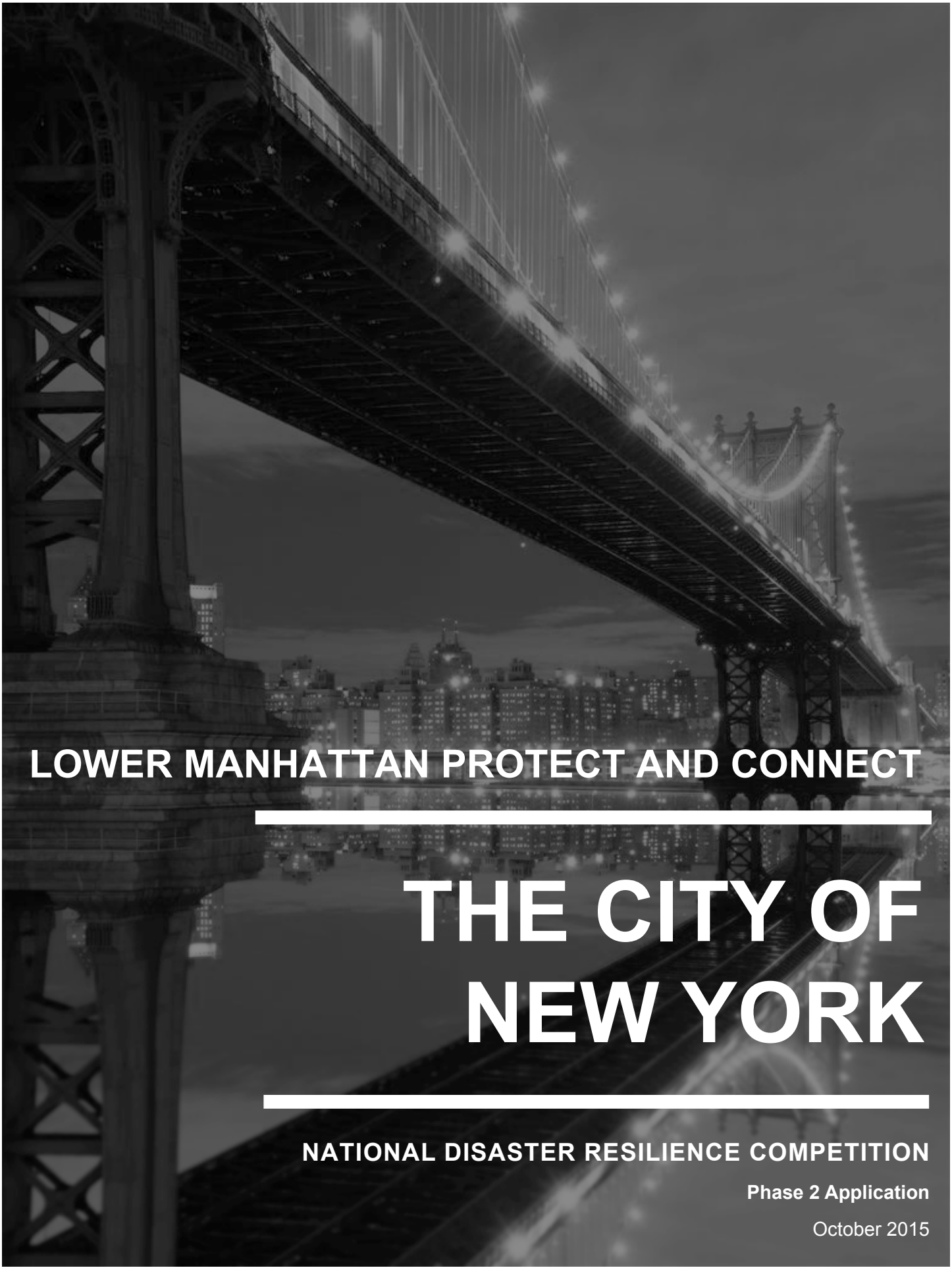


LOWER MANHATTAN PROTECT AND CONNECT

THE CITY OF NEW YORK

NATIONAL DISASTER RESILIENCE COMPETITION

Phase 2 Application

October 2015

Contents

Office of the Mayor

October 27, 2015

Daniel A. Zarrilli, PE
Director
Office of Recovery and Resiliency

253 Broadway, 10th Floor
New York, NY 10007

Secretary Julián Castro
U.S. Department of Housing and Urban Development
451 7th Street S.W.
Washington, DC 20410

Re: National Disaster Resilience Competition
Submittal by the City of New York

Dear Secretary Castro:

On behalf of the City of New York, I am pleased to submit this application to the National Disaster Resilience Competition (NDRC) being conducted by the Department of Housing and Urban Development (HUD). This application, strongly supported by local community and business leaders and endorsed by global resiliency experts, demonstrates a compelling and comprehensive resilience vision for the neighborhoods of Lower Manhattan, home to vulnerable residents, vital regional infrastructure, and economic activity of national importance. Your support, leveraging a City commitment of $108 million, is critical to achieving that vision.

Hurricane Sandy was the worst natural disaster in the history of New York City, with 44 lives lost and $19 billion in damages and lost economic activity. It was also a turning point in our efforts to adapt to climate change and invest in resilience. While, in many ways, we are still recovering from Sandy, we are already investing, with your support, to guard against future risks. This is most apparent in the implementation of an over $20 billion resiliency program, with investments in physical, social, and economic measures across the five boroughs to strengthen communities, adapt buildings, protect infrastructure, and improve our coastal defenses, as part of the City's *OneNYC* program.

In this NDRC application, we have built on the successful *Rebuild by Design* effort and expanded our engagement with local communities and other stakeholders to propose a multilayered resiliency program that will *protect* and *connect* residents, businesses, infrastructure, and economic activity in Lower Manhattan from the risks of a changing climate and extreme weather. This includes an integrated approach to managing water, including innovative coastal protection and stormwater management, which also improves neighborhood connections on our public housing and affordable housing developments.

The City's commitment to this endeavor is clear. In late August, Mayor de Blasio announced $100 million of new city funds in support of this application, on top of $8 million of city funds that were allocated earlier this year and nearly $7 million in federal and State assistance that has already been secured. This month, we took the first steps toward implementation by releasing an RFP for preliminary design services, including public engagement and environmental review. We simply could not afford to wait to get started.

To accomplish this program, we have built an extensive team. City agencies, such as the New York City Housing Authority (NYCHA), Housing Preservation and Development (HPD), and the New York City Economic Development Corporation (NYCEDC), will play a primary role under the leadership of the Mayor's Office. Local elected officials and community organizations have offered their full support. We are partnering with the Trust for Public Land (TPL) and others to bring outside perspective to our program. Academic partners from the New School and the New York City Panel on Climate Change will ensure that the best science continues to inform our climate resilience policy and actions. The State of New York has offered its support and partnership. And world-renowned resilience experts have endorsed our approach.

The last partner that is necessary is HUD. The City strongly encourages HUD to award $500 million, the maximum amount, to this game-changing application. Not only is this a compelling application that best demonstrates the concepts put forward by the National Disaster Resilience Competition, the City has shown the capacity to implement its projects, acting with urgency and successfully building community support on the implementation of similar *Rebuild by Design* projects funded by HUD. Given that these NDRC allocations are the last available Sandy funds, it is imperative that they be awarded in the epicenter of Sandy's impact to buy down future risks from climate change and extreme weather.

We look forward to hearing from you and deepening a successful resilience partnership with HUD as we build a stronger, more resilient New York.

Sincerely,

Daniel A. Zarrilli

EXHIBIT A EXECUTIVE SUMMARY

The City of New York

When New York City (the City) released *One New York: The Plan for a Strong and Just City* (*OneNYC*) in April 2015, it strengthened the City's plan for achieving a more equitable, resilient city (Source). In the City's NDRC Phase 1 Application, the City described an approach to resiliency with goals aligning with the City's overall resiliency policy as laid out in *OneNYC* – embracing the coastline, planning ambitiously, creating a stronger more resilient city, and keeping the City affordable (Source).

The City, led by the Mayor's Office of Recovery and Resiliency (ORR) and joined by the Department of Housing Preservation and Development (HPD), New York City Economic Development Corporation (NYCEDC), the New York City Housing Authority (NYCHA) and The Trust for Public Land have come together to develop the Lower Manhattan Protect and Connect Project, which creates stronger physical and social connections and expands upon robust coastal protection construction. Each organization brings extensive experience in managing, planning, and implementing resiliency projects while working collaboratively with the New Yorkers. Together, they form a strong team that is committed to successfully implementing the Project.

Under Phase 2 of the HUD National Disaster Resilience Competition (NDRC), the City has chosen Lower Manhattan as the Target Area from the potential locations outlined in the Phase 1 Application. The Target Area is critical due to the significant low-to moderate- income population that lives and works in this extremely vulnerable, low-lying area, 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 Project Area also has significant Unmet Recovery Needs (URN) from its qualifying disaster, Hurricane Sandy (DR-4085).

The City will execute the Lower Manhattan Protect and Connect Project to increase resiliency across the Target Area by implementing the three Project Activities. *Coastal Protection,* extending south from Montgomery Street to the N Moore Street at the north of Battery Park City, will include new potential recreational space, walkways, bicycle paths, and retail space to connect communities to and

along the waterfront. The coastal protection components will connect to and expand the City's East Side Coastal Resilience (ESCR) project (Source). These three integrated coastal protection components will provide coastal protection and stormwater drainage solutions to the entire Target Area and serve as connective ribbon along the edge of Lower Manhattan. *New York City Housing Authority's (NYCHA) Stormwater Management through Placemaking* provides green and gray stormwater management that addresses upland flooding in the Target Area through placemaking solutions across nine NYCHA developments from 14th Street to the Brooklyn Bridge. This Activity creates community gathering and recreational space that connects NYCHA residents to their neighbors, improves water quality, reduces sewer overflows and treatment costs, reduces urban heat island effect, and reduces atmospheric CO_2 concentrations. The *Multi-Family Housing Retrofit Program* includes building upgrades to five HPD affordable housing complexes. These upgrades will reduce risk of future power and utility losses, reduce operating costs and carbon emissions due to improved energy efficiencies, help maintain the housing affordability in the Target Area, and will improve the quality of life and security for residents who are predominantly low income and elderly.

The three Activities of the Lower Manhattan Protect and Connect Project combine together to create a holistic approach that uses multiple lines of defense to protect vital infrastructure, housing, jobs and some of the City's most vulnerable populations. It is a feasible, scalable, and innovative approach to building a resilient community, investing in affordable housing, and offering physical protection from extreme flooding. It forges stronger connections in the form of 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. This resilient approach will ensure that Lower Manhattan can remain a stable foundation during shocks and stresses, and serve as a replicable outward model, creating greater resilience across all of the City boroughs, the region, the nation, and around the world.

The estimated cost to construct the three Activities, based on the current understanding of existing features and design criteria for the Project, is estimated to be $608 million. Total Target Area investments of $875 million create $6.8 billion in benefits, yielding a benefit cost ratio of 7.87.

The City's plan is to implement similar initiatives across all five boroughs to protect numerous federal, state, city, philanthropic and private investments, including post-Sandy repairs funded by Community Development Block Grant-Disaster Recovery (CDBG-DR) and Federal Emergency Management Agency (FEMA). The City and its partners continue to prove their long-term commitment to resilience through adopting legislation, raising building standards, aligning development practices with best available science, and coordinating the multiple long term resilience plans.

The City is applying for $500 million dollars in CDBG-NDR funding to add to its significant financial commitments with more than $405.8 million in direct and supporting leverage, including a direct financial commitment of $108 million in City capital dollars. While these funds would support the planning and implementation of resiliency measures across Lower Manhattan and the Battery and the City is already taking steps to implement this project before the completion of this competition. The City and its Partners have continued to build on four years of extensive outreach and engagement of governmental, public, and private stakeholders. The Lower Manhattan Protect and Connect Project is an outcome of this effective community engagement and planning. The Lower Manhattan Protect and Connect Project will strengthen an important part of the City's coastline - physically, socially, and economically - for all New Yorkers to enjoy.

EXHIBIT B THRESHOLD REQUIREMENTS

The City of New York

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) Notice of Funding Availability (NOFA) Section III.A. The City further certifies that all proposed activities for which CDBG-NDR funds would be used 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 (Source). The U.S. Department of Housing and Urban Development (HUD) determined in the Phase 1 Application review that all five New York City counties (i.e., New York, Kings, Bronx, Richmond, and Queens) were Most Impacted and Distressed (MID). The Target Area for the Lower Manhattan Protect and Connect Project is in New York County.

The City is partnering with New York City Economic Development Corporation (NYCEDC) and the New York City Housing Authority (NYCHA) to implement Activities that will increase resilience in the Target Area. When fully implemented, the Project's multiple lines of defense will provide resilience through coastal protection, local-level retrofits and upgrades, green infrastructure for reduction of stormwater impacts and heat-island effects, and community resilience through placemaking. These measures will reduce the incidence of combined sewer overflow events, strengthen community ties, and reduce loss of service in transportation, telecommunication, and energy systems, enabling the community to more quickly resume their normal daily lives. The City is also incorporating a 2050, 90th percentile, sea level rise (SLR) into the designs based on compelling data generated by the New York Panel on Climate Change (NPCC) (Source).

