HUNTS POINT LIFELINES

PennDesign / OLIN
HR&A Advisors
eDesign Dynamics
Level Infrastructure
McLaren Engineering Group
Barretto Bay Strategies
Philip Habib & Associates
Buro Happold

APRIL 6, 2014 Rev1

REBUILD BY DESIGN

An Initiative of the President's Hurricane Sandy Rebuilding Task Force

In Collaboration With
NYU's Institute for Public Knowledge
Municipal Art Society
Regional Plan Association
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Project Development Partners

Community Board 2 Environmental Committee
Mayor's Office of Long-Term Planning and Sustainability, City of New York
New York City Economic Development Corporation
The Point CDC
New Fulton Fish Market
Hunts Point Terminal Market
Hunts Point Cooperative Market

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EXECUTIVE SUMMARY

The U.S. Department of Housing and Urban Development's Rebuild by Design competition asked 10 interdisciplinary teams to select what they believed was the best site in the region to demonstrate an innovative, scalable solution that increases the region's long term resilience and shows the power of design to help cities, towns, and neighborhoods respond to the mammoth challenge of climate transformation in the northeastern United States. The teams were challenged to integrate design with deep community engagement, research, and analysis, as well as implementation and funding strategies that would result in buildable projects catalyzing real change and serving as regional models.

The PennDesign/OLIN team's focus on economic and community vulnerability to climate risks led to the selection of the 690-acre Hunts Point peninsula of the South Bronx as the site for our proposal. Hunts Point is the hub of the region's food supply chain. Hunts Point is a physically, socially, and economically vulnerable place—but at the same time a place with the community assets and business capacity to set the stage for resilience building. An investment in resilience at Hunts Point will be felt throughout the region, providing food security for 22 million people, protecting living wage jobs, and serving as a model for working waterfronts everywhere.

