



**LOWER MANHATTAN PROTECT AND CONNECT**

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**THE CITY OF  
NEW YORK**

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**NATIONAL DISASTER RESILIENCE COMPETITION**

Phase 2 Application Draft for Public Comment

September 4, 2015

September 4, 2015

Re: NYC's Application to the National Disaster Resilience Competition (NDRC)

Dear New Yorker:

The City of New York respectfully submits for public review and comment the attached draft application to the National Disaster Resilience Competition being conducted by the U.S. Department of Housing and Urban Development (HUD). The City's draft application demonstrates a comprehensive resiliency vision for Lower Manhattan, Two Bridges, and the Lower East Side that will *protect* and *connect* residents, businesses, infrastructure, and economic activity in these communities from the risks of a changing climate and extreme weather.

This application builds upon an existing successful collaboration with HUD on its Rebuild by Design competition, expands that coastal protection effort south into Two Bridges and Lower Manhattan, extends its reach upland into the Lower East Side through stormwater management placemaking on New York City Housing Authority (NYCHA) campuses, and integrates the City's multifamily resiliency investments. The Lower Manhattan Protect and Connect Project is a vision of comprehensive resiliency investments that are integrated into the community fabric. By responding to local conditions and transforming connections within neighborhoods and to the waterfront, this project aims to strengthen an important piece of the City's coastline.

Significantly, the City has just recently announced that it will commit an additional \$100 million for this project. This new City investment is in addition to the nearly \$15 million for Lower Manhattan resiliency that the City announced in March 2015, which included \$6.75 million from the City and State for preliminary design and environmental review and another \$8 million in City capital funds for first-phase flood protection design and implementation at the Battery. By making this significant investment, this draft application builds upon a commitment made in OneNYC, the City's strategic plan released earlier this year. If successful with its application, the City intends to leverage its own commitment to this project with NDRC funds to make the next phase of this project a reality.

The new flood protection system will be an important step forward in realizing the City's comprehensive \$20 billion resiliency plan already underway across the five boroughs, including the East Side Coastal Resiliency Project being built from Montgomery Street north to East 23rd Street. The City, in collaboration with partners like the U.S. Army Corps of Engineers, has already implemented a number of short-term resiliency measures, such as additional sand and dunes on the City's beaches, and repairs and improvements to City facilities, boardwalks, and other infrastructure. The City and its partners are also implementing a variety of coastal resiliency measures such as beach improvements and wetland enhancements in the Rockaways and Jamaica Bay, a levee on the East Shore of Staten Island, investments at the food distribution center in Hunts Point, a comprehensive study at Coney Island Creek, and integrated flood



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protection in Red Hook. This is supplemented by significant resiliency investments being made in City infrastructure, such as \$3 billion for NYCHA developments, \$1.7 billion for public hospitals, and other measures to prepare for the impacts of climate change and other 21st century threats.

The City is committed to engaging residents and local stakeholders in the development of this application and we look forward to an extensive public engagement process over the next two months in advance of HUD's October 27<sup>th</sup> competition deadline. We will be conducting two public hearings, a small business roundtable, and numerous other meetings to ensure that the final application best represents the needs of the City and these communities. Please visit [nyc.gov/cdbg](http://nyc.gov/cdbg) for more information.

The City looks forward to working closely with its partners and HUD on a successful conclusion to this NDRC competition, and we look forward to continuing to implement the City's comprehensive resiliency program in partnership with residents, stakeholders, and our partners in government.

Sincerely,

A handwritten signature in blue ink, appearing to read "D. Zarrilli".

Daniel A. Zarrilli  
Director

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# Application

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**EXHIBIT A**  
**EXECUTIVE SUMMARY**

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Exhibit A – Executive Summary

The City of New York (the City) believes stronger connections between individuals and neighborhoods forge a greater level of public respect and trust, and stronger connections between places and facilities prove vital for emergency preparedness and response during a catastrophic event. The City has been recognized as a leader in its approach to resiliency, including the implementation of groundbreaking work to implement Rebuild by Design projects in partnership with HUD, and continues to make significant investments to connect and protect its communities from the risks posed by climate change while advancing access and equity for all New Yorkers.

Shock events, specifically those due to severe weather, such as hurricanes, heavy rain events, and extreme heat and cold, are projected to occur with increasing frequency, duration, or intensity in New York City. The potential impacts of these catastrophic events are magnified when coupled with the City's aging infrastructure, limited affordable housing stock, and population shifts, with these impacts increasingly threatening the City's most vulnerable populations. The **Lower Manhattan Protect and Connect Project**, as detailed within this application, is a comprehensive resiliency vision that integrates coastal protection into the community fabric such that it fortifies the City when necessary, and enhances the urban realm at all other times. In addition, this project includes improvements to stormwater management infrastructure, providing for a comprehensive approach to flood resiliency by ensuring that rainfall can drain from the area without causing sewer backups or discharges of untreated sewage to the area waters, as well as providing a way to remove flood waters during and after severe wet weather events. Finally, enhancing the resiliency of the City's dense multi-family affordable and public housing stock will contribute to more stable and vibrant neighborhoods. By responding to local conditions and transforming connections within neighborhoods and to the waterfront, the **Lower Manhattan Protect and Connect Project** aims to

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strengthen an important piece of the City’s coastline, physically, socially, and economically, for all New Yorkers and visitors to enjoy.

In April 2015, Mayor Bill de Blasio released *One New York: The Plan for a Strong and Just City (OneNYC)*, expanding the mission of the Mayor’s Office of Recovery and Resiliency (ORR) and setting new goals to strengthen social and economic resiliency, upgrade buildings, adapt the region’s infrastructure systems, and enhance the City’s coastal defenses in response to the evolving risks associated with climate change and other 21st century threats. *OneNYC* builds upon prior climate resiliency plans, including the 2013 report, *A Stronger, More Resilient New York*, that put forth a comprehensive plan containing actionable recommendations both for rebuilding the communities impacted by Sandy, as well as increasing the resiliency of infrastructure and buildings citywide.

Following the goals outlined in these reports, as well as the Six Goals put forth by U.S. Department of Housing and Urban Development (HUD), the City has developed a proposal for Phase 2 of the HUD National Disaster Resilience Competition (NDRC). The east side of Lower Manhattan (the Target Area), specifically between East 14<sup>th</sup> Street and the southern end of Battery Park City, has been chosen as the Target Area from the potential projects outlined in the City’s NDRC Phase 1 Application. Prioritizing the Target Area is critical due to the significant low to moderate income (LMI) population that both lives and works in this extremely vulnerable, low-lying geographic location, its significance to local small business health, for the transportation mobility it provides for millions of commuters, and because of its role in the global economy . The City intends to address these goals for the Target Area by defining the following activities for the proposed Project:

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Exhibit A – Executive Summary

1. **Coastal Protection for Two Bridges**, the area south from Montgomery Street and the FDR Drive to the Brooklyn Bridge;
2. **Coastal Protection for Manhattan Tip**, extending from the Brooklyn Bridge south to the western side of Battery Park; and,
3. **Stormwater Management through Placemaking**, which includes green stormwater solutions, coastal protection, and social resiliency for the nine New York City Housing Authority (NYCHA) developments in the Target Area.
4. **Multi-Family Resiliency Retrofit Program**, which includes comprehensive resiliency upgrades to five New York City Department of Housing Preservation and Development (HPD) affordable housing complexes building on the experience and data of projects currently underway.

The estimated cost of construction, based on the current understanding of existing features and design criteria for the project, is approximately \$633 million. A detailed breakdown of the assumptions and costs is included in Attachment F - Benefit Cost Analysis.

As stated in the City's NDRC Phase 1 Application, the City's objective in applying for funds through NDRC is to implement resiliency initiatives across the City's most vulnerable areas to protect federal investments leveraged for recovery and resiliency efforts following Hurricane Sandy, including Community Development Block Grant-Disaster Recovery (CDBG-DR) funds and Federal Emergency Management Agency (FEMA) public assistance. The City has also made a firm financial commitment of \$108 million in City capital dollars to further resiliency planning and implementation around Lower Manhattan and Battery Park.

The City and its Partners have proven through past and current projects to have the administrative and technical capacity to successfully implement the proposed activities. ORR is the

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lead agency in this effort, partnered with the New York City Economic Development Corporation (NYCEDC), the New York City Housing Authority (NYCHA), the New York City Department of Housing Preservation and Development (HPD), and the New York City Department of Parks and Recreation (DPR), among others. Through extensive outreach and collaboration efforts, the City and its Partners have engaged both governmental and public stakeholders, who have embraced the City's vision of a resilient city.

The City is already measuring numerous metrics related to resiliency, including social vulnerability and future economic losses, in order to monitor the progress of its comprehensive plans, such as *OneNYC*. The proposed Project will bring the City a step closer to achieving the ambitious goals it has put forth in recent years. Furthermore, this approach is scalable and replicable in other areas of the City and region, and will provide a flexible adaption pathway for future resiliency.

By funding this project, HUD will be enabling New York City to support an equitable waterfront designed to withstand the threats of climate change, connect neighborhoods, and leverage ongoing Federal, State, and local resiliency investments within Lower Manhattan.

**EXHIBIT B**  
**THRESHOLD REQUIREMENTS**

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Exhibit B – Threshold Requirements

The City of New York (The City) certifies that it is eligible under the General Section for Fiscal Year 2014 Discretionary Programs and is a City- and County-Level Eligible Applicant per the National Disaster Resilience Competition (NDRC) Phase 2 Notice of Funding Availability (NOFA) Section III.A. The City further certifies that all proposed activities described herein meet the requirements as outlined in the NDRC NOFA Appendix A. The City also agrees to all items described in the Community Site Block Grant- National Disaster Resilience (CDBG-NDR) Application Certifications.

In 2012, the President issued a Major Disaster Declaration following Hurricane Sandy (DR-4085) for New York City. As stated in the NDRC Phase 1 Application, the U.S. Department of Housing and Urban Development (HUD) determined all five New York City counties (i.e., New York, Kings, Bronx, Richmond, and Queens) to be Most Impacted and Distressed (MID). While the communities within Lower Manhattan (New York County) would be the direct beneficiaries of the proposed activities, the entire New York Metropolitan Area would indirectly benefit due to Lower Manhattan's critical role as a regional and national economic driver and critical transportation link.

The proposed activities will incorporate greater resiliency into vulnerable Lower Manhattan communities, which are threatened by aging infrastructure, a growing population, increasing social inequality, and climate change. As seas warm and continue to rise and precipitation events become more intense, severe coastal storms, similar to Hurricane Sandy, are expected to increase in frequency. The proposed activities would reduce coastal and stormwater flood risk to housing, buildings, and infrastructure in Lower Manhattan. To further increase resiliency, the City is incorporating a 2050s 90<sup>th</sup> percentile sea level rise prediction into all design elevations based on information from the New York Panel on Climate Change (NPCC) ([Source](#)). Hurricane Sandy revealed vulnerabilities in New York City's aging infrastructure, as well as a need for a

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comprehensive strategy to prepare for, withstand, and recover from future storm events. Flood protection must be built into the urban fabric, protecting against future storms and connecting people through multi-purpose flood defense mechanisms. Stormwater drainage and green infrastructure improvements on New York City Housing Authority (NYCHA) developments will mitigate the impacts of precipitation, while multi-functional coastal barriers will mitigate the impacts of storm surge. The proposed **Lower Manhattan Protect and Connect Project** consists of coastal flood protection systems and stormwater management solutions which are intended to protect and connect communities within Lower Manhattan while responding to neighborhood and local conditions. These activities are consistent with those eligible for CDBG funding pursuant to 24 CFR §570.201 (c), and do not include any activities defined as ineligible in the NDRC NOFA nor those in 24 CFR §570.207.

The proposed project meets the national objective of serving low to moderate income (LMI) persons by meeting the area benefit criterion. The Target Area, within Lower Manhattan, is home to more than 62,000 persons classified as LMI, who account for 67 percent of the residents in the Target Area, well in excess of the 51 percent threshold. This population will be protected from storm surge and stormwater flooding by the proposed Project.

The overall benefit requirement is met by this project, as 67 percent of the population benefitting from the proposed project is classified as LMI, meaning that at least fifty percent of grant funds will serve LMI persons. Based on the project costs provided in Attachment F - Benefit Cost Analysis, 74 percent of the proposed project cost benefits the Target Area, which is a regional economic center and supports more than 50,000 jobs for LMI persons. LMI households face unique challenges preparing for, evacuating during, and recovering after disaster events due to limited resources; therefore, the proposed Project aims to fulfill the national objective of serving this

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population by protecting their communities from and increasing resiliency against future extreme weather events.

**Unmet Need Updated from Phase 1 - Housing**

For the purposes of the Phase 1 Application, the City identified \$516.7 million in Unmet Housing Need throughout the five MID counties within New York City. The New York City Housing Authority (NYCHA) demonstrated over \$439 million of that need, which included resiliency measures for 400 buildings with over 35,000 public housing residential units. The New York City Department of Housing Preservation and Development (HPD) demonstrated the remaining \$77.3 million in housing need for unfunded resiliency retrofits of 95 affordable housing buildings within the Phase 1 five MID counties.

The Phase 2 proposed project meets the unmet recovery need (URN), identified in Phase 1, of nine NYCHA developments in the Target Area. These developments include 80 buildings and 21,519 residents. These developments were inundated with contaminated seawater during Hurricane Sandy, causing an estimated \$588 million in damage to building systems and disrupting services. Since the submittal of the Phase 1 Application, NYCHA has obligated funding for some, but not all, proposed resiliency measures. FEMA has committed to \$326.4 million for mitigation measures at the developments in the Target Area. Nevertheless, this mitigation does not address undamaged facilities at these developments that remain at risk, and NYCHA estimates that additional necessary stormwater management resiliency measures constitute a URN of \$99,905,212. There is no funding identified through FEMA, CDBG-DR, private insurance or the National Flood Insurance Program (NFIP) to pay for the URN. Further, future similar impacts cannot be addressed through stormwater management and damaged building mitigation activities alone. An integrated solution is necessary to

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Exhibit B – Threshold Requirements

prevent infiltration of seawater onto the developments to protect access and safety of residents, protect still exposed structures and prevent flooding from stormwater.