All Activities that would be carried out with CDBG-NDR funding 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 Project meets the national objective of serving low to moderate income (LMI) persons through the area benefit criterion. The Target Area is home to more than 110,000 persons classified as LMI, who account for 56 percent of the residents in the Target Area who will be the primary beneficiary of the Project. All project activities qualify for CDBG-NDR funding under the national objective of urgent need through its tie-back to the qualifying disaster.

The overall benefit requirement is met by this project, as more than 70 percent of the project cost directly benefit LMI population by protecting affordable housing stock and LMI neighborhoods within the Target Area, meaning that at least fifty percent of grant funds will serve LMI persons. The Target Area is also a regional economic center and supports more than 50,000 jobs for LMI persons.

FEMA Project Worksheets are attached to the MID-URN checklist URN of Housing ($156.6 million) and Infrastructure ($2.2 million). These demonstrate the tie-back to the qualifying disaster, Hurricane Sandy (DR4085) and are summarized below. A detailed discussion of MID-URN, updated for the Phase 2 Application, is included in Exhibit D – Need.

<u>Housing:</u>

(1) NYCHA: Nine developments in the Target Area have total damages (including resilient upgrades) of $700.5 million. Funding in the amount of $588.5 million has been identified leaving an URN of $111.9 million.

(2) HPD: Five buildings in the Target Area have total damages (including resilient upgrades) of $44.5 million. No funding has been identified, leaving an URN of $44.5 million.

<u>Infrastructure:</u>

(1) New York City: Two properties have total damages (including resilient upgrades) of $2.22 million. No funding has been identified, leaving an URN of $2.2 million.

A comprehensive and thorough Benefit Cost Analysis of the proposed project was prepared by

the City of New York and its Partners. The analysis projects that with all quantifiable and qualitative benefits incorporated, the project will realize benefit cost ratio of over 7.0, with a net present value of $6.82 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

The City of New York

During the Phase 1 Application process, the City of New York (the City) and its Partner organizations demonstrated ample general management, cross-disciplinary technical, community engagement, and regional capacity. The Phase 2 Application expands and updates on the capacity discussion introduced during Phase 1 using multiple examples and details the management structures and roles of the City and its partners. The Project will be led by the Mayor's Office of Recovery & Resiliency (ORR) in coordination with supporting City agencies, the Office of Management and Budget (OMB) and the Department of Housing Preservation and Development (HPD); and in collaboration with its Partners, the New York City Economic Development Corporation (NYCEDC), the New York City Housing Authority (NYCHA), and the Trust for Public Land.

Based on the close existing ties between the City and its partners, all parties are expected to participate fully. The City has an existing subrecipient agreement with NYCEDC to perform the Lower Manhattan Coastal Resiliency study and NYCEDC and ORR have partnered on several resiliency studies to date with no issues with NYCEDC's ability to fulfill their commitments. NYCHA is committed to improving the resiliency of its developments through Stormwater Management Through Placemaking; the City does not anticipate NYCHA being unable to fulfill its obligation if awarded through NDRC. The Trust for Public Land has a strong history in improving public space and making them more resilient. If for some reason the Trust for Public Land is unable to fulfill its obligation, the City will find implement improvements to public spaces through its various agencies.

Past Experience

City Capacity and Experience

During planning and implementation of the Project, the City's role will include general management functions, technical coordination and guidance, and regional coordination. As the lead agency for the City, ORR will oversee all Project Activities, including those accomplished by its Partners. ORR will lead and coordinate across the City, State, Federal, and community partners to

ensure full implementation of the project from beginning to end. ORR will also take an active and direct role in implementing the Project Activities of this application which fall directly within ORR's coastal resiliency portfolio. ORR will be supported by OMB and HPD.

General Management Capacity – The City demonstrates general management capacity through its ongoing management of the approximately $4.2 billion CDBG-DR grant. As part of Community Development Block Grant Disaster Recovery (CDBG-DR) compliance, OMB oversees all City agencies (including ORR) receiving funds to ensure they maintain and review documentation that demonstrates cost reasonableness, selection criteria, and independent cost estimates when necessary. The City complies with federal *procurement* regulations and its own procurement rules. For example, OMB's CDBG-DR unit reviews contracts pursuant to 2 CFR 200 and the City's Procurement Policy Board regulations to ensure open and competitive procurements. While administering these grants, the City employs its internal measures to review contractor integrity, compliance with public policy, past performance, and financial and technical resources of potential vendors, as well as to handle various types of procurement, including sealed bids and proposals, small purchases, and noncompetitive procurement.

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

The City's work through HPD's Multifamily Storm Recovery Program also demonstrates its general administrative capacity. The Multi-Family Resiliency Retrofit Program is directly administered by the HPD's Division of Sandy Recovery, with the support of the Divisions of Resiliency Planning and Building and Land Development Services, which reviews all HPD project resiliency scopes. HPD will continue to provide *program management* for the implementation of building upgrades and retrofits to its multifamily affordable housing properties in the Target Area. Under *Build it Back,* HPD staff members work on *program development, administration and planning*, heading a collaborative effort in partnership with over 13 sister agencies, advocates, developers, tenants, community organizations, elected officials, and financial institutions, managing all necessary *contracts and budgets*. Separate from citywide procurement rules and guidelines, HPD's Office of Development conducts a sponsor review process to vet contractors selected to work on development projects.

The CDBG-DR contracts, as well as HPD's resiliency efforts, are tracked in the City's NYC Recovery & Resiliency Tracker. ORR established a *project control* team dedicated to the operation of a customized, web-based program management information system to facilitate project tracking. The Tracker holds baseline and updated performance information on approximately 1,024 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 monthly reports on *project performance*. 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 at ORR monthly management meetings,

and at a higher level at monthly meetings with the Special Advisor to the Mayor for Infrastructure & Resiliency, and 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.

If awarded funding, the extensive set of tools availability to the City make it fully capable of *quickly launching* the project within the approved schedule, as has been demonstrated with current projects funded by other CDBG-DR programs cited throughout this Application. The best example of the City's ability to work with its Partners and launch quickly is the initiation of the coastal resiliency phase of the Project described in this Phase 2 application. ORR has selected NYCEDC as the Project Manager for the feasibility study for Lower Manhattan Coastal Resiliency (LMCR) and NYCEDC recently released a request for proposal (RFP, Source) in order to select a consultant to "deliver a detailed, feasible, and comprehensive flood protection concept design and advanced planning for the study area." Funded through $6.75 million in CDBG-DR funds, the study will evaluate coastal protection measures for the entire target area as well as Battery Park City. When the feasibility study and necessary environmental reviews have been completed, ORR will select another city entity to serve as Project Manager for design and construction for Lower Manhattan Coastal Resiliency.

Technical Capacity – The City's technical capacity is demonstrated through a series of projects, including the reconstructing the Rockaway Boardwalk, implementing the Multi-Family Resiliency Retrofit Program, coordinating with the New York Panel on Climate Change (NPCC), and flood insurance planning. As part of the Rockaway Boardwalk Reconstruction Project (Source) the City completed a more than $140 million effort to *repair and restore* Rockaway Beach. The project repaired intact sections of boardwalk, *renovated* of damaged beach buildings, *constructed* of new boardwalk islands, and created interim shoreline protection and anti-erosion measures. The project is entering a second phase that will provide more long-term protection for Rockaway, construct a new boardwalk, and develop a *conceptual plan* for further improvements to the area's parks and facilities.

HPD *designs projects* and collaborates with other agencies to develop policy guidelines and *best practices* for multi-family resiliency in the City. Through its ongoing implementation of the Multi-Family Resiliency Retrofit Program, HPD manages a pipeline of over 40 retrofit projects citywide, impacting over 8,000 households. Implementation of resiliency retrofits at the affordable housing complexes within the Project Area will occur within the existing program's organizational and staffing structure. Retrofit projects currently funded by the program are each assigned a *Project Manager* within the Division of Storm Recovery. Project Managers oversee the design and completion of scopes of work, coordinate activities between HPD, the building owner, and technical consultants, and facilitate contractor bidding. Technical guidance, as needed, is provided by HPD's Division of Building and Land Development Services. Once projects begin construction, a dedicated staff member oversees the *construction management* process. HPD also coordinated with NYCHA's project development team to review retrofitting strategies suitable for campus-style housing and to align resiliency projects within specific neighborhoods, including Lower Manhattan. ORR also provided guidance on HPD's planned scopes of resiliency work to help identify opportunities to incorporate energy efficiency measures.

As described in the Phase 1 Application, the NPCC advises the City on climate risks and resiliency measures. It *established a risk management framework* for the City's critical infrastructure which incorporated best science and drew on the latest climate models in its projections of sea level rise. Using these projections to determine future flooding, the City worked with NPCC to develop a series of "future flood maps," attached to the Phase 1 Application, to highlight the areas most at risk of future coastal flooding. The framework and analyses developed by the NPCC enhances the City's capacity to conduct *risk and vulnerability assessments*.

The City is also pursuing multiple risk reduction efforts, in addition to *flood insurance*, to protect City buildings from the next disaster. Market forces and National Flood Insurance Program (NFIP) 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 projected future damage). 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 such as hospitals, fire stations, and police stations. ORR has also launched a major affordability study for private property owners, to understand the impact of rising *insurance* premiums 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 the Homeowner Flood Insurance Affordability Act (HFIAA).

Further, now that FEMA's Preliminary FIRMs for the City greatly expand the Special Flood Hazard Area, the provision of accurate *flood risk* information to affected New Yorkers is critical. The City works closely with FEMA on outreach to impacted communities, but FEMA materials and tools are often confusing or difficult to use. For example, because FEMA's address lookup is so challenging on its website, the City has worked with a non-profit Center (Source) for New York City Neighborhoods to develop a more user-friendly alternative. The City is also working with FEMA to try and improve agent training and therefore increased effectiveness of information at the point of sale.

Community Engagement and Inclusiveness

Regional Collaboration – As detailed in the Phase 1 Application, 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 Coordination on numerous recovery and coastal resiliency projects, including GOSR's NY Rising (Source) and the Staten Island Living Breakwaters Rebuild by Design

project. ORR's role in these projects include *coordinating with GOSR and multiple city agencies*.

ORR also worked 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.

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 – The City and its agencies have extensive experience in *engaging communities* in robust processes to address resiliency and recovery, with a particular emphasis on 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 were 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 City's latest long-term planning document that addresses growth, sustainability, resiliency, and equity (Source). More than 7,500 New Yorkers took an online public survey, 800 participated in the telephone survey, and more than 1,300 residents attended over forty community meetings in every borough. 177 civic organizations met with over fifty elected officials' offices 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 (Source). The City pioneered an innovative community engagement program that leverages local community leadership as well as stakeholders from many aspects of civic life, such as environmental justice, housing, business, and community organizing in order to implement climate adaptation projects that include flood protection, energy resiliency and social benefits. 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. Through ESCR, the City has engaged over 600 people at ten different sessions, public meetings, vision sessions, workshops, and other consultations. The goals of the *community engagement* for the ESCR Project are aligned with those of the Lower Manhattan Protect and Connect Project, and the City and its Partners will continue to expand existing discussions with stakeholders and the 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 through this large-scale infrastructure solution.

NYCEDC Capacity and Experience

As mentioned above, NYCEDC will lead the feasibility study for the City's coastal protection components. NYCEDC's 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 team. They implement/cooperate with citywide programs to eliminate blight, and assist tenants, private businesses, NYCEDC departments and City agencies in real estate matters.

General Management Capacity – NYCEDC'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. As stated in the City's Phase 1 Application, EDC has successfully completed hundreds of development projects and implemented many public policy initiatives; seven project examples where NYCEDC was a major partner in coastal resiliency initiatives were listed in the Phase 1 Application, including the Rockaway Boardwalk Reconstruction Project (Source).

As mentioned previously, ORR has selected NYCEDC as the Project Manager for the feasibility study for Lower Manhattan Coastal Resiliency (Source). NYCEDC is currently accepting proposals for a consultant or consultant team for engineering, planning, landscape architecture, urban design, environmental planning, cost estimating, economic analysis, and public engagement services to protect Lower Manhattan from storm surge and sea level rise.

NYCHA Capacity and Experience

New York City has executed a Partnership Agreement (PA) with the New York City Housing Authority (NYCHA). By creating a Partnership Agreement with NYCHA, New York City can better connect with the vulnerable LMI populations living and working within the Project 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.

General Management Capacity –Three years ago, NYCHA created the Sandy Recovery

Division within the Capital Projects Department that is solely focused on the thirty-five Sandy-damaged developments. For the past 2 years, CB&I, a private firm, has been the Project Management Organization (PMO) and, under the leadership of the VP of Disaster Recovery, has taken on the responsibility of managing NYCHA's $3 billion Sandy recovery and resiliency program; through this teaming NYCHA's capacity now includes that provided by both CB&I and its sub-consultant partners, CSA and Hagerty (the PMO team). The PMO team has a strong knowledge of HUD regulations governing the comprehensive grant program and modernization standards, general conditions of construction contracts for *procurement* and *contracting procedures* required of federal grantees. Members of the PMO team have provided full *construction project management*, from concept to close-out and architectural and engineering services for NYCHA and other Public Housing Authorities in New Jersey and Pennsylvania for the last 20 years. The PMO team has over 15 years of *disaster program management* experience preparing thousands of high quality grant applications, *establishing tracking metrics* and performing evaluations to ensure premium *performance standards*.

