>73</sup> Id.

<sup>74</sup> Id.

<sup>75</sup> Testimony by Amy Peterson, Director of the Mayor's Office of Housing Recovery Operations, Oversight – Build It Back, September 26, 2017, available at: <https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3136570&GUID=2BC725C2-C054-4CD3-B68B-1B35C9A71CCB&Options=&Search=>

<sup>76</sup> Id.

<sup>77</sup> Id.

When BIB was created, it did not have dedicated customer service staff. BIB lost paperwork and applications and failed to properly communicate with applicants.<sup>78</sup> In addition, managing federal funds and their accompanying rules made the development and implementation of BIB more complex.<sup>79</sup> However, BIB's customer service improved over several months, and proper standards and procedures were implemented.<sup>80</sup> BIB acquired more City staff at its centers, including additional foreign language speaking staff, and were better able to assist applicants through the process.<sup>81</sup> The program's policies were also posted online so they were accessible to applicants.<sup>82</sup>

As of June 2020, BIB has served over 99 percent of the approximately 8,300 homeowners who remained in the program through either reimbursement check, construction start or acquisition.<sup>83</sup> Approximately 5,313 projects have been completed across Sandy-impacted areas in Brooklyn, the Bronx, Queens and Staten Island.<sup>84</sup>

## **2. CITY RESILIENCY PROJECTS**

In May 2014, Mayor Bill de Blasio announced that the New York City Mayor's Office of Resiliency ("MOR"), formerly known as the Mayor's Office of Recovery and Resiliency, would lead City efforts "to build a stronger, more resilient New York," though it is at least in part a renamed continuation of the Office of Long Term Planning and Sustainability, as codified by Local

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<sup>78</sup> Testimony by Amy Peterson, Director of the Mayor's Office of Housing Recovery Operations, Oversight – Housing Recovery Post-Sandy: The Status of the Build-It-Back Program, March 31, 2014, available at: <https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=1683909&GUID=1924370E-147A-4A32-B115-625FB1221A8E&Options=&Search=>

<sup>79</sup> Id.

<sup>80</sup> Id.

<sup>81</sup> Id.

<sup>82</sup> Id.

<sup>83</sup> NYC Recovery. Sandy Funding Tracker, available at: <https://www1.nyc.gov/content/sandytracker/pages/build-it-back>

<sup>84</sup> Id.



Law 17 of 2008.<sup>85</sup> MOR describes itself as being guided by scientific data and the analysis of the New York City Panel on Climate Change (“NPCC”), to ensure that NYC’s communities, economy and public services can withstand and combat the impacts of 21<sup>st</sup> century threats such as climate change.<sup>86</sup> This work includes spearheading a resiliency program with a \$20 billion budget (\$5.5 billion from city capital, the rest from various federal agencies<sup>87</sup>). Residents can visit the OneNYC Recovery & Resiliency Map to see how this budget is being spent on recovery and resiliency projects in their communities.<sup>88</sup>

MOR, along with the Mayor’s Office of Sustainability (MOS), is guided by and oversees several city initiatives, including *OneNYC: The Plan for a Strong and Just City* (“OneNYC”), which was previously known as “PlaNYC” and is required pursuant to local law, and its related greenhouse gas reduction and climate resiliency goals, along with efforts to recover and rebuild from Superstorm Sandy. OneNYC’s “Vision 4: Our Resilient City” is in part an update of the Bloomberg administration’s 2013 report, *A Stronger, More Resilient New York*, in which an initial plan for the City’s post-Sandy recovery was laid out.<sup>89</sup>

Additionally, MOR prepared Climate Resiliency Design Guidelines<sup>90</sup> to provide step-by-step instructions for climate change-adaptive construction, incorporating historical weather data with NPCC climate change projections in order to ensure that building code and design standards are updated to address future conditions.<sup>91</sup>

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<sup>85</sup> NYC Mayor's Office of Resiliency, "Director's Message" available at: <http://www1.nyc.gov/site/orr/about/directors-message.page>

<sup>86</sup> NYC Mayor's Office of Recovery & Resiliency, "About" <http://www1.nyc.gov/site/orr/about/about.page>

<sup>87</sup> NYC Special Initiative for Rebuilding and Resiliency. A Stronger, More Resilient New York. [https://www1.nyc.gov/assets/sirr/downloads/pdf/Ch19\\_Funding\\_FINAL\\_singles.pdf](https://www1.nyc.gov/assets/sirr/downloads/pdf/Ch19_Funding_FINAL_singles.pdf)