The Residential Building Mitigation Program identified for the Phase 1 Application currently has a citywide pipeline of over thirty five projects (about 8,000 households) which house LMI residents. Due to the program's limited funding and the high need for recovery and resiliency assistance throughout the city, not all affordable housing projects impacted by Sandy can benefit from comprehensive resiliency funding through existing sources. Five of the New York City Department of Housing Preservation and Development (HPD) affordable housing developments identified within Phase 1 as having URN are within Lower Manhattan. Two of these housing developments, totaling 805 units, have had their damages assessed at over \$8 million by the *Build it Back* program; these buildings sustained extensive flooding to below grade spaces and ground floors, resulting in damages similar to those encountered at NYCHA's properties. All five apartment developments suffered from power loss resulting from the explosion of the nearby Con Edison substation at 14th Street and Avenue C, and local street flooding levels that reached several feet. None of the buildings within the Target Area had backup power sources, and some residents went without power for over a week after the storm, suffering from loss of emergency lighting, elevators, heating, and potable water.

The 2014 New York City Housing Vacancy Survey reports that 52 percent of Mitchell-Lama co-ops in Manhattan house residents over the age of 62. Three Mitchell-Lama co-ops within the Target Area represent a total of 2,252 units, indicating that over 1,000 residents over the age of 62 may have been affected by power loss. Loss of power disproportionately impacts the health and safety of older residents, due to the inability to regulate indoor temperatures, refrigerate medications, access residents on upper floors of high rises, and pump drinking water throughout the buildings.

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Exhibit B – Threshold Requirements

Building-level resiliency needs at the five affordable housing developments within the Target Area include retrofit measures aligned with those currently implemented by HPD's existing \$60 million *Multi-family Resiliency Retrofit Program*, focused on the particular needs and challenges of affordable housing residents. HPD has identified a need for measures that protect and upgrade critical building systems to prevent future damages, provide backup power, reduce energy loads, and in some cases, lower flood insurance premiums. The cost of these URN measures have been identified at \$40 million. The proposed activity would leverage the structure and technical capacity of the existing *Multi-family Resiliency Retrofit Program* to benefit residents within the Target Area, allowing HPD to serve a larger number of vulnerable affordable housing properties with its limited resources. According to the NOFA's Appendix G, documentation required to submit this housing URN for consideration includes an analysis that shows the program waiting list and a reasonable estimate of aggregated average unmet repair needs exceeds the existing CDBG-DR funding available.

**Phase 2 Unmet Need Submittal – Infrastructure**

The City is submitting, for HUD's consideration, further URN for the qualifying disaster that will be addressed by the proposed project. This URN in addition to that submitted in the Phase 1 Application includes URN for permanent public infrastructure.

It is well known that Hurricane Sandy devastated infrastructure and public investments. Much of that infrastructure may have been repaired over the course of the last few years, but in many cases, important resiliency measures could not be implemented during the repair process. The reasons for this remaining need vary, but one particular example the City is submitting for HUD's consideration lies within the New York City Police Museum located at 100 Old Slip, Manhattan, and owned by the City. Originally constructed between 1909 and 1211, the building's exterior is

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Exhibit B – Threshold Requirements

historically landmarked. Due to the proximity of the East River to the southeast, the building was inundated with flood water during Hurricane Sandy and depths varied from three to five feet. Flood water completely filled the basement. Water intrusion damaged finishes, equipment and contents. The boilers, main air handler, ductwork, water heater, elevator machine room and HVAC controls in the basement were completely inundated. The fire signal station, chillers, fire sprinkler pumps, control systems, switchgear and phone lines on the first floor were damaged by the flood water. In addition, high winds from the storm damaged the roof which allowed rain water to enter and damage mechanical equipment and assets on the fifth floor, which was constructed in the 1980s. This resulted in critical electrical, mechanical and architectural elements being damaged. A Category E Project Worksheet in the amount of \$3 million to repair the damage has been developed (Attachment F - Benefit Cost Analysis). The Project Worksheet included a \$216,248 hazard mitigation project to relocate utility equipment within the structure, though this only protects equipment within the structure and not the historically significant exterior, nor the interior contents.

Engineers developed a scope and cost estimate to protect the structure against future flood damage in the amount of \$823,068. Nevertheless, mitigation to the structure is complicated by the historical nature of the building; protection of the building's exterior is not currently feasible and could not be funded for this reason. External flood protection, against both stormwater and coastal flooding, would be necessary to protect the Museum. Documentation required to submit permanent public infrastructure URN for HUD's consideration includes an engineering report or a FEMA Project Worksheet with an estimated repair amount. Both an engineering report and the FEMA Project Worksheet are available for consideration in Attachment F - Benefit Cost Analysis.

**Tie-Back to Qualifying Disaster (Hurricane Sandy DR-4085)**

The tie back to the qualifying disaster is established by the extent of damages suffered in the proposed Project's Target Area that are anticipated to be prevented in the future. Such damages include those identified above, such as the \$588 million in NYCHA development damages, the \$3 million in the Police Museum's damages, and the \$8 million in damages to just two of the five HPD developments. Further damages that constitute a tie-back to the qualifying disaster are described in Attachment F- Benefit Cost Analysis, Exhibit D - Need, and Exhibit E – Soundness of Approach.

**Benefit Cost Analysis**

A comprehensive and thorough Benefit Cost Analysis of the proposed project was prepared by the City of New York and its Partners, and is included within Attachment F – Benefit Cost Analysis. The analysis projects that with all quantifiable and qualitative benefits incorporated, the project will realize a ratio of benefits to costs of over six, with a net present value of \$6.46 billion, compared to an estimated total cost of over \$1 billion, which includes fifty years of projected maintenance and operations costs, as well as costs of resiliency measures already funded in order to not duplicate benefits and maintain a conservative approach.

# EXHIBIT C CAPACITY

**General Administrative Capacity**

The application is submitted by the City of New York, in association with the Mayor’s Office of Recovery & Resiliency (ORR) and the New York City Office of Management and Budget (OMB); and in collaboration with its Partners, the New York City Economic Development Corporation (EDC), the New York City Housing Authority (NYCHA), and the New York City Department of Housing Preservation and Development (HPD). The ORR will oversee the Project of any activities that are awarded funding as a result of this competition. In March 2014, Mayor Bill de Blasio established ORR with the mandate to improve the City’s activities in four key areas:

1. Enhance recovery and resiliency policy, planning, coordination, and strategies for long-term climate resiliency efforts among City agencies as laid out in *A Stronger, More Resilient New York* ([Source](#));
2. Expedite efforts to secure additional federal funding for resiliency upgrades;
3. Collaborate State and Federal recovery and resiliency planning processes to maximize investment in New York City; and,
4. Expand economic opportunity for New Yorkers by incorporating workforce development and local hiring into every recovery and resiliency project (Source: NDRC Phase 1 Application pg. 9).

The City of New York (the City) and its agencies have extensive experience with federal grants and the capacity to manage National Disaster Resilience Competition (NDRC) awarded projects, including a track record of close interagency coordination on disaster recovery and resiliency efforts. The following examples of general administrative capacity demonstrate the City’s ability to manage the proposed project if awarded.

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Exhibit C – Capacity

Procurement

The City complies with federal procurement regulations and its own procurement rules. For example, the Community Development Block Grant Disaster Recovery (CDBG-DR) unit within the City's Office of Management & Budget (OMB) reviews contracts pursuant to 2 CFR 200 as well as to the regulations of the City's Procurement Policy Board to ensure open and competitive procurements. Many City agencies that have managed CDBG-DR programs have become familiar with these federal regulations. As part of CDBG-DR compliance, various City agencies under the oversight of OMB maintain and review documentation that demonstrates cost reasonableness, selection criteria, and independent cost estimates when necessary. The City has measures in place to review contractor integrity, compliance with public policy, past performance, and financial and technical resources of potential vendors. City agencies have processes in place to handle various types of procurement, including sealed bids and proposals, small purchases, and noncompetitive procurement.

Contract Management and Financial Management

City agencies work with many vendors to implement programs, including disaster recovery efforts. The City complies with local and federal regulations such as Section 3 reporting and Davis Bacon requirements. The City's extensive procurement review process further enables its agencies to properly oversee vendors.

The City's budgeting and its annual external financial reporting are both done in accordance with generally accepted accounting principles (GAAP) applicable to U.S. state and local governments, meaning that the City meets the highest standards of financial reporting and an extremely high and rare standard for budgeting. The City's GAAP financial statements are audited by an independent CPA firm each year, and an annual Federal funds Single Audit of all Federal

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Exhibit C – Capacity

grant expenditures is also conducted by that firm in accordance with Federal OMB Circular A-133 (including sub-recipient monitoring).

With regard to accountability, quality control monitoring and internal auditing, OMB oversees the approximately \$4.21 billion CDBG-DR grant from the U.S. Department of Housing and Urban Development (HUD). Within OMB, the CDBG-DR taskforce has a monitoring and compliance unit that reviews overall grant administration as well as the management of particular programs to ensure quality control and accountability. The monitoring and compliance unit meets with partner agencies periodically to review files for quality and consistency.

In addition to OMB, HPD will provide program management for the implementation of comprehensive resiliency retrofits to multifamily affordable housing properties in the Target Area. HPD is responsible for carrying out Mayor Bill de Blasio's *Housing New York: A Five-Borough Ten-Year Plan*, and leads the initiative to build or preserve 200,000 affordable housing units and to help both tenants and landlords preserve the quality and affordability of their homes. HPD carries out this work in partnership with over 13 sister agencies, advocates, developers, tenants, community organizations, elected officials, and financial institutions.

HPD's resiliency strategy will help focus the efforts of the CDBG-DR taskforce on the affordable housing developments with more extensive resiliency upgrades, and to develop projects in tandem with the coastal infrastructure and stormwater management components of the NDRC application.

Project Launch, Tracking and Evaluation

If awarded funding, the City is fully capable of quickly launching the project within the approved schedule, as has been demonstrated with current projects funded by other CDBG-DR programs. The Office of Recovery & Resiliency (ORR) recognizes the importance of having strong

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Exhibit C – Capacity

visibility on program performance, especially since it has been charged with the overall management of an unprecedented scale of investment in rebuilding and fortifying the City after Hurricane Sandy.

To this end, it has established a project control team dedicated to the development of a customized, web-based program management information system called the NYC Recovery & Resiliency Tracker. The Tracker holds baseline and updated performance information on approximately 1,024 individual open or planned projects, executed by 26 City agencies, and produces multiple reports and other analyses that enable ORR to view performance from individual project to program level. The project control team works in close partnership with staff from each city agency charged with the direct delivery of a project(s) within the recovery and resiliency portfolio, in order to establish meaningful project baselines and to collect regular updates on project performance.

The team follows a monthly cycle during which project updates are collected and analyzed; monthly reporting brings project successes and challenges to the attention of ORR. Additional reporting allows for performance evaluations that focus on project schedule and budget performance, and individual project issues at both overall and agency program level. These reports are discussed in detail in monthly management meetings within ORR, and at a higher level at monthly meetings with the Special Advisor to the Mayor for Infrastructure & Resiliency, as well as with the First Deputy Mayor. As necessary, ORR calls meetings with agency leadership to address project performance issues directly, and to help provide or secure additional support.

**Technical Capacity**

**Risk and Vulnerability Assessment and Project Design**

The New York City Panel on Climate Change (NPCC) was established as an independent body that advises the City on climate risks and resiliency measures. With the best available data,

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Exhibit C – Capacity

NPCC science informs the City’s comprehensive climate policies, including its multilayered, citywide resiliency plan and sweeping sustainability initiatives—in line with President Obama’s recent Executive Order 13653 “*Preparing the US for Impacts of Climate Change.*” The NPCC works in collaboration with the Mayor’s Office of Recovery & Resiliency (ORR), the Mayor’s Office of Sustainability, the Mayor’s Office of Operations, and the Department of Health and Mental Hygiene.

The third NPCC panel was convened in June 2015 and builds upon previous NPCC reports, evaluating new focus areas that include:

1. Climate science (regional climate projections focusing on extreme events and community-based assessment of adaptation options)
2. Equity (focus on a neighborhood scale);
3. Critical infrastructure systems (with a focus on interdependent transportation and energy systems, extending beyond city scale to a regional approach)
4. Indicators and monitoring system (developing expanded climate resiliency indicators and monitoring system)
5. Enhanced mapping protocols (for enhanced risk, uncertainty, vulnerability and resiliency mapping).

New York City’s current flood maps date back to 1983. In 2009, the Federal Emergency Management Agency (FEMA) began updating the scientific modeling behind New York City’s flood maps. In December 2013, FEMA released the results of their update to the public: the Preliminary Flood Insurance Rate Maps (Preliminary FIRMs). The City adopted these maps into its building code in December of 2013 as the best available data.

In March 2015, FEMA started a 90-day public review period which ended on June 28.

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Exhibit C – Capacity

The City hired an engineering team to review FEMA’s Preliminary FIRMs for accuracy. The City’s team found errors in FEMA’s modeling. Based on the City’s analysis, a formal appeal was submitted to FEMA on June 26, 2015. The City’s goal is to provide New Yorkers with an accurate understanding of their flood risk. There is no guarantee FEMA will accept the City’s appeal, and there is no indication of how long it will take for FEMA to reach a decision. Until the appeal is resolved, FEMA’s Preliminary FIRMs remain in effect for building code purposes.

Capacity to Manage Flood Insurance Issues

Market forces and NFIP (National Flood Insurance Program) coverage limits make flood insurance only a partial solution for the City in protecting its buildings against future risks. The City will spend over \$3 billion restoring structures, while the City’s insurance consultant estimates that the maximum amount of flood coverage available for these structures is \$500 million (only 17% of the damage). Therefore, the City is pursuing multiple risk reduction efforts, in addition to flood insurance, to protect City buildings from the next disaster. Regarding insurance, the City is currently implementing a flood insurance plan in three phases. Phase I includes procuring NFIP policies for over 450 flood damaged city buildings. Phases II and III include the procurement of a citywide commercial flood policy, formulated from key elevation and building data, and which will provide two additional layers of protection for the city’s most critical and vulnerable buildings: hospitals, fire stations, police stations, etc.

For NYC property owners, the consideration of policy cost, perceived risk, and quality of insurance agent are the most important factors in determining whether they purchase and maintain flood insurance. Many owners in the floodplain are low to moderate income New Yorkers who struggle to make mortgage payments, let alone flood insurance premium payments. Therefore, the City has launched major affordability studies to understand the impact of rising insurance premiums

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on households and neighborhoods, and to develop and recommend possible solutions, parallel to the National Affordability study mandated by the Biggert Waters Act as amended by HFIAA. (Source: NYC NDRC Phase 1 Application pg. 33-36)

Further, now that FEMA's Preliminary FIRMs for the City greatly expand the Special Flood Hazard Area, giving accurate flood risk information to affected New Yorkers is critical. The City works closely with FEMA on outreach to impacted communities, but their materials are often confusing or difficult to use. For example, because FEMA's address lookup is so challenging on its site, <http://www.region2coastal.com/>, the City has worked with a non-profit Center for New York City Neighborhoods to develop [www.FloodHelpNY.org](http://www.FloodHelpNY.org), a more user-friendly alternative (Source: NYC NDRC Phase 1 Application pg. 33-36). The City is also working with FEMA to try and improve the training and therefore the effectiveness of the interaction at the point of sale.