The PMO team has the ability to plan, schedule, scope, and prioritize the needed recovery efforts, which includes management and coordination of all aspects of: *1) planning; 2) analysis of alternatives; 3) funding management; 4) financial reporting; 5) metric management; 6) grant administration; 7) design coordination; 8) procurement scheduling; 9) construction scheduling and coordination; and 10) the close-out process*. Because NYCHA already has a team of designers, planners, architects and engineers currently working on how to create more resilient public housing developments through the Sandy recovery process, if awarded NDRC funding, it could procure supplemental services and implement the activities defined in the Partnership Agreement immediately in order to have the activities completed within the timeframe required by the NDRC.

Technical Capacity – NYCHA's Sandy Recovery Division possesses expertise in *public housing design upgrades, green infrastructure impacts, energy efficiency* standards, knowledge of how to

leverage multiple funding sources to achieve project success, and an in-depth understanding of various *climate change* and sea level rise risk model's project impacts. NYCHA's has worked with the City over the past 5 years to implement resilient infrastructure upgrades like green/gray stormwater management, alternative energy projects and energy efficiency upgrades similar to the ones that are described in the NDRC Stormwater Management through Placemaking Activity. For the last 4 years, NYCHA's Sandy Recovery Division has been working to leverage multiple funding sources to achieve the maximum resilient benefits for its residents. In the past 3 years, the Sandy Recovery Division and the PMO team have been working closely with organizations like NOAA, academic institutions and other exert non-profits to attain and process the impacts of the most up-to-date climate change data through the use of various climate change and sea level rise risk models to integrate that information into the Sandy recovery design solutions. Over the past 3 years, the PMO team has run dozens of complex BCAs as part of NYCHA's recovery, and the PMO team BCA lead is also the current State of Maryland Hazard Mitigation Branch Director who over the past 6 years has averaged 100-200 BCAs per year.

Community Engagement and Inclusiveness – ORR's partnership with NYCHA has created better communication with the vulnerable LMI populations living and working within the Target Area. The Partnership Agreement with NYCHA creates a formal framework allowing for NYCHA residents to be engaged in the conversation and to collaborate on solutions that are right for their community. NYCHA's Project Management Office team has a group of multilingual outreach specialists 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 exchange with the tenants the most up-to-date status of needs, issues and progress achieved.

NYCHA and the City have been working together for the past year on engagement surrounding the ESCR Project. The goals of the community engagement for ESCR are aligned with that of the

overall Project and the 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.

Trust for Public Land Capacity and Experience

Technical Capacity – The Trust for Public Land has a long history of working with the City of New York on a multitude of projects, including the community-driven design and construction of more than 70 Playgrounds; the last 10 include award-winning green infrastructure playgrounds program, in partnership with the New York City Department of Environmental Protection (Source). The Trust for Public Land has also partnered with the Port Authority of NY & NJ and NYC Parks to establish waterfront parks that protect the city from storm events—including design, remediation and construction the first new post-Sandy resilient park. Trust for Public Land will serve as a partner to undertake Green Infrastructure park and open space projects that will be capable of managing stormwater, reducing flooding, buffering vulnerable neighborhoods, and protecting existing, vulnerable infrastructure.

The Trust for Public Land has developed a NYC Decision Support Tool, in cooperation with the City. This web-based tool supports and assesses high priority areas for green infrastructure investment, to reduce the impact and damage on critical infrastructure and socially vulnerable populations. The development of this tool has been funded by the Rockefeller Foundation, a NOAA Crest grant, and private donors. It incorporates research (led by Columbia and Drexel Universities and The Trust for Public Land), and assesses the performance of green infrastructure during Hurricane Sandy and the social resilience aspects of impacted communities. The NYC Decision Support Tool will be used throughout this project to inform strategic site selection and maximize impact of investments.

Management Structure

The City: ORR will lead the design and implementation of the Project; it will lead project management through its Planning and Coastal Defense units, ensure that the city's social and economic

resiliency Project goals are met, actively monitor the project budget and progress, and lead external affairs and communications with elected officials and local community organizations.

ORR is organized in line with 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, Social and Economic Resiliency, Buildings Policy, Infrastructure Policy, and External Affairs. Overall, ORR currently has nineteen professional staff on board and approved capacity to fill eleven additional positions. The Project will be led by ORR's planning team in coordination with City agency and non-governmental partners.

Daniel Zarrilli is the Director of ORR. Under his direction, the project will be led by the Deputy Director of Planning with additional direction provided by the Senior Advisor for Coastal Resiliency. ORR will work closely with OMB to provide overall oversight for the grant funding with NYCEDC to lead a feasibility study for the coastal protection components, with HPD on building-scale resiliency investments, and with NYCHA to provide program management and oversight for the stormwater place-making activities proposed on NYCHA properties in the Target Area.

As a supporting agency, HPD will administer funds under the HPD Multi-Family Resiliency Retrofit Program Activity, drawing upon the capacity and expertise of departments and staff throughout the agency. All Project Managers are overseen by the Director of Multifamily Storm Recovery. The Director of Resiliency Planning guides program policy related to multifamily resiliency and long-term planning. Both Directors report to the Assistant Commissioner for Storm Recovery. Staff working on multifamily resiliency at HPD are part of the Multi-Family Storm Recovery team under the Assistant Commissioner of Storm Recovery. The Division of Sandy Recovery is located in the HPD Office of Development. Under the supervision of the Assistant Commissioner of Sandy Recovery, the Resiliency Retrofit Program is overseen by the Director of Multi-family Storm Recovery, and includes a team of project managers who work with borrowers/grantees from intake through legal closing and to

construction completion.

An organizational chart with key City agencies and staff is provided at the end of this Exhibit.

NYCEDC: NYCEDC will lead the feasibility study for the Lower Manhattan Coastal Resiliency Project. The project is within NYCEDC Planning, Development and Transportation Department, which is led by its Executive Vice President. NYCEDC's resiliency project portfolio is led by the Senior Vice President of Development who reports to the Executive Vice President. The Project Manager will be the Assistant Vice President of Resiliency. The Project Manager at NYCEDC will coordinate with ORR to procure and manage consultant team, deliver technical analyses to diverse stakeholders, and provide needed interagency coordination to advance project goals. The Project Manager is responsible for daily administration of the tasks as described in the scope of the contract and all contract administration, including budgeting and compliance in coordination with the lead consultant. Required coordination includes regular check-ins with consultant teams and key agency partners, review and approval of all deliverables, and engagement with ORR and other external partners on project delivery, as needed. An organizational chart is provided at the end of this Exhibit.

NYCHA: 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 Partner Agreement with the City would be similar to the existing disaster recovery structure. 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 Project. 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 the operations and day-to-day activities involved with implementing NYCHA's recovery program, including the Project Activity within the NYCHA developments. The NYCHA Resilience Manager acts as project manager to oversee the implementation of the Project Activity 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.

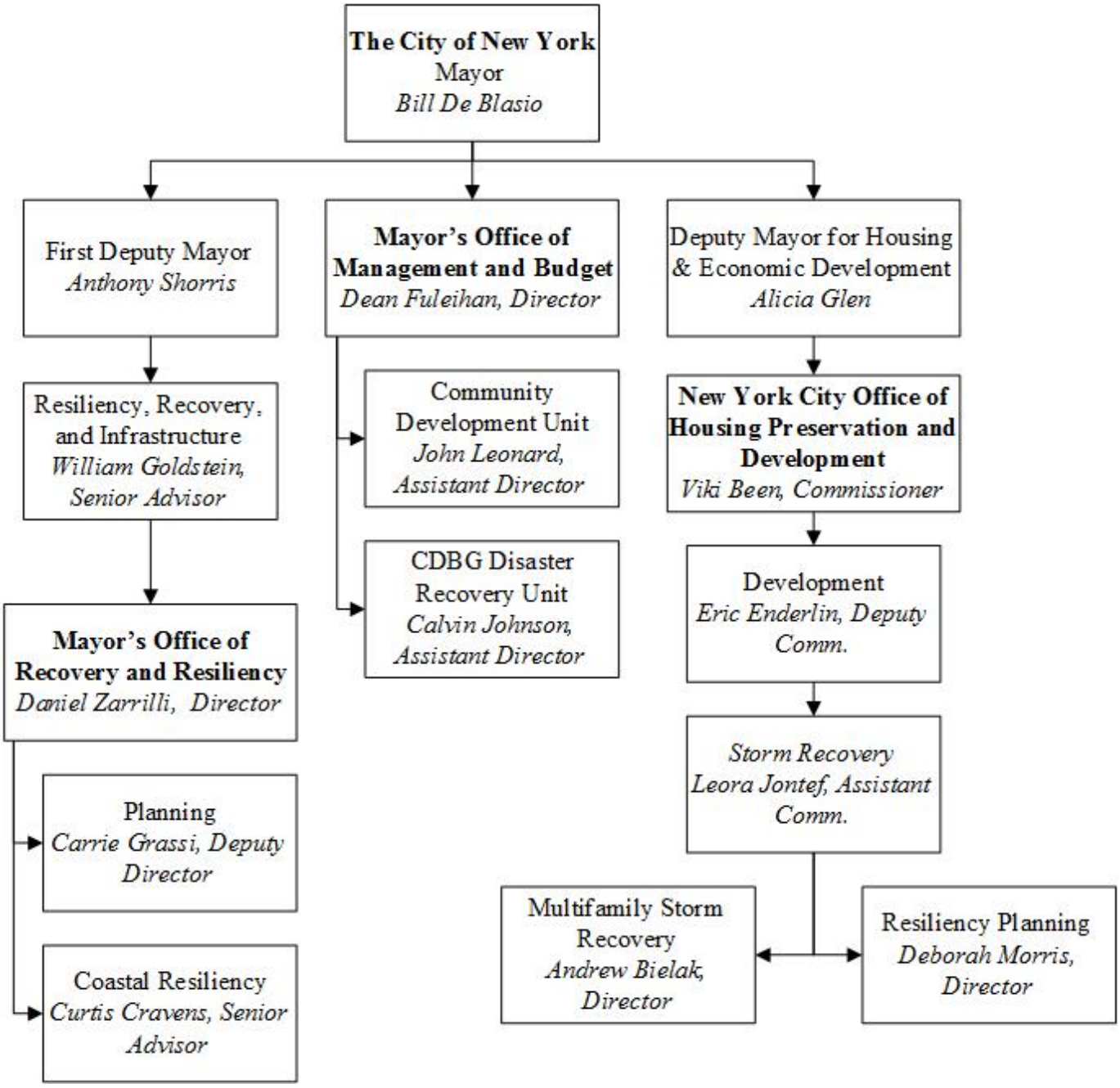
Trust for Public Land: The New York State Office Director will provide overall management of the implementation of activities by the Trust for Public Land in partnership with the City. The NYC Playgrounds Program Director and NYC Programs Manager will provide day-to-day project management on the activity, including working with City and community stakeholders, leading the conceptual development, design, and construction phases for the activities. The Green Infrastructure Director will provide technical guidance through the process for the activity on the highest design standards for green infrastructure development for the purpose of maximal stormwater capture. The Climate Conservation Director will serve in an advisory role to the green infrastructure development.

References

Rebuild By Design: Henk Ovink, Kingdom of The Netherlands, PO Box 20901, 2500EX The Hague, The Netherlands. Phone: Office +31704568301, Cell +31615017826, Email: henk.ovink@minienm.nl

100 Resilient Cities: Michael Berkowitz, President, 100 Resilient Cities, 420 Fifth Avenue, 19th Floor New York, NY 10018. Phone: +1 212 852 8213, Email: Mberkowitz@100resilientcities.org

News Article: http://www.pbs.org/newshour/bb/two-cities-two-different-responses-rising-sea-levels/#.VZq-tqO0ZAg.facebook


The City of New York
Mayor
Bill De Blasio
First Deputy Mayor
Anthony Shorris
Mayor's Office of Management and Budget
Dean Fuleihan, Director
Deputy Mayor for Housing & Economic Development
Alicia Glen
Resiliency, Recovery, and Infrastructure
William Goldstein, Senior Advisor
Community Development Unit
John Leonard, Assistant Director
New York City Office of Housing Preservation and Development
Viki Been, Commissioner
CDBG Disaster Recovery Unit
Calvin Johnson, Assistant Director
Development
Eric Enderlin, Deputy Comm.
Mayor's Office of Recovery and Resiliency
Daniel Zarrilli, Director
Storm Recovery
Leora Jontef, Assistant Comm.
Planning
Carrie Grassi, Deputy Director
Multifamily Storm Recovery
Andrew Bielak, Director
Resiliency Planning
Deborah Morris, Director
Coastal Resiliency
Curtis Cravens, Senior Advisor

