MILKEN INSTITUTE

# Financing Urban Resiliency

## Coastal Resiliency in Lower Manhattan

## Project Background

The stresses of urbanization are felt globally, but particularly so in cities located along seacoasts and deltas. Of the world's ten largest cities, eight are along coastlines.[1] These cities face a more acute fraying of physical infrastructure and social fabric as climate change and rising sea levels encroach. Major US cities are not immune, as we've learned in recent decades. The New York metropolitan area, at No. 1 in both population and population density, has an urgent need to address local vulnerabilities.

When Hurricane Sandy struck the East Coast in October 2012, it flooded 17 percent of the New York City area. More than 40 people died, and damages and lost economic activity reached $19 billion.[2] In Lower Manhattan (the District), home to 10 percent of the city's jobs and 10 percent of its economic output, the storm surge, at 14 feet, caused massive power outages and property damage, and was a wakeup call for better climate change preparedness.[3] In the years since Sandy, considerable private and public resources have been directed towards resilience, protection, and recovery efforts within Lower Manhattan and across the city. But Lower Manhattan still needs major infrastructure investment to mitigate further risk to this regionally and nationally vital neighborhood. *The New York Times*, citing a report by the insurer Swiss Re and speaking of New York City as a whole, reported that "if New York suffers another storm like Sandy in the early 2050s, when ocean levels and the population are likely to be higher, it could cause $90 billion in damage—almost five times the cost of the initial storm."[4]

In March 2019, the city released its "Lower Manhattan Climate Resilience Study," which builds upon prior studies and recommendations, and identifies approximately $500 million worth of specific adaptation projects. The report also calls for a climate resilience master plan, to be developed over the next two years, for the Financial District and Seaport, two particularly high-density and vulnerable waterfront neighborhoods. The master plan will examine the extension of the East River shoreline as the only feasible option[5]—a project that could, according to Mayor Bill de Blasio, carry a price tag up to $10

billion.[6] This level of expenditure is far beyond the capabilities of the city budget alone and will require an innovative approach to financing.

To address these funding challenges, the Milken Institute began an applied research project to market-test potential financing solutions. With a combination of primary research, stakeholder engagement, and a Financial Innovations Lab workshop held on April 3, 2019, the Institute, in collaboration with AECOM, explored how a menu of different financing options could help to support new infrastructure projects. The Lab brought together government agencies, academics, NGOs, advocacy groups, property owners, insurance industry experts, investors, and financial institutions to debate the advantages and disadvantages of new models. While no one solution was determined to be a "silver bullet," Lab participants helped to brainstorm a variety of financing tools and outlined the opportunities and challenges in moving toward implementation with a goal of outlining potential next steps. This executive summary provides an overview of the Lab discussions and preceding research, with a focus on actionable recommendations that can help bridge the funding gap for these imperative resilience infrastructure projects.

## Need for Climate Adaptation in Lower Manhattan

Sandy's devastation was amplified because the storm made landfall during a spring high tide, also called a king tide (the name is a reference to the "springing forth" of the tides at new and full moons, according to the National Oceanic and Atmospheric Association).[7] The result was a storm tide (storm surge plus high tide),[8] with water levels 14 feet higher than normal.[9] Approximately 400 buildings and more than 21,000 homes were flooded in Lower Manhattan, and there were major disruptions to power, transit and tunnel traffic, communications, and water and sewer systems.[10]

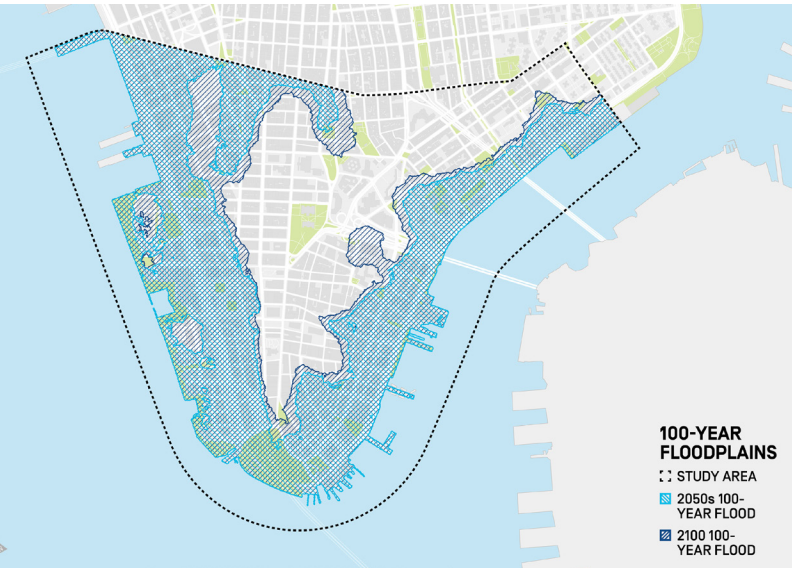
The risk of a similar event underscores the need to protect Lower Manhattan, which has nearly 90 million square feet of commercial space, according to the Alliance for Downtown New York (Downtown Alliance). With approximately 300,000 workers, it is "the second largest central business district in New York City and the fourth largest nationally."[11] It is a destination for 26 ferry lines, and 19 of the city's 25 subway lines pass through it, making it a crucial hub upon which the city and region rely. Potential catastrophic damage to the District from future extreme weather events would have far-reaching effects.[12]