### **Community Engagement and Inclusiveness**

#### **Regional Collaboration**

ORR is currently collaborating with State agencies including the New York State Governor's Office of Storm Recovery (GOSR), the New York State Division of Homeland Security and Emergency Services, and the New York State Department of Environmental Conservation on numerous recovery and coastal resiliency projects. Two such signature projects include GOSR's Community Reconstruction Program (NY Rising) and the Staten Island Living Breakwaters Rebuild by Design project (Source: NYC NDRC Application Phase 1 pg. 16-17). ORR is the main point of contact for GOSR in working through project details and design, and facilitates coordination with the appropriate city agencies. Under the State's NY Rising program the City has been working collaboratively in fifteen New York City neighborhoods to develop projects that enhance those areas' resiliency to flooding. ORR serves as the sub-recipient in managing the NY Rising portfolio

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in close partnership with each agency that is responsible for implementing specific projects (Source: NYC NDRC Application Phase 1 pg. 16-17).

ORR also has extensive experience coordinating with federal, state, and community-based partners. Examples of these partnerships include ORR’s work with the US Army Corps of Engineers (USACE) to implement a series of coastal resiliency projects in the aftermath of Hurricane Sandy. These projects include the re-nourishment of Atlantic Ocean beaches in Coney Island and the Rockaways; construction of T-groins to mitigate wave impacts at Sea Gate in Coney Island; advancing implementation of the South Shore Staten Phase I levee; and development of the Rockaway Reformulation project. The Rockaway Reformulation project in particular is an example of robust partnership and coordination with USACE in Jamaica Bay and the Rockaways. In addition to working closely with residents, civic organizations, and government agencies on these projects, the City partners with academic and philanthropic sectors through the City University of New York-led Science & Resiliency Institute at Jamaica Bay and the Rockefeller Foundation to advance long term resiliency and protection initiatives (Source: NYC NDRC Application Phase 1 pg. 25-26).

The City actively participates in a variety of collaborative forums through which the City shares its knowledge, experiences, and best practices. The City is a member of the “C40” networks including Connecting Delta Cities and C40 Climate Risk Assessment, as well as 100 Resilient Cities. In addition, the City engages with other cities through semi-structured interactions, including informational presentations, learning exchanges with peer cities, and hosting international delegations. Through these channels the City acts as a resource and collaborative partner to other cities, and learns from them as well in order to move together toward a more resilient future.

Community Engagement and Outreach

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The City and its agencies have extensive experience in engaging communities in robust processes to address resiliency and recovery, with a particular emphasis on engaging vulnerable populations. For example, the Special Initiative for Rebuilding and Resiliency (SIRR) was responsible with analyzing the impacts of Hurricane Sandy, assessing the risk and outlining comprehensive strategies for improving resiliency. Thousands of New Yorkers have been directly engaged via meetings and public workshops in the development of this resiliency plan. The City continued this dedication to community engagement throughout the development of "*OneNYC: The Plan for A Strong and Just City*", the City's latest long-term planning document that addresses growth, sustainability, resiliency, and equity as the City prepares to celebrate its 400th anniversary ([Source](#)). More than 7,500 New Yorkers took an online public survey, 800 participated in the telephone survey, more than 1,300 residents attended over forty community meetings in every borough, and 177 civic organizations and over fifty elected officials' offices met to discuss the visions described in OneNYC. Over 125 representatives from over 70 City agencies worked together to develop the OneNYC plan and fifteen leaders from neighboring cities and counties met at City Hall to discuss the plan.

The most recent example of community engagement is the work accomplished after the announcement of the Rebuild by Design awards for East Side Coastal Resiliency (ESCR) in Manhattan and Hunts Point Resiliency (HPR) in the Bronx. The City pioneered an innovative community engagement program that leverages local leadership in each community as well as stakeholders from many aspects of civic life, such as environmental justice, housing, business, community organizing in order to implement climate adaptation projects that include flood protection, energy resiliency and social co-benefits.

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The goals of the community engagement for the East Side Coastal Resiliency (ESCR) Project are aligned with those of the **Lower Manhattan Protect and Connect Project** and the City and its Partners will continue to expand the existing discussions with stakeholders and broader public through workshops, feedback sessions and the use of technology platforms that allow an ongoing feedback loop with the people that will be served by this large-scale infrastructure solutions. As an example of community leadership in the City's planning processes, ESCR brought together a Task Force comprised of members of the local Community Board and leaders from the tenant associations of neighboring public housing developments. Between ESCR and HPR, the City has engaged over 700 people at fourteen different sessions, through public meetings, vision sessions, workshops, and other consultations.

Another example of effective community engagement and outreach capacity is ORR's partnership with NYCHA in its resiliency portfolio. Through this partnership the Mayor's Office and City Partners can better connect with the vulnerable LMI populations living and working within the Target Area. The Partnership Agreement with NYCHA creates a formal framework for NYCHA residents to be engaged in the conversation and collaborate on finding the solutions that are right for their community. NYCHA's Project Management Office team has a group of multilingual outreach specialist that meet with residents on a daily basis. This team, mainly comprised of NYCHA residents, have been working across the damaged developments for the last two years and have formed strong relationships with the residents. This high level of presence allows the Partners to both give to and receive from the tenants the most up-to-date status of needs, issues and progress achieved.

**Management Structure**

*Mayor's Office of Recovery and Resiliency (ORR) as a Managing Agency*

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The New York City Mayor’s Office of Recovery and Resiliency (ORR) will lead the NDRC application, design and implementation of the proposed project. Daniel Zarrilli is the Director of ORR. ORR is part of the Mayor’s Office of Recovery, Resiliency and Infrastructure, which is directed by William Goldstein, and also includes the Mayor’s Office of Sustainability and the Mayor’s Office of Housing Recovery Operations. Mr. Goldstein reports directly to New York City First Deputy Mayor Anthony Shorris, the second highest ranking official at City Hall.

ORR is organized across the four resiliency goals of the City’s planning document OneNYC: social and economic resiliency of neighborhoods, buildings, infrastructure, and coastal defense. There are also separate teams dedicated to Project Controls and External Affairs. Overall, ORR has currently has nineteen professional staff on board and an additional eleven vacant positions. This **Lower Manhattan Protect and Connect Project** will be led by ORR’s planning team in coordination with City agency and non-governmental partners. Under the direction of Daniel Zarrilli, the project will be led by the Deputy Director of Planning and a Senior Policy Advisor of Planning, with additional direction provided by the Senior Advisory for Coastal Resiliency.

To implement the project, ORR will work closely with OMB to provide overall oversight for the grant funding; with EDC to lead a planning and feasibility study for the coastal protection components; with HPD on building-scale resiliency investments; with NYCHA to provide program management and oversight for the stormwater place-making activities proposed on NYCHA properties in the Target Area.

*New York City Office of Management and Budget (OMB) as a Managing Agency*

OMB oversees an annual expense budget of \$78.5 billion (FY 2015) and a capital budget of more than \$6.1 billion a year. With a staff of approximately 300 employees, OMB prepares and monitors the budgets and programs of over 80 city agencies and organizations. Within OMB, the

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Community Development (CD) unit has managed the CDBG Entitlement Program for forty years. The CD unit has twelve staff members with 236 years of collective experience managing and monitoring CDBG programs. For the fiscal year 2015, the CD unit handled oversight and compliance for the approximately \$153 million received under the CDBG program, as well as additional program income. The City uses CDBG funds at several agencies that work with civil rights and fair housing issues, including the Commission on Human Rights, the Department of City Planning (DCP), and HPD's Division of Housing Policy Analysis and Statistical Research. The CD unit works with these agencies to publish this data in the City's annual Consolidated Plan. The CDBG Disaster Recovery unit (CDBG-DR) oversees the City's Action Plan and subsequent amendments as well as monitoring and compliance for the approximately \$4.21 billion allocation from HUD for Hurricane Sandy recovery. The CDBG-DR unit provides programmatic guidance, coordinates policy, administers CDBG-DR allocations, and provides oversight, monitoring, and audit support of recovery activities. These activities are concentrated on providing assistance to impacted homeowners, renters, and businesses, and on rehabilitating City infrastructure and ensuring sound investments of funds. The unit has full-time staff members dedicated to program and policy, environmental review, and expenditures and drawdowns.

*New York City Economic Development Corporation (EDC) as a Partner Agency*

EDC's Asset Management Division actively manages approximately 200 City assets and provides project planning, leasing, management, maintenance, contract procurement, budgeting, financial reporting, administration, and risk management (e.g. insurance) for these assets to create jobs and provide real estate for businesses. In this capacity, EDC's 94 Asset Management staff have a wealth of experience in preserving and improving both infrastructure and properties, providing critical infrastructure services as part of the Office of Emergency Management's (OEM) response

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team, implementing/cooperating with citywide programs to eliminate blight, and assisting tenants, private businesses, EDC departments and City agencies in real estate matters.

EDC's staff consists of industry experts in real estate and housing, financial assistance, asset management, resiliency and sustainability, waterfront policy, planning and public works, community engagement, capital design and engineering, industrial and manufacturing policy, international business, environmental compliance, and renewable energy development and advancement.

EDC has experience working on projects in all areas of the City's recovery and resiliency portfolio including working with the Department of Small Business Services in designing and streamlining the Hurricane Sandy Business Loan and Grant Program, and spearheading the RISE: NYC initiative to develop innovate and cost-effective technology solutions to make small businesses more resilient. EDC is also a major partner in leading many of the City's coastal resiliency initiatives including: City-wide Raised Shorelines Project; Coney Island Creek; Gowanus Canal and Newtown Creek; Hunts Point Resiliency Project; Staten Island Saw Mill Creek Marsh and Staten Island Beachfront; Rockaway Boardwalk Reconstruction Project; Citywide Waterfront Mapping; and Citywide Waterfront Inspection.

*New York City Housing Preservation and Development (HPD) as a Partner Agency*

HPD is the largest municipal housing preservation and development agency in the nation. The agency's mission is to make strategic investments that will improve and strengthen neighborhoods while preserving the stability and affordability of our existing housing stock.

HPD oversees the implementation of the Multi-Family Storm Recovery Program as part of *Build it Back* ([Source](#)), and collaborates with other agencies to develop policy guidelines and best practices for multi-family resiliency in New York City. To administer the agency's existing \$60 million in CDBG-DR funds towards the **Lower Manhattan Protect and Connect Project** activity,

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the HPD Multi-Family Resiliency Retrofit Program, HPD draws on the capacity and expertise of departments and staff throughout the agency. Staff working on multifamily resiliency at HPD are part of the Multi-Family Storm Recovery team under Leora Jontef, the Assistant Commissioner of Storm Recovery. The Division of Storm Recovery reports to Eric Enderlin, the Deputy Commissioner of Office of Development, who reports to the Commissioner of HPD, Vicki Been. The Commissioner reports to the Deputy Mayor for Housing and Economic Development, Alicia Glen.

HPD administers the *Build it Back Multi-Family Repairs Program*, employing a total of 84 staff members who work exclusively on *Build it Back*. The *Multi-Family Repairs Program* provides forgivable loans or grants for repairs, reimbursement, and resiliency improvements to buildings with five or more units. Eligible properties include rental buildings, condominiums, and co-operatives that sustained damage due to Sandy, as well as individual condo and co-op units. There are currently thirty-seven HPD staff members who work on program development, administration and planning for the *Build it Back Multi-Family Repairs Program*.

HPD has collaborated extensively with ORR, NYCHA, and DCP to better understand what retrofit strategies are appropriate for multi-family housing in New York City. HPD has worked closely with ORR to understand how resiliency retrofit measures can align with energy efficiency upgrades, and to analyze the costs and benefits of this additional work. Specifically, ORR has provided guidance on HPD's planned scopes of resiliency work to help identify opportunities to incorporate energy efficiency measures. HPD has also worked closely with DCP on its *Retrofitting Buildings for Flood Risk Manual*, which illustrates a range of retrofit strategies for the various multi-family building types in New York City's floodplain. Lastly, HPD has coordinated with NYCHA on to review retrofitting strategies suitable for campus-style housing and align resiliency projects within

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specific neighborhoods, including Lower Manhattan. This exchange has directly influenced HPD's decision to provide onsite backup power to large campus-style developments such as the five developments targeted for this competition.

*New York City Housing Authority (NYCHA) as a Partner Agency*

As the largest housing authority in North America, NYCHA has the ability to affect change in the lives of over 400,000 New Yorkers living in its 328 public housing developments across the five boroughs, and another 235,000 residents who receive subsidized rental assistance in private homes through the NYCHA-administered Section 8 Leased Housing Program. NYCHA has approximately 11,000 employees serving almost 200,000 families. NYCHA's residents occupy 12.4% of the city's rental apartments, and the agency administers a robust portfolio of asset management, direct services, resident engagements, and economic mobility programs. NYCHA also has a specialized team of contractors who oversee the planning and management of construction across 34 Sandy-damaged developments. NYCHA has a team of designers, planners, architects and engineers currently working on how to fund and construct more resilient public housing.

NYCHA created a Sandy Recovery Division within its Capital Projects Department that is solely focused on the Sandy damaged developments. Key staff, roles and responsibilities for managing the activities described in NYCHA's Partnership Agreement with the City would be similar to the existing disaster recovery structure, as follows.

The Vice President for Disaster Recovery (primary liaison to the City) is responsible for accomplishing the goals of the Recovery Program and would assume responsibility for the NDRC project in a similar fashion. NYCHA's Senior Advisor is the strategic advisor to the Recovery Program and liaison to PMO staff; their Recovery & Resiliency Program Manager is responsible for

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the operations and day-to-day activities involved with implementing NYCHA’s recovery program, including the proposed activity within NYCHA developments.

The NYCHA Resilience Manager acts as project manager to oversee the implementation of the proposed activity within NYCHA developments and to maintain compliance with grant requirements, while the NDRC Activities Integrity Assurance staff ensure that all NDRC funded activities are executed in compliance with the narrative presented to HUD in the NDRC application.

The NDRC Activities Integrity Assurance Specialist will ensure that all NDRC funded activities are executed in compliance with the narrative presented to HUD in the NDRC application.