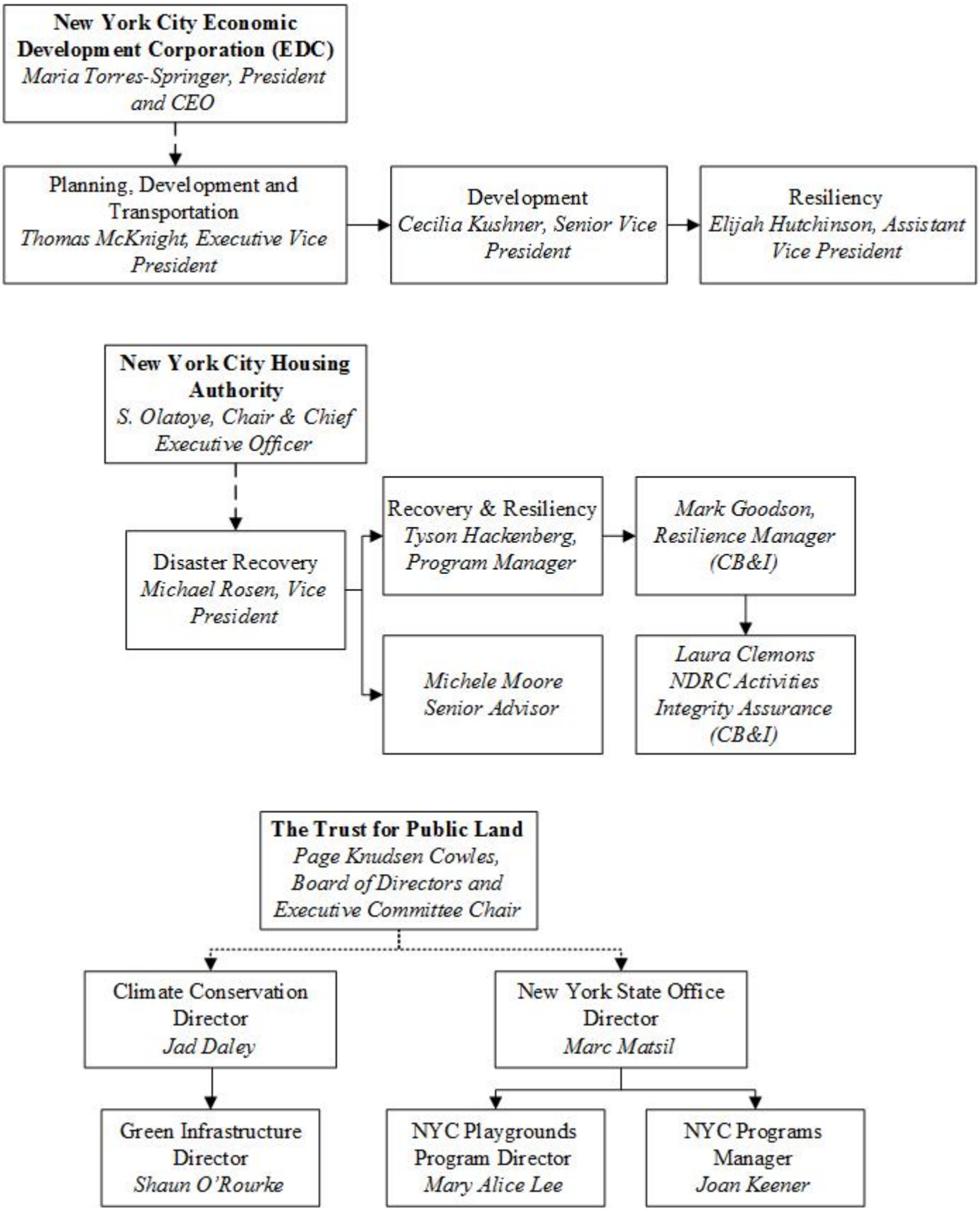

New York City Economic Development Corporation (EDC)
Maria Torres-Springer, President and CEO
Planning, Development and Transportation
Thomas McKnight, Executive Vice President
Development
Cecilia Kushner, Senior Vice President
Resiliency
Elijah Hutchinson, Assistant Vice President
New York City Housing Authority
S. Olatoye, Chair & Chief Executive Officer
Disaster Recovery
Michael Rosen, Vice President
Recovery & Resiliency
Tyson Hackenberg, Program Manager
Mark Goodson, Resilience Manager (CB&I)
Michele Moore
Senior Advisor
Laura Clemons
NDRC Activities
Integrity Assurance
(CB&I)
The Trust for Public Land
Page Knudsen Cowles, Board of Directors and Executive Committee Chair
Climate Conservation Director
Jad Daley
New York State Office Director
Marc Matsil
Green Infrastructure Director
Shaun O'Rourke
NYC Playgrounds Program Director
Mary Alice Lee
NYC Programs Manager
Joan Keener

EXHIBIT D NEED

The City of New York

In October 2012, Hurricane Sandy (DR-4085) caused substantial damage throughout New York City (the City). In total, 44 New Yorkers perished, an estimated 10% living within flooded areas were injured within the first week of the storm, and many more were displaced from their homes. It is estimated that more than 69,000 residential units were damaged throughout the City; approximately 20% of those in the inundation zone were rendered uninhabitable (Source). Hurricane Sandy revealed extensive vulnerabilities within the City, and need for a comprehensive strategy to prepare for, withstand, and recover from future storm events. The City is submitting this Phase 2 Application for HUD's National Disaster Resilience Competition (NDRC) to address Unmet Recovery Needs from Hurricane Sandy and has identified an area of Lower Manhattan as the Target Area for Phase 2 Project Activities based on an updated status of needs since the Phase 1 Application.

Target Geography

The Target Area for all activities of the Lower Manhattan Protect and Connect Project is located in New York County (Manhattan) and stretches along the East River from 14th Street to the Battery, then up the Hudson River to N Moore Street.

. It was selected based on: a) the large low- to moderate-income (LMI) population; b) the high level of historical and future risks within the area, as demonstrated by Hurricane Sandy; c) the concentration of important community assets, such as financial institutions, transportation facilities, historic sites, small businesses, affordable housing, and municipal buildings; and d) concentration of jobs for people living in the larger region, including Connecticut, New Jersey, and Pennsylvania..

Transportation: When the City's transportation network fails, economic productivity and social health are impacted due to the public's inaccessibility to work and to access social or essential services. The Metropolitan Transportation Authority reports over $5 billion in damages, with a significant portion of those costs in Lower Manhattan. The Target Area is crucial to regional connectivity (Source); it contains the convergence of the City's transportation network, including subway lines that link four

boroughs, major roadways, ferry services, terminals, helicopter pads, and critical road tunnels. The 22 subway stations in the Target Area totaled almost 400,000 daily riders in 2014 and over 98% of workers commute into the Target Area from the greater New York Metropolitan Area (including CT, NJ, and PA) and beyond. Of the residents who travel out of the Target Area for work, 43.5% are low- to moderate-income and therefore highly vulnerable to lost income due to transit disruptions.

Critical Infrastructure and Public Facilities: The Target Area includes multiple emergency services facilities, including the Police Department Headquarters, New York Presbyterian Hospital/Lower Manhattan Hospital, multiple fire stations, and a Hurricane Evacuation Center. Two electrical substations and one communications switching facility are also located in the Target Area. During Hurricane Sandy, over 150 public facilities in the Target Area were damaged with an estimated total damage cost of $634 million (Source).

Jobs and Employment: The Target Area is home to more than 240,700 jobs, and 1,479 different employers (Source). Over 20% of these jobs produce wage earnings below low to moderate income (LMI) limits for Manhattan and more than 30% of the jobs are held by workers with a high school or lower level of education. Input output models of Hurricane Sandy

indicate that total job loss (part time and full time, as well as temporary and permanent positions) as a result of impacts to the Target Area could have been about 27,000 when direct, indirect, and induced effects are considered. 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.

Affordable Housing: Subsidized housing helps meet the affordable housing demand. The 10,038 New York City Housing Authority (NYCHA) housing units, 3,113 privately owned affordable units subsidized by the Department of Housing Preservation and Development (HPD), and 1,114 units in the Mitchell-Lama Housing Program – a non-subsidy governmental housing guarantee in New York State –

that house LMI households in the Target Area are critical to the City's affordable housing stock. These developments were inundated with contaminated seawater during Hurricane Sandy, causing damage to building systems and affecting 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 the NYCHYA and HPD developments included: mechanical systems, electrical systems, structure and furnishings, as well as property grounds.

Most Impacted and Distressed Updated from Phase 1

The City's NDRC Phase 1 application qualified under the Most Impacted threshold at the County level. Under this Phase 2 Application, the City meets the Most Impacted threshold within its Target Area based on housing damage. During Hurricane Sandy, 54 of the 78 NYCHA buildings in the Target Area suffered damage and over 805 HPD affordable housing units in the Target Area registered for repair and reimbursement assistance through the *Build it Back Program*. Damage to the NYCHA's Two Bridges U.R.A. affected 250 apartment units, well above the 100 home threshold for Most Impacted areas. A model of the inundation zone of the Hurricane Sandy flood event indicates that 208 buildings within the area to be protected by the Project were inundated during Hurricane Sandy.

The City estimates more than 10,000 individuals in the Target Area are both low income and rent-burdened, well over the 100 individual threshold. The Target Area is home to over 200,000 people, of which over 81,600 individuals have incomes below 50% area median. Within the target area there are three neighborhood tabulation areas (NTA), a NYC-specific census geography consisting of agglomerated census tracts: Battery Park City/Lower Manhattan, Chinatown, and Lower East Side. According to data from the US Census, 48% of households in these NTAs pay greater than 30% of household income towards rent; they have a combined population over 162,000, of which over 66,000

are low income. With an average household size in the three NTA's of 2.28 persons, more than 34,000 individuals are rent burdened, and over 10,000 of these rent-burdened individuals are also low income and therefore distressed.

Vulnerable Populations: Hurricane Sandy disproportionately affected LMI City residents because many NYCHA developments and other forms of affordable housing stock lie within the floodplain (Source). Overall, the area's population is vulnerable as 56% of the population in the Target Area is considered LMI, 51% of the Target Area's population is extremely low income; 25% of adults have not graduated from high school; 14% are either under five years old or over 65 years old, and 22% have low English language proficiency. Additionally, NYCHA's Lavanburg development is utilized by the Department of Homeless Services to provide units to the homeless, and the Target Area is also home to over 17,000 people with a physical disability (Source, page 108-109).

These diverse vulnerable groups often struggle to evacuate and to financially recover from major impacts, and often require more assistance from others prior to, during, and post-disaster. They can also be more susceptible to mental health traumas from disruptions caused by disasters. *One New York: The Plan for a Strong and Just City* (*OneNYC*) (Source) states: more than a third of residents of very high-poverty neighborhoods have been diagnosed with high blood pressure; 15% of all New Yorkers report having been diagnosed with depression; and in the City's poorest neighborhoods, 7% of residents experience serious psychological distress. If these conditions exist during normal daily life, they are only exacerbated during times of emergency or extended recovery. With 19% of people living in the Target Area under the age of 5 or over the age of 65, the stress on caregivers can also add to the overall vulnerability of the population. Manhattan's Social Vulnerability Index (SoVI) of 4.5 is within the top fifth percentile for vulnerability to environmental hazards in the country; New York County is among the most vulnerable counties in the state (Source).

Unmet Recovery Needs (URN)

During the Phase 1 Application process, the City qualified based on unmet recovery needs (URN) identified throughout all five New York City Counties (i.e., Bronx, Kings, New York, Richmond, and Queens) based on widespread damage from Hurricane Sandy (DR-4085). For the purposes of the Phase 2 application, the City has used examples within the Target Area to meet the URN thresholds discussed in Exhibit B.

Unmet Recovery Need Updated from Phase 1 – Housing: In the Phase 1 Application, the City identified $516.7 million in Unmet Housing Need throughout the five MID counties within the City, based on resiliency needs at 400 NYCHA buildings with over 35,000 public housing residential units and $77.3 million in housing need for unfunded resiliency retrofits of 95 HPD affordable housing buildings. The Phase 2 Project addresses the URN identified in the Phase 1 Application of nine NYCHA developments in the Target Area (Campos Plaza II, Baruch, LaGuardia, Lavanburg, Riis I and II, Smith, Two Bridges, and Wald Houses) and five privately owned affordable housing developments funded through HPD. 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.

The Federal Emergency Management Agency (FEMA) has committed to $326.4 million in Public Assistance 406 hazard mitigation funds towards FEMA eligible mitigation measures at the nine NYCHA developments in the Target Area. This mitigation only addresses flood impacts to structures; it does not address protection of undamaged buildings at these developments, vehicles, grounds, or access to the developments, and does not provide necessary site-wide stormwater management measures which constitute a URN of $100 million. There is no funding identified through FEMA, CDBG-DR, private insurance or the National Flood Insurance Program (NFIP) to pay for NYCHA's URN at these developments at this time.

FEMA and CDBG-DR funds will be allocated to install permanent back-up generators on some damaged buildings to provide power during brown-outs or black-outs during heat waves. None of the fourteen low-income housing developments in the Target Area had backup power during Sandy, causing some residents to go without power for weeks, with no access to electricity, hot water, elevators, heating, and trash compactors to dispose of massive amounts of garbage.

The HPD Residential Building Mitigation Program identified for the Phase 1 Application currently has a citywide pipeline of over thirty-eight projects (about 8,000 households) which house LMI residents. Five of the HPD affordable housing developments identified within URN during the Phase 1 Application are within the Target Area. Two of these housing developments, totaling 805 units, have had their damages assessed at over $40 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 disruption of power at 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. Two of the HPD developments, have received funding through Build it Back to restore their assets (about $1 Million each), but remain on the waiting list for resiliency measures. The estimated cost of resiliency measures at these two developments represents over $7.1 million dollars of URN.

The 2014 New York City Housing Vacancy Survey reports that 52% 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. There are two area distribution substations within the Target Area that could have caused power outages if power had not already been affected at the 14th Street ConEd facility. These two area distribution substations were damaged from floodwaters and are located in South Street Seaport and south of the Brooklyn Bridge.

Unmet building-level resiliency needs at the five HPD 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. There is no funding identified through FEMA, CDBG-DR, private insurance or the NFIP to pay for HPD's URN..

Phase 2 Updated Unmet Recovery Need – Infrastructure: The City has identified further URN for the qualifying disaster that will be addressed by the Project. This addition to the URN submitted in the Phase 1 Application consists of URN for permanent public infrastructure.