The "Lower Manhattan Climate Resilience Study" identifies climate hazards and projects their effects on Lower Manhattan neighborhoods in both the 2050s and in 2100, statistics based on the most conservative NPCC projections. These include rare and extreme events (e.g., coastal storm surge; more frequent and longer heat waves; and extreme precipitation, defined as one or more inches of rain in a 24-hour period) as well as for lower-intensity "chronic conditions" (e.g., sea level rise, groundwater table rise, and tidal floods).[13] About 37 percent of the area's properties will be at risk from 100-year storm surge by the 2050s. By 2100, nearly 50 percent of Lower Manhattan's properties, including some 60 percent of its historic buildings, will be at risk. The potential damage to Lower Manhattan, just in terms of assessed property values, stands at $13 billion by the 2050s and $14 billion by 2100 (2018 dollars).[14]

Sea level is projected to rise nearly three feet by the 2050s and six feet by 2100, potentially leading to three-foot tidal flooding every month that extends inland up to four blocks in some neighborhoods. The damage may reach a combined assessed value of $4 billion (2018 dollars), according to the study. Meanwhile, the rising groundwater table could bring its own problems, increasing the vulnerability of 450 of the area's historic structures, including roughly 150 whose foundations do not extend into the bedrock. In addition, the city's subsurface infrastructure will be vulnerable to corrosion, settlement, and uplift caused by groundwater

table rise.[15] All of these risks contribute to the urgency of the situation and the need to invest in protective and adaptive measures today.

**Figure 1: Lower Manhattan's 100-Year Floodplains**




*Source: NYCEDC "Lower Manhattan Climate Resilience Study."*

The problem is not unique to New York City. Communities across the country are making sizeable investments to improve resilience and mitigate the effects of climate change, using public and private funding sources and public-private partnerships. Public funding can come from the federal, state, or local governments and include allocations of tax revenues from general funds, revenues from tolls or other user fees, or grants and subsidies. Municipalities may issue bonds to pay for infrastructure; this kind of borrowing is often preferable because it spreads out the costs of expensive projects over decades, relieving short-term budgetary stress.[16] Private investment can take the form of either equity or debt. Equity investment occurs through the purchase of listed infrastructure stocks, funds, or index funds, as well as through direct equity investment in infrastructure projects or companies. Debt investment is made with the purchase of corporate bonds of infrastructure companies, project-specific bonds, or infrastructure bond funds. Finally, infrastructure companies can access direct loans for their projects.

For example, capital for the $3.3 billion price tag to replace Seattle's Alaskan Way Viaduct with a bored tunnel under a two-mile stretch of the city was secured through a combination of public sources, including contributions from the Port of Seattle; federal, state, county, and local governments; and revenues from a gas tax and tolls.[17] In Miami, voters in 2017 approved a $400 million general obligation bond, the "Miami Forever" bond, with $200 million targeting resilience strategies and infrastructure repair or buttressing (drainage systems, raised roadways, pumping stations). The City of Miami has promised not to impose property tax increases but instead will keep tax rates at current levels, even after old bonds are repaid.[18]

In New York, the potentially $10 billion in proposed projects in Lower Manhattan far exceeds the city's capital budget. Mayor de Blasio has advocated for federal funding for this urgent and imperative work, but federal dollars are not guaranteed.[19] Exploring alternative, innovative funding plans is necessary.

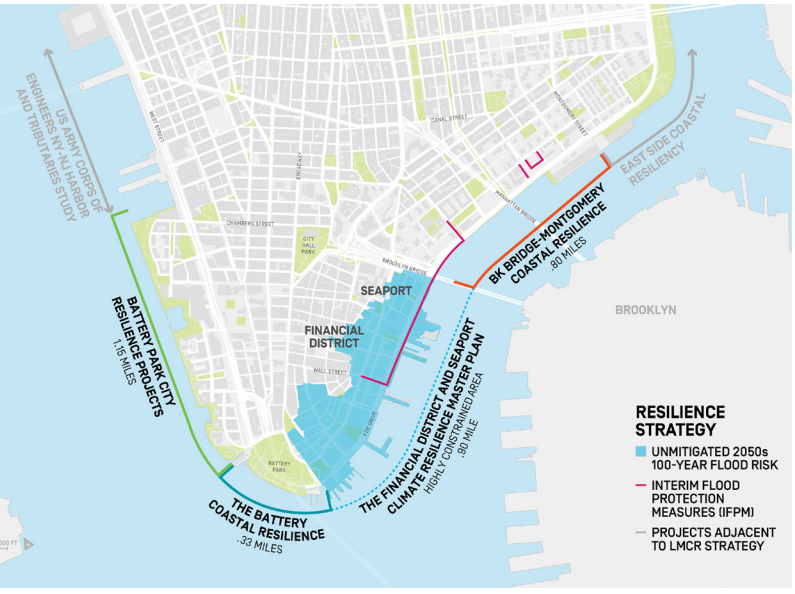
## Status of Current Initiatives

New York City has a history of deploying forward-looking initiatives to address long-term challenges. This is clearly illustrated in the planning documents shared by the last two administrations. Mayor Michael Bloomberg released a series of plans, including "PlaNYC: A Stronger, More Resilient New York" (2013), which provided a framework for recovery and adaptation in the wake of Hurricane Sandy.[20] Mayor Bill de Blasio built upon this work in 2015, with the release of "One New York: The Plan for a Strong and Just City (OneNYC)," which addressed poverty reduction and equity among other sustainability goals.[21] Its update, "OneNYC 2050," was released in 2019 and details specific target achievements by 2050: independence from fossil fuels and cars, neighborhood security, economic security, access to health care and quality education, modern infrastructure, and a vibrant democracy. The