The Resiliency Specialists are technical specialists in landscape architecture, sustainability, green infrastructure and community engagement; these staff provide expertise throughout project implementation to ensure successful outcomes. NYCHA’s Design Oversight Manager develop specifications for design contractor procurement, as well as oversee designers to ensure design intent, schedule and budget compliance, and overall quality. The Grants Manager is responsible for benefit-cost-analysis, documentation of match, environmental review, and CDBG-NDR compliance; their Construction Manager helps develop specifications for construction contractor procurement, and oversee the contractors responsible for construction to ensure design intent, schedule and budget compliance, and overall quality. NYCHA’s Community Outreach Manager plans, organizes and leads community outreach to ensure community engagement throughout and beyond the design and construction of the proposed resiliency improvements, while the Procurement Manager manages the procurement of contractors required to implement the proposed projects according to HUD and NYCHA policies.

# **EXHIBIT D NEED**

### **Unmet Recovery Need Overview**

In October 2012, Hurricane Sandy (DR-4085) caused substantial damage throughout large portions of New York City. In total, forty four New Yorkers perished, and others were injured or displaced from their homes by the storm. It is estimated that more than 69,000 residential units were damaged throughout New York City. Hurricane Sandy set a record breaking tide in New York City at 14.1 feet above mean low tide. New York City was unable to handle the volume of seawater that entered the City. This resulted in widespread flooding due to the inability of New York City's fourteen wastewater treatment plants to treat the volume of water flowing into storm drains. Many critical facilities, including transportation hubs, power stations, hospitals, and schools, were out of service for months after the storm, adversely affecting millions of people.

Hurricane Sandy revealed extensive vulnerabilities of New York City's physical structures, as well as a need for a comprehensive strategy to prepare for, withstand, and recover from future storm events. As originally indicated during the City's NDRC Phase 1 Application, the City's proposal for Phase 2 continues to further its comprehensive climate resiliency planning efforts, specifically the goals outlined in *One New York: The Plan for a Strong and Just City (OneNYC)*. Based on an updated status of needs since the City's NDRC Phase 1 Application, the City has identified portions of Lower Manhattan as the Target Area to be addressed by the proposal under Phase 2.

### **Target Geography**

The Target Area for the **Lower Manhattan Protect and Connect Project** was established through the analysis of the future risks due to climate change and the historical vulnerabilities of the area. A list of affected census tracts and block groups is included in Attachment F – Benefit Cost Analysis.

## **Impacts of Hurricane Sandy within the Target Area**

### Transportation

New York City is socially and economically dependent on its multi-layered transportation network. If the transportation network fails, economic productivity and social health immediately fall due to the public's inaccessibility to work, to consume, and to use essential services. The Target Area is the convergence of New York City's transportation network, including subway lines that link four boroughs. The Target Area also includes major thoroughfares, ferry services and terminals, helicopter landing pads, and two car tunnels. With over 98 percent of workers commuting into the Target Area from the New York Metropolitan Area and beyond, this area is crucial to regional connectivity ([Source](#)). It is no surprise that Hurricane Sandy became the largest transit disaster in United States history. Four out of ten of the nation's transit riders had their commute interrupted in the aftermath of the hurricane. Two notable subway stations, South Ferry and Whitehall, required complete reconstruction after Hurricane Sandy, including critical electrical equipment. Repairs are ongoing and are expected to cost at least \$600 million ([Source](#)).

### Critical Infrastructure

New York City contains the oldest electricity generation and distribution system in the world, currently serving eight million New Yorkers and 25,000 businesses. Following the storm, one third of New York City's electrical generating capacity was lost. On 13<sup>th</sup> Street in Manhattan, a transformer exploded due to flooding at a Con Edison of New York (ConEd) facility, cutting off power to all residents in the Target Area, including 80,000 people in 423 New York City Housing Authority (NYCHA) buildings across Lower Manhattan. ([Source](#)). Four months after the storm, ConEd reported damages totaling \$521 million.

### Jobs and Employment

The Target Area is home to more than 240,700 jobs, and 1,479 different employers ([Source](#)). Almost twenty-five percent, or over 50,000 of these jobs, have earnings below low to moderate income (LMI) limits for Manhattan, and that more than thirty percent, or over 16,450 of these jobs are held by workers with a high school or lower level of education. For more details on the LODES data analysis, see Attachment F- Benefit Cost Analysis. The New York State Labor Department stated that 30,000 private jobs were lost around New York City as a result of Hurricane Sandy. This job loss disproportionately affected LMI households because many of the jobs lost were in industries that did not have the resources available to reopen immediately, such as food services and retail. For more information on the impacts of Hurricane Sandy, see Attachment F- Benefit Cost Analysis.

### Affordable Housing

The Target Area includes nine New York City Housing Authority (NYCHA) developments, totaling 10,038 units. The Target Area is also home to 3,113 privately owned affordable housing units within five developments subsidized by the Department of Housing Preservation and Development (HPD).

These developments were inundated with contaminated seawater during Hurricane Sandy, causing damage to building systems and effecting essential services. Many developments were without electricity, heat or hot water for days or weeks until crews could install temporary systems. The weeks following the disaster were spent cleaning and removing large amounts of contaminated debris and sand deposited across the sites, pumping water from cellars and crawl spaces, and re-establishing basic services for the residents, many of whom were not able to evacuate. Damages to these developments included:

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1. Mechanical systems: boilers and controls, steam and vacuum equipment, pumps, trash compaction systems, and elevator equipment;
2. Electrical systems: distribution systems, breakers, panels, branch circuitry, wiring and conduit, switches, lighting fixtures, and closed circuit television [CCTV] surveillance system components;
3. Structure and furnishings: concrete floors, concrete and masonry wall units, wall and floor finishes, tile, wood and vinyl flooring, doors and doorframes and associated hardware; and,
4. Property grounds: compactors, site lighting, playground protective surfaces, playsets, maintenance equipment and many residents' personal vehicles parked in NYCHA parking lots.

During Hurricane Sandy, 54 of the 78 NYCHA buildings in the Target Area suffered damage. Over 6,200 housing units in the Target Area registered for repair and reimbursement assistance through the *Build it Back Program*. Through this program, \$8 million in damages were assessed for a total of 805 units in New York City affordable housing developments. Damage to a single NYCHA building, located in the Two Bridges development, affected 250 apartment units, which is well above the 100 home threshold for Most Impacted and Distressed areas.

**Unmet Recovery Needs (URN)**

During the City's NDRC Phase 1 Application process, the City identified projects city-wide within all five New York City Counties (i.e., Bronx, Kings, New York, Richmond, and Queens) that were previously potential for inclusion in the Phase 2 Application; as stated in the City's NDRC Phase 1 Application, determined by HUD to be Most Impacted and Distressed (MID) based on widespread damage from Hurricane Sandy (DR-4085).

The proposed project would address the unmet recovery needs (URN) in response to the damage and danger of Hurricane Sandy. A particular focus of the proposed solution includes

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addressing the URN of nine public housing developments operated by NYCHA: Campos Plaza II, Baruch, LaGuardia, Lavanburg, Riis I and II, Smith, Two Bridges, and Wald Houses and five privately owned affordable housing developments: Haven Plaza, Village East Towers, Masaryk Towers, Gouverneur Gardens, and Lands End II.

FEMA has committed 406 hazard mitigation funds towards damaged buildings for a variety of structure-specific mitigation measures, including, but not limited to: sealing external building walls with a waterproof coating to make structures below the flood level watertight, installing flood gates on below-grade entry doors and flood-proof doors at grade, elevating boiler equipment, and raising electrical equipment and fire safety systems above the design flood elevation to prevent future damage from flooding.

Additionally, FEMA funds will be allocated to install permanent back-up generators on damaged buildings that will provide power to these buildings during power outages. None of the fourteen low-income housing developments in the Target Area had backup power sources, and some residents went without power for weeks after the storm, with no access to electricity, hot water, elevators, heating, and trash compactors to dispose of massive amounts of refuse.

**Most Impacted and Distressed**

Distressed characteristics were already present in the Target Area prior to Hurricane Sandy. Based on the LMI Universe Sample used by HUD, within the census block groups determined to fall within the Target Area, there are over 53,500 individuals with incomes below fifty percent of the median for the area. According to data provided by the Furman Center at New York University, within the Lower East Side/Chinatown neighborhood tabulation areas (NTA), twenty five percent of the population was severely rent-burdened in 2008, which the Furman Center and HUD define as a household paying more than fifty percent of its income towards rent ([Source](#)). In 2008, 86 percent of

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area residents were renters, and this rate has remained relatively constant, suggesting that over 30,000 individuals in the Lower East Side/Chinatown NTA are severely rent-burdened. It is not possible to quantify the overlap between individuals with under fifty percent of area median incomes with individuals who are severely burdened by rent. However, the Target Area and the wider NTA is home to 122,000 people, of which twenty five percent are severely rent burdened, and 67 percent are considered LMI by HUD. Thus, it is reasonable to conclude that the Distressed threshold of 100 individuals who are both low income and rent-burdened is met ([Source](#)).

Vulnerable Populations

Hurricane Sandy disproportionately affected LMI New York City residents because many NYCHA developments and other forms of affordable housing stock lie within the floodplain ([Source](#)). Overall, the area's vulnerable population includes low-income residents, residents with lower levels of educational attainment, the elderly, disabled, and homeless. As described in Attachment F- Benefit Cost Analysis, 67 percent of the population in the Target Area is considered LMI. Thirty-three percent of the area's population is extremely low income (51 percent specifically within the Two Bridges neighborhood); nineteen percent are either below five years old or above 65 years old; twenty-five percent have not graduated from high school; and thirty-four percent have low English language proficiency. NYCHA Lavanburg Homes is managed by Henry Street Settlement, who has a contract with the Department of Homeless Services and provides placement to the homeless. The Target Area is also home to 1,686 persons with disabilities. These diverse vulnerable groups lack the resources to be able to financially recover, require more assistance from caretakers or family, or may be more susceptible to mental health effects of disasters, hampering their ability to recover quickly after catastrophic events. The social vulnerability of the population can be quantified through the Social Vulnerability Index (SoVI). Manhattan's SoVI is within the top fifth percentile

for vulnerability to environmental hazards in the country and among the most vulnerable counties in the state ([Source](#)).

In addition to affordable housing, the *2014 New York City Hazard Mitigation Plan* identified that the elderly population is also severely at risk from severe weather events. Approximately twenty seven percent of the households are in the area inundated by Hurricane Sandy, with twelve percent of these seniors living alone. In addition, fifteen percent of the population living in the 100-year floodplain is over 65 years old; eighteen percent of the population living in the 100-year floodplain is living at or below the poverty level. Loss of power disproportionately impacts the health and safety of older residents, due to the inability to regulate indoor temperatures, refrigerate medications, access residents on upper floors of high rises, and pump drinking water throughout the buildings. Residents who utilize an oxygen apparatus may also require power for this medical necessity.

### **Additional Resiliency Needs**

The calculation of the resiliency value in Attachment F- Benefit Cost Analysis includes consideration of historical losses from previous storm events, where available, and bases results on expected losses from modeled hazard events.

Economic impact value is expressed as lost output, which occurs when structures are damaged and occupants must either relocate to another building or wait until repairs are made. The lost output results are taken from IMPLAN, an input-output economic modeling software. The total economic ripple effect throughout the entire Target Area is a net present value of almost \$577 million. Human impacts that result from natural disasters are also quantified, using values such as casualties, mental stress and anxiety, and lost productivity. The human impact accounts for a \$150 million loss.

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The City uses the definition of resiliency presented by the Intergovernmental Panel on Climate Change (IPCC) and subsequently by the New York City Panel on Climate Change (NPCC) to be: *“Resilience is the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a potentially hazardous event in a timely and efficient manner, including through insuring the preservation, restoration, or improvement of its essential basic structures.”* ([Source](#))

The City has adopted this framework as its redevelopment model; that is, the City, its Partners, and the federal government must work together to better protect New York City to withstand catastrophic events, and emerge as a stronger, more connected region. The City is being thoughtful in its approach to Sandy recovery in the way that it is leveraging repair efforts to protect New York City’s most vulnerable population from a variety of potential events, accounting for the most current research on the risks and impacts of climate change.

The proposed project will increase resiliency by reducing future losses to coastal and stormwater flood events, reducing the incidence of combined sewer overflow events, mitigating the urban heat island effect, reducing loss of service in transportation, telecommunication and energy systems, providing opportunity for economic revitalization in the Target Area, and protecting against future loss of affordable housing and infrastructure. Included in project activities are also retrofits to affordable housing complexes that will reduce resident’s dislocation time post-disaster. The City proposes to use this opportunity as a vehicle for increased social, environmental, and economic vitality in the communities protected.

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Need for Coastal Protection

Hurricane Sandy demonstrated the realities of climate change and exposed the vulnerability of the City’s coastal population. If the protective measures included in this application had been in place at the time of the qualifying disaster, widespread flooding in Lower Manhattan could have been reduced or prevented, avoiding \$5.8 billion in damages. These damages include: direct physical damages to buildings, utilities, communication and transportation assets; displacement; loss of public and essential facility services, such as transportation, power, hospitals, and police stations; economic losses (lost wages and business income); and human impacts including casualties, mental stress and anxiety, and loss productivity. These losses demonstrate a need for the increased resiliency provided by the proposed Project.

Need for Upgrades to Affordable Housing

Hurricane Sandy left many Target Area residents without electricity, heat, and water for weeks after the storm, forcing many residents to relocate. Many of the families living in these affordable housing complexes have very few resources to carry them through the wrenching experience of displacement due to flooding.

The City’s existing Multifamily Resiliency Retrofit Program strives to align resiliency needs with broader housing preservation and affordability goals by preventing the loss of affordable housing units, identifying opportunities to implement resiliency measures with energy efficiency co-benefits, and addressing additional rehabilitation needs of affordable housing properties when applicable. Such activities will serve to directly address and reduce the consequences power loss in proposed multifamily affordable housing complexes in the Target Area, allowing residents to remain in their homes during the recovery period.

Need for Community Connectivity

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When communities feel empowered as a unit of people, they can help each other pull through times of disaster together. The Target Area includes communities that are cut off by transportation systems, social patterns and income inequality. By connecting communities with adjacent populations and increasing space for community gathering, individuals can form relationships that foster stability and mutual assistance in times of need.

Need for Stormwater Management

Hurricane Sandy revealed the limits of New York City's stormwater infrastructure. When capacity is reached at New York City's wastewater treatment facilities, untreated sewage spills directly into New York City's waterways. During Hurricane Sandy, 5.2 billion gallons of untreated or partially treated sewage was discharged into New York City's waterways, thereby releasing bacteria and pathogens that are harmful to humans and their surrounding environment. These combined sewer overflow (CSO) events do not solely occur in extreme storm events. In 2008, it was estimated that 27 billion gallons of untreated sewage was discharged into New York City's waterways during heavy rain events. Each year, these CSO events significantly deteriorate the quality of New York City's waterways.