Regional Importance

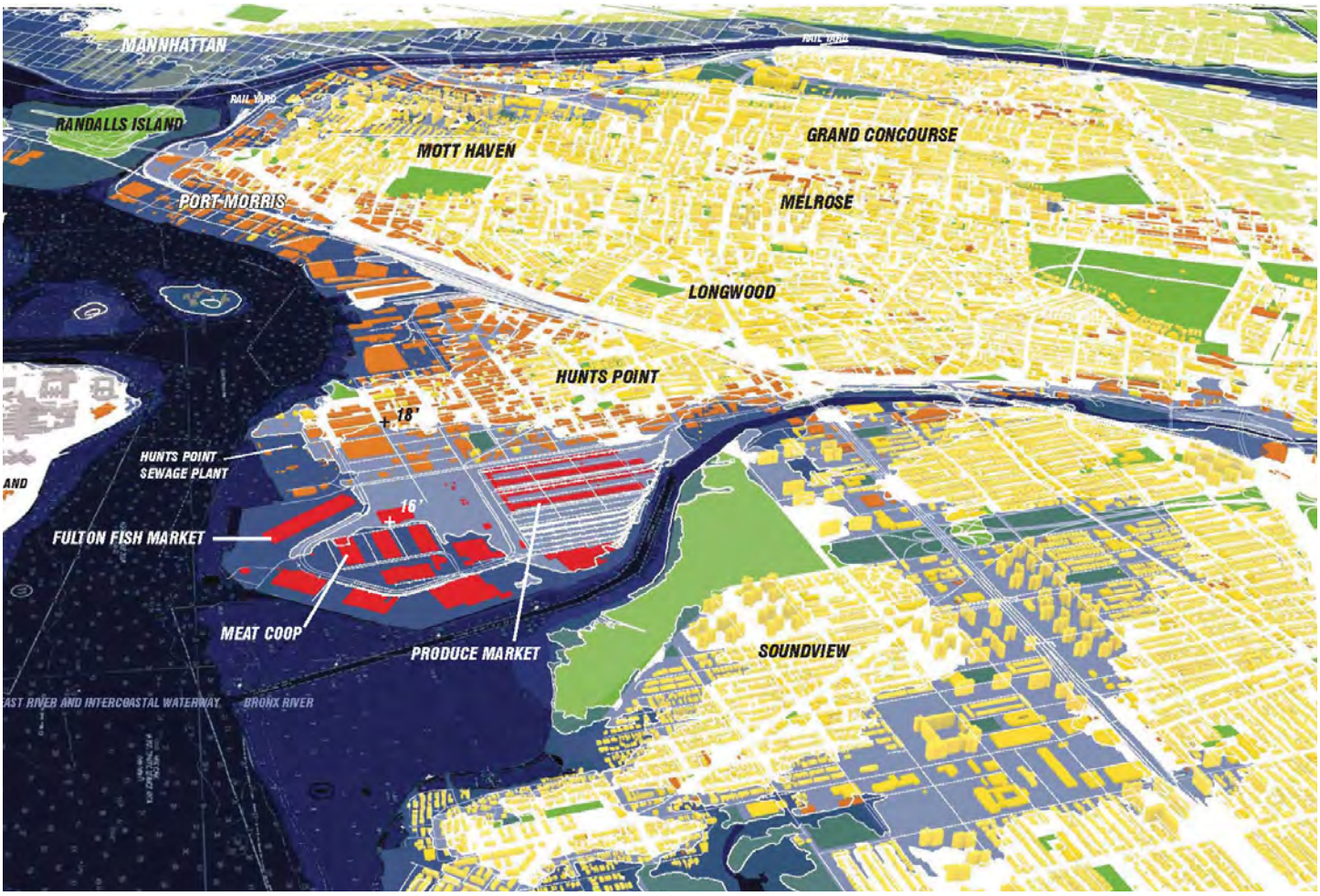
The vast Hunts Point Food Distribution Center is the heart of the food distribution network for 22 million people in the region, representing $5 billion in annual revenues and more than 20,000 direct jobs, including 8,500 largely unionized positions in the Food Distribution Center, a cluster of wholesalers based on City-owned land. Hurricane Sandy exposed the vulnerability of Hunts Point to flooding, as well as power and fuel outages, and highlighted the critical importance of protecting this high-value asset. The City of New York's PlaNYC analysis and sustainability planning effort strongly recommended that Hunts Point be designated as a high priority for protection by means of an integrated flood protection system.

Vulnerability

Much of the Food Distribution Center and many surrounding businesses in the food cluster are in the floodplain now and much more of the peninsula will be flood-prone by 2050 due to sea level rise. Very few businesses appear to have flood insurance or contingency plans in place. The Hunts Point Waste Water Treatment Plant has one of the lowest elevations of the facilities in the City's inventory, and it has earned the City's highest priority for protection. It sits next to the Food Distribution Center for the region.

Hunts Point is located in the poorest Congressional District in the United States (NY-15) and scores very high on multiple dimensions of HUD's 8 storm vulnerability factors. The neighborhood is challenged by poverty, isolation, and threats to pedestrian safety due to truck traffic, as well as poor air quality and decades of environmental degradation.