<sup>88</sup> A link to the interactive map can be found at: <https://maps.nyc.gov/resiliency/>

<sup>89</sup> NYC Economic Development Corporation, "A Stronger, More Resilient New York" (2013), <https://www.nycedc.com/resource/stronger-more-resilient-new-york>

<sup>90</sup> NYC Mayor's Office of Recovery and Resiliency, "Climate Resiliency Design Guidelines," (March 2019), [https://www1.nyc.gov/assets/orr/pdf/NYC\\_Climate\\_Resiliency\\_Design\\_Guidelines\\_v3-0.pdf](https://www1.nyc.gov/assets/orr/pdf/NYC_Climate_Resiliency_Design_Guidelines_v3-0.pdf)

<sup>91</sup> Id.

These guidelines are supplemented by Department of City Planning Resilient Neighborhood studies, which identify neighborhood-specific strategies, including zoning and land use changes, to support the vitality and resiliency of communities in the floodplain and prepare them for future storms.<sup>92</sup> It was launched in 2013 to work directly with floodplain communities to look at questions of land use, zoning and development in light of coastal flood risks. DCP published summary reports for the neighborhoods studied in 2016 and 2017.<sup>93</sup>

The City has also secured a commitment from FEMA to redraw the City's flood maps so that they better account for flood risk.<sup>94</sup>

Progress on projects that are part of the \$20 billion resiliency program continue to advance, including the completion of the Rockaway Boardwalk, interim flood protection measures and hundreds of home elevations.<sup>95</sup> A \$106 million heat mitigation and adaptation program was also launched, to help keep residents safe during extreme heat.<sup>96</sup>

During this Committee's October 2019 joint hearing with the Committee on Environmental Protection on the Seventh Anniversary of Superstorm Sandy, MOR testified that four major groundbreakings would take place in the upcoming year: (1) the Staten Island Coastal Storm Risk Management Project; (2) the Atlantic-Side Rockaway Reformulation Project; (3) the East Side Coastal Resiliency Project; and (4) New York State's Living Breakwaters.<sup>97</sup> Construction for the

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<sup>92</sup> NYC Department of City Planning. Resilient Neighborhoods. <https://www1.nyc.gov/site/planning/plans/resilient-neighborhoods.page>

<sup>93</sup> Id.

<sup>94</sup> NYC Office of the Mayor, "OneNYC Progress Report 2018" (May 2018), [https://onenyc.cityofnewyork.us/wp-content/uploads/2018/05/OneNYC\\_Progress\\_2018.pdf](https://onenyc.cityofnewyork.us/wp-content/uploads/2018/05/OneNYC_Progress_2018.pdf)

<sup>95</sup> Id.

<sup>96</sup> Id.

<sup>97</sup> MOR Testimony, available at:

[https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=4146641&GUID=0C9B61CF-51E6-4F50-B8DA-C8D06CD87E4E&Options=Advanced&Search=.](https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=4146641&GUID=0C9B61CF-51E6-4F50-B8DA-C8D06CD87E4E&Options=Advanced&Search=)

East Side Coastal Resiliency Projected is expected to begin Fall 2020.<sup>98</sup> MOR also testified that the U.S. Army Corps of Engineers' (USACE) New York-New Jersey Harbor and Tributaries (NYNJHAT) study would "provide the blueprint for the next round of coastal resiliency projects in New York City."<sup>99</sup> The NYNJHAT study covered 2,150+ square miles and 900+ miles of affected shoreline, including 25 counties in New York and New Jersey with an affected population of roughly 16 million people.<sup>100</sup> It investigated measures to address future flood risk and protect the New York-New Jersey Harbor Region from coastal storm damage in the study area, while contributing to the resilience of communities, critical infrastructure, and the environment.<sup>101</sup> The NYNJHAT study was the only comprehensive study investigating large scale coastal storm risk protection measures in the North Atlantic region, and was considered a necessary precursor to any such large scale protections. In February 2020, four years into its planned six year study, the USACE announced that the NYNJHAT study was "indefinitely postponed" because it did not receive federal funding to continue the study.<sup>102</sup>

After Superstorm Sandy, the City instituted a hazard mitigation plan.<sup>103</sup> Across the five boroughs, there are approximately 900 mitigation actions being undertaken as part of this plan.<sup>104</sup>

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<sup>98</sup> East Side Coastal Resiliency Project Updates, available at: <https://www1.nyc.gov/site/escr/project-updates/project-updates.page>.