Improvements to stormwater infrastructure across NYCHA's nine developments will provide protection from flooding by reducing the amount of rainfall that needs to drain from the Target Area. This reduction in load will help prevent sewer backups or discharges of untreated sewage to the area waterways. NYCHA's stormwater management features will help the City manage rainfall and "resist, delay, store, discharge and recover" quickly from light to heavy rain events.

A critical element in NYCHA's recovery and the overall effort to preserve affordable housing in New York City is to ensure that the infrastructure that is replaced is done in a manner that reduces the risks to the residents in times of severe storms, flooding and extreme heat and cold

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events. The proposed activities will mitigate the NYCHA development grounds against localized flooding during a variety of rain events, from daily flooding to heavy rain events like Hurricane Irene. NYCHA will contribute to Target Area water management through the use of water storage areas and bioswales, surface grading and contouring, soil amendments and underground stormwater retention and detention cisterns, porous paving materials for parking areas and recreation areas and controlled-flow rooftop water detention systems on its nine developments. Accomplishing stormwater management through the expansion of green spaces, will also address the threat of severe heat waves by mitigating the urban heat island effect and improve connectivity, both between adjacent NYCHA developments and to the whole neighborhood, and provide opportunities for community programming and increase economic development opportunities. There is strong empirical evidence communities with stronger social networks improve the resiliency of vulnerable populations against hazards; during a severe 1995 heatwave in Chicago, a study found that communities with more resilient social environments suffered fewer casualties (Source).

**Growth Analysis**

Hurricane Sandy illustrated multiple growth risks in the City's current economic development patterns that hinder resiliency. These patterns are discussed in detail in the Growth Risk Analysis portion of the Attachment F - Benefit Cost Analysis, with highlights of key projected demographic and economic trends, as permitted per instructions in the NOFA, presented below.

*Demographic Trends*

- In 2011 there were approximately one million low income households in New York City, yet only 425,000 rental units were affordable to those households. There is a continued mismatch between New York City's demand for affordable housing and its supply, exacerbating the income inequality that threatens the City's progress.

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- It is expected that the City will need at least 250,000 new units to meet the housing demand for the additional population expected by 2040; 200,000 of those units are planned to be affordable housing units.

*Economic and Employment Trends*

- Technology, advertising, media and information technology (TAMI) companies have accounted for forty-seven percent of all relocations within the City to Lower Manhattan since 2011.
- Economic and employment trends in the City have not fully offset the wage stagnation that occurred during the Great Recession; low-income New Yorkers continue to struggle with the City's high cost of living, and almost twenty-five percent of the total labor force earns less than \$20,000 a year.

*Future Risk*

In summation of overall expected growth trends, the City expects to accommodate more than nine million residents by 2040, and in doing so will construct 250,000 new housing units and focus workforce development efforts towards the highest growing economic sectors for the area. The risk of such growth without physical, economic, and social resiliency measures in place is that existing social inequality issues may be exacerbated; growing income inequality, obstacles to job mobility, a crisis of housing affordability, and aging infrastructure.

**Gap/Capability Analysis**

In the development of the City's climate risk assessment and climate adaptation plan, the City has identified the following factors, among others, which contribute to or hinder disaster recovery and citywide resiliency, as detailed below. Ultimately, the effect of the proposed Project will be a reduction in the need for recovery after catastrophic events.

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- Accessibility of Information During Recovery: Recommendations to improve accessibility of recovery information and services for all city residents (including persons with disabilities or special medical needs, homebound populations, non-English speakers and un-documented immigrants) include expanding the capacity of the City’s 311 call center; formalizing the communication process between local officials and community partners so that information is precise, complete and clear; and increasing outreach to deliver recovery information in every affected neighborhood by every method available. Although social media has proven to be an effective method of communication during recovery, it does not reach all people groups and does not prevent incorrect information from being distributed. The City will continue to work with neighborhood groups, local organizations, NYCHA and other entities to deliver critical recovery information and support to residents who may need assistance to take advantage of recovery resources.
- Loss of Power: Building upon recommendations from the Hurricane Sandy FEMA After-Action Report, the City needs to improve the two-way communication process for reporting power outages, and establish alternative power options for the cascading effects of power loss such as traffic and street lights management or power loss at shelters. Moreover, the City is working with suppliers to assure that all possible mitigation is completed for a reduction in power outages and down time.
- Transportation: Post-disaster transportation challenges included severe fuel shortages which disrupted subway, bus and taxi services, and damages to transportation infrastructure. Situational awareness was crippled due to the overwhelming nature of the problem and to initially frantic response activities. Recommendations for future recovery and resiliency include the creation of a Liquid Fuels Roundtable to assure adequate fuel for response and recovery

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needs; the development of a citywide emergency transportation plan; and upgrades to fuel infrastructure systems.

- Sheltering: The City maximized the resources available and plans in place for opening shelters to approximately 6,800 people in 73 shelters during Hurricane Sandy ([Source](#)). Recommendations for improvements include planning to keep shelters opened longer and to transition people into “medium-term occupancy” facilities during the recovery process.
- Structural Recovery: The Hurricane Sandy FEMA After-Action Report provides a look at the additional capacity needed in order to respond to flood inundation of large-scale buildings and recommends numerous actions for increased future recovery capacity including pre-storm identification of equipment and skilled resources that would be needed for building restoration and better coordination with property owners.
- Coordination with Agencies and Private Entities: The City recognizes the need to partner more effectively year round with neighborhood, city, state and federal entities that are critical during recovery. These groups can bring much-needed resources to the recovery effort. Recommendations to address this include establishing continuous and consistent information exchanges with such groups; developing City templates for sharing critical information; and generally building better pre-disaster relationships with these vital links to resilient recovery.

**Broader Area**

In addressing the impacts and needs of the broader area, the City agencies are partners in the New York-New Jersey-Connecticut Sustainable Communities Consortium to discuss regional strategies to integrate resiliency in floodplain management, long-term planning, and housing, transportation, economic and environmental programs. The Consortium includes several local and regional governments and planning councils from Connecticut, New Jersey and New York

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State. The Consortium’s Advisory Board consists of eleven State agencies and non-profit organizations from New York, New Jersey, Connecticut and the greater region.

In addition, New York City has been working with state and federal partners such as the United States Army Corps of Engineers (USACE), the New York State Department of Environmental Conservation (NYSDEC), and the Federal Emergency Management Agency (FEMA) to coordinate resiliency and repair efforts. Moreover, the City will continue working with New Jersey, Connecticut, Long Island, and New York State to create regional strategies for flood zone management, climate resiliency, and long term planning to promote more livable, economically vibrant places.

National Impact

The Target Area is often considered the leading financial center of the United States, as it houses the Wall Street area, including the New York Stock Exchange, NASDAQ, and the New York Board of Trade. The New York Stock Exchange and the NASDAQ are the first and second largest stock exchanges in the world by market capitalization. The value of the New York Stock Exchange’s listed companies is \$19.69 trillion as of May 2015, and the average daily trading value in 2013 was \$169 billion.

Wall Street was closed for two days after Hurricane Sandy due to blackouts, transportation interruptions, and flooding in the area ([Source](#)). After two full days of complete suspension of stock exchange, many transactions were backlogged and led to significantly higher exchange volume after the market reopened. Such a situation creates risk of stock market disruption ([Source](#)). Wall Street appears to have returned to normal the week following Hurricane Sandy, but had the stock market been closed for one additional day, more significant impacts on the nation’s economic growth were predicted as buying and selling became backlogged.

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Overall, the proposed project is expected to generate more than 3,000 jobs, \$373 million in labor income, and \$652 million in industry output throughout New York County alone. These results may be considered conservative, as economic relationships can and do extend to geographic areas beyond New York County. It is expected that project implementation will also generate economic benefits at a national level.

**Best Approach**

In the City’s NDRC Phase 1 Application, the City described an approach to resiliency with goals of embracing the coastline, planning ambitiously, creating a stronger more resilient city, and keeping the City affordable. The City is proposing the **Lower Manhattan Protect and Connect Project** because it represents a feasible approach to a resilient community, offering protection from extreme flooding, continuity of operation for local businesses, social and economic equality between different neighborhoods, opportunities for economic revitalization through new retail space and jobs, new public spaces for healthy recreation, and expanded connectivity for residents and area visitors. There is a need for large-scale coastal protection and stormwater infrastructure to protect vulnerable coastal communities from sea level rise and storm-related flooding and allow New York City to properly manage precipitation and flooding events, while implementing building-level retrofitting of the Target Area’s affordable housing stock to preserve affordable housing in the Target Area. The protection of homes, jobs, and critical infrastructure is balanced with an overarching need to unify and connect these neighborhoods to create a protected and more equitable City that supports a future of growth and prosperity for all residents.

**EXHIBIT E**  
**SOUNDNESS OF APPROACH**

### **Approach Overview**

The proposed **Lower Manhattan Protect and Connect Project** consists of coastal flood protection measures, stormwater management strategies through Placemaking and resiliency measures that are designed to enhance the community fabric within the Target Area. The proposed Project is also intended to connect and integrate with the currently ongoing East Side Coastal Resiliency (ESCR) project funded through the Rebuild by Design competition with Community Development Block Grant-Disaster Recovery (CDBG-DR) grant funds.

The Project discussed herein includes permanent and non-permanent structures, including passive floodwalls, mechanical gates, and deployable panel systems, to protect vulnerable communities, critical infrastructure, and existing community spaces from storm surge, while maintaining and enhancing the daily functionality of existing land, creating opportunity for enhanced waterfront uses, and upholding community equity in protection. Drainage and green infrastructure improvements mitigate the associated impacts of severe and moderate precipitation events and hasten the recovery process after large rain events. Placemaking concepts focus on evolving public spaces into community places by focusing aspects of sociability, uses and activities, accessibility, and comfort. Mitigation measures at housing developments increase resiliency by providing backup power, reducing energy loads, and floodproofing critical building systems.

### **Defining Metrics and Measuring Project Success**

In order for the Project to be acknowledged as effective, metrics must be defined and measured throughout the lifecycle of the project. In the City's NDRC Phase 1 Application (pg 43), the City describes four outcomes to advance resiliency goals:

1. Strengthened coastal defenses;
2. Upgraded buildings that are more resilient;

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3. Protection of core infrastructure and the continuity of services; and,
4. Neighborhoods that are safer and more connected relative to increased risk to shock events, and stabilized from displacement due to inequality.

As described in its *OneNYC* comprehensive plan, the City is already measuring numerous metrics related to resiliency, environmental, and social value. Specific metrics related to the outcomes of the proposed Project herein include:

Overall Resiliency – The City is measuring the following metrics with regards to overall resiliency from flood events:

- Reduced amount of stormwater flooding in most affected communities;
- Increased square footage of buildings upgraded against flood risk;
- Increased linear feet of coastal defenses completed; and,
- Increased number of residents benefiting from coastal defenses and restored ecosystems.

Social Vulnerability – The proposed Project will support the City’s quantifiable goals aimed at reducing social vulnerability:

- Reduced social vulnerability (using the Social Vulnerability Index) for neighborhoods across the City;
- Preserving 120,000 affordable housing units By 2024;
- Increased number of public cultural and civic events in community districts with the highest rates of poverty and lowest rates of public cultural and civic programming;
- Doubling of the number of cyclists, tracked by the NYC In-Season Cycling Indicator, by 2020; and,
- Increased percentage of adult New Yorkers who meet physical-activity recommendations from 67 percent to 80 percent by 2035.

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Environmental Resiliency – The proposed Project will measurably contribute to the following environmental metrics being measured by the City:

- An increase in the percentage of New Yorkers living within walking distance to a park from 79.5 percent to 85 percent by 2030.

Economic Resiliency:

- A reduction in average annual economic losses resulting from climate-related events, as stated in *OneNYC*;
- Tracking jobs created by the project, and monitoring which new jobs could be filled by low to moderate (LMI) individuals, as stated in the City’s NDRC Phase 1 Application. The City state: “*Any construction projects and program spending related to NDRC will provide for Section 3 requirements to hire local and/or LMI residents that will provide for economic mobility*” (pg 45). Additionally, the City will comply with Section 3 of the Housing and Urban Development Act of 1968, as amended (12 U.S.C. 1701u) and HUD’s implementing regulations at 24 CFR part 135.

For more information about measuring the effects of the proposed Project, see the City’s NDRC Phase 1 Application, Exhibit F, the four Visions identified in the City’s *OneNYC*, and Attachment F- Benefit Cost Analysis.

**Alternatives Evaluation**

Feasibility

Before pursuing what was considered to be the best feasible option, the City evaluated potential actions based on the following criteria:

- Its structural ability to protect the community of today, as well as the community of the future based on historical data and sea level rise (SLR);

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- The City’s technical and managerial ability to implement the flood protection system;
- The resources required to maintain and operate;
- The potential for social and economic benefits to the neighborhood; and,
- The community’s expressed desire for the benefits.

Evaluation of Options

The City evaluated multiple options of how to protect and connect the Target Area to determine their ability to advance the City’s resiliency goals and meet the needs outlined in Exhibit D - Needs. Four options were evaluated to determine the most feasible option.