It is well known that Hurricane Sandy devastated infrastructure and public investments. The Sandy Tracker (Source) identifies over 150 public facilities in the five zip codes that comprise the Target Area as damaged as a result of Hurricane Sandy, with an estimated total damage cost of $634 million. Much of that infrastructure may have been repaired since the event in 2012, but in many cases, important resiliency measures such as dry flood proofing, elevation of equipment, and even perimeter protection could not be implemented during the repair process. Mitigation may not have been feasible at the time or may not have been approved. Of the $2.8 billion in mitigation measures proposed to

FEMA's Public Assistance program Citywide, only $247 million has been approved as of October 2015, illustrating a significant current unmet resilience need.

As in the case for URN related to housing, the City has used examples of damages within the Target Area to demonstrate that the URN thresholds were met. The examples represents a very small portion of the damages experienced in the Target Area. Documentation for Infrastructure URN for HUD's consideration includes FEMA Project Worksheets with an estimated repair amounts for both examples, which are described below.

The New York City Police Museum, located at 100 Old Slip, Manhattan, is owned by the City. Originally constructed between 1909 and 1911, the building's exterior is historically landmarked. Due to the proximity of the East River to the southeast, the building was inundated during Hurricane Sandy by three to five feet of water. Flood water completely filled the basement and water intrusion damaged finishes, equipment and contents. A FEMA, Category E, Permanent Work Project Worksheet in the amount of $3 million to repair the City's damaged components includes a $216,248 hazard mitigation project to relocate utility equipment within the structure. This only protects some equipment within the structure and not all contents and interior, which experienced significant mold infestation, nor the historically significant exterior. Engineers developed a scope and cost estimate to protect the exterior building structure against future flood damage in the amount of $823,068, but mitigation to the structure is complicated by the historical nature of the building. Protection of the building's exterior is not feasible and is not funded for this reason. External flood protection, against both stormwater and coastal flooding, would be necessary to protect the historic Museum building.

The New York City Fire Department Engine 4 and Ladder Company 15 occupy the ground floor at 32 Old Slip, Manhattan, NY. The 36-story building was built in 1986 and has a footprint of approximately 33,000 square feet. Due to the proximity of the East River to the southeast, the building was battered with storm waters during Hurricane Sandy. Though there was no apparent damage to the

building structure, contaminated flood surge in excess of 3 - 4 feet entered through all exterior doors and several windows, causing submersion (three day period) of all contents & materials below the flood water on the ground floor. Flood waters containing salts, motor oil, diesel fuel, gasoline, anti-freeze and raw sewage backup submerged all contents and materials, which later induced mold growth and compromised the air quality throughout the facility. A FEMA, Category E, Permanent Work Project Worksheet in the amount of $79,485 to repair the City's damaged components has been developed. The Project Worksheet did not include hazard mitigation. Because the fire station cannot be protected in isolation from the rest of the building, engineers developed a scope and cost estimate to protect the entire building exterior against future flood damage using a system of deployable barriers, in the amount of $1,396,901. Protection of the building's exterior is not feasible because FDNY is a tenant and cannot modify the building structure. External flood protection, against both stormwater and coastal flooding, would be necessary to protect the building.

Resiliency Needs within Recovery Needs

The City must increase resiliency by reducing future losses to coastal and stormwater flood events, reducing the incidence of combined sewer overflow events, and reducing loss of service in transportation, telecommunication, and energy systems. By providing opportunity for economic revitalization in the Target Area, protecting against future loss of affordable housing and infrastructure, and mitigating other hazards, such as urban heat island effect as an integral part of its resiliency measures, the City is creating a vehicle for increased social, environmental, and economic vitality in the communities protected. According to *One City, Rebuilding Together, A Report on the City of New York's Response to Hurricane Sandy and the Path Forward* (Source), "It is clear that without action by the city and its many partners, dramatic changes happening in our climate will continue to negatively affect our City's infrastructure and neighborhoods."

Sandy is expected to have cost local government hundreds of millions (the City has spent about

$288 million (Source) of the total $2.45 billion, on Housing Recovery alone), and the federal government over $15 billion (Source), including federal funding administered by the City and by Federal Agencies. The cost of inaction, in lost lives and destroyed neighborhoods, could be huge; initial loss-modeling conducted by the City and the reinsurance firm, Swiss Re, shows a future Sandy-like storm could cost the city and its residents more than $90 billion in damage by the 2050s (Source).

Within the Target Area, based on models of impacts the Project is expected to prevent, Sandy is expected to have cost individuals and businesses, based on a review of ownership, about $2.6 billion in structure, contents, and inventory damage and relocation costs alone, including insurance pay outs. Impacts to structures that appear to be owned by local, state government, and federal government are expected to have been almost $500 million, not including transportation and utility assets. The five zip codes in the Target Area have the highest concentration of damaged public assets as a result of Sandy, with over 151 damaged facilities and $634 million in FEMA Public Assistance as of June 2015 comprising 42% of damaged facilities and 55% of damage costs.

If the Project had been implemented prior to Sandy, the Target Area would likely still have been under evacuation orders, but the storm surge would not have penetrated that portion of the City. The full damages within the Target Area would have likely been greatly diminished due to the level of protection anticipated to be reached by the Project. As such, in the Target Area, Sandy would have cost individuals, local government, insurance, state government, and the federal government the costs of evacuation, sheltering, and implementing resilience or emergency protective measures, such as closing gaps in the perimeter protection at the waterfront. The City's overall costs to individuals, insurance, as well as local, state, and federal government agencies could have been reduced by the over $3 billion in structure, contents, inventory, and relocation costs projected in the Target Area.

Need for Coastal Protection: Hurricane Sandy demonstrated the realities of climate change and exposed the vulnerability of the City's coastal population. If the Project's coastal protective measures

had been in place at the time of the qualifying disaster, widespread flooding in Lower Manhattan could have been reduced or prevented, avoiding over $3 billion in total impacts. Avoided impacts would have included: direct physical damages to buildings, utilities, communication and transportation assets; displacement; loss of public and essential facility services, such as transportation, power, fire stations, and police stations; economic losses (lost wages and business income) affecting the local, regional and global economies; and human impacts including casualties, mental stress and anxiety, and lost productivity. Such losses demonstrate a need for the increased resiliency provided by the Project.

Need for Upgrades to Affordable Housing: As stated above, Hurricane Sandy left many Target Area residents without electricity, heat, and water for weeks, forcing many residents to relocate or live in sub-standard conditions. Many of the families living in affordable housing complexes have very few resources to carry them through the wrenching experience of displacement due to flooding. NYCHA and HPD are working 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. The Project strives to directly address URN and reduce the impacts to the LMI population living in the Target Area. Power and utility security and protection against coastal and stormwater flooding will allow residents to safely remain in their homes during the recovery period.

Need for Community Connectivity: A critical function of the Project is to repair the severed connections between the Two Bridges neighborhood, the NYCHA developments, and the Tip of Manhattan for increased resilience through social cohesion and greater public contact between these communities. The Rockefeller Foundation identifies “collective identity and mutual support” (Source) as strong indicators of resilient places and Judith Rodin, in *The Resilience Dividend* (Source), states that “climate disruptions, safety, community cohesion, and the built environment are all intimately connected and interrelated.” The Target Area includes communities that are cut off by transportation systems,

social patterns and income inequality. By connecting neighborhoods and increasing space for community gatherings through the connective ribbon of the coastal protection and the NYCHA placemaking elements, individuals can form relationships that foster stability and mutual assistance during emergencies. Enhanced social cohesion lessens the feeling of isolation and actually decreases collective risk during disasters.

Need for Stormwater Management: The densely packed buildings and high proportion of hard, paved surfaces have changed the City's natural hydrologic conditions. These hard surfaces guide rainwater into the sewers rather than allowing it to naturally percolate back into the soil. The Target Area has a combined stormwater and sewer system, meaning that both stormwater and sewage share the same pipe system. During large storms, significant volumes of rainfall combine with the sewage produced by the millions of people living, working and recreating in the City, which may stress the its combined sewer infrastructure. When the combined volume exceeds the capacity of the City's 14 wastewater treatment plants, the City experiences an "overflow" of raw sewage that is released into public waterways like the East and Hudson Rivers. This overflow can be highly damaging to the environment and ecosystems.

During Hurricane Sandy, 5.2 billion gallons of untreated or partially treated sewage was discharged into the City's waterways, releasing bacteria and pathogens that are harmful to people and the environment. These combined sewer overflow (CSO) events do not solely occur during extreme coastal flooding events. In 2008, an estimated 27 billion gallons of untreated sewage were discharged into the City's waterways during heavy rain events, contributing to the deterioration of the quality of the City's waterways. The EPA's Clean Water Act aims to make at least 90% of the city's waterways hospitable for recreation and the City has set a goal of reducing these overflows by 40% by 2030. Early models show that green and grey infrastructure actions in the Target Area could reduce CSOs during the 8" 24 hour event by 30 million gallons alone.

Future Needs - Growth Analysis: Hurricane Sandy illustrated multiple growth risks in the City's current economic development patterns that hinder resiliency.

Demographic Trends

- In 2011, the City had approximately one million low income households, yet only 425,000 rental units were affordable to those households. The continued mismatch between the City's demand for affordable housing and its supply exacerbates the income inequality threatening the City's progress.
- The City it 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 47% 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 25% of the total labor force earns less than $20,000 a year.

The City expects to accommodate more than nine million residents by 2040, in part through the construction of 250,000 new housing units and focusing workforce development efforts towards the highest growing economic sectors for the area. Without physical, economic, and social resiliency measures in place, existing social inequality issues such as growing income inequality, obstacles to job mobility, and a crisis of housing affordability may be exacerbated.

Other Factors Hindering Recovery and Resilience: 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. Ultimately, the effect of the proposed Project will be a reduction in the need for recovery after catastrophic events.

Accessibility of Information During Recovery: The City needs to improve accessibility of recovery

information and services for all city residents (including those with disabilities or special medical needs, homebound populations, non-English speakers, and un-documented immigrants, Source). Actions to may 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 (including, but not limited to, social media). 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 (Source), 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. The City is also 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. Recommendations for future recovery and resiliency include the creation of a Liquid Fuels Roundtable to assure adequate fuel for response and recovery needs; the development of a citywide emergency transportation plan; and upgrades to fuel infrastructure systems (Source).

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 (Source) provides a look at the additional capacity needed 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 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; these groups can bring critical resources to the recovery effort. Recommendations to address this include: establishing continuous and consistent information exchanges; developing City templates for sharing critical information; and building better pre-disaster relationships with these vital links to resiliency recovery.

Broader Area Coordination and Implications

In addressing the impacts and needs of the broader area, 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 New Jersey, Connecticut, and New York State. The Consortium's Advisory Board consists of 11 State agencies and non-profit organizations from New York, New Jersey, Connecticut and the greater region.

The City has also 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 FEMA to coordinate resiliency and repair efforts. 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; it includes the Wall Street area, which houses the New York Stock Exchange (NYSE), NASDAQ, and the New York Board of Trade. The NYSE and NASDAQ are two largest stock

exchanges in the world by market capitalization. The value of NYSE listed companies is $19.69 trillion as of May 2015; average daily trading value from 2010 to the present was over $41 billion (Source)

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.

The proposed project is expected to generate jobs, labor income, and increase industry output throughout New York County and the greater region. Economic relationships spread across broad geographies; as such, project implementation should also generate significant national economic benefits both as a result of project implementation and future costs avoided.

Best Approach

In the City's NDRC Phase 1 Application, it described an approach to resiliency with goals aligning with the its overall resiliency policy as laid out in *OneNYC*: embracing the coastline, planning ambitiously, creating a stronger more resilient city, and keeping the City affordable (Source). The City also recognized the need for large scale coastal protection, which would act as the first line of defense against storm surge and sea level rise. Of the potential Phase 2 projects identified in Phase 1, the City selected Lower Manhattan integrated flood protection to pursue under this Application. The City is committed to completion of this project regardless of the award of CDBG funds received through this Application and, through NYCEDC, has initiated the project through the release of a planning and feasibility study Request for Proposal (RFP) seeking a consultant for the Lower Manhattan Coastal Resiliency (LMCR) Project. The scope of the RFP includes development of a detailed, feasible, and

comprehensive flood protection concept design stretching south from Montgomery Street to the Battery and to the northern end of Battery Park City (Source). LMCR will connect to the East Side Coastal Resiliency (ESCR) project (Source), which extends the coastal protection north to 14th Street; together these projects provide coastal protection for the entire Target Area.

While the coastal protection aspect of the Lower Manhattan Protect and Connect Project, submitted under this Phase 2 application, is a major part the City's larger plan to provide resilience to Lower Manhattan, the overall Project was designed within the framework of the Phase 1 Application commitments. The Target Area for this application was selected based on the characteristics described in this Exhibit, including unmet recovery needs, affordable housing, vulnerable populations, critical infrastructure and public facilities, and jobs and employment. Under Phase 1, the City committed to developing a Phase 2 project that focuses not only on coastal protection, but also protects these coastal communities with vulnerable populations and critical infrastructure. It also committed to developing a Phase 2 project that could be quickly implemented, where other funds could be leveraged to meet larger resiliency goals, and where the City can build on projects that have already received significant public engagement. The NYCHA Stormwater Management through Placemaking and HPD's Multi-Family Housing Retrofit Program activities meet these criteria and complete the overall Project by adding multiple lines of defense.