<sup>99</sup> MOR Testimony, available at: <https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=4146641&GUID=0C9B61CF-51E6-4F50-B8DA-C8D06CD87E4E&Options=Advanced&Search=>.

<sup>100</sup> U.S. Army Corps of Engineers, "PowerPoint: New York-New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study--National Environmental Policy Act (NEPA) SCOPING MEETING" (October 12, 2018), <https://www.nan.usace.army.mil/Portals/37/docs/civilworks/projects/ny/coast/NYNJHAT/NYNJHAT%20NEPA%20Scoping%20Presentation%203%20Oct%202018.pdf?ver=2018-10-12-151150-907>

<sup>101</sup> Id at 75

<sup>102</sup> Anne Barnard, "After Trump Mocks a Sea Wall in New York, Plan is Abruptly Shelved," N.Y. Times, (Feb. 26, 2020), <https://www.nytimes.com/2020/02/25/nyregion/sea-wall-nyc.html>.

<sup>103</sup> NYC Emergency Management, "NYC's Risk Landscape: A Guide to Hazard Mitigation" (May 2019), available at: [https://www1.nyc.gov/assets/em/downloads/pdf/hazard\\_mitigation/risklandscape2.0\\_2019\\_r2\\_digital\\_lowres.pdf](https://www1.nyc.gov/assets/em/downloads/pdf/hazard_mitigation/risklandscape2.0_2019_r2_digital_lowres.pdf).

<sup>104</sup> NYC Hazard Mitigation Projects Map. Available at: <https://maps.nyc.gov/resiliency/>

These actions are categorized as emergency service actions, coastal and natural resource protections, infrastructure projects, prevention and policy actions, property protections, and public education and awareness initiatives.<sup>105</sup> Since Superstorm Sandy, the following resiliency projects have been completed or are in the planning stages, many with or by state or federal agencies.

### Citywide

NYC Emergency Management, with MOR and other City agencies, manages the Interim Flood Protection Measures (IFPM) program, which is designed to protect low-lying areas throughout the City from flooding caused by hurricanes and tropical storms.<sup>106</sup> There are 55 sites in the IFPM program, with four being community sites located in the South Street Seaport (Manhattan), Two Bridges (Manhattan), Red Hook (Brooklyn) and Astoria (Queens). The IFPM consist of “just in time” water-filled dams (Tiger Dams) and pre-deployed sand-filled barriers (HESCO Barriers). On August 3, 2020, the day before Tropical Storm Isaias hit the City, NYC Emergency Management installed IFPM along a one-mile stretch of lower Manhattan from Wall Street to Catherine Slip.<sup>107</sup>

### Brooklyn

USACE announced the completion of the Sea Gate Reach portion of the Coney Island Coastal Storm Risk Reduction Project in June 2016.<sup>108</sup> The \$28 million project started over twenty years ago with the widening and elevating of Coney Island beach between Corbin Place and West

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<sup>105</sup> Id.

<sup>106</sup> NYC Emergency Management, Interim Flood Protection Measures Program, available at: <https://www1.nyc.gov/site/em/ready/interim-flood-protection-measures-program.page> (last visited Oct. 6, 2020).

<sup>107</sup> Christopher Robbins, Gothamist, “Flood Barriers Going Up in Lower Manhattan as Tropical Storm Isaias Heads North,” (Aug. 3, 2020), <https://gothamist.com/news/flood-barriers-going-lower-manhattan-tropical-storm-isaias-heads-north>.