report also details 30 initiatives, such as achieving carbon neutrality, 100 percent clean electricity, and investments in core infrastructure, including a more resilient waterfront.[22]

An important aspect of post-Sandy coastal resilience efforts in Manhattan has been the East Side Coastal Resiliency (ESCR) Project, a large-scale initiative targeting the 2.4-mile East River shoreline from East 25th Street down to Montgomery Street. The ultimate goal of the ESCR is to raise East River Park, and install "buried coastal defense measures," (e.g., buried floodwalls, or surge barriers) at the water's edge as protection from a 100-year storm and modeled-2050s sea levels. This $1.45 billion project was partially funded, in 2014, with a $335 million federal grant awarded through the federal Housing and Urban Development's Rebuild by Design competition.[23] The city has allocated the remaining funding, but it is clear that the federal funds were an integral part of the capital structure.[24]

**Figure 2: Lower Manhattan Climate Resilience Strategy Projects**




*Source: NYCEDC "Lower Manhattan Climate Resilience Study."*

Just south of the ESCR, another project, the Lower Manhattan Coastal Resiliency (LMCR) Project, has set out flood protection plans for the neighborhoods south of Montgomery Street, around the tip of Manhattan and up through Battery Park City. This effort included both the development of near-term projects, such as those in the Two Bridges and Battery neighborhoods, and an overall long-term strategy in the form of the "Lower Manhattan Climate Resilience Study." This study detailed the current objectives of the LMCR Project and laid out a "climate adaptation toolkit" and multiple approaches that account for the variety of neighborhood contexts and climate hazards that the District will face, and provides a strategy for protecting the District through the year 2100. In Battery Park City, three separate but interrelated resilience projects are being advanced that will provide that neighborhood with greater protection from future climate risks. See sidebar for additional details of the LMCR Project within the Two Bridges neighborhood.

As noted, the report also calls for a climate resilience master plan to address specific challenges in the Financial District and Seaport, both of which have low topography, very little actual space between building structures and the water, dense above- and below-ground infrastructure, and limited sewage capacity—in short, high risk, with few options. The master plan will develop a design and a first phase adaption project for a shoreline extension that integrates the necessary flood protection and drainage infrastructure; it will also explore financing strategies from a mix of public and private resources.[25]

## Case Study: Brooklyn Bridge-Montgomery Coastal Resilience Project

**Lessons Learned: As new projects are designed in Lower Manhattan, metrics on the physical, environmental, and social resiliency need to be integrated into any master plan.**

The Lower Manhattan Coastal Resiliency (LMCR) Project aims to reduce flood risk due to coastal storms and sea level rise from Manhattan's Two Bridges neighborhood to Battery Park City. The multinational engineering firm, AECOM, developed a long-term strategy aimed at flood reduction in Lower Manhattan as well as a feasible concept design for a flood risk reduction system for the Two Bridges neighborhood specifically, a project known as Brooklyn Bridge-Montgomery Coastal Resilience. Its interdisciplinary team undertook a collaborative design process that involved engineers, architects, landscape architects, planners, economists, environmental and regulatory experts, hydrodynamic modeling specialists, and community engagement advisors. The interdisciplinary team used a collaborative design process to ensure LMCR goals focus on prioritizing implementable project concepts and infrastructure typologies, realizing long-term resilience opportunities, and engaging the community on core design principles and priorities.

In the Two Bridges neighborhood, the project explored a variety of infrastructure typologies to develop a system of flood protection, which is currently being developed to the level of final design. The concept design incorporates passive flood barriers with deployable flood barriers that lie flush with the pavement on sunny days and "flip-up" in event of a storm. This protects the community from flooding and integrates infrastructure into the community fabric, while allowing for continued access to the waterfront.

The Two Bridges project is possible due to $176 million in federal funding in the form of a HUD Community Development Block Grant—National Disaster Resilience Competition (CDBG—NDR). The overall project budget for the flood protection system is $203 million. Equivalent federal funds have not been allocated since 2014, leaving significant unmet need for any future project of this type.