When fully implemented, the Project's multiple lines of defense will include coastal protection, green infrastructure for reduction of stormwater impacts and heat-island effects, community resilience through placemaking, and local-level retrofits and upgrades. Placemaking activities have the potential to forge stronger connections between individuals and neighborhoods and foster a greater level of public respect and trust, and prove vital for emergency preparedness and response during catastrophic events. While individually each activity provides some level of resiliency to the City, implementation of the Project in its entirety is the most robust and holistic solution to the complex problem of resiliency in the

City's dense urban environment. 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.

As fully described in Exhibit E - Soundness of Approach, the City evaluated multiple options before selecting an appropriate approach that works in conjunction with non-CDBG activities, including those described in Exhibit G – Long Term Commitment, to support its overall vision of a resilient City. The City's Phase 2 Lower Manhattan Protect and Connect Project presents a feasible and innovative approach to building 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.

EXHIBIT E SOUNDNESS OF APPROACH

The City of New York

Approach Overview

To address the extensive needs in the Target Area for both future protection and resiliency described in Exhibit D – Need, the City of New York (the City) engaged planners, architects, engineers and members of various City agencies and departments in the planning and development of the Phase 2 Lower Manhattan Protect and Connect Project. The participants reviewed information gathered from the Rebuild by Design competition with Community Development Block Grant-Disaster Recovery (CDBG-DR) funds, *OneNYC* (Source), Special Initiative for Rebuilding and Resiliency (Source), and the current HUD Funded, East Side Coastal Resiliency (ESCR) project (Source) to formulate the approach discussed below. The approach considered land use, affected population, and environmental factors to create options, then select the option that will be most resilient and viable in the urban land-scape of the Target Area.

The City's Phase 2 Lower Manhattan Protect and Connect Project (the Project) consists of coastal flood protection measures, stormwater management strategies through placemaking, and building upgrades that are designed to protect the Target Area while enhancing the social fabric of the neighborhood. The Project fulfills the City's Phase 1 commitment to develop a Phase 2 project that focuses not only on coastal protection, but also uses multiple lines of defense to protect these coastal communities with vulnerable populations and critical infrastructure as discussed further in Exhibit D - Need. The Project will connect to and integrate with the currently ongoing ESCR project, expanding upon years of work, thousands of hours of community feedback sessions, and millions of federal, state, local, philanthropic and private dollars that are being invested in the Target Area.

In addition to reducing future losses to coastal and stormwater flood events, the Project will increase resiliency by reducing the incidence of combined sewer overflow events, reducing urban heat island effect, and reducing the likelihood of loss of service of transportation, telecommunication, and energy systems. The Project also provides opportunity for economic revitalization in the Target Area protecting against future loss of affordable housing and infrastructure while creating safer places by

increasing social cohesion and community connectedness. The City plans to use this as a vehicle for increased social, environmental, and economic vitality in the communities protected.

A coastal flood protection solution will protect vulnerable communities, critical infrastructure, and existing community spaces from storm surge, and will be designed in a way that maintains the neighborhood character and enhances daily functionality of existing land, enhancing the waterfront and upholding community equity. Drainage and green infrastructure improvements will mitigate the 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 on 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.

This Project builds upon the years of outreach that has occurred since Hurricane Sandy in the Target Area during Special Initiative for Rebuilding and Resiliency (SIRR), Rebuild by Design, *OneNYC*, and the current ESCR project. The City will also continue its longtime close coordination with New York City Housing Authority (NYCHA) and the City Department of Housing Preservation and Development's (HPD) planned outreach to consult with NYCHA and affordable housing residents in the Target Area.

Defining Metrics and Measuring Project Success

To help evaluate the effectiveness of the Project, metrics have been defined and will be evaluated throughout the lifecycle of the project. Specific metrics that build upon the goals of *OneNYC* and the metrics developed in the Phase 1 Application were developed to follow the guidance of the NOFA.

Resiliency Value – The City will use the following metrics to track increased resiliency to flood events:

- *Increased number of households upgraded to protect against utility and power loss*; Change

Expected: The nine Target NYCHA developments and the five HPD Multifamily Resiliency Retrofit Program developments will be protected against power loss and utility outage during future coastal storm events of the Sandy magnitude. Method of Measurement: modeling and confirmation of post-event impacts by NYCHA and HPD. Tracking Period: Project useful life.

- *Increased linear feet of coastal defenses completed*; Change Expected: 11,500 linear feet of coastal protection. Method of Measurement: Engineering design and aerial photography as measured by the City. Tracking Period: Will be complete by September 2022.
- *Increased number of residents benefiting from coastal defenses and restored ecosystems*. Change Expected: 55,074 residents will be protected by the project from storm surge due to the 100-year storm. Method of Measurement: modeling based upon the project's completed level of protection. Tracking Period: Within one year after project completion.
- *Reduced amount of stormwater flooding in most affected communities*; Change Expected: "Yes" answers to the NYCHA Puddle Watcher resident survey of at least 100 respondents across 9 developments will be reduced by 80% in answer to: "When it rains heavily, does it negatively affect the areas you walk through and the paths you use in your development?" Method of Measurement: Survey at the nine Target NYCHA developments. Tracking Period: Prior to construction, 3 months after construction is completed, and annually.

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

- *No net loss in vegetation along the waterfront, significant improvement in ecosystem services on public housing properties;* Change Expected: The Project is expected to preserve current ecosystem services along the waterfront with no net loss of vegetation. Significant new vegetation and ecosystem improvements will be made to about 400,000 square feet on NYCHA developments. Method of Measurement: program tracking. Tracking Period: Through project completion.

- *Total square feet of reduced energy usage*; Change Expected: the Multi-family Resiliency Retrofit program is expected to result in an annual reduction in energy usage of around 208,000 MMBTUs among over 3.5 million square feet of space. Method of Measurement: Program tracking. Tracking Period: Through project completion.
- *Reduction in Stormwater runoff as a result of NYCHA Stormwater Management through Placemaking*; Change Expected: 50% decrease in water quantity and 50% increase in water quality of parking lot runoff. Method of Measurement: NYCHA measurement of quantity, turbidity and PH levels in compliance with their stormwater pollution prevention plan. Tracking Period: One year after project completion.

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

- *Reduce measured social vulnerability;* Change Expected: Based on an improvement in environmental factors, the Activities within the Target Area will reduce the current SoVI® of 4.0 for Manhattan by a measurable portion. It is difficult to measure the SoVI® for the Target Area, specifically, but *OneNYC* has a goal to significantly reduce the SoVI® index for the City. Method of Measurement: City review of the SoVI® index. Tracking Period: Change is expected to take place at project completion and continue to improve through project useful life and will be measured in accordance with *OneNYC*.
- *Increased recreational space on NYCHA public housing campuses, for the enjoyment of both residents and neighboring communities*; Change Expected: Resident happiness increased with place survey and an increase in quality of life assessment. Method of Measurement: Happiness Index survey of at least 100 respondents across 9 NYCHA developments. Tracking Period: Administered prior to construction, 6-12 months after construction is completed, and annually.
- *Improve passive and active recreational space along the waterfront in the Target Area*; Change

Expected: About 170,000 SF of new passive and 120,000 SF of new active recreational space is planned along the waterfront in the Target Area. Method of Measurement: Engineering design and aerial photography as measured by the City. Tracking Period: Through project completion.

The following additional Citywide metrics will be supported by added recreational space in public housing and along the waterfront:

- Increased percentage of adult New Yorkers who meet physical-activity recommendations from 67 percent to 80 percent by 2035, as measured through City a review of state-level data on physical fitness and exercise rates.
- An increase in the percentage of New Yorkers living within walking distance to a park from 79.5 percent to 85 percent by 2030 as measured by City GIS mapping analysis.

- *Preserving 120,000 affordable housing units by 2024*; Change Expected: Within the Target Area, 14,265 affordable and public housing units will be preserved against flood impacts, with operating costs also reduced, at minimum, over the project useful life. Method of Measurement: Existing City tracking systems. Tracking Period: Through 2024.

Economic Resiliency:

- *A reduction in economic losses resulting from climate-related events, as stated in OneNYC;* Change Expected: Based on modeling completed within the BCA, the Project is expected to reduce direct physical damages, relocation costs, and the residual economic effects that could occur during a Sandy like event by several billion dollars. Average annual savings, as a result of the project could reach several hundred million dollars. Method of Measurement: a review of damage cost records retained by the City. Tracking Period: Through the project useful life.
- *Measure the increase in employment opportunities in the Target Areas over time after project completion.* Change Expected: Incremental increase over time of number of jobs in Target Area. Method of Measurement: Count number of jobs added in Target Area by using data from the

American Community Survey. Tracking Period: Every three years or as often as the US Census makes the ACS data available.

- *Measure the increase in employment opportunities for LMI individuals in the Target Areas over time after project completion.* Change Expected: Incremental increase over time of number of jobs for LMI individuals in Target Area. In its Phase 1 Application, the City states: *"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"*. 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, utilizing the existing programs such as the Workforce 1 Career Centers (Source). Method of Measurement: Tracking jobs created by the project, and monitoring which new jobs could be filled by low to moderate (LMI) individuals. Tracking Period: Every three years or as often as the US Census makes the ACS data available.
- *Increased property values in the area surrounding the NYCHA Manhattan Campus.* Change Expected: 10% of residential and commercial properties within ¼ mile radius of NYCHA's Manhattan Campus to see an increase in their assessed property value. Method of Measurement: Assessed property value records. Tracking Period: 3 years after completion.
- *Reduced operating costs for affordable housing*; Change Expected: Upgrades to five affordable housing developments in the area are expected to reduce annual operating costs by potentially millions of dollars. Method of Measurement: program tracking. Tracking Period: Until a year after project completion, 2023.

Alternatives Evaluation

Before pursuing the Project Activities that are considered to be the best feasible option, the City evaluated four options based on the following criteria: structural ability to protect the community of today and the community of the future based on historical data and sea level rise (SLR); the City's

technical and managerial ability to implement the flood protection system; the resources required to maintain and operate the system; the potential for social and economic benefits to the neighborhoods protected; and, the community's expressed desire for the benefits. Using these criteria enables the City to select an option that protects and connects the Target Area, advances its resiliency goals and meet the needs outlined in Exhibit D – Need.

Evaluation of Options

Option 1: The "no action" alternative would leave the Target Area at continued risk of repeat damage during coastal and stormwater flood events, similar to the damages caused by Hurricane Sandy. As discussed in Exhibit D, the Target Area experienced billions of dollars in damage during Hurricane Sandy, including disruption to transportation networks, damage to critical infrastructure, business interruptions, and damages to affordable housing units. *Over time, "no action" would increase the vulnerable populations at risk during the next storm.* There are over 10,000 public housing units in the Target Area and as the floodplain continues to grow, and without action, the number of vulnerable persons impacted and the severity of impact will only increase.

Option 2: Option 2 would involve constructing a new separate stormwater sewer system in the Target Area to address precipitation events. There are numerous flood management, structural, and environmental advantages to this option. This system would manage stormwater through the installation of new conveyance pipes, thereby preventing the stormwater from entering and potentially overwhelming the existing combined sewer pipes and causing backups. This new system would then discharge the stormwater to new outfalls. Construction of this new system strengthens the existing sewer system by reducing demand on aging pipe infrastructure. Furthermore, diverting stormwater from the existing system reduces energy demands associated with treating the stormwater at wastewater treatment plants, leading to reduced treatment costs and associated hazardous air emissions. The primary disadvantage of this option is that it does not protect the Target Area against a storm surge event. In the event of a storm surge, the stormwater system would be rendered inoperable. Buildings within the

floodplain would need to continuously be monitored and analyzed for floodproofing. Furthermore, separate stormwater systems are typically used to address lesser rain events. Although the diameter of the conveyance pipes can be increased in order to handle increased flow rates, the size of the pipes would likely be limited by available space and cost. This option is also very costly, approximately $573 million, and involves considerable disruption to existing infrastructure. *This option does not address a storm surge event and does not foster social nor economic growth.*

Option 3: Option 3 would involve implementing features such as wave attenuating structures and other energy-absorbing amenities (benches, planters, curbs, low walls or a combination thereof), located along the shoreline of the Target Area. For smaller storm surge 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 of expanding the pump station is approximately $300 million to $500 million and will also require annual maintenance. Affordable housing would be further protected with the addition of redundant external power, i.e. portable generators. *The expanded pump station would require substantial annual maintenance and involve moderate disruption to the existing infrastructure. Though it addresses upland flooding and affordable housing, this option is not holistic because it doesn't provide a suitable level of coastal protection.*

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 localized pump stations that could be deployed to reduce the stress on the sewer system when combined sewer outfalls are closed; coupled with green and gray stormwater infrastructure that 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 and offer safe refuge in times of impactful events including surge, heavy rains, terrorist/cyber-attacks, extreme heat events and heavy snow/ice events that might result in quick thaw flooding. Coastal flood protection coupled with stormwater infrastructure improvements created through enhanced community connection corridors, along with buildings that provide energy security would address the most amount of risks to both common and catastrophic events. *The system would require less annual maintenance than the other options and involve minimal disruption to the existing sewer system and other area infrastructure; it provides multiple lines of defense, addresses upland flooding, and creates numerous social, environmental and economic co-benefits making it the most holistic option.*

Project Description

The Project will integrate 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 incorporates the features of Option 4 and consists of deployable and fixed walls, mechanical gates, deployable panel systems, and earthen berms to protect the Target Area, which spans from Montgomery Street south around the Manhattan Tip, continues to the northern portion of Battery Park City and ends at N Moore Street, during a storm surge event. Stormwater infrastructure improvements will be connected to the coastal protection system and implemented across the Target Area. Active and passive stormwater management will be accomplished through placemaking on 9 NYCHA developments. The Project will also include the elevation of critical building systems within 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. These measures serve as an additional line of defense and provide necessary protection of vulnerable

populations, as discussed further in Exhibit D, and can be implemented quickly to provide greater security and protection to the developments while the larger coastal protection system is built.