<sup>108</sup> News Releases, Army Corps announces the completion of Sea Gate Reach portion of the Coney Island Coastal Storm Risk Reduction Project, US Army Corps of Engineers, June 13, 2016, available at: <https://www.nan.usace.army.mil/Media/News-Releases/Article/797718/army-corps-announces-the-completion-of-sea-gate-reach-portion-of-the-coney-isla/>

37<sup>th</sup> Street and more recently included beach replenishment, groin work and as a result of Superstorm Sandy, 70,000 cubic yards of sand was placed at Sea Gate Beach.<sup>109</sup> In addition, the project includes four new T-groin structures, and Norton Point Dike and the West 37<sup>th</sup> Street Terminal Groin were reinforced with bedding stone to minimize sand erosion.<sup>110</sup> 30,000 cubic yards of sand will be placed every ten years in future phases of this project to minimize sand erosion and reduce damages to households and businesses during future storms.<sup>111</sup>

The planned Red Hook Integrated Flood Protection System is comprised of permanent flood protection barriers around Atlantic Basin. Currently, only temporary measures such as HESCO barriers and Tiger dams have been employed.<sup>112</sup> Department of City Planning led resiliency studies were completed for Canarsie, Sheepshead Bay and Gerritsen Beach in 2017.<sup>113</sup> These studies examine damage caused by Sandy, potential for damage from future storms, and review zoning regulations to identify changes to land use and zoning necessary to ensure the continued vitality of the neighborhoods.<sup>114</sup> The resiliency study for the Coney Island Creek identifies flood proof measures, measures to improve storm water drainage, and flood mitigation measures for the area.<sup>115</sup> Additionally, sand has been replenished along Coney Island beach to address Sandy-related coastal erosion.<sup>116</sup>

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<sup>109</sup> Id.

<sup>110</sup> Id.

<sup>111</sup> Id.

<sup>112</sup> <https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/Rockaway-Inlet-to-Norton-Point-Coney-Island/Sea-Gate-More-Info/>

<sup>113</sup> NYC Department of City Planning. Resilient Neighborhoods. Brooklyn. <https://www1.nyc.gov/site/planning/plans/brooklyn.page> (last accessed 10/25/19)

<sup>114</sup> Id.

<sup>115</sup> New York Economic Development Corporation. Coney Island Creek Resiliency Study. [https://edc.nyc/sites/default/files/filemanager/2016.07.08\\_CICBWFS\\_PFR\\_FINAL\\_Reduced.pdf](https://edc.nyc/sites/default/files/filemanager/2016.07.08_CICBWFS_PFR_FINAL_Reduced.pdf) (last accessed 10/25/19)

<sup>116</sup> Id.

## Manhattan

Some of the most extensive resiliency projects currently being considered are those aimed at protecting lower Manhattan. The City has committed to employing a variety of resilience strategies along the southern tip of the island, broken into five distinct project areas, starting with the Battery Park City Resilience projects on the west side, the Battery Coastal Resilience project on the southern tip, the financial district and seaport climate resilience master plan, and the Brooklyn Bridge Montgomery Coastal Resilience Plan (also known as the Two Bridges Plan) and East Side Coastal Resiliency Project to the east (with construction set to begin Fall 2020).<sup>117</sup> Emphasis on this area has been justified by the high concentration of economic interests and critical infrastructure in the area, coupled with its low lying topography.<sup>118</sup> The Battery Coastal Resilience project would raise the height of the waterfront esplanade in the neighborhood,<sup>119</sup> and construction is set to begin in 2021.<sup>120</sup> The Battery Park City resilience effort is split into 3 projects, the South Battery Park City Resiliency Project, which would create a continuous flood barrier from the Museum of Jewish Heritage to a higher elevation point at State Street, the North Battery Park City Resiliency Project which relies on deployable barriers, and the Battery Park City Western Perimeter Resiliency project, which relies on garden/park walls to create a new line of flood protection along the water's edge.<sup>121</sup> The financial district and seaport plan that is being proposed is still in the development stage, but is expected to consist of a significant buildout, extending the

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<sup>117</sup> New York City Economic Development Corp. Lower Manhattan Climate Resilience Study, March 2019. [https://edc.nyc/sites/default/files/filemanager/Projects/LMCR/Final\\_Image/Lower\\_Manhattan\\_Climate\\_Resilience\\_March\\_2019.pdf](https://edc.nyc/sites/default/files/filemanager/Projects/LMCR/Final_Image/Lower_Manhattan_Climate_Resilience_March_2019.pdf) (last accessed 10/21/19)

<sup>118</sup> Id.

<sup>119</sup> Id.

<sup>120</sup> The Battery Coastal Resilience, available at: <https://www1.nyc.gov/site/lmcr/progress/battery-coastal-resilience.page> (last accessed 10/8/20).