### Figure 3: Brooklyn Bridge-Montgomery Coastal Resilience Renderings


*Source: AECOM.*

In the years since Hurricane Sandy, building owners have made significant investments to shore up their properties against future flood risk. Many have relocated key mechanical systems to higher floors. Some have gone further, outfitting their properties with movable emergency flood barriers. For example, Verizon has made such an investment on its landmark building at 140 West Street, where four of the building's five subbasements were flooded, rendering fuel tanks for emergency generators useless and causing massive disruption of communication services throughout Lower Manhattan, including the New York Stock Exchange. Verizon spent $35 million on cleanup, repairs, and restoration of the historic structure, including the fabrication of a portable floodwall that can be deployed to protect the building from future storms.[26] These types of private and corporate efforts are commendable and essential to long-term resilience, but they do not address the greater neighborhood vulnerabilities, which could render those building improvements insufficient if transportation, electricity, and other core functions are continually disrupted.

# Summary of Discussed Recommendations

Lab participants agreed that significant investment is needed for infrastructure that will protect Lower Manhattan from future severe weather events and other risks associated with climate change and rising sea levels. The immense scale of capital necessary to complete the proposed projects is beyond the reach of the city budget, and federal funding is unlikely in the foreseeable future. Innovative financing will be needed to bridge the funding gap.

Throughout the Lab, participants explored a variety of mechanisms and approaches that could help overcome current barriers, capture the future value of proposed resiliency projects, and bridge the funding gaps via a mix of funding streams. The key recommendations were:

1. Collect and analyze local data to quantify the dollar value of expected benefits derived from resiliency projects
2. Develop a bond funding toolkit whose multi-pronged approach could include a traditional bonding program
3. Establish city, state, or regional trust funds capitalized by a surcharge on certain regulated insurance lines
4. Further explore development opportunities on newly created land in the East River
5. Establish a city-level fund and revenue bond model capitalized by surcharges on water and sewer bills

# Key Recommendations

## Improve Data Collection, Metrics, and Quantification of Risk

1.

*Current Challenges/Needs:* Coastal resiliency for Lower Manhattan means protecting not only individual buildings but also the area's numerous major infrastructure assets and utilities that operate under the aegis of various owners and stakeholders, from the 19 subway lines that run through the District to the ConEdison facility on East 13th Street and the multiple Port Authority assets. It also involves protecting historical monuments and cultural centers that attract millions of tourists per year.

With the diversity of structures, assets, and stakeholders, it can be challenging to articulate the exact resiliency standard to which improvements should be made, and how each member of the community can directly benefit. For a building, are you protecting against a six-foot storm surge or 16? And have you quantified what it would mean for your occupancy rates if the subways would be suspended for two days or two weeks? Would new community infrastructure help to protect your building against the projected seal level rise of year 2050 or more realistically 2100?

Lab participants identified challenges in understanding exactly what resiliency means and how each potential infrastructure project would lead to a measurable benefit for buildings in the area. For example, the Federal Emergency Management Agency flood maps have not been meaningfully updated since 1983, which can make predicting the true cost of tidal inundation or post-storm recovery time difficult. This lack of clarity around important tools like flood maps can cause confusion among stakeholders.

Participants also acknowledged a need for easier aggregation of environmental data and standardized metrics for proving resiliency. Subsequently, this information can help to quantify the risk of future damage and loss. Indeed, a lack of consensus around risk metrics is one factor that has contributed to a lag in market indicators that could help rationalize large-scale investment in resilience projects. Lab participants explained that the true level of risk is not yet priced in to the financing and insurance costs for these vulnerable properties.

*Model:* Lab participants noted that while scientists have provided underlying climate change data and the insurance industry has compiled additional data on projected vulnerabilities and liabilities, their data and conclusions have not been sufficiently or widely communicated and articulated. The lack of available data, coupled with few standards of what resiliency means and how it relates to a risk assessment, means that quantifying the dollar value of savings is a challenge.

Lab participants were interested in ways that future savings from averted flood damage could be passed on to property owners who had invested in resiliency projects. The city has already taken important steps to help quantify and communicate the potential benefit of new infrastructure investment, from reports to websites and campaigns. But many participants suggested the creation of a more easily accessible platform that would provide a set of standard data points to articulate an integrated resiliency score and also provide metrics that demonstrate how new improvement projects at a site or district level could potentially bolster this resiliency score. Having this before and after comparison of a resiliency score could then factor into financing models from insurance premium discounts to a resiliency improvement district.

*Existing Examples:* In the late 1990s, the US Green Building Council (USGBC) established Leadership in Energy and Environmental Design (LEED), the most widely used standard of certification for environmentally friendly buildings.[27] In 2017, the USGBC and Green Business Certification Inc. expanded their certification systems to include the independently developed RELi system, which uses LEED criteria but also includes "acute hazard preparation and adaptation along with chronic risk mitigation at the building and neighborhood scale."[28] These resilience guidelines are applied to a rating system that is meant to identify and mitigate the risk of damage to buildings from natural disasters and other emergencies. Establishing clear resiliency standards and performance metrics, like RELi 2.0, provides a framework by which insurance discounts or other financial benefits can then be used as incentives.