The Project is divided into three Activities, detailed below. These Activities are concepts that were developed through preliminary analysis of site conditions and cost estimation for the purposes of articulating the feasibility of these concepts. The City will work with its Partners to engage the community throughout the process, from study and analysis stages to developing a final design, and will undergo environmental review for any covered projects.

Activity 1: Coastal Protection

The coastal flood protection system 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 system runs southwest along the Franklin D. Roosevelt East River Drive (FDR) and connects into higher elevation adjacent to the Brooklyn Bridge. It then continues along the southern tip of the island to the western edge of The Battery to connect into higher elevation. The system then continues along the western edge of Battery Park City ending at N Moore Street.

As the dominant feature stretching along the eastern coastline, the FDR (an elevated expressway) plays a critical role in the conceptual alternative design. The system is designed to be located underneath the expressway as independent structures that do not rely on the foundation or structure of the FDR. The system then transitions from fixed walls along the FDR to deployable panels along the Whitehall Ferry Terminal building, and continues with a levee system at the perimeter of The Battery. Use of a levee system maintains and strives to enhance the character of open space and status of The Battery as a visitor destination. With numerous attractions and amenities already in place at The Battery, measures of the Project focus on maintaining the park's existing character. The West Street Corridor Coastal Protection will provide protection by using deployable flood barriers to connect the Battery to the existing walls throughout the area and to higher ground on N Moore Street. A deployable pumping solution will aid in the removal of stormwater. The City considers this area to be part of the larger area

flood protection and is not requesting funds for the West Street Corridor Coastal Protection under this application. The coastal flood protection system will 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.

While the construction of the 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. In the area surrounding the Brooklyn Bridge, the project will enhance the connection between the neighborhoods by adding passive seating areas, dog parks, and smaller retail areas, enhancing connections to community facilities. Additionally, 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 will be designed to be 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 path from the Two Bridges neighborhood to the Manhattan Tip, connecting to the ongoing East River Waterfront Esplanade improvements, and revitalizing the waterfront as an appealing destination in the Two Bridges neighborhood, the City aims to strengthen the connection of the Two Bridges neighborhood to the rest of Lower Manhattan and revitalize the area in order to promote a stronger neighborhood economy.

Based on the drainage and storage capacities of the Target Area, preliminary analysis has shown that fifteen deployable pump stations and wet wells or a similar feasible approach will be installed at strategic locations, with two pumps at each location. In addition, two deployable pumps will be used during storm events in the West Street Corridor Coastal Protection area to aid in relieving combined sewer system backups due to a surge.

Activity 2: 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 features. Hard infrastructure features within the NYCHA developments include underground water storage cisterns located beneath areas such as playgrounds, basketball courts, parking lots and high-performance playing fields, depressed water storage designed to temporarily retain excess stormwater from the surroundings (also known as a "water squares"), permeable pavement and sidewalks, controlled-flow rooftop detention systems known as "blue roofs", and downspout disconnections from the combined sewer system. Green infrastructure features include bioswales, surface grading and recontouring, and soil amendments.

NYCHA's stormwater management strategies allow their sites to retain, detain, store and absorb water during a range of rainfall events, with capacity up to an 8" 24 hour event on some sites. NYCHA has estimated that within the Target Area, it can manage over thirty million gallons of water during heavy rain events with these feature combinations. This large capacity to retain, detain and store water on-site will ease the stress on combined sewage systems allowing it to handle larger events before reaching capacity. It not only allows the City to withstand larger rain events and mitigates site flooding, it also helps the city avoid the significant financial cost associated with CSO fines and will delay necessary sewer upgrades in the future.

NYCHA's nine developments make up 96 acres of the Target Area and five out of these nine developments (Baruch, Wald, 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 able to retain, detain, store and absorb over twenty five million gallons of water. Execution of the 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 has prioritized these 9 sites: (1) Baruch; (2) Lavanburg; (3) Wald; (4) Riis 2; (5) Riis 1; (6) Smith; (7) La Guardia; (8) Campos 2; (9) Two Bridges; (10) Additional Campus Features.

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 3: 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 will implement comprehensive resiliency upgrades for the five targeted housing developments.

In addition to 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 will provide the housing complex with backup power while also producing energy savings and operating cost reductions. Conversion off of district steam to natural

gas will 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. 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 technical standards of the existing Multi-Family Resiliency Retrofit Program as well as the agency's Green Preservation Program where applicable.

The Multi-Family Resiliency Retrofit Program Activity is expected to reduce annual energy costs by over $4 million, significantly reducing annual operating burden while providing security during future storm events and power outages.

Project Feasibility and Effectiveness

The Project Activities are considered both reliable and constructible based on the capacity and experience demonstrated by the City and its Partners on other projects of similar scope and size. In developing its approach, the City used coastal protection measures considered reliable in terms of structural mass, selecting barrier concepts that will limit wave overtopping and be designed to withstand varying levels of impacts that may be encountered during a surge. The pumping systems of the coastal protection Activity have built-in storage in case of a pump failure. The Multifamily Resiliency Retrofit Program incorporates a thorough review process ensuring technical feasibility. The City also considered and accounted for various site constraints, including the possible presence of high-voltage Con Edison transmission lines, the need to maintain access to The Battery, the need to minimize impacts on existing park facilities, and the need to minimize impacts to traffic on the FDR.

While working in a dense urban environment is a challenge, the City and its Partners have constructed projects throughout its history that successfully overcome it. NYCHA, for example, has constructed on other properties in conjunction with NYCDEP and their Sandy Recovery Division is already procuring services from firms that have designed and built similar features before. A detailed

discussion of the capacity of the City and its Partners is included in Exhibit C – Capacity.

Level of Protection

The design elevation of the coastal flood protection measures is directly related to the level of protection possible for the Target Area. The selected design elevations for account for the current 100-year storm surge level based upon the Federal Emergency Management Agency Preliminary Flood Insurance Rate Maps (FEMA PFIRMs) with an allowance for sea level rise (SLR) for the high projected range in 2050. The design elevations include an additional allowance for wave run-up and overtopping defense, which meets or exceeds the safety factor often described as freeboard. The 90th percentile of the projected SLR curve in 2050 was used as it allows for an extension of the system design life if the higher probability or median SLR values are achieved. The approach to the level of protection is the same as the CDBG-DR funded ESCR project. The West Street Corridor Coastal Protection has an interim level of protection of a 100 year storm without sea level rise. The City plans to further study this complex area and build upon this level of protection in the future.

The City's stormwater infrastructure improvements are designed for the 5-year 24-hour occurrence rainfall event. The NYCHA Stormwater Management through Placemaking is designed for an 8" 24-hour event and significantly 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 projection and thus the project will be scaled appropriately, as described below. Structural foundations, walls, pile systems and other hard assets will all be designed with a 50-year minimum service life. The Stormwater Management through Placemaking solutions are designed to 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 and 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).

As a major urban center that was recently challenged by significant natural and man-made threats, the 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 the City.

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. NYCHA's sites have been prioritized for Activity scalability in a way that ranks the developments for impact on both water management and community impact. 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 sub-activities. 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 sub-activities will be determined once the utility survey, ground survey and final design are completed, and meetings and workshops are held with the agencies and stakeholders.

The overall project schedule is divided into multiple phases: Planning Procurement (September 2015-June 2016), Design Procurement and Design Phase (June 2016-January 2019), Construction Procurement and Construction Phase (January 2019-September 2022). Planning Procurement is already underway; in September, an RFP was issued by the City and its Partners for a Feasibility Study for Lower Manhattan Coastal Resiliency. Once funding for Project Activities is 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 will take between two and five years. The City is submitting an Expenditure Deadline waiver.

Acquisition of federal, state, and local permits will involve coordination with the U.S. Army Corps of Engineers and FEMA, as well as New York State. Permitting will begin at the end of the conceptual design phase and will 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 will meet all environmental and historic preservation requirements and to move through the Unified Federal Review process without unusual delay or issue. The City 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.

Project Budget

Project Costs

The estimated opinion of construction cost based on the current understanding of existing features and design criteria for the project is approximately $608 million, of which $500 million is eligible for funding. The anticipated annual O&M costs of $6.7 million 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 will not be used towards operations and maintenance costs.

Cost Development Process

Costs for the Project were 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 U.S. Army Corps of Engineers design guidance and will continue to be followed throughout the further design development of the Project.

Cost Analysis

The budget for the project was developed by examining construction cost estimates from recent projects within the 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. In addition, the City has multiple project tracking and management tools, as described in Exhibit C – Capacity.

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 Project, the City conducted a benefit

cost analysis. 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. Total Target Area investments of $879 million create $6.8 billion in benefits, yielding a benefit cost ratio of 7.87. These costs 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.

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. 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

Thanks to the extensive public outreach for the Rebuild by Design competition, the ESCR project, and NYCHA recovery efforts, the communities in the 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 Project, the City 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 ensured that vulnerable and underserved populations were involved, and that public input and feedback was actively solicited. The City 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 was conducted during the public comment for the City's Project. Additionally, ORR 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 included a 30-day comment period from September 4th – October 3rd and two public hearings. The City also submitted to the Sandy Regional Coordination Working Group (Sandy Regional Infrastructure Resilience Coordination Group) to be considered for the Hurricane Sandy Recovery Set Aside. A copy of the confirmation of submission, a full list of the consultation events and a summary of the Public.

Actions Taken: The inclusion of the interim coastal protection for the West Street Corridor Coastal Protection was a direct result of Public Comments. Although this area was originally going to be in the City's application, the feasibility of the coastal protection at the same level of protection as the rest of the Project was not cost beneficial. Protecting the area to an interim level of protection will enable the City to perform additional studies and design a more cost effective solution in the future.

Plan Consistency

The Project 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 2014 New York City Hazard Mitigation Plan (NYCHMP) (Source). For more information on planning coordination, updates and alignment, see Exhibit G - Long-Term Commitment. HUD-2991.

Consolidated Plan and/or Regional Sustainability Plan

In April 2015, the Mayor's Office released *OneNYC* (Source), a roadmap for constructing and maintaining a resilient city which evolved from the 2007 *PlaNYC* (Source) and the 2013 report *A Stronger, More Resilient New York* (Source). 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 the City, among other challenges. The *Vision 4: Our Resilient City* section of the plan contains initiatives relating to coastal

defense. The Coastal Protection chapter of this section incorporates *Initiative 21: Install an integrated flood protection system in Lower Manhattan, including the Lower East Side,* incorporated from the 2013 report. *OneNYC* characterizes this Project as an integrated flood protection system for all of Southern Manhattan from the Lower East Side to Battery Park City. This Project is consistent with the initiative.

In May 2015 the City released an updated Consolidated Plan in accordance with HUD requirements. In its Five Year Strategic Plan, the City identifies priority needs such as preserving existing affordable housing stock, ensuring the safety of elderly and disabled populations in NYCHA facilities, addressing impacts from Hurricane Sandy, providing community green space, and rehabilitating existing rental units. The Project is consistent with these priorities.

NextGeneration NYCHA (Source) 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. The Stormwater Management through Placemaking is aligned with the goals of this plan.

Housing New York, A Five-Borough, Ten-Year Plan (Source) is Mayor Bill de Blasio's city-wide long-term affordable housing plan that details how New York will build and preserve 200,000 of the City's affordable housing units over the coming decade. HPD's Multi-Family Resiliency Retrofit Program is a direct result of this plan.

Mitigation Plan and/or Transportation Plan

The 2014 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 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.

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 Project.

EXHIBIT F LEVERAGE

The City of New York

Direct Financial Commitments

On August 27, 2015, the City announced their commitment to a multi-layered resiliency strategy, the Lower Manhattan Protect and Connect Project described in this Phase 2 application for the 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 2015 specifically to further resiliency planning and implementation of flood protection at The Battery. The $108 million in committed funds will serve as direct leverage and are available for the City to use for project activities directly related to this Community Development Block Grant National Disaster Resilience (CDBG-NDR) Phase 2 application.

Operations and maintenance expenses for this infrastructure will not be covered by funds awarded to the City through NDRC. 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, the Lower Manhattan Protect and Connect Project estimates an annual cost of $6.7 million, specifically $213,000 towards the New York City Housing Authority (NYCHA) Stormwater Management through 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.

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 $85 million, including $2.9 million for the NYCHA Stormwater Management through Placemaking and $2.5 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. The long-term, direct financial

commitment, over the anticipated lifespan of 50 years, from the City's Partners that own and manage these properties is estimated at $5.6 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 Application. The City has identified projects across City agencies that advance the resiliency of Lower Manhattan's social infrastructure and physical assets, as well as provide co-benefits through smart infrastructure investments in green infrastructure, city parks, and affordable housing developments. The City has identified **$297.8** million as Supporting Commitments to the Lower Manhattan Protect and Connect Project. The Supporting Leverage consists of funds being used to carry out site activities that directly support the Lower Manhattan Protect and Connect Project, and are not part of the sources and uses.