<sup>121</sup> New York City Lower Manhattan Coastal Resiliency. Battery Park City Resilience Projects. <https://www1.nyc.gov/site/lmcr/progress/battery-park-city-resilience-projects.page> (last accessed 10/21/19)

shoreline approximately 500 feet (or two City blocks) into the East River at a projected cost of \$10 billion.<sup>122</sup> The Two Bridges Plan is reliant on permanent deployable flood walls that would be hidden underground most of the time, and flipped up in the event of a storm.<sup>123</sup>

## Queens

The new resilient Rockaway boardwalk opened in May 2017, after it was destroyed by Superstorm Sandy. The project cost \$341 million and was constructed with a steel-reinforced concrete deck which is adhered to steel pipes that elevate it above the 100-year flood plain.<sup>124</sup> Six miles of planted dunes were also integrated into the boardwalk design for protection from future storms.<sup>125</sup> The East Rockaway Inlet to Rockaway Inlet and Jamaica Bay study was completed by the USACE in May 2019. The project includes beach fill with a reinforced dune, new and rehabilitated groins, and high frequency flood risk reduction features for portions of the Bay-side of the Rockaway peninsula.<sup>126</sup> Construction on the Atlantic-side is expected to commence during Fall 2020, and the Bay-side is still in the design phase.

In Breezy Point, a \$56 million double dune system project was approved in August 2014, along with other bayside flooding and erosion protection measures to protect the area from future extreme weather conditions.<sup>127</sup> The dune system continues the existing dune line on the Atlantic

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<sup>122</sup> New York City Economic Development Corp. Lower Manhattan Climate Resilience Study, March 2019. [https://edc.nyc/sites/default/files/filemanager/Projects/LMCR/Final\\_Image/Lower\\_Manhattan\\_Climate\\_Resilience\\_March\\_2019.pdf](https://edc.nyc/sites/default/files/filemanager/Projects/LMCR/Final_Image/Lower_Manhattan_Climate_Resilience_March_2019.pdf) (last accessed 10/21/19)

<sup>123</sup> Id.

<sup>124</sup> Bill Barry, *Resilient Rockaway boardwalk completed in time for Memorial Day weekend*, Times Ledger News, May 26, 2017, available at: <https://qns.com/story/2017/05/26/resilient-rockaway-boardwalk-completed-in-time-for-memorial-day-weekend/>

<sup>125</sup> Id.

<sup>126</sup> U.S. Army Corps of Engineers, East Rockaway Inlet to Rockaway Inlet, and Jamaica Bay, available at: <https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/East-Rockaway-Inlet-to-Rockaway-inlet/> (last visited Oct. 7, 2020).

<sup>127</sup> Press Release, *Governor Cuomo, Mayor de Blasio and Congressman Meeks Announce Federal Approval of Comprehensive Coastal Protection System for Breezy Point, Queens*, August 4, 2014, available at: <https://www1.nyc.gov/office-of-the-mayor/news/836-14/governor-cuomo-mayor-de-blasio-congressman-meeks-federal-approval-comprehensive>

side of Breezy Point and provides flood and erosion protection by using the Cooperative's natural features.<sup>128</sup>

### The Bronx

The Department of City Planning (DCP) Resilient Neighborhoods studies of Harding Park<sup>129</sup> and Edgewater Park<sup>130</sup> identified strategies to retrofit existing homes and rebuild structures for maximum resiliency while maintaining compliance with local zoning regulations and without unduly affecting existing neighborhood aesthetics. The studies also identified a number of green infrastructure solutions to address stormwater runoff and chronic ponding issues, and call for the fortification of breakwaters along the waterfront.<sup>131</sup> A Rebuild by Design<sup>132</sup> project for Hunts Point obtained \$45 million in HUD CDBG-DR funding. The proposed project will develop a resilient working waterfront and install resilient and sustainable power to critical facilities at the Food Distribution Center and two local public schools. Also in the study phase, this project is assessing the feasibility of various flood control measures to protect critical food distribution resources in the neighborhood.<sup>133</sup>

### Staten Island

A DCP resilient neighborhoods study of Staten Island's East Shore uses damage caused by Sandy to examine potential for damage from future storms.<sup>134</sup> This initiative has borne numerous

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<sup>128</sup> Id.