The National Flood Insurance Program (NFIP) has taken such an approach through its Community Rating System (CRS) program, implemented in 1990 to recognize and encourage local-level flood mitigation activities. Discounts are applied to flood insurance premium rates when communities engage in activities that "reduce flood damage to insurable property; strengthen and support the insurance aspects of the NFIP; and encourage a comprehensive approach to floodplain management." The CRS uses a 1-9 rating system, with Class 1 receiving the greatest premium discount and Class 9 the smallest. The CRS provides a template for how to incentivize community-level risk reduction, while subsequently providing a financial benefit to individual property owners through reduced insurance premiums. A similar rating system that incentivizes community-level resilience efforts and rewards individual property owners could be applied to a broader state-level public property insurance.[29]

*Next Steps:* Lab participants debated how best to aggregate data from various city agencies, from the Metropolitan Transportation Authority to ConEdison, and then how to package that into a system of performance metrics to understand a pre- and post-investment resiliency score for area assets. Next steps should create a framework for collection and synthesis to help move new data-dependent financing models forward, including:

- **Quantify the preventable losses, both economic and societal, avoided by the implementation of specific resiliency projects and disseminate those findings to stakeholders.**
- **Gather and synthesize local-level data from government and private sources that illustrate the risks posed by climate change and rising sea levels, as well as the potential avoided losses due to resilience investment.**
- **Create a public website, or enhance existing websites, with easily digestible information, infographics, and interactive maps. These communication and engagement efforts will help make the case for increased public investment and galvanize stakeholder support.**
- **Encourage and incentivize the use of a RELi-like rating system for buildings and neighborhoods, especially those in areas vulnerable to flood risk.**
- **Engage insurance industry experts to design a potential new product that offers reduced premiums for communities and individuals that engage in resiliency projects.**

## Case Study: Greater Protection, Lower Premiums

**Lessons Learned: It is important to find the best funding mechanism to model future cost savings from upfront investments in infrastructure that makes Lower Manhattan more resilient.**

An important concept explored during the Lab was the idea that property owners and communities can invest in resilience projects today and benefit from reduced insurance premiums in the future. MyStrongHome is a benefit corporation that utilizes this model on an individual building level, both to help property owners safeguard their homes from extreme weather threats and to finance those improvements through savings on insurance premiums.[39]

MyStrongHome provides homeowners with a new "FORTIFIED" roof that meets a verified hazard mitigation standard set by the Insurance Institute for Business and Home Safety (IBHS)—and, in fact, strengthened well beyond the level required by building codes, making it less likely to experience storm damage. The work is funded using future savings on homeowner's insurance bill. The insurance discounts are substantial when the homeowner's insurance policy is obtained through one of the company's insurance partners. To pay for the upfront project costs, MyStrongHome offers unsecured loans with up to seven-year payback periods. These loans are paid off through savings from reduced insurance premiums; after the debt is retired, the homeowner benefits from lower insurance premiums.[30]

Though on a smaller residential scale, this business model shows how future insurance savings derived from reducing risk can be captured to pay upfront costs of resiliency projects. This model could potentially be applied to Lower Manhattan, where property owners are looking to make building-level resiliency improvements. Lab participants also discussed the possibility of property owners contributing to a pool of capital that could be deployed for District-wide resiliency projects. In return, the property owners benefit from increased protection and reduced premiums.

## 2. Expand Municipal Bond Options

*Current Challenges/Needs:* Because resiliency infrastructure projects often lack a clear revenue-generating component (i.e., they won't generate tolls as a bridge would), their bonding programs require more innovative approaches. It is clear that the city will have to fund a large portion of the infrastructure. Bonds can help to raise the capital, but the funding will require either a reallocation of the city budget from existing revenue or identification of new ways to attract capital through new taxes or fees. The allocation of revenue from indirect sources in the form of a surcharge or tax is possible, but it can be politically difficult. Other cities have levied additional sales taxes or tacked a fee on to hotel stays to be paid by tourists.

*Models:* A municipal bonding program as part of a funding toolkit can be developed in various ways. This could include general obligation (GO) bonds, which are backed by the full faith and credit of the issuing jurisdiction, or revenue bonds if a dedicated source of repayment is identified, perhaps tied to the development of newly created land or a potential tourism tax for resiliency, given Lower Manhattan's attractions and historical sites. It could also include a bond that is tied to the environmental or resiliency improvements, such as an environmental impact bond, or a bond linked to climate change triggers, similar to a catastrophe bond.

*Existing Examples:* A tourism tax has worked in cities, such as Branson, Missouri, when the local tax base could not support the infrastructure needed to sustain the number of tourist visits each year. Lab participants agreed that this could be a potential option but might have political and social pushback given existing hotel occupancy taxes and surcharges. Additionally, there were questions as to the best activity to tax. According to the Downtown Alliance, 14.6 million tourists visited Lower Manhattan last year, but only 15 percent stayed in a hotel in the area. Consequently, more modeling would need to be done to understand potential tourism tax opportunities and the price sensitivity of the market to mitigate against potential negative consequences of a new surcharge.