Overlaying floodplains and land use reveals an INDUSTRIAL WATERFRONT AT RISK



Capacity

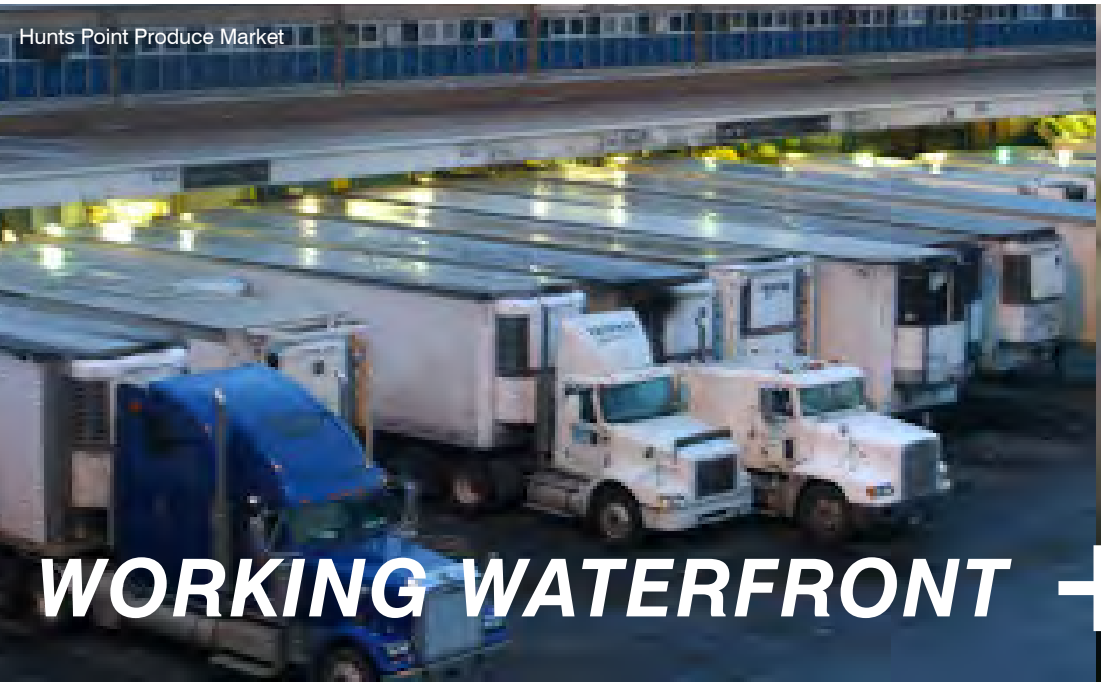
The food hub efficiently moves enormous quantities of food to every scale of buyer from push carts to hospitals to large grocery chains throughout New York, New Jersey and Connecticut. Representing the interests of many businesses and thousands of employees in the Food Distribution Center, the three cooperative markets—produce, meat and fish—view resilience planning and implementation efforts as an imperative for their members. Along with organized labor locals at the three markets, the management of the coops have a deep interest in preserving, protecting, and ensuring the competitiveness of the Food Distribution Center for decades to come.

Hunts Point's community-based organizations, including Sustainable South Bronx, The Point CDC, Rocking the Boat, and Mothers on the Move are nationally recognized as leaders in environmental education, action, and green jobs strategies. Leadership of Community Board 2 is strong. Local organizations have cooperated with the New York City Department of Parks and Recreation, as well as many other local and regional groups on major planning and implementation projects for improvement of waterways and the inland community. Offshore, aquatic habitat pilots in the Bronx and East Rivers are among the highest performing in the estuary, bringing praise and recognition to the local groups that launched and managed the projects.

Opportunity

The number of small businesses – notably, those owned and operated by immigrants – and living wage jobs in the peninsula has increased significantly over the last 14 years, and the current growth rate is estimated at 9%. With freight rail, deep water access, and a strong position in the regional road network, Hunts Point has great potential for development as a thriving intermodal hub as technology for refrigerated containers and transfer vessels improves. It is well-positioned to play a role as the nexus for an east coast maritime emergency supply chain, significantly reducing supply loss risks and ensuring continuity in regional food distribution during weather events when roads, tunnels, and bridges are impassable.