<sup>129</sup> NYC Department of City Planning. Resilient Neighborhoods. Harding Park. <https://www1.nyc.gov/assets/planning/download/pdf/plans-studies/resilient-neighborhoods/harding-park/summary-report-harding-park.pdf> (last accessed 10/25/19)

<sup>130</sup> NYC Department of City Planning. Resilient Neighborhoods. Edgewater Park. <https://www1.nyc.gov/assets/planning/download/pdf/plans-studies/resilient-neighborhoods/edgewater-park/summary-report-edgewater-park.pdf?r=1> (last accessed 10/25/19)

<sup>131</sup> Id

<sup>132</sup> Rebuild by Design was a HUD-launched design competition for areas affected by Superstorm Sandy to propose, and if selected receive federal funding, to implement projects to be more resilient against future storms.

<sup>133</sup> Rebuild by Design.; Hunts Point Resiliency Project. <http://www.rebuildbydesign.org/our-work/all-proposals/winning-projects/hunts-point-lifelines> (last accessed 10/22/19)

<sup>134</sup> Id at 85



zoning changes to the affected area, and density limiting initiatives in the New York State buyout areas of Oakwood Beach, Graham Beach and Ocean Breeze.<sup>135</sup> Additionally, the Staten Island Levee Project is a \$615 million proposed levee for the East Shore (a federal/City project); it will integrate the USACE's seawall project, and create a 5.3 mile long barrier from Fort Wadsworth to Oakwood Beach.<sup>136</sup> Construction is set to begin in 2021. Further, \$60 million in CDBG-DR funds have been allocated to create an ecologically enhanced breakwater system along the Tottenville shoreline, in conjunction with the Tottenville Shoreline Protection Project, which uses living breakwaters, dunes, and dune plantings to protect the Conference House Park shoreline from Carteret St. to Page Ave.<sup>137</sup>

Shoreline protection and reinforced dunes were installed between South Beach and Conference House Park.<sup>138</sup> In addition, Phase I of the New Creek Bluebelt was completed in 2018.<sup>139</sup> Located in Midland Beach, the \$25 million first phase of the project included the first two of 19 Bluebelt wetlands that will receive and filter stormwater that falls in the area.<sup>140</sup> The project included a new 4.7-acre freshwater wetland between Nugent Avenue and Freeborn Street and a 0.7-acre freshwater wetland from Freeborn Street to Olympia Boulevard.<sup>141</sup> Phase II of the project is ongoing and is expected to be completed in 2021.<sup>142</sup> Phase II of the project includes the

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<sup>135</sup> NYC Department of City Planning. Resilient Neighborhoods. East Shore Neighborhoods.

<https://www1.nyc.gov/site/planning/plans/resilient-neighborhoods/east-shore.page> (last accessed 10/23/19)

<sup>136</sup> <https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/Rockaway-Inlet-to-Norton-Point-Coney-Island/Sea-Gate-More-Info/>

<sup>137</sup> Id.

<sup>138</sup> See, NYC Hazard Mitigation Projects, available at: <https://maps.nyc.gov/resiliency/>

<sup>139</sup> Press Release, *City Announces Construction Underway on \$39 million Mid-Island Bluebelt Phase II*, April 11, 2019, available at: <https://www1.nyc.gov/site/ddc/about/press-releases/2019/pr-041119-bluebelt.page>

<sup>140</sup> Press Release, *City and Staten Island Leaders Tour the First Mid-Island Bluebelt*, November 6, 2017, available at: <https://www1.nyc.gov/site/ddc/about/press-releases/2017/pr-110617-bluebelt.page>

<sup>141</sup> Id.

<sup>142</sup> Erik Bascome, *Construction Underway on \$39M Phase Two of Mid-Island Bluebelt Project*, SILive, April 13, 2019, available at: <https://www.silive.com/news/2019/04/construction-underway-on-39m-phase-two-of-mid-island-bluebelt-project.html>

construction of an 8.8 acre wetland from Zoe Street and Husson Street and a 0.1 acre freshwater wetland between Husson Street and Hylan Boulevard.<sup>143</sup> The project also includes the construction of 8,500 linear feet of stormwater sewers, 9,200 linear feet of sanitary sewers, nine stormwater chambers, 35 hydrants, 84 catch basins and 10,000 linear feet of water mains.<sup>144</sup>