Environmental Impact Bonds (EIBs) enable private investment when local governments lack the upfront capital to address significant environmental challenges. These bonds can be modeled in various ways, but in general, they are "pay for success" bonds. Investors pay upfront project costs; when the completed project is independently verified, they are repaid according to agreed-upon outcomes and/or performance metrics.[31] In 2017, the DC Water and Sewer Authority (DC Water) issued a $25 million environmental impact bond, the first of its kind in the United States, to finance a five-year project to reduce wastewater/stormwater runoff into the Potomac River. Under its "pay for success" terms, the investors receive semiannual payments at a set interest rate. At maturity, a "contingent payment" will be determined, based on three possible outcomes: one that beats performance/project expectations by a predetermined percentage receives a contingency "bonus" for the investors, another where the expected outcome is achieved and no extra payment is rewarded, or an outcome that falls below expectations means that the investors owe that contingency payment to the municipality/bond issuer.[32]

Although the primary focus of the Lab was how to raise capital for resilience projects that prepare Lower Manhattan for extreme weather events, a related issue arose: how to fund restoration and rebuilding efforts after an extreme weather event has occurred. Catastrophe bonds are designed to help meet recovery needs. These high-yield debt instruments allow the sponsor, often an insurer or international finance institution like the World Bank, to transfer risk to investors by lowering its out-of-pocket costs in the event of a natural disaster, or a specific level of natural disaster, such as a Category 5 storm. The bond pays higher-than-usual yields and has a short maturity of three to five years. If there is no triggering event—no earthquake, no hurricane—within the life of the bond, then the investors get back their principal plus interest. If the specified catastrophe strikes, however, and all predetermined thresholds are met, the insurer retains the principal and interest.

This form of reinsurance could play an important role in the city's overall resilience strategy. A model could be designed so the triggering event is tied to a climate change metric, such as the number of inches of sea level rise. Thus, the City of New York could theoretically sponsor a catastrophe bond that triggers when the sea level in the New York region rises above a preset level. The subsequent bond payout received by the city could fund additional resilience infrastructure. This approach could provide funding for replacement projects when older infrastructure is on the verge of obsolescence.

*Next Steps:* Lab participants recognized the potential of various bond models, but raising the city's debt levels with a GO issuance would require political will. Thus, a revenue-backed structure might be more realistic. A new tourism tax or surcharge would raise funds, which wouldn't affect the city's credit rating, but they would also be a heavy lift politically. There were also reservations, for example, with EIBs because the existing examples only generated a modest amount of capital and would need to support projects with directly measurable outcomes, which further articulates the need for more standard resiliency data. Catastrophe bonds have raised significant amounts of funding, but Lab participants agreed that much more work would need to be done to model potential resiliency triggers. To assess the ideal mix of bond issuance, the following could be the next steps:

- **Explore which of the proposed resiliency projects, or portions thereof, would be appropriate for an EIB and define the clear performance metrics that will be applied to said projects. The stormwater management portions of proposed projects would be a natural fit, and the DC Water EIB program could be used as a template.**
- **Model a potential variation of a catastrophe bond but with a resiliency trigger or metric.**
- **Design a potential revenue source through some sort of tourism tax or surcharge, modeling various activities for Lower Manhattan or possibly New York City more broadly to allocate revenue toward resiliency.**

**ESTIMATED POTENTIAL REVENUE**
**$3 billion** in GO bonds
**$500 million** in revenue bonds (revenue source potentially a tourism tax)
**$50 million** in EIBs
**$350 million** in catastrophe bonds (for reinsurance purposes)

*Estimates based on similar previous bond issuances in New York City and elsewhere.*

## Design an Insurance Surcharge for Resiliency

3.

*Current Challenges/Needs:* Climate change and its associated risks affect the entire New York-New Jersey-Connecticut metropolitan region. More than a million people in the region live in neighborhoods already vulnerable to the flooding that would accompany an "extreme storm," and with anticipated sea level rise, this number could double by 2050. The risk of "permanent flooding" is heightened as the waters rise along the region's 3,700 miles of tidal coastline. In this region are key infrastructure assets such as airports, shipping ports, trains, tunnels, and subway yards; energy infrastructure; and hospitals, nursing homes, and public housing, whose management, policies, and interests tend to operate in silos.[33]

Cross-jurisdictional collaboration involves unique challenges to address governance concerns, political self-interest, changing priorities, legal hurdles, and questions of equity, particularly when it comes to pooling capital. Whether the collaboration is within one state or in the tri-state metropolitan area, local projects will compete with those that benefit the region as a whole, and lower-income areas with less to contribute to a funding pool may feel their needs are overlooked, even though their risks may be greater than wealthier stakeholders. Lab participants debated a model that could pool funding across states, or across local jurisdictions and communities, with a goal to raise significant capital that would require a governance structure that could address some of the bureaucracy issues.

*Model:* A possible solution is a state or regional trust fund, capitalized via a surcharge on certain lines of insurance. An insurance surcharge could help establish a dedicated funding source that crosses jurisdictions but also could take advantage of bond leverage. The Regional Plan Association (RPA) has explored this model in a recent report, and Lab participant Jesse M. Keenan, of Harvard University's Graduate School of Design, further developed the concept in his own subsequent report.

Goldman Sachs has also done similar work on insurance surcharges. Its investment banking division found that premiums for property, casualty, and title insurance in New York State alone totaled roughly $47 billion in 2017, and a 2 percent surcharge would raise about $950 million annually. Residents would pay a $26 annual surcharge on an average homeowner's insurance bill of $1,302, and a $24 annual surcharge on the average car insurance bill of $1,224.