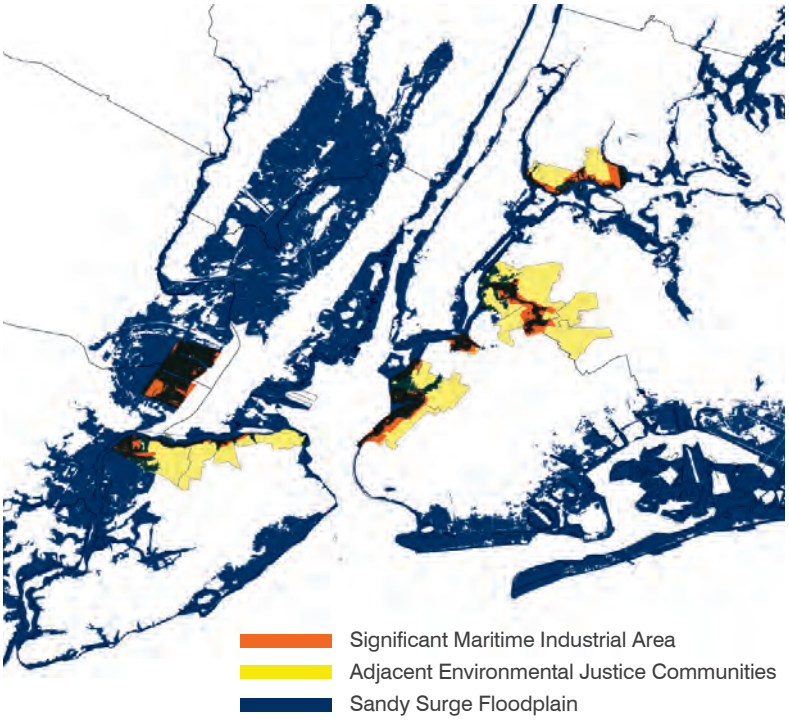
Through patient, long-term consultation, Community Planning Board 2 and area non-profit organizations, in



partnership with the City, have generated a number of detailed and highly-regarded community-based plans, such as the Hunts Point Vision Plan and the South Bronx Greenway Master Plan. These thoughtful strategic plans align well with an integrated flood protection system at the edge of the peninsula, complemented by a range of other resilience strategies. The plans lay ground work for fast engagement and action to develop a Rebuild by Design project that is truly community-driven.

The City owns 4 continuous miles of the Hunts Point shoreline—the entire length of the water's edge needed to build perimeter protection for the Food Distribution Center, neighboring businesses in the flood cluster, and the sewage treatment plant. There are no historic resources or homes around which the flood protection must be woven. This condition is rare in the Sandy-affected region.

The wave energy and geomorphology of the Hunts Point peninsula make it possible to create effective protection at moderate cost, unlike more exposed sites in the region. While the Hunts Point Food Distribution Center is a unique regional asset, the approach to building resilience here has wide applicability as a model for other industrial waterfronts.



Hunts Point is one of six SIGNIFICANT MARITIME INDUSTRIAL AREAS in New York City.

Soundview Reef Restoration Project

COMMUNITY + WORKING ECOLOGY

Hunts Point Lifelines builds on these important site facts and opportunities to forge a common purpose among the residential community, businesses owners, organized labor, and the City of New York. This unprecedented coalition of interests – linking groups that have long been at odds – seeks to spur action on the part of public and private sector decision-makers to preserve, protect, and enhance the host community for the world's largest food distribution center. Key stakeholders that have already endorsed the Lifelines proposal include the three major cooperative markets—the Hunts Point Terminal Market (produce), The Hunts Point Cooperative Market (meat), and the New Fulton Fish Market—as well as Teamsters Local 202, United Food and Commercial Workers Locals 342 and 359, Community Board 2, THE POINT Community Development Corporation, Sustainable South Bronx, Mothers on the Move, Rocking the Boat, the NYC Environmental Justice Alliance, the John V. Lindsay Wildcat Academy, Senator Charles Schumer, and Congressman Jose E. Serrano (NY-15).