### **3. 2020 HURRICANE SEASON AND COVID-19**

The City did not need to use evacuation shelters during TS Isaias. However, more than a month remains in one of the most active hurricane seasons ever recorded. The City uses public schools as temporary emergency shelters to house evacuees,<sup>145</sup> like during Superstorm Sandy. Before COVID-19, hundreds of people would be housed in school gymnasiums, sleeping on cots only feet apart, and having buffet-style meals.<sup>146</sup> However, such congregate sheltering could now create a public health danger. The American Red Cross's New York Division has issued guidance for operating shelters during the COVID-19 pandemic.<sup>147</sup> Non-congregate shelters, like hotels, are the preferred option during the pandemic, but they may not be immediately available in sufficient quantities or in all necessary locations. If congregate shelters are needed, masks and protective gear should be made available, health screenings for COVID-19 symptoms should be required before entering the shelter, those who are symptomatic or test positive for the virus should be isolated, people should be brought individually packed meals, and cots should be spaced further

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<sup>143</sup> Id.

<sup>144</sup> Id.

<sup>145</sup> NYC Emergency Management Evacuation Zones and Evacuation Centers, available at: [https://www1.nyc.gov/assets/em/downloads/pdf/2020\\_evacuation\\_zones\\_and\\_centers\\_by\\_borough.pdf](https://www1.nyc.gov/assets/em/downloads/pdf/2020_evacuation_zones_and_centers_by_borough.pdf) (last accessed Oct. 14, 2020).

<sup>146</sup> Caroline Spivak, Curbed New York, "New York's Hurricane Dilemma: Shelter from COVID-19 or a Storm," Aug. 4, 2020, available at: <https://ny.curbed.com/2020/8/4/21354015/new-york-hurricane-tropical-storm-isaias-coronavirus>.

<sup>147</sup> American Red Cross, Pre-Landfall Congregate Shelter Operations in a COVID-19 Pandemic, available at: <https://www.msema.org/wp-content/uploads/2020/05/Pre-LandfallShelterOperationsCOVID-19Pandemic-002.pdf>.

apart to ensure social distancing.<sup>148</sup> After a storm hits, volunteers with emergency-management experience are typically flown in from other parts of the country. However, because of possible two-week quarantine requirements for such volunteers, the Red Cross launched its inaugural Hurricane Season Reserve Corps in July,<sup>149</sup> through which it is seeking 1,000 local volunteers to support emergency shelters.<sup>150</sup>

The Centers for Disease Control and Prevention (CDC) has also issued a guidance document for emergency management agencies to use if evacuation shelters are needed during the current pandemic, titled “CDC Interim Guidance for General Population Shelters During the COVID-19 Pandemic” (CDC Interim Guidance).<sup>151</sup> The CDC recommends that alternatives to opening disaster shelters be considered, like sheltering in place. However, if that is not an option, then the CDC recommends that small shelters of fewer than 50 people, housed in hotels or dormitories, be prioritized over large congregate shelters. For individuals who exhibit symptoms of COVID-19, the CDC recommends separate areas in which these individuals are able to isolate from the rest of the sheltering population.<sup>152</sup> FEMA also recommends using hotels, classrooms and empty dormitories as shelters because they provide greater opportunities for social distancing.<sup>153</sup>

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<sup>148</sup> Caroline Spivak, Curbed New York, “New York’s Hurricane Dilemma: Shelter from COVID-19 or a Storm,” Aug. 4, 2020, available at: <https://ny.curbed.com/2020/8/4/21354015/new-york-hurricane-tropical-storm-isaias-coronavirus>.

<sup>149</sup> American Red Cross, Hundreds of Volunteers Needed for New Red Cross Hurricane Reserve Team, July 27, 2020, available at: <https://www.redcross.org/local/new-york/greater-new-york/about-us/news-and-events/press-releases/hundreds-of-volunteers-needed-for-new-red-cross-hurricane-reserv.html>.

<sup>150</sup> Caroline Spivak, Curbed New York, “New York’s Hurricane Dilemma: Shelter from COVID-19 or a Storm,” Aug. 4, 2020, available at: <https://ny.curbed.com/2020/8/4/21354015/new-york-hurricane-tropical-storm-isaias-coronavirus>.

<sup>151</sup> Centers for Disease Control and Prevention, CDC Interim Guidance for General Population Shelters During the COVID-19 Pandemic, Sept. 10, 2020, available at: <https://www.cdc.gov/coronavirus/2019-ncov/downloads/Guidance-for-Gen-Pop-Disaster-Shelters-COVID19.pdf>.