- Option 1: The “no action” alternative would result in repeated catastrophic damage during storm surge events. Transportation and telecommunications infrastructure would need immediate costly repairs to restore critical service. The resulting deterioration of structures and loss of businesses and jobs would weaken community morale and result in an overall decline in property values. Residents who have the resources to leave would do so and those who do not may subsequently be stranded. If no action is taken to improve stormwater infrastructure, the Target Area would continue to experience combined sewer overflow (CSO) related flooding during times of heavy precipitation and surge events. In addition, the contamination of the East River will continue triggering Environmental Protection Agency (EPA) Consent Decree related fines. Public and affordable housing would continue to be negatively affected by storms and result in displaced LMI residents. *The “no action” would increase the vulnerable populations at risk during the next storm.*
- Option 2: Option 2 involves managing stormwater through the installation of a new high level storm sewer system, consisting of separate stormwater conveyance pipes that would discharge to new stormwater outfalls, rather than through the existing combined sewer pipes. Buildings

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would need to continuously be monitored and analyzed for floodproofing. While this option strengthens the existing stormwater system, it would only be beneficial during small rain events. In the event of a storm surge, the stormwater system would be rendered inoperable. This option is also very costly, approximately \$573 million, and involves considerable disruption to existing infrastructure. *This approach also fails to improve the City's ability to rebound quickly in the aftermath of another large surge event, does not foster social nor economic growth, and would inadvertently leave some critical infrastructure unprotected.*

- Option 3: Option 3 involves implementing features such as wave attenuating structures and other energy-absorbing amenities (benches, planters, curbs, low walls or a combination thereof) and would be located along the shoreline of the Target Area. For smaller events, such as extreme high tides or weaker tropical systems, these features would likely reduce the risk and impact of storm surge to the Target Area but would not stop the larger surge inundation for more severe events. The stormwater management strategy would utilize the existing sewer system and expand the capacity of the existing Manhattan Pump Station to three times its current capacity. This option would require moderate disruption of the existing infrastructure. The cost for this option is approximately \$300 million to \$500 million and will also require annual maintenance. As a result, the City does not consider this a viable option.
- Option 4 (most feasible): This option would employ various types of coastal flood protection, such as floodwalls, earthen levees and flood gates, integrated with urban design and landscape features. The approach is conceptualized to account for sea level rise (SLR) and protect against future storm surges. Stormwater infrastructure improvements would include the construction of new underground containment vaults (i.e., wet wells) and localized pump stations that could be deployed to reduce the stress on the sewer system when combined outfalls are closed. Green

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and gray stormwater infrastructure would be incorporated to manage stormwater by reducing peak flows and increasing storage capacity to delay release into the sewer system. Additional building upgrades would be implemented to further protect affordable housing developments. Coastal flood protection coupled with stormwater infrastructure improvements would prevent sea water from entering the Target Area and facilitate internal conveyance of stormwater, thereby reducing flooding during storm events and normal precipitation. *The system would require slight annual maintenance and involve minimal disruption to the existing sewer system and other area infrastructure; it also addresses upland flooding, and has the potential for social and economic co-benefits.*

**Project Description**

The conceptualization of the Project is fundamentally rooted in integrating climate resiliency into the urban fabric, including maintaining visual and physical connections to the waterfront, as well as enhancing upland areas through expanded and enhanced green corridors, resilient buildings and social programming elements.

The coastal flood protection system, which spans from the southern portion of Battery Park City, around the Manhattan Tip, and continues northeast to Montgomery Street, consists of fixed walls, mechanical gates, and deployable panel systems to protect those areas from flooding during a storm surge event.

Proposed stormwater infrastructure improvements connected to the coastal protection system and implemented across New York City Housing Authority (NYCHA) developments would work in conjunction with the coastal flood protection and would include the installation of wet wells and deployable pumps. Wet wells would be concentrated around combined sewer outfalls to divert

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stormwater into storage basins. Deployable pumps would allow stormwater to safely be released from wet wells into the East River.

The Project will include both active and passive stormwater management through Placemaking on NYCHA developments. Active stormwater infrastructure controls and releases water, while passive systems allow absorption into the earth relieves pressure on the urban combined sewer system and mitigates flooding in the streets.

NYCHA's stormwater management strategies allow their sites to retain, detain, store and absorb water during peak rainfall and ease the stress on combined sewage systems. This would increase the capacity of the City to withstand intense storm events by mitigating flooding. It also helps the city avoid the significant financial cost associated with upgrading sewers in the future, relative to both water quality and storm protection.

The Project will also include the elevation of critical building systems within New York City Department of Housing Preservation and Development (HPD) developments, dry flood-proofing through flood barriers and doors, installation of backflow preventers and sump pumps, development of emergency building plans, and provision of backup power for affordable housing developments with regulatory agreements.

The Project is divided into four Activities, detailed below. These Activities are described below as concepts that were developed based on preliminary analysis of site conditions and cost estimation for the purposes of articulating the feasibility of these concepts. When funds are awarded by HUD to implement these Activities, the City will work with its Partners to engage the community on design alternatives, complete thorough study and analysis to develop a final design, and will undergo environmental review for any covered projects.

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Activity 1: Coastal Protection for Two Bridges

The coastal flood protection system for the Two Bridges neighborhood of Lower Manhattan begins at Montgomery Street, abutting the southern end of the ESCR Project Area, and serves as a natural extension of ESCR to fully protect Manhattan's most vulnerable areas. The perimeter runs southwest along the Franklin D. Roosevelt East River Drive (FDR) and connects into higher elevation adjacent to the Brooklyn Bridge. This part of the Target Area includes the NYCHA sites located between Catherine Street and the Brooklyn Bridge, as well as several existing public parks.

As the dominant feature stretching along the Two Bridges coastline, the FDR (an elevated expressway) plays a critical role in the conceptual alternative design. The proposed system is designed to be located underneath the expressway as independent structures that do not rely on the foundation or structure of the FDR.

Based on the drainage and storage capacities of the Two Bridges area, the City anticipates ten deployable pump stations and wet wells would be installed at strategic locations, with two pumps at each location.

While the construction of the proposed coastal flood protection system serves the primary function of physical protection from flooding, it also provides an opportunity to improve the neighborhood's economic and social resiliency. To accomplish this, the preliminary alignment of the coastal flood protection system winds in and out of the centerline projection of the FDR. This additional space creates openings for programming and economic opportunities, as well as preserves views to the water and community. These spaces on the exposed side of the flood protection system are floodable and therefore can quickly return to normal. Moreover, the City envisions a variety of other neighborhood-scale facilities and open space additions, including playgrounds, parks, and active and passive recreation areas. By preserving the visual corridors, maintaining the existing bike

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path from Manhattan Tip to the Two Bridges neighborhood, connecting to the ongoing East River Waterfront Esplanade improvements, and reinventing the waterfront as an appealing destination in the Two Bridges neighborhood, the City aims to strengthen the connection of Two Bridges to the rest of Lower Manhattan and revitalize the area in order to promote a stronger neighborhood economy.

Additional details of the Coastal Protection for Two Bridges can be found in the Project Description section of Attachment F- Benefit Cost Analysis.

Activity 2: Coastal Protection for Manhattan Tip

The coastal flood protection system for the Manhattan Tip area begins adjacent to the Brooklyn Bridge, connecting to the southern end of the coastal flood protection system for Two Bridges, and continues along the southern tip of the island to the western edge of Battery Park. The most feasible option for the coastal flood protection system for this area based on preliminary site analysis and basic design concepts transitions from fixed walls along the FDR, to deployable panels along the Whitehall Ferry Terminal building, and concludes with a levee system at the perimeter of Battery Park. Use of a levee system maintains and strives to enhance the character of open space and status of Battery Park as a visitor destination. The coastal flood protection system would defend the critical arteries and infrastructure of the region, including the Battery Park Underpass, and the entrance to the Brooklyn Battery Tunnel, as well as other key assets identified in Attachment F- Benefit Cost Analysis.

With numerous attractions and amenities already in place at Battery Park, measures of the proposed Protect focus on maintaining the park's existing character. The City aims to add a series of landscape elements to the levee, including constructing a pedestrian and bicycle trail and adding

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various shading elements. Inclusion of a covered walkway and an outdoor amphitheater provide temporary reprieve for visitors and residents alike.

In the area adjoining Two Bridges and Manhattan Tip, the project would enhance the connection between the neighborhoods by adding passive seating areas, dog parks, and smaller retail areas, enhancing connections to community facilities.

Based on the storage and drainage capacities in Manhattan Tip, five deployable pump stations and wet wells would be placed based on the proximity to key portions of the existing sewers and the alignment of the coastal flood protection system along the East River.

Additional details of the Coastal Protection for Manhattan Tip can be found in the Project Description section of Attachment F- Benefit Cost Analysis.

Activity 3: Stormwater Management through Placemaking

Nine NYCHA developments in the Target Area (Baruch, Wald, Riis 1, Riis 2, Lavanburg, Campos 2, LaGuardia, Smith and Two Bridges) will incorporate active and passive Stormwater Management through Placemaking strategies. Active strategies within the NYCHA developments include underground cisterns, depressed water storage designed to temporarily retain excess stormwater from the surroundings known as a “water square,” controlled-flow rooftop detention systems known as “blue roofs”, and downspout disconnections from the combined sewer system. Passive strategies include bioswales, surface grading and recontouring, and soil amendments, and sidewalks, parking and recreational areas with permeable pavement. NYCHA has estimated that within the Target Area, it can manage over thirty million gallons of water.

NYCHA’s nine developments make up 96 acres of the Target Area and five out of these nine developments (Baruch, Walk, Riis 1, Riis 2 and Lavanberg), are contiguous properties that form a 62 acre rectangular campus located along the East River. This one NYCHA “campus” is estimated to be

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able to retain, detain, store and absorb over twenty five million gallons of water. Execution of the proposed interventions across this campus also provides a tremendous opportunity for community connectivity, programming and linkage to the ESCR coastal protection activities currently underway. These physical connections to the coastal protection will expand the neighborhood's access to the recreational amenities and programming that the City is planning. The four other NYCHA sites (Smith, LaGuardia, Campos 2 and Two Bridges) each offer additional on-site water management and connect neighborhoods in the Target Area.

NYCHA's multi-pronged "resist, delay, store, discharge, recover" approach to stormwater management becomes a resiliency strategy that protects against site flooding, coupled with the Federal Emergency Management Agency (FEMA) funded mitigation items like back-up power generation on-site, to create "safe havens" across the Target Area where the facilities, features and people can experience a more rapid recovery.

Through implementing Stormwater Management through Placemaking, NYCHA can protect the developments in a way that contributes to a healthier, more functional watershed that reduces urban flooding, reduces heat island effect, lowers carbon dioxide levels, provides a safer place for the community in times of disaster, creates jobs, increases active recreation areas, improves air quality and becomes an attractive space for visitors and residents.

Activity 4: Multi-Family Resiliency Retrofit Program

HPD will target five affordable housing complexes within the floodplain of Lower Manhattan to receive comprehensive resiliency upgrades through the Multi-Family Resiliency Retrofit Program Activity.

Building on the experience and data of projects currently underway, HPD would implement comprehensive resiliency upgrades for the five targeted housing developments. In addition to

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standard resiliency retrofit measures – including elevation of critical building systems when feasible, dry flood-proofing through flood barriers and doors, installation of backflow preventers and sump pumps, development of emergency building plans, and provision of backup power – HPD will assess the feasibility of upgrades that include co-benefits, such as installation of cogeneration or combined heat and power (CHP) systems, as well as conversion off of district steam heat to natural gas boilers. A CHP system would provide the housing complex with backup power while also producing energy savings and operating cost reductions. Conversion off of district steam to natural gas would allow for elevation of the buildings’ heating systems above the Design Flood Elevation while also producing significant energy cost savings, thereby promoting long-term resiliency and affordability of the property. NYCHA is also planning to implement this conversion at its own properties, and acknowledges the significant resiliency and cost benefits of this measure. In addition, HPD will investigate opportunities to further reduce the energy demand of these buildings through smaller scale retrofits such as weatherproofing and lighting upgrades. These measures will make these properties adapted to endure power outages while reducing energy costs for residents. HPD will incorporate the existing technical standards of the existing Multi-Family Resiliency Retrofit Program as well as the agency’s Green Preservation Program where applicable.

Level of Protection

Design elevation of coastal flood protection measures is directly related to the level of protection possible for the Target Area. The selected design elevations account for the projected rise in sea level ranges for the 2050s on top of the current 100-year storm surge level based upon the Federal Emergency Management Agency Preliminary Flood Insurance Rate Maps (FEMA PFIRMs). In addition, the design elevation includes an additional allowance for wave runup and overtopping defense for the 2050s high sea level rise base flood, which matches or exceeds the safety factor often

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described as freeboard. The 90<sup>th</sup> percentile of the projected SLR curve in the 2050s was used as it allows for extension of the system design life if the higher probability or median SLR values are achieved.

The City's stormwater infrastructure improvements are designed for the 5-year 24-hour occurrence rainfall event. The NYCHA Stormwater Management through Placemaking reduces the water capacity demands on the City's combined sewer system during a variety of rain events. The resiliency measures for HPD's housing complexes will be designed to protect to the 100-year flood elevation.

As a result of the aforementioned considerations, the Project useful life is assumed to be fifty years and the project is anticipated to meet or exceed the 100-year level of protection for the entire 50-year Project useful life. However, there is a high degree of uncertainty in SLR estimates and thus the project will be scaled appropriately, as described below. Structural foundations, walls, pile systems and other hard assets would all be designed with a 50-year minimum service life. The Stormwater Management through Placemaking solutions are designed to manage a 6"/24 hour rain event with additional capacity able to be added over time and a 50-year minimum service life.

**Project Scalability**

The City is using a design approach known as Flexible Adaptation Pathways, as set forth in the Climate Resilient Cities 2010 report published by the New York City Panel on Climate Change (NPCC). After understanding risks understanding assets, adaptation strategies are prioritized and implemented. The final step is to monitor and reassess the implemented design with the most recent understandings of the risks posed by climate change. As research continues on the subject of climate change, the City will utilize this cyclical design process to adapt infrastructure to the most current knowledge of the effects of climate change ([Source](#)).

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As a major urban center that was recently challenged by significant natural and man-made threats, New York City has expended significant effort and funds to improve preparedness and response to disasters. With multiple innovative coastal protection and resiliency projects underway, the City sees itself at the forefront of cutting edge thought and practical design for resiliency projects. By interweaving physical protection with social benefits and economy-enhancing features, the City envisions its approach to resiliency in the Target Area as a model that will be used across all five boroughs. Each Project activity builds upon current or planned projects within New York City. The City and its Partners have already begun to replicate this same approach to coastal protection, Stormwater Management through Placemaking and affordable housing infrastructure upgrades in Brooklyn (Red Hook and Coney Island) and in Queens (Rockaway and Far Rockaway).

The entirety of the Eastern Seaboard is at risk of experiencing storm events similar to the scope and magnitude as that experienced by the City, and the concepts presented within are easily scalable and replicable for different size storm events or populations. Moreover, the City's commitment to serving the public through protection measures and providing services within the area will inspire and set up a new standard that can be scaled and replicated, not only in the United States, but around the world.

**Project Schedule and Implementation Plan**

The City and its Partners have identified multiple opportunities for phasing based on subprojects, such as utility relocations for transmission lines, New York City Department of Environmental Protection (DEP) infrastructure, and Sandy damage recovery construction work on NYCHA and affordable housing properties. The activities will be carefully coordinated among the agencies and may need to occur prior to construction of the flood protection features in certain areas. The number and scope of these subprojects would be determined once the utility survey, ground

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survey and final design are completed, and meetings and workshops are held with the agencies and stakeholders.

Once funding for the proposed Project has been secured, the City and its partners anticipate that the design process will include tasks such as conceptual design, geotechnical survey, utility survey, preliminary design, selection of the final configuration, and final design. Based on schedules and estimates from multiple projects in the area and the ESCR project already underway, the schedule for construction for various activities may take between three and five years.