Hunts Point Lifelines works at every scale, from the individual lot to the vast expanse of the east coast, to demonstrate a model for maritime industrial areas. We propose to do this through four LIFELINES:

Lifeline 1: Integrated Flood Protection

The central focus of Hunts Point Lifelines is a flood protection system and energy plan that keep the region's food supply on-line through storm and disaster, and stimulate reinvestment in the South Bronx significant maritime industrial area. The flood protection design is fully integrated with a waterfront alignment of the South Bronx Greenway, a long-standing project of great importance to the community and a cornerstone of the New York City Economic Development Corporation's Hunts Point Vision Plan.

The potential for flood hazard mitigation funding makes it possible to expand the scale, ambition and infrastructural functions of the greenway planned in 2005. Our design for Hunts Point's flood protection incorporates an applied research model that we call Levee Lab—a series of designed ecologies, applied materials research, and pilots testing new techniques for construction and maintenance for climate adaptation of industrial waterfronts. Collectively, these projects can contribute to the development of a new regulatory framework and demonstrate an intelligent approach to scaling up research results to benefit working waterfronts throughout New York Harbor and beyond.

INTEGRATED FLOOD PROTECTION builds upon the ambitions of a South Bronx Greenway Plan first envisioned in 2005.

Lifeline 2: Livelihoods

Jobs are an essential part of resilience infrastructure in communities where poverty creates major vulnerability to storms and other disasters, as well as the quotidian challenges of life. An important aim of LIFELINES is to demonstrate that local communities can participate in climate adaptation, understand its dynamics and risks, and benefit from public and private sector investments in resilience without compromising the integrity of the flood protection project or the intent of procurement safeguards. In this equity framework, local procurement and labor force strategies will not only build community economic assets needed for resilience, but also generate a range of benefits including learning, awareness of waterfront dynamics, perception of risk, informed citizenship, and a deeper sense of locality and personal investment. These are all meaningful contributions to the cultural shift that will be instrumental to the larger transformation that Rebuild by Design seeks to catalyze.

Lifeline 3: Cleanways

The Cleanways are a series of infrastructure elements that improve connectivity, sociability, air quality, safe passage for pedestrians through truck routes, food access, commercial activity, and filtration of stormwater in major rain events. They connect the new amenity and open space of the waterfront to neighborhoods inland. The Cleanways help to recenter the community around public transit and the new Metro North station proposed for Hunts Point.

The most forward-looking and ambitious element of the Cleanways Lifeline is a proposal to move beyond back-up generation in phase 1 to creation of a clean Tri-Gen Power Generating Station that turns heat into chilled water, designed for the huge thermal load of a district dependent on refrigeration. The creation of a Tri-Gen Plant would make it possible for the Hunts Point peninsula to act as a microgrid island when the City grid goes down. While the public investment required to leverage private operator investment is significant, there are major cost reductions for power to food businesses in Hunts Point, and reductions to air pollution and the carbon tab of the Food Center.

GREENWAY along the East River

TIDAL INLET and rain water treatment basin

Lifeline 4: Maritime Supply Chain

Through our research, we have identified an opportunity to create a base of operations in Hunts Point for the distribution of goods, personnel, and equipment to areas under emergency, particularly when roads, tunnels and bridges are down. The September 11, 2001 attacks, the 2003 black out, the 1997 blizzard, and the 2011 and 2012 hurricanes provided stark evidence of the vulnerability of New York's road- and subway-based transportation network to a range of threats. The first mode of transportation restored after most events is maritime access, and more than 15 million people in the New York metropolitan area live within a few miles of navigable waterways, including New York Harbor, the East River, Long Island Sound, and the Hudson, Passaic and Raritan rivers.

HUNTS POINT LIFELINES proposes to build on the Marine Highways, Cities Readiness Initiative, and Disaster Relief and Mitigation programs of the federal government to explore the viability of establishing a maritime emergency supply chain for the east coast, with Hunts Point as a major distribution node and potential supply stockpile site. Once built, the necessary pier infrastructure would make it possible to increase reliance on marine highways for regular interstate commerce, increasing resilience, reducing carbon, and stimulating growth in Hunts Point.