<sup>152</sup> Centers for Disease Control and Prevention, CDC Interim Guidance for General Population Shelters During the COVID-19 Pandemic, Sept. 10, 2020, available at: <https://www.cdc.gov/coronavirus/2019-ncov/downloads/Guidance-for-Gen-Pop-Disaster-Shelters-COVID19.pdf>.

<sup>153</sup> Caroline Spivak, “New York’s Hurricane Dilemma: Shelter From COVID-19 or a Storm,” Curbed New York, Aug. 4, 2020, available at: <https://ny.curbed.com/2020/8/4/21354015/new-york-hurricane-tropical-storm-isaias-coronavirus>.

Coordinated messages on how to safely evacuate during the pandemic would be extremely important. Some public health experts have stressed that localities must be prepared before a coastal storm or hurricane makes landfall. Irwin Redlener, an expert in disaster preparedness and public health at Columbia University stated that “the U.S. has been far less prepared for disasters than most people imagined.”<sup>154</sup> Additionally, resources have been spread thin because emergency management agencies are focused on COVID-19. People may need additional time to evacuate. Food banks, already stretched to capacity because of the pandemic,<sup>155</sup> may not be available immediately after a coastal storm or hurricane.<sup>156</sup>

NYC Emergency Management’s guidance for evacuation before a coastal storm or hurricane states that residents should “[i]nclude items that can help protect you and others from COVID-19, including hand sanitizer, and face coverings for each person.”<sup>157</sup> Other than stating that residents should include hand sanitizer and face coverings in their “Go Bag,” the City has not updated its evacuation guidance to account for the COVID-19 pandemic.<sup>158</sup> Additionally, the City’s evacuation centers are still located in school buildings.<sup>159</sup> It is unclear how social distancing will be maintained if these evacuation centers are used during the 2020 hurricane season.

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<sup>154</sup> Dan Goldberg and Brianna Ehley, Politico, States brace for disasters as pandemic collides with hurricane season, June 1, 2020, available at: [https://www.politico.com/news/2020/06/01/pandemic-coronavirus-hurricane-season-291643?mc\\_cid=ea92baffd8&mc\\_eid=8dd499739f](https://www.politico.com/news/2020/06/01/pandemic-coronavirus-hurricane-season-291643?mc_cid=ea92baffd8&mc_eid=8dd499739f).

<sup>155</sup> Devin Gannon, 6sqft, ‘No end in sight’: How NYC is dealing with the growing hunger crisis, July 30, 2020, available at: <https://www.6sqft.com/coronavirus-hunger-crisis-new-york/>.

<sup>156</sup> Dan Goldberg and Brianna Ehley, Politico, States brace for disasters as pandemic collides with hurricane season, June 1, 2020, available at: [https://www.politico.com/news/2020/06/01/pandemic-coronavirus-hurricane-season-291643?mc\\_cid=ea92baffd8&mc\\_eid=8dd499739f](https://www.politico.com/news/2020/06/01/pandemic-coronavirus-hurricane-season-291643?mc_cid=ea92baffd8&mc_eid=8dd499739f).

<sup>157</sup> NYC Emergency Management, Coastal Storms & Hurricanes, available at: <https://www1.nyc.gov/site/em/ready/coastal-storms-hurricanes.page> (last visited Oct. 6, 2020).

<sup>158</sup> NYC Emergency Management, Coastal Storms & Hurricanes, available at: <https://www1.nyc.gov/site/em/ready/coastal-storms-hurricanes.page> (last visited Oct. 14, 2020).

<sup>159</sup> NYC Emergency Management Evacuation Zones and Evacuation Centers, available at: [https://www1.nyc.gov/assets/em/downloads/pdf/2020\\_evacuation\\_zones\\_and\\_centers\\_by\\_borough.pdf](https://www1.nyc.gov/assets/em/downloads/pdf/2020_evacuation_zones_and_centers_by_borough.pdf) (last accessed Oct. 14, 2020).

## **Conclusion**

At today's hearing, the Committee expects to hear testimony regarding the status of the City's resiliency projects, which projects are funded, which projects are in the planning, design or construction phase, and why specific projects are moving forward. Additionally, the Committee expects to hear testimony regarding the City's preparations for the 2020 hurricane season and how that information has been conveyed to the public.