If this model were expanded to include New York, New Jersey, and Connecticut, the funding would increase further, but multi-state coordination could prove difficult. The RPA notes that a 1.5 percent surcharge on property and casualty insurance in New York, New Jersey, and Connecticut with bond leverage of (1x) over the course of 20 years could produce a current value of some $6.8 billion.

Participants also noted that any regional trust fund must incorporate a mechanism for equitable distribution of funds to all participating states, and its governance structure should include representatives from those states as well. The RPA has addressed these concerns by proposing the creation of a Regional Coastal Commission that would remain politically independent, involve multiple stakeholders, and facilitate project coordination and information sharing. This approach may not be feasible, considering that costs for Lower Manhattan alone total around $10 billion, and the funds raised may be spread too thinly to be effective.

*Next Steps:* Participants suggested that if the surcharge applies solely to residents of New York City, the result would allow for focused capital allocations to the large-scale projects in Lower Manhattan. Because New York City accounts for roughly 43 percent of the state population,[37] a 2 percent citywide surcharge on property, casualty, and title insurance premiums would likely generate roughly 43 percent of the revenue estimated at the state level, or $408.5 million per year. Further analysis would help determine totals that are more precise and the feasibility of a citywide surcharge. Lab participants recommended a tiered rate structure—residents and businesses that benefit directly would pay a higher surcharge than those who do not—as an approach that could help make the proposal more politically viable and equitable. Below are potential next steps:

- **Model a citywide insurance surcharge with the help of an insurance firm and government agencies.**
- **Develop additional modeling of a tiered rate structure that accounts for different property risk levels.**
- **Develop a governance structure for the trust fund that addresses transparency concerns by building in clear reporting criteria and balanced stakeholder representation on the board.**

**ESTIMATED POTENTIAL REVENUE**
**$408.5 million** per year (city-level surcharge)

## Model the Value of Shoreline Extension

4.

*Current Challenges/Needs:* The city's resilience master plan involves an expanded shoreline, which led participants to question the value of potential private development opportunities on the reclaimed land, especially around the Financial District and Seaport, as well as potential redevelopment of the broader Lower Manhattan area. In the years since Hurricane Sandy, shoreline extension has been studied as a viable resilience approach that provides both protection and development opportunities to offset project costs.[38] More recently, the city's March 2019 study independently concluded that shoreline extension could be partially funded through

development opportunities and made clear that further study and stakeholder engagement were required before determining whether such an option was desirable from a public policy perspective.[39]

*Models:* Participants discussed two potential avenues for raising funds through development. The first is through the sale of air rights, rezoning existing parcels to expand development upward. This could be considered for areas in and around Lower Manhattan that lie outside of the floodplains. The second method could include selling development rights to the newly created land from the shoreline extension, either outright or through a long-term land lease structure. Tax Increment Financing (TIF) would also be an important tool for capturing the future value of the newly created land. The private development on this land will generate an increase in tax revenue that would not be possible but for the public sector investment in this shoreline extension project. As such, it is reasonable that a portion of that tax revenue be captured to pay for the investment.

*Existing Examples:* For redeveloping existing land, participants discussed the ongoing revitalization of East Midtown, which included rezoning that allows for higher-density construction in a 78-block area by investing in transit improvements and/or purchasing air rights from the district's landmarks. A minimum contribution of $61.49 per square foot, or 20 percent of the air rights sale price, goes to the city.[40] A similar approach could be crafted where the sale of air rights would benefit the proposed resiliency projects. For example, if there were 4 million square feet of new development identified in the area, with a $260 per square foot valuation (because Lower Manhattan transacts as a discount of approximately 84 percent of Midtown), the result would be about $1 billion for a resiliency fund, should 100 percent of the proceeds go to the city. It's worth noting that this is based on precedent from East Midtown's floor area ratio bonus valuation of $307.45. Additionally, in East Midtown, only 20 percent of the sales goes into a city fund; the rest goes to the landmark's owner.

Apart from the redevelopment of existing parcels, the shoreline extension could offer an opportunity to raise capital through the sale of development rights to the new land. For the purpose of financial analysis within the context of this executive summary, an estimated 8 million square feet was assumed for a mix of commercial, residential, and community property. With a per square foot price of up to $475, not including tax revenue, development could lead to nearly $3.8 billion in new funding. The city could look to examples of other new area development. Battery Park City could be used as both a model of a process through which the shoreline was extended and the land was developed and a model of a single entity governance structure, because the Battery Park City Authority has the mandate to coordinate activity and help raise funds to support the area's long-term sustainability.

Apart from the direct sale of land or air rights, tools similar to tax increment financing can be utilized. Hudson Yards is noteworthy as it facilitated the redevelopment of a large portion of Manhattan's West Side through the establishment of the Hudson Yards Financing District, spanning from roughly West 29th Street and 8th Avenue to West 43rd Street and 12th Avenue. The project was creative in its use of financing structures, with Hudson Yards Infrastructure Corporation issuing a total of $3.5 billion in bonds over the course of the project, beginning in 2005.[41] Payments in lieu of taxes, or PILOTs, have been used to cover the costs of the project. PILOTs facilitate tax incentives for private development at Hudson Yards, where property owners receive a 15 to 40 percent reduction on what would have been their property tax for 19 years.[42] This arrangement was structured so interest on the debt was paid by the city until revenue from the new development was at an adequate level to cover the payments. Also, credit support for a portion of the debt was provided by the Transitional Finance Authority.[43] The Hudson Yards project can help inform best practices for innovative financing for similar projects in the future.