Acquisition of federal, state, and local permits would involve coordination with the U.S. Army Corps of Engineers and FEMA, as well as New York State. Permitting would begin at the end of the conceptual design phase and would end during final design. By involving numerous government agencies from the initial planning stages, including coordination during this grant process, the City and its Partners anticipate that permitting can be expedited.

The City and its Partners have addressed the integration of science-based environmental planning into project development in its Phase 1 Application. Effects of climate change, sea level rise, and extreme weather have been incorporated into project design concepts, and have been communicated to the public through the Public Engagement Plan activities. The NPCC (as codified by Local Law 42) has a standard process for updating local climate change projections; the panel also identifies and recommends strategies for addressing the impacts of climate change. (See NDRC Phase 1 Application for details on the work of this Panel.) Nature-based flood protection measures have been incorporated into project concepts for a well-rounded and comprehensive approach in this flood reduction and environmental health action.

The City and its Partners will meet all environmental and historic preservation requirements and to move through the Unified Federal Review process without unusual delay or issue. The City

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will continue to coordinate with all appropriate governments and agencies to advance project implementation and goals for maximum effectiveness and resiliency outcome. When possible, NYCHA is including the stormwater management features in the consolidated FEMA environmental review process. The timing of funding allocation will dictate this opportunity.

A chart showing the anticipated project schedule is included in Attachment F- Benefit Cost Analysis.

### **Project Budget**

The following sections discuss the methodology for the projected project costs, a summary of the results from Attachment F- Benefit Cost Analysis, and potential Sources of Funds for the proposed Project.

#### **Project Costs**

The estimated opinion of construction cost based on the current understanding of existing features and design criteria for the project is approximately \$623,000,000.

The anticipated annual O&M costs will include operations costs for periodic full-scale functional exercises and regular training in the operation and maintenance of the mechanical equipment, logistics of deployment, inspections and consultant services. Any funds received through the NDRC-CDBG grant would not be used towards operations and maintenance costs. Individual activity costs are discussed in Attachment F- Benefit Cost Analysis.

#### **Benefit Cost Analysis Results**

The benefits of coastal flood protection, Stormwater Management through Placemaking and resiliency measures to affordable housing, along with social programming, are integral to the design process. In order to evaluate the benefits against the costs of the proposed Project, the City conducted a benefit cost analysis. Costs for this analysis, further discussed in Attachment F- Benefit

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Cost Analysis, are based on preliminary alignments of the protective barriers, concepts for the stormwater solutions, preliminary concepts for resiliency measures and locations for amenities and programming. The concepts used for the purposes of the cost are preliminary and may change as more progress is made on urban design and community engagement input.

Cost Development Process

Costs for the proposed Project was developed in conformance with accepted design practices, standards, guidelines, and computer software. The City followed international and local building codes, numerous state and national design guidelines, and USACE design guidance. A full list of references and a list of computer models and programs employed by the City while developing its projects is included in Attachment F- Benefit Cost Analysis.

Cost Analysis

The budget for the project was developed by examining construction cost estimates from recent projects within the New York City area of similar scope, construction costs from recent projects in other U.S. localities, vendor quotes and engineering judgement and experience in order to ensure that it is in line with industry standards. As the project moves forward into the construction phase, the City will use a competitive bidding process and through a bid evaluation, ensure that the costs are in line with the expected costs. Additional details can be found in Attachment F- Benefit Cost Analysis.

Sources of Funds

As the protection of the affordable housing stock and infrastructure, amenities, and attractions within Lower Manhattan is critical, the City is committed to the execution of the activities outlined in this application and intends to pursue other funding sources if funding from the NDRC is not available.

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Funding for the continued O&M of the flood barrier and system components will be identified by the City for the operating City agencies for the ongoing operations and maintenance of this infrastructure.

**Public Engagement and Additional Consultation**

Due to the extensive public outreach for the Rebuild by Design competition, the ESCR project, and NYCHA recovery efforts, the communities in the proposed Project’s Target Area will continue to be a critical design partner in the solutions that are ultimately implemented. The City will continue public outreach and intergovernmental coordination to ensure that the activities, once funded, will be embraced by both the public, other agencies and community organizations.

Specific to the proposed Project, the City has developed an outreach plan to assess the recovery needs, community development issues, and vulnerabilities in the Target Area, and to identify and design an approach that will directly address these needs. The plan will ensure that vulnerable and underserved populations are involved, and that public input and feedback is actively solicited. The City has already conducted a briefing with local elected officials, and several briefings with city agency stakeholders, as well as with the New York State Governor’s Office of Storm Recovery. Extensive consultation and stakeholder involvement will be conducted during the public comment for the City’s proposed projects. The City’s has chosen to do a 30-day comment period from early September 4, 2015, to October 3, 2015. During this time, the City will:

1. Host two public hearings;
2. Co-Host a Resiliency Conference with the Municipal Arts Society;
3. Engage private business owners in the proposed Target Area; and
4. Notify local residents about the proposal at various pre-scheduled public meetings.

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Additionally, in the development of this proposal ORR has hosted a briefing for local stakeholders on the future plan for resiliency in Lower Manhattan and a Mayoral briefing with the community board, civic and business leaders, and elected officials from the area prior to the commencement of the public comment period.

This outreach builds upon the years of outreach that has occurred since Hurricane Sandy in the proposed project area during Special Institute for Rebuilding and Resiliency (SIRR), Rebuild by Design, *OneNYC*, and the current ESCR project. The City will also coordinate closely with NYCHA and HPD’s planned outreach to consult with NYCHA residents and affordable housing residents in the Target Area.

**Plan Consistency**

The proposed is consistent with other adopted planning documents applicable to the most impacted and distressed Target Area, specifically the Regional Sustainability and Consolidated Plan and the New York City Hazard Mitigation Plan. For more information on planning coordination, updates and alignment, see Exhibit G - Long-Term Commitment.

**Consolidated Plan and/or Regional Sustainability Plan**

In April 2015, the New York City Mayor’s Office released *OneNYC* ([Source](#)), a roadmap for constructing and maintaining a resilient city which evolved from the 2007 *PlaNYC* plan and the 2013 report *A Stronger, More Resilient New York*. The goals laid out in *OneNYC* include: creating safer neighborhoods by strengthening community, social, and economic preparedness; upgrading the city's buildings to withstand the effects of climate change; repairing and improving infrastructure in order to maintain services; and strengthening the City's coastal defenses against flooding and SLR. *OneNYC* provides approaches for addressing climate change and resiliency issues in New York City, among other challenges. The *Vision 4: Our Resilient City* section of the plan contains initiatives

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relating to coastal defense. The Coastal Protection chapter of this section contains *Initiative 21*:  
*Install an integrated flood protection system in Lower Manhattan, including the Lower East Side.*

*OneNYC* further characterizes this Project as an integrated flood protection system for all of Southern Manhattan from the Lower East Side to Battery City Park. This initiative is consistent with the proposed project. *NextGeneration NYCHA* is a long-term strategic plan that details how NYCHA will create safe, clean, and connected communities and preserve the City’s public housing assets for the next generation, as part of Mayor Bill de Blasio’s city-wide affordable housing plan.

Mitigation Plan and/or Transportation Plan

The 2014 New York City Hazard Mitigation Plan (NYCHMP, [Source](#)) identified Lower Manhattan specifically as a low-lying area that is particularly vulnerable to flooding from storm surge and sea level rise. The proposed project is consistent with the following 2014 NYCHMP goals and objectives.

- 1.1 - Identify and reduce the impacts of hazards on vulnerable populations.
- 2.1 - Implement mitigation programs that protect critical facilities and services and promote reliability of lifeline systems to minimize impacts from hazards, maintain operations and expedite recovery from an emergency.
- 2.7 - Promote appropriate mitigation actions for all public and privately owned property within the City's jurisdiction including, but not limited to, residential units, commercial structures, educational institutions, healthcare facilities, cultural facilities and infrastructure systems.
- 4.3 - Develop hazard mitigation policies that protect the environment.
- 4.4 - Promote climate change adaptation strategies that protect against long-term effects on the environment.

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Further, the project is listed in Chapter 4 and identified as mitigation action F.P.56 as, “*Lower Manhattan flood protection: Install an integrated flood protection system in Lower Manhattan, including the Lower East Side.*” This mitigation action is consistent with the proposed project.

# **EXHIBIT F LEVERAGE**

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Exhibit F – Leverage

Direct Financial Commitments

On August 27, 2015, the City announced their, as well as many community stakeholders, commitment to a multi-layered resiliency strategy, the **Lower Manhattan Protect and Connect Project**, as proposed in this Phase 2 application for National Disaster Resilience Competition (NDRC). As part of this announcement the City made a commitment of \$100 million in capital funding which will be used as a direct financial commitment for implementation of the Project ([Source](#)). An additional \$8 million in City capital dollars was announced in March 2014 specifically to further resiliency planning and implementation of flood protection at Battery Park (Source: NYC NDRC Phase 1 Application, pg. 49). The \$108 million in committed funds will serve as direct leverage and are available for the City to use for activities directly related to the undertaking of project activities directly related to this Community Development Block Grant National Disaster Resilience (CDBG-NDR) Phase 2 application. Upon award of CDBG-NDR Phase 2, it is acknowledged that these committed and direct leveraged resources will be included in a sources and uses statement for the project in conjunction with the CDBG-NDR assistance.

Operations and maintenance expenses for this infrastructure will not be covered by funds awarded to the City through NDRC, and the City will budget for these long-term financial commitments with its operating agency partners over the course of the anticipated lifespans of these projects. As detailed in Exhibit E- Soundness of Approach and Attachment F -Benefit Coast Analysis, the proposed **Lower Manhattan Protect and Connect Project** estimates an annual costs of \$4.2 million, specifically \$230,000 towards the New York City Housing Authority (NYCHA) Stormwater Management Placemaking, to operate and maintain this infrastructure and \$200,000 towards the New York Housing Preservation and Development (HPD) Multi-Family Resiliency Retrofit Program to operate and maintain these resiliency investments at the building-scale.

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Over the anticipated lifespan of 50 years, the City's long-term, direct financial commitment towards the operations and maintenance of this project is estimated at \$108 million, \$2.6 million for the NYCHA Stormwater Management through Placemaking System, and \$2.7 for the HPD Multi-Family Resiliency Retrofit Program. The building owners and operators have made the commitment to cover these costs over the lifespan of these building retrofits. Over the anticipated lifespan of 50 years, the long-term, direct financial commitment from the City's Partners that own and manage these properties is estimated at \$5.3 million for these building retrofits for resiliency.

**Supporting Commitments**

The City is developing partnerships to align strategic supporting commitments that will complement the projects being proposed in this CDBG-NDR Phase 2 Application. The City is in the process of identifying projects across City agencies that advance the resiliency of Lower Manhattan's social infrastructure as well as its physical assets. The agencies delivering activities and programs that serve as supporting commitments for this CDBG-NDR Phase 2 Application include the Department of Parks and Recreation, the Department of Transportation, Department of Environmental Protection, and the New York City Economic Development Corporation. Initiatives already underway that enhance the social and economic resiliency of Lower Manhattan communities include investments in community parks and playgrounds, rebuilding public streets, and rehabilitation to waterfront assets. The City is working to quantify and aggregate the value of these investments as part of its analysis to identify support commitments for this CDBG-NDR Phase 2 Application.

The City is developing a partnership with a local university will study participatory planning processes for resiliency investments in dense urban communities. For example, the supporting activities could evaluate the social and economic co-benefits of green and grey infrastructure for

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Lower Manhattan communities, or study the trade-offs in the types of built and natural resiliency interventions for the complex urban fabric of Lower Manhattan, including the monetary value of these investments utilizing mapping.

The City is coordinating its efforts for neighborhood-scale resiliency as discussed in this NDRC-NDR Phase 2 Application with the private sector based in Lower Manhattan. To complement the projects being proposed related to flood protection, stormwater management and housing resiliency, the City is focusing its efforts on protecting economic activity and neighborhood vitality by engaging small and medium sized businesses located within Manhattan Tip and Two Bridges neighborhoods. Development of resiliency activities and programs will promote community strength against chronic environmental stressors and future shock events. Additionally, considering the density of high-value assets in Lower Manhattan, the City is engaging private property owners of both residential and commercial properties to coordinate building-scale resiliency investments underway by these stakeholders with the neighborhood-scale resiliency planning the City is undertaking with the community.

Finally, The Mayor’s Office of Recovery and Resiliency (ORR) possesses a Climate Change Adaptation Task Force made up of more than 60 infrastructure operators and government agencies at the City, State and Federal levels. This Task Force is developing an inventory of assets and is conducting vulnerability assessments for their asset portfolios as part of a cross-sector, regional approach. The City will work through the Task Force to quantify the support commitments that regional infrastructure operators for mass transit, power, and telecommunications—among others—are investing to make Lower Manhattan more resilient.

**EXHIBIT G**  
**LONG TERM COMMITMENT**

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Exhibit G – Long Term Commitments

The City of New York’s vision for resiliency and climate adaptation is rooted in nearly a decade of innovative and proactive planning. Focused on responsibly meeting the City’s growing population and infrastructure needs, the City’s resiliency plans include New York City’s initial sustainability strategy, in hopes of becoming a model for heavily urbanized cities around the world.

On April 22, 2015, Mayor Bill de Blasio released *One New York: The Plan for a Strong and Just City (OneNYC)*. *OneNYC* expands on the critical targets established under previous plans such as *A Stronger More Resilient New York* released in 2013 which serves as the City’s climate risk assessment and climate change action plan. Growth, sustainability, and resiliency remain at the core of *OneNYC* – but with the poverty rate remaining high and income inequality continuing to grow, Mayor Bill de Blasio’s administration added equity as a guiding principle of the plan. This principle calls for fairness and equal access to assets, services, resources, and opportunities so that all New Yorkers can reach their full potential.

*OneNYC* lays out clear resiliency objectives in its fourth vision “Our Resilient City:” to eliminate disaster-related long term displacement (more than one year) by 2050, to reduce the Social Vulnerability Index for neighborhoods across the city, and to reduce average annual economic losses resulting from climate-related events. Specifically, this resiliency vision is articulated as such: “Our neighborhoods, economy, and public services will be ready to withstand and emerge stronger from the impacts of climate change and other 21st century threats.” Four specific resiliency goals listed in this plan are:

- Every City neighborhood will be safer by strengthening community, social and economic resiliency;
- The City’s buildings will be upgraded against changing climate impact;
- Infrastructure systems across the region will adapt to maintain continued service; and,

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- The City’s coastal defenses will be strengthened against flooding and sea level rise.

*OneNYC* includes several new approaches to governance designed to strengthen resiliency.