SUPPLY PIER ACCESS, restaurant, and event space

EMERGENCY SUPPLY HUB

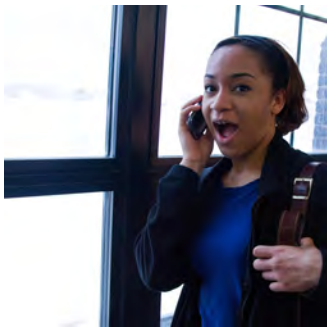
Making it Happen

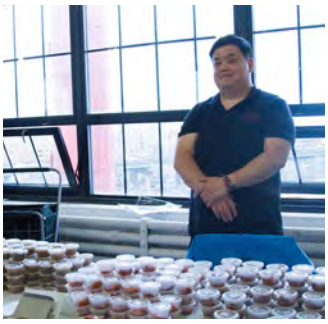
The estimated Benefit to Cost Ratio of HUNTS POINT LIFELINES is 1.6. The high value of the economic functions being protected means that many project elements with benefits that are difficult to quantify, such as community access to the waterfront, are more than offset by the benefit. An estimate of the total cost of LIFELINES is $1.2 billion. The cost of the first phase, which protects the Food Distribution Center, the Waste Water Treatment Plant and many businesses, but does not protect the entire working shoreline of Oak Point and Port Morris is preliminarily estimated at $816 million. This phase can be further subdivided into Phase 1A—critical, early-action elements required to protect Hunts Point today—and Phase 1B, elements required to provide comprehensive protection through 2050 (see the Cost Estimate and benefit Cost Analysis chapter for details). Our team has also investigated a wide range of funding sources and programs that may allow these costs to be shared by many parties, leveraging HUD's investment in the project (funding sources are detailed in the Implementation chapter).

The PennDesign / OLIN team has the expertise and capacity to deliver a smart feasibility phase, an interdisciplinary design and planning phase that produces a charismatic landscape infrastructure grounded in research and technical analysis, and speedy delivery of the EIS, permitting, bidding and construction phases. The team is led by the University of Pennsylvania Graduate School of Design and OLIN for landscape architecture and urban design. Our strong team includes McLaren Engineering Group for marine and structural engineering; eDesign Dynamics for hydrology, ecology and stormwater design; Level Infrastructure for energy, engineering strategy and economic analysis; HR&A Advisors for economic analysis; Buro Happold for engineering; Philip Habib for civil engineering; and Barretto Bay Strategies for community engagement.

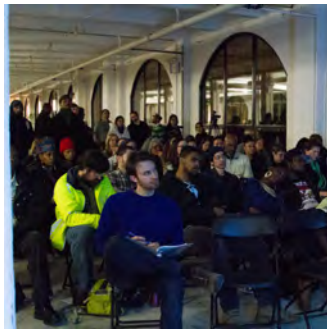
A preliminary implementation plan is included in this report as a first step in shaping a plan with input from HUD, its partners, and ours. Some components of the feasibility analysis required to vet and develop the elements are clear, while the innovative emergency maritime supply chain concept, in particular, requires conversation with government players at other levels to gauge interest and next steps in what could be a bold enterprise for FEMA, HUD, the Center for Disease Control, the NYC Office of Emergency Management, the State of New York and Hunts Point.

HUNTS POINT LIFELINES builds on the strong analytic framework for action on climate adaptation created by New York City's PlaNYC. It takes up the next challenge of innovation on the human side of implementation to create common cause and planning approaches that make each resilience investment transformative at the scale of neighborhood life, and a stimulus to the future economy that will make continued investment possible. We believe there is tremendous interest on the part of government at all levels, and of our project's coalition to demonstrate this potential. For all the reasons outlined here, Hunts Point is the place to invest in making it happen.