*Next Steps:* Development is not a simple solution for raising new capital for infrastructure. It

requires political will, community support, and strong and sustained market participation. Below are potential next steps:

- **As the Financial District and Seaport Climate Resilience Master Plan takes form, explore tools that the city can use to capture the future value of any new real estate, through either TIFs or other development opportunities.**
- **Model the potential value of development rights for the newly created shoreline or rezoning of the broader neighborhood.**

**ESTIMATED POTENTIAL REVENUE**
Anywhere from **$500 million** to **$1 billion** from rezoning, depending on the area of lower Manhattan considered for air rights sales

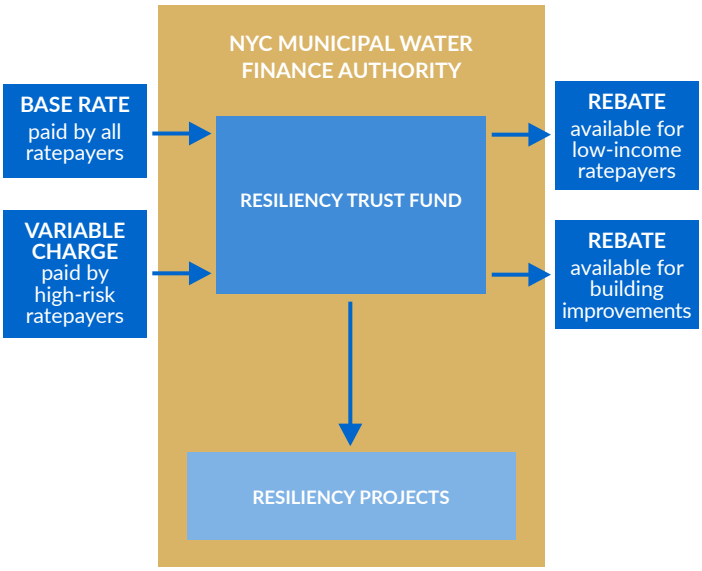
Anywhere from **$1 billion** to **$3.8 billion** due to shoreline extension development, depending on the final design of the project and the potential per square footage price.

## 5. Design a Water and Sewer Surcharge

*Current Challenges/Needs:* Lab participants debated the best way to raise revenue that could fund new infrastructure, including to repay any new bond issuance. New taxes and fees are politically challenging, and ensuring anything raised is equitably spread among participants who directly benefit from the projects is critical. An insurance surcharge would require the buy-in from industry leaders. Thus, alternative models were explored.

*Models:* Lab participants discussed capitalization of a trust fund with a surcharge to revenue-generating services and utilities, such as water and sewer fees. Again, a tiered rate structure would apply: all city residents and businesses would pay a base rate, and an additional variable charge would apply to those residents at higher risk, with risk levels being determined by location of the property in, say, the floodplain, or "x" number of feet above sea level. Property owners who undertake certifiable building improvements that address climate change could qualify for rebates. To address issues of equity and affordability, lower-income property owners could also receive rebates. The structure of the surcharge is illustrated below.

### Figure 4: Water and Sewer Surcharge Model




*Source: Milken Institute.*

It was suggested that the NYC Municipal Water Finance Authority (NYW) could manage the trust fund. This would require an expansion of its mandate through state legislation, but it could be worthwhile, given that NYW was established to finance the capital needs of the water and sewer system of the City of New York.[44] Expanding the scope of its work to include financing coastal resiliency infrastructure could be appropriate. Also, once the Water Tunnel No. 3 project is completed, there could other funds redirected to the proposed resiliency projects, should there be capacity under current debt limits. Lab participants also suggested that a surcharge on other utility bills, like telecom or energy, could be used as an alternative or supplementary revenue source.

*Next Steps:* More research needs to be done to understand the capacity of utilities and agencies to levy additional surcharges to support resiliency. However, there was excitement from participants that utilizing existing entities could help to avoid

having to create something new, which can require more political will. Next steps include:

- **Identify a champion of the proposed surcharge and establish its political viability.**
- **Introduce state legislation to expand the mandate of the NYW.**
- **Perform specific modeling that could help define the appropriate levels of surcharges and the subsequent bonding capabilities.**

### ESTIMATED POTENTIAL REVENUE

Assuming a 1, 2, or 3 percent surcharge on $3.673 billion in water and sewer user payments in FY 2019, the revenue below can be estimated:

**$36.73 million** per year (1 percent)
**$73.46 million** per year (2 percent)
**$110.19 million** per year (3 percent)

## Conclusion

This Financial Innovations Lab was part of an ongoing dialogue to address Lower Manhattan's coastal resiliency needs and the related funding gaps. The discussions among government agencies, academics, NGOs, advocacy groups, property owners, insurance industry experts, investors, and financial institutions produced new ideas and important recommendations. Follow-up items could include additional working groups and research to develop the recommendations, as well as continued conversations among experts and stakeholders.

# Acknowledgments


## IN COLLABORATION WITH

AECOM

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