Supporting Commitment #1: **$13.2** million from the Community Parks Initiative (CPI), a multi-faceted program led by the New York City Department of Parks and Recreation (NYCDPR) that invests in under-resourced public parks located in the City's densely populated and growing neighborhoods with higher-than-average concentrations of poverty. CPI's first phase targets 35 community parks through a $135 million capital investment that promotes the full re-creation of these parks and $36.3 million in capital funding from the New York City Department of Environmental Protection (NYCDEP) for green infrastructure improvements at these sites; the partnership with NYCDEP for green infrastructure improvements brings more resilient park designs that advances other citywide goals, like coastal resiliency. There are three CPI facilities in the Target Area within or adjacent to the floodplain that are receiving $13.1 million in capital and expense funds from CPI in 2015: Henry M. Jackson Playground and Sol Lain Playground will receive green infrastructure; Luther Gulick Playground will receive more green open space incorporating sustainable design features. These capital improvements will enhance critical active recreational spaces in Lower Manhattan that improve community

connectivity and social resiliency. The green infrastructure improvements layered onto the recreational assets are aligned with the activities proposed in Lower Manhattan Protect and Connect to foster social and environmental co-benefits that come with infrastructure that is designed with communities. An additional $151 million in Mayoral funding has been made available to expand the portfolio of CPI projects over the upcoming four fiscal years across the City, including potential for further investment within the Target Area.

Supporting Commitment #2: **$282.6** million pledged via a Memorandum of Understanding by FEMA to NYCHA during the summer of 2015. These funds are part of the $3 billion in funding announced on March 31, 2015 by Mayor de Blasio with Congressional representatives and the leadership of the New York City Housing Authority (NYCHA) that will allow NYCHA to repair and enhance resiliency at 33 developments where Sandy's storm surge damaging boilers, electrical and mechanical equipment, playgrounds, trash collections systems and killed hundreds of trees.

Only the FEMA funded activities that allow NYCHA to carry out its Stormwater Management through Placemaking Activity and that directly support the overall Lower Manhattan Connect and Protect Project, are captured. These activities are: (1) Recreational areas repair work (includes playgrounds and basketball courts) will be expanded with NDR funds to include permeable surfaces, underground water storage and conveyance systems that direct, retain, detain and store water during rain events; (2) Sight lighting will be expanded with NDR funds to be designed in conjunction with the way-finding, seating and other pedestrian corridor enhancements for Placemaking and community connectivity; (3) Generators that power sight-wide lighting are being installed on rooftops will be expanded with NDR funds so that the rooftops also include water detention, or blue roofs, that will detain water on-site during peak storm events; and (4) Construction site restoration activities will be expanded with NDR funds to include topographic recontouring, soil amendments, bioswales, converting all sidewalks and parking lots to permeable and the installation of underground water

storage. These features will us green and gray infrastructure improvements to convey, absorb and store millions of gallons of stormwater on-site. The commitment breakdown for each development and activity alignment is broken down in Attachment: NYCHA Supporting Commitment. The requested CDBG-NDR funds will enable NYCHA to expand the FEMA Public Assistance scope to have a greater resilience impact for the LMI population living in the Target Area.

Supporting Commitment #3: **$2** million through a research partnership with the Urban Ecology Lab at The New School for Social Research from funds awarded to The New School by the National Science Foundation. This research partnership will implement aspects of the Lower Manhattan Protect and Connect Project as part of their leadership on the multi-institution, multi-city Urban Resilience to Extreme Weather Related Events Sustainability Research Network (UREx SRN). The UREx SRN will develop a diverse suite of new methods and tools to assess how infrastructure can be more resilient, provide ecosystem services, improve social wellbeing, and utilize new technologies in ways that benefit all segments of urban populations. The extreme events that this project will focus on include urban flooding, coastal storms, regional droughts, and extreme heat waves. This partnership will develop projects over the course of implementing Lower Manhattan Protect and Connect to 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 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. Additional City agencies participating in this research partnership include the New York City Department of Health, the New York City Department of City Planning, DPR, and DEP.

EXHIBIT G LONG TERM COMMITMENT

The City of New York

On April 22, 2015, Mayor Bill de Blasio released *One New York: The Plan for a Strong and Just City* (Source). *OneNYC* includes New York City's (the City) initial sustainability strategy, which the City envisions as a model for heavily urbanized cities around the world. It expands on the targets established under plans such as *A Stronger More Resilient New York* (Source), 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 de Blasio's administration added equity as a guiding principle.

OneNYC lays out clear resiliency objectives in its fourth vision "Our Resilient City." Four specific resiliency goals listed in this plan are: 1) Every City neighborhood will be safer by strengthening community, social and economic resiliency; 2) The City's buildings will be upgraded against changing climate impact; 3) Infrastructure systems across the region will adapt to maintain continued service; and, 4) The City's coastal defenses will be strengthened against flooding and sea level rise. It 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. The *OneNYC* plan and the Ten-Year Capital Strategy are aligned to ensure funding for *OneNYC* resiliency goals. Specific actions taken by the City to achieve these ambitious goals include progress towards meeting the benchmarks described in the Phase 1 Application.

The City has also identified further actions including legislative steps, the creation of a regional task force, modification of zoning codes, insurance affordability studies, and the creation of a long-term strategic plan for New York City Housing Authority (NYCHA) sites, to align with resiliency goals.

These city-wide actions are described below. With the exception of the zoning code amendments described under "Raising Standards" below, the City's Phase 1 and additional Phase 2 commitments have already been undertaken. The zoning code amendments will be enacted prior to twelve months after the award of CBDG-NDR funds.

Lessons Learned

The City's Climate Change Adaptation Task Force (CCATF) was established to identify critical infrastructure that could be at-risk due to 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 the City. The Mayor's Office of Recovery and Resiliency chairs the CCATF, which organized its inaugural meeting under this current administration in July 2015. The CCATF supports regional agencies by 1) evaluating the potential impacts of climate risks to public health, the City's natural systems, critical infrastructure and buildings, and 2) identifying the rules, policies and regulations governing such systems and infrastructure that may be affected by climate change. 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 that have a clear resiliency plan. *The outcome measure is the number of regional agencies participating in the CCATF, which 20 as of July 31, 2015. A 4-year goal of 60 participating agencies is expected.*

Inventory of At-Risk Regional Infrastructure Assets: The City works with public and private entities to update an inventory of infrastructure assets that are at-risk to climate change hazards. The current list is a partial inventory focused on flooding and sea level rise; it will expand to include risks from heat and extreme events. *The outcome measure is the number of assets captured in the inventory; there were 2,100 assets as of July 31, 2015. The 4-year goal is to have at least 2,500 assets listed.*

Legislative Action

Since September 2014, the City has taken numerous legislative actions to strengthen the resiliency of local neighborhoods to stress/shock events, and to adapt buildings and infrastructure to the threats of climate change. The City Council revised the building code to address resiliency across a variety of risks and to provide clarity; the existing codes were deficient in requiring builders to mitigate. 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; they remove barriers to resiliency, such as clarifying the installation of flood protection measures, the location of fuel tank storage within buildings, and the ability to utilize backup natural gas generators. These changes were codified through Local Law 51 of 2014 and Local Law 52 of 2014, described below.

Local Law 51 of 2014: This law, adopted on September 30, 2014, provides technical corrections and clarification of provisions of the NYC construction codes to better inform structural adaptation to climate change risk.

Local Law 52 of 2014: This legislative action, adopted on October 10, 2014, requires revisions to the NYC construction codes to require adaptation of buildings to the risks of climate change. The outcome measure is buildings that are required to receive new construction permits following passage of the law. *The outcome measure for both of these laws (51 and 52) is the number of new permits pulled that will be covered by these higher standards; up to 386,000 structures will be built to higher building standards or adapted over the next 10 years.*

Local Law 17 of 2015: This law, adopted on March 3, 2015, 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 storm or hurricane. The materials would provide Zip Code-level information for locations of nearest shelters, evacuation zones borders and contact information for local organizations that could provide

assistance. The materials would be translated into the ten most commonly spoken languages within that community, and made available online. *The outcome measure is the total population receiving these new materials; there are 2,990,000 people in evacuation areas that might receive this information over the next 10 years.*

Local Law 18 of 2015: This law, adopted on March 3, 2015, requires the creation of a task force to study the recovery and rebuilding efforts of charitable organizations and houses of worship in areas affected by Hurricane Sandy. The task force will study how these organizations fared in the recovery process, how to improve their resiliency and what essential role they might play in a future event. *The task force will present their recommendations to the City Council and the Mayor after eight months; the outcome measure is this report, expected in late 2015.*

Local Law 34 of 2015: This law, adopted on April 28, 2015, 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 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. *The outcome measure is the number of residential properties benefiting from this legislation through stabilized tax assessments. 58,000 homes will potentially save taxes due to this law over the next 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 for Mitigation of Homes: Since the submission of the Phase 1 Application, the City approved a text amendment to its zoning code in order to facilitate the adaptation of 1-4 family homes and buildings citywide against flood risk, including elevations and relocation or hardening of building systems. One initiative will assist Sandy-damaged single family homeowners living in non-conforming structures to reconstruct, elevate or otherwise mitigate against future flood risks. Additionally, the Flood Resilience City-wide text amendment will raise standards by requiring buildings to be elevated to a level one or two feet higher than the FEMA-designated flood elevation, depending on building type. Single- and two-family homes are now required to provide two feet of extra protection (commonly called "freeboard"), and most other buildings are required to provide a foot of freeboard. This text amendment applies to all properties, both residential and commercial, in the 100-year floodplain and is expected to be adopted in fall 2016. The signed letter documenting the firm commitment to complete this action is provided as an attachment to this Exhibit. *The outcome measure is the number of buildings that will benefit from this legislation through City permits to reconstruct or elevate. As many as 71,500 structures may benefit over the next 10 years.*

Resilience Actions Related to Plan Update or Alignment

Incorporating Best Available Science: 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 NPCC released "Building the Knowledge Base for Climate Resiliency" (Source), which provides climate projections for temperature, precipitation, and sea level rise through 2100 for the first time. The report also includes:

new coastal flood risk maps to the end of the century for 100-year and 500-year coastal flood events; enhanced dynamic modeling of future coastal flooding that accounts for sea level rise; a review of key issues related to climate change health risks; and a process for enhancing a New York City Climate Resiliency Indicators and Monitoring System.

With the release of the 2015 NPCC report, the Mayor also convened the Third NPCC to initiate 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: projections for humidity and extreme events; risk analysis at a neighborhood scale; recommendations related to community-based adaptation and equity; infrastructure adaptation focusing on interdependent transportation and energy systems; expanding the city's climate resiliency indicators and monitoring system; and enhancing risk mapping. 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.

NYCHA Long-term strategic planning: *NextGeneration NYCHA* (Source) was created as a long-term strategic plan that will guide NYCHA toward creating safe, clean, sustainable and connected communities to serve as an example of how urban communities can rebuild. To ensure NYCHA's success in this process, it developed a recovery program called "Recovery to Resiliency" which aligns with the goals of *NextGeneration* NYCHA 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. *The outcome measure represents the number of Sandy-damaged multi-family buildings that will benefit under this program. In May of 2015 there were none benefitting; it is expected that as many as 469 will benefit within the next 10 years.*

Resilience Actions Related to Financing and Economic Issues

The New York City Office of Management and Budget (OMB) has contracted an insurance broker and is in the process of procuring insurance for City-owned structures through FEMA's National Flood Insurance Program (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 functioned on a pay-as-you-go model. Insurance coverage is expected throughout the life of the asset (e.g., building, vehicles) 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 assisting in the mitigation of properties. These strategies include the development of studies of multi-family and one- to four-family residential properties in the market place relating to flood insurance affordability.

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 mitigation investments for these structures. A survey of owners in the defined area will be conducted to gather information on insurance status, price changes, and resiliency measures taken; the study will describe the impact of new federal flood maps and legislation on New Yorkers who live in these areas and will inform the City's long-term planning efforts to develop programs that could make flood insurance more affordable. *The outcome measure for this commitment is the number of multi-family buildings that participate in the study, which is expected to be 50 by the end of this year.*

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. Study tasks include 1) identify a statistically significant sample of one- to four-family structures in the floodplain; 2) collect elevation data of structures in the floodplain for that sample; 3) assess the economic impact of increased flood insurance rates on individual homeowners and at-risk neighborhoods; and 4) develop options to encourage risk reduction and address the affordability challenges for property owners that could be adopted at the federal, state or city level. *The intended outcome measure for this commitment is the number of one- to four-family buildings participating in this study, which is expected to be 700 by the spring of 2016.*

Long-Term Financial Sustainability of NYCHA: In order to provide operational flexibility and the ability to leverage philanthropic dollars and activate innovative partnerships to support residents, NYCHA will launch an independent 501c3 non-profit organization, "The Fund for Public Housing" (The Fund) in the fall of 2015. 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 further emphasizes the goals of *NextGeneration NYCHA* and its commitment to ensuring that affordable housing is safe, clean and connected for future generations. *The intended outcome measure is the number of philanthropic dollars to be raised, which is expected to be $50 million in the first year.*

ATTACHMENT A MAPS AND RENDERINGS

The City of New York

LOWER MANHATTAN PROTECT AND CONNECT
CONCEPTUAL DESIGN OVERVIEW

NYCHA STORMWATER MANAGEMENT THROUGH PLACEMAKING
CONCEPTUAL RENDERING