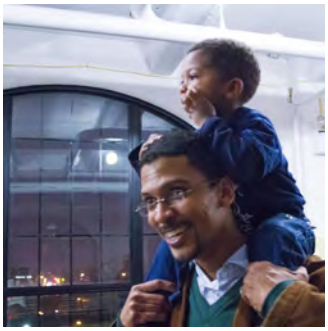











ENGAGED COMMUNITY: participants in the SLAMBAKE event, which showcased local cooking talent and the Hunts Point Lifelines proposal.

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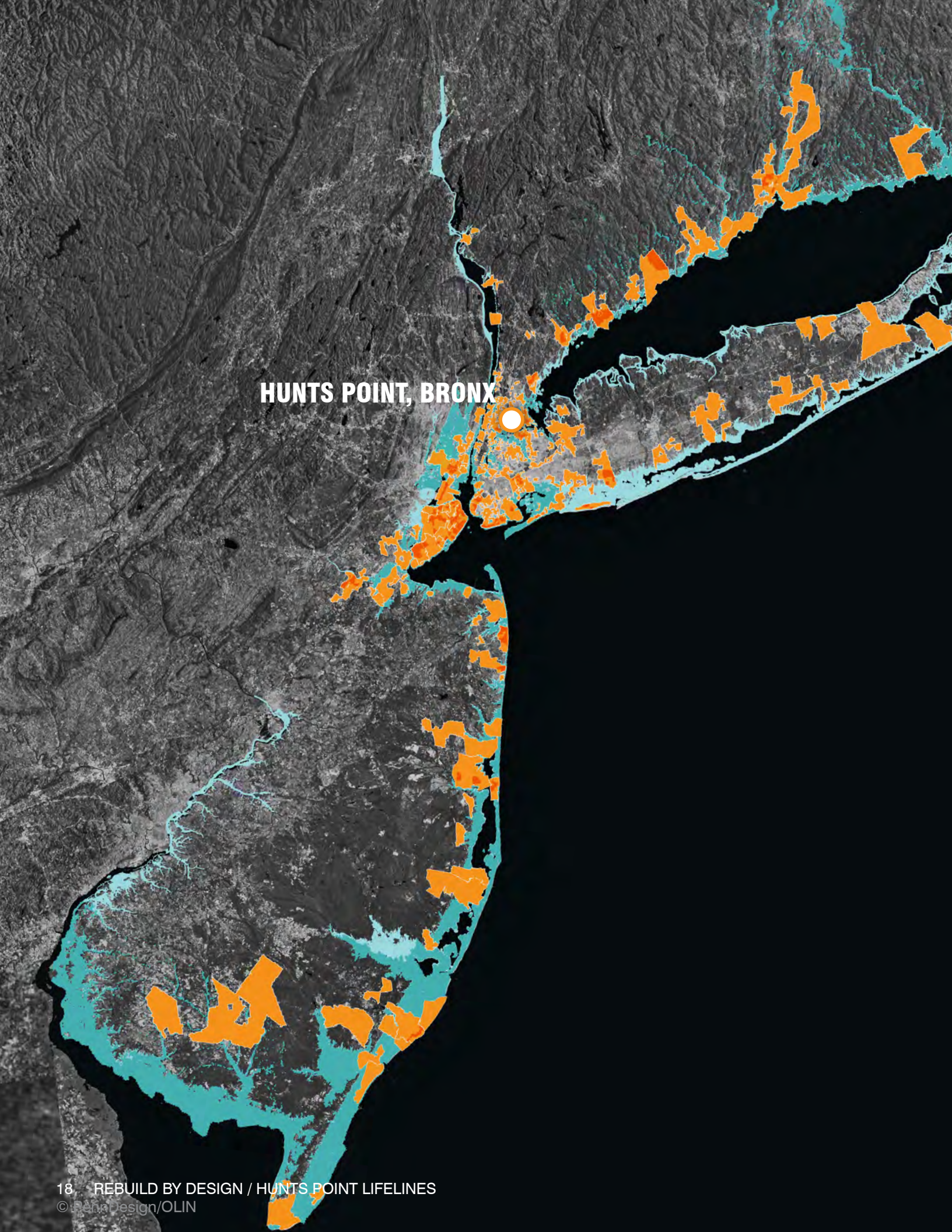


REGIONAL CONTEXT
REBUILD BY DESIGN
STAGE 2 RESEARCH

Hunts Point is the hub of a distribution network that supplies food for 22 million people and 23,000 restaurants in the New York region.[1] The three wholesale cooperative markets that make up the Hunts Point Food Distribution Center supply 60 percent of New York City's produce, 50 percent of its meat, and 33 percent of its fish.[2] In addition to the FDC itself, these three markets anchor a large and vibrant food cluster outside its fences. This cluster includes large distributors like Krasdale and Anheuser Busch, as well as smaller food entrepreneurs. Taken together, this food cluster represents a $5 billion economy, directly employing 8,500 people.[3] Hunts Point is thus essential to not only New York's food security, but its economy and the job security of many residents. But as the 2013 SIRR report warned, "the Hunts Point neighborhood is not just critically important, it is also vulnerable."[4]

The PennDesign/OLIN team's Stage 1 response recognized that vulnerability and resilience have social and economic dimensions; neither one is a purely - or even primarily - physical phenomenon. Our Phase II regional analysis flowed directly from this premise, a premise that also underpins our approach to understanding vulnerability and designing for resilience in Hunts Point.

1. Office of the New York State Comptroller. "An Economic Snapshot of the Hunts Point Food Distribution Center." 2008
2. Ibid.
3. Ibid.
4. The City of New York. "A Stronger, More Resilient New York." 2013.

During Hurricane Sandy, disruptions to the food and fuel supply chain led to food shortages in the Sandy-affected region.

PHYSICAL VULNERABILITY

In our Stage II regional analysis, physical vulnerability was represented by a composite of existing FEMA flood zones and areas inundated by storm surge during Hurricane Sandy.

Although Hunts Point was mostly spared by Hurricane Sandy, which arrived there at low tide, the food cluster is vulnerable to flooding, and will become increasingly so as sea levels rise. The New Fulton Fish Market (one of the three FDC wholesale markets) and three of the largest distribution businesses—Anheuser Busch, Citarella, and Krasdale—all lie within the existing FEMA 100 year floodplain. One other critical piece of regional infrastructure also exists within the 100 year floodplain: the Hunts Point Wastewater Treatment Plant, which serves 648,000 Bronx Residents.[1]

The rest of the food cluster is on slightly higher, but still vulnerable ground. The cooperative Meat Market falls within the current 500 year floodplain; by 2050, the produce market will as well.[2] By 2050, most of the food businesses outside the FDC boundaries will be subject to a 1 percent annual risk of flooding.

This physical flood risk includes the inundation from storm surge and wave action seen during Hurricane Sandy, but it also includes the river and overland flooding more typical of a storm

1. New York City DEP. 2007.
2. The PennDesign/OLIN team used the 2013 SIRR Report's 90% Confidence Level Sea Level Rise estimate of 31" for the year 2050 and the estimated future floodplain mapping produced from that report.

650,000
RESIDENTS RELY ON THE WASTE WATER TREATMENT PLANT

65%
OF UNION LABOR in the FDC LIVES IN THE BRONX

12,000
JOBS in the HUNTS POINT FLOODPLAIN

like Hurricane Irene. Because most of Hunts Point is served by a combined sewer system and because it is the site of the Wastewater Treatment Plant, storm surges may result in the backup of combined flows that inundate streets and property with sanitary sewage. Industrial sites within Hunts Point are often contaminated, and these contaminants may be mobilized during a flood. Finally, storms may sever the infrastructural networks—particularly energy and transportation—that food distribution businesses rely on.