First, the administration calls on City agencies, as well as the public and private sector, to cross traditional boundaries in pursuit of innovative solutions. Second, this plan focuses on building community, social, and economic networks in order to strengthen resiliency at the neighborhood level. This includes deepening non-profit and business participation in emergency planning and exploring social cohesion as a strategy for resiliency ([Source](#)). The *OneNYC* plan and the Ten-Year Capital Strategy are aligned to ensure funding for *OneNYC* resiliency goals.

Lessons Learned

The City’s Climate Change Adaptation Task Force (CCATF) was established to identify critical infrastructure within the New York City metropolitan region that could be at-risk from the effects of climate change and to develop coordinated adaptation strategies to secure these assets based on the best available science. The CCATF is made up of City, State and Federal agencies, authorities, and private companies that operate, maintain, or control critical infrastructure in New York City. Local Law 42 (2012), enacted on September 22, 2012, codified the CCATF and the New York City Panel on Climate Change (NPCC) and specified the membership, frequency of meetings, and tasks for both the CCATF and NPCC. The Mayor’s Office of Recovery and Resiliency chairs the CCATF which organized its inaugural meeting under this current administration in July 2015. The objectives of the CCATF are: to meet at least twice a year to review climate change projections as recommended by the NPCC; to evaluate the potential impacts of climate risks to public health, the city’s natural systems, critical infrastructure and buildings and economics and identify the rules, policies and regulations governing such systems and infrastructure that may be affected by climate change; to create an inventory of potential risks, develop adaptation strategies and identify issues for

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further study; to establish a framework for entities to use to design new projects and retrofits or upgrades to citywide resiliency standards; and to issue a report with recommendations based on this information and submitted to the mayor and city council and made available to the public. The long-term commitments related to the CCATF include:

- **Regional Resiliency Planning:** The City provides technical and organizational assistance to increase the number of private and public infrastructure entities with a clear resiliency plan.

<i>Outcome Measure</i>	<i>Baseline</i>	<i>Goal</i>	<i>Effective Date</i>	<i>Duration</i>
Regional Agencies	20	60	07/31/2015	4 years

- **Inventory of At-Risk Regional Infrastructure Assets:** The City works with public and private entities to expand and update a full inventory of infrastructure assets at-risk to climate change hazards which currently focuses on flooding and sea level rise partial inventory and will expand to include risks related to heat and extreme events.

<i>Outcome Measure</i>	<i>Baseline</i>	<i>Goal</i>	<i>Effective Date</i>	<i>Duration</i>
Infrastructure Assets	2,100	2,500	07/31/2015	4 years

Legislative Action

Since September 2014, the City has taken numerous legislative actions to enhance the resiliency of communities as part of its long-term commitment to strengthen the resiliency of local communities to both stressors and shock events, and to adapt buildings and infrastructure to the threats of climate change. With respect to buildings, Hurricane Sandy flooded an area that included approximately 88,700 buildings which provided housing for 443,000 residents and jobs for 245,000

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workers. The City worked with the City Council to revise the building code to address resiliency across a variety of risks posed by climate change and to provide clarity where the present codes are deficient in enabling builders to harden new and rebuilt structures. In the lessons learned from Hurricane Sandy, the City acknowledges that developments built to meet flood-resistant construction standards fared better to a disruptive flooding event. These building code revisions promote higher standards for building performance with the incorporation of the best available flood map data and updated wind performance standards; and remove barriers to resiliency, such as clarifying the installation of temporary flood protection measures, the location of fuel tank storage within buildings, and the ability to utilize backup natural gas generators.

- Local Law 51 of 2014: This legislative action provides technical corrections and clarification of provisions of the NYC construction codes to enable the adaptation of buildings to the risks of climate change.

<i>Outcome Measure</i>	<i>Baseline</i>	<i>Goal</i>	<i>Effective Date</i>	<i>Duration</i>
Buildings	-	-	09/30/2014	3 years

- Local Law 52 of 2014: This legislative action requires revisions to the NYC construction codes to enable the adaptation of buildings to the risks of climate change.

<i>Outcome Measure</i>	<i>Baseline</i>	<i>Goal</i>	<i>Effective Date</i>	<i>Duration</i>
Buildings	-	-	10/10/2014	3 years

- Local Law 17 of 2015: This legislative action requires the Office of Emergency Management (OEM) to create local emergency preparedness public awareness materials with information relevant to neighborhoods where there is a particular risk of an evacuation due to a coastal

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storm or hurricane. The materials would provide information based on zip codes for the locations of the nearest evacuation centers, the borders of evacuation zones and possibly contact information for local organizations that could provide assistance after an emergency. The materials would also be translated into the ten most commonly spoken languages within that community, and made available online. The specific outcome measure is the total population living in hurricane evacuation zones.

<i>Outcome Measure</i>	<i>Baseline</i>	<i>Goal</i>	<i>Effective Date</i>	<i>Duration</i>
People	2,990,000	2,990,000	03/03/2015	10 years

- Local Law 18 of 2015: This legislative action would require the creation of a task force to study the recovery and rebuilding of charitable organizations and houses of worship in areas affected by Hurricane Sandy. The task force would study how these organizations fared in the recovery process, how to improve their resiliency and what role they might play in a future recovery. The task force would present their recommendations to the City Council and the Mayor after eight months.

<i>Outcome Measure</i>	<i>Baseline</i>	<i>Goal</i>	<i>Effective Date</i>	<i>Duration</i>
Individual Members	0	19	03/03/2015	8 months

- Local Law 34 of 2015: This legislative action allows the City to limit increases in the assessed value of single-family and two-to-four family residential properties that were damaged during Hurricane Sandy. The New York State Real Property Tax Law limits how much the assessed value of a New York City property can increase annually, however these limits do not apply when the value is increased due to physical changes to the property. As a

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result, homeowners who rebuilt or repaired a Sandy-damaged property were treated in the existing tax law as if they had made property improvements and saw increases in their property tax bills. This legislation ensures that the value of a rebuilt property is assessed at its pre-damage value so that any repairs or elevations do not lead to increased property taxes. This legislation and was enacted in cooperation with New York State which passed supplemental legislation to amend the New York State Real Property Tax Law.

<i>Outcome Measure</i>	<i>Baseline</i>	<i>Goal</i>	<i>Effective Date</i>	<i>Duration</i>
Homes	0	58,000	04/28/2015	5 years

Raising Standards

The City is making a long-term commitment to raising standards including the development of citywide zoning changes for resiliency, conducting environmental review of zoning and land use changes, integrating coastal protection into local land use and waterfront planning, and increasing the resiliency of enclosed industrial facilities.

- Raising Standards to Enable Mitigation of Homes: The City is advancing a text amendment to its zoning code in order to facilitate the mitigation of 1-4 family homes and buildings citywide against flood risk, including elevations and relocation or hardening of building systems. One initiative is will bring Sandy-damaged single family homes which are currently legally non-compliant and legally non-conforming to be granted permission to reconstruct, elevate or otherwise mitigate against future flood risks. Additionally, the Flood Resilience City-wide text amendment that will raise standards for all properties, both residential and commercial, in the 100-year floodplain which is expected to be adopted in fall 2016.

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<i>Outcome Measure</i>	<i>Baseline</i>	<i>Goal</i>	<i>Effective Date</i>	<i>Duration</i>
Buildings	0	71,500	09/01/16	10 years

Resilience Actions Related to Plan Update or Alignment

The New York City Panel on Climate Change (NPCC) is an independent body that advises the City on climate risks and resiliency. As the best available data, NPCC science informs the City’s comprehensive climate policies, including its multilayered, citywide resiliency plan and sweeping sustainability initiatives. In February 2015, the Second New York City Panel on Climate Change released its updated climate projections in the report “Building the Knowledge Base for Climate Resiliency ([Source](#)). The report provides climate projections through 2100 for the first time, for temperature, precipitation, and sea level rise, representing advancement in the science. In addition to providing climate projections through 2100, this 2015 report includes: new coastal flood risk maps to the end of the century for the current 100-year (1 percent annual chance of occurrence) and 500-year (0.2 percent annual chance of occurrence) coastal flood events; enhanced dynamic flood inundation modeling of future coastal flooding that includes the effects of sea level rise; a review of key issues related to climate change health risks relevant to the citizens of New York City; and a process for enhancing a New York City Climate Resiliency Indicators and Monitoring System.

With the release of the 2015 report of the NPCC, the Mayor also convened the Third New York City Panel on Climate Change (NPCC 3) to begin work on the next set of climate change projects and associated risk assessment for the City. Additionally, the NPCC 3 will tackle new topics and focus areas including:

1. Projections for humidity and extreme events;

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2. Risk analysis at a neighborhood scale;
3. Recommendations related to community-based adaptation and equity;
4. Infrastructure adaptation focusing on interdependent transportation and energy systems;
5. Expanding the city’s climate resiliency indicators and monitoring system; and,
6. Enhancing mapping of risks.

The work of the NPCC informs a multitude of long-term resiliency actions taken by the City, including the analysis of flood maps, emergency preparedness for chronic events such as heat waves, as well as infrastructure operations and asset management relative to climate vulnerabilities through the Climate Change Adaptation Task Force. The specific outcome measure is the total area of New York City impacted by the NPCC’s climate projections.

<i>Outcome Measure</i>	<i>Baseline</i>	<i>Goal</i>	<i>Effective Date</i>	<i>Duration</i>
Square Miles	468.9	468.9	02/17/15	10 years

*NextGeneration* NYCHA was created as a long-term strategic plan that will guide NYCHA towards creating safe, clean, sustainable, and connected communities to serve as a shining example of how urban communities can rebuild safer, stronger, and smarter. To ensure NYCHA’s success in this process, it has developed a recovery program called “Recovery to Resiliency” that has incorporated the goals of *NextGeneration* NYCHA into the disaster recovery plan by creating new revenue streams, reducing operating costs, improving the quality of NYCHA’s spaces, leveraging available funding, and engaging residents and stakeholders in new ways. NYCHA’s Recovery to Resiliency program is organized into three interdependent sections: protecting the people and property, moving beyond the disaster, and ensuring success. These sections represent opportunities

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to enrich a recovery program, and provide additional benefits, such as safer places to live, new jobs, more efficient operations, and new revenue streams.

In order to provide operational flexibility and the ability to leverage philanthropic dollars and activate innovative partnerships to support our residents, NYCHA will launch an independent 501c3 non-profit organization, The Fund for Public Housing “The Fund”, in the Fall of 2015. The Fund will invest in NYCHA infrastructure needs through innovative partnerships that will create safer, cleaner, and more connected communities. Realizing that NYCHA’s current financial model was unsustainable, The Fund was created to support a new resident engagement model, allow for more creative approaches to partnership and fundraising, and to create a network of connected communities. The Fund will focus on youth and education, health and wellness, human capital development, age-friendly integration and sustainable practices. It will be governed by an independent board of directors composed of NYCHA senior staff, NYCHA residents and private sector citizens. The Fund has a three year fundraising goal of \$200 million, with a goal of \$50 million in the first year. The Fund will allow NYCHA to continue to make substantial investments to truly change the way public housing looks and functions in New York City. The Fund further emphasizes the goals of *NextGeneration NYCHA* and its commitment to ensuring that affordable housing safe, clean and connected for future generations.

The specific outcome measure represents Sandy-damaged multi-family buildings of NYCHA.

<i>Outcome Measure</i>	<i>Baseline</i>	<i>Goal</i>	<i>Effective Date</i>	<i>Duration</i>
Multi-Family Buildings	0	469	05/19/15	10 years

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Resilience Actions Related to Financing and Economic Issues

The City's Community Development Block Grant Disaster Resilience (CDBG-DR) allocation of \$4.21 billion is leveraged by numerous other sources of Federal, State, City, and private funding. New York City's CDBG-DR housing allocation is also being leveraged against numerous other sources, including proceeds from FEMA (Individual Assistance, Hazard Mitigation Grant Program, and Public Assistance), Small Business Administration (SBA) Disaster Loans, National Flood Insurance Program (NFIP) payouts, private insurance payouts, and other Disaster Relief Appropriation funds ([Source](#)).

In addition to Federal sources and private insurance payouts, the private and non-profit sectors provide financial resources and support to New Yorkers impacted by Hurricane Sandy. Since the storm, the Mayor's Fund to Advance New York City has played a critical role in relief and recovery efforts by facilitating privately-funded programs that leverage flexible capital to address unmet housing needs while the CDBG-DR programs are put in place.

The New York City Office of Management and Budget (OMB) has contracted an insurance broker and is in the process of procuring insurance through Federal Emergency Management Agency's NFIP. The program would cover over four hundred assets damaged by Hurricane Sandy as required by the Stafford Act to protect the investment of federal dollars. Previously, the City did not have insurance and rather functioned on a pay-as-you-go model. Insurance coverage is expected throughout the life of the asset (building, vehicles, etc.) and will serve to increase the percentage of insured public buildings in the City. With regard to private flood insurance, the City has developed strategies that will help property owners to deal with increasing flood insurance premium rates as well as assistance in mitigating properties to reduce flood risk.

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- Flood Insurance Affordability Study for Multi-Family Buildings: The City is conducting a flood insurance affordability study for multifamily and mixed-use buildings in the floodplain and in the area potentially at risk of flooding during the 100-year storm in the 2020s. The study will assess flood insurance coverage, premiums and any mitigation investments multi-family residential and mixed-use buildings. The study will design and conduct a survey of owners in the area described by the Preliminary Flood Insurance Rate Maps as well as the area at risk according to the City’s future flood map for the 2020s to gather information on insurance status, price changes, and resiliency measures taken; and describe the impact of new federal flood maps and legislation on New Yorkers who live in or near high-risk flood areas and inform the City’s long-term planning efforts to make communities stronger and to develop programs that could make flood insurance more affordable for city residents.

<i>Outcome Measure</i>	<i>Baseline</i>	<i>Goal</i>	<i>Effective Date</i>	<i>Duration</i>
Multi-Family Buildings	0	50	12/01/14	10 months

- Flood Insurance Affordability Study for One- to Four-Family Homes: The City is conducting a study to understand the impacts of rising flood insurance costs on one- to four-family residents and to develop solutions. The specific tasks of the study are: to identify a statistically significant sample of one- to four-family structures in the floodplain; to collect elevation data of structures in the floodplain for the identified sample; to assess the economic impact of increased flood insurance rates on individual homeowners and at-risk neighborhoods; and to develop options to encourage risk reduction and address the affordability challenges for property owners throughout the floodplain that could be adopted at the federal, state or city level.

NYC NDRC Phase 2 Application Draft for Public Comment  
Exhibit G – Long Term Commitments

<i>Outcome Measure</i>	<i>Baseline</i>	<i>Goal</i>	<i>Effective Date</i>	<i>Duration</i>
1- to 4-Family Buildings	0	700	03/01/15	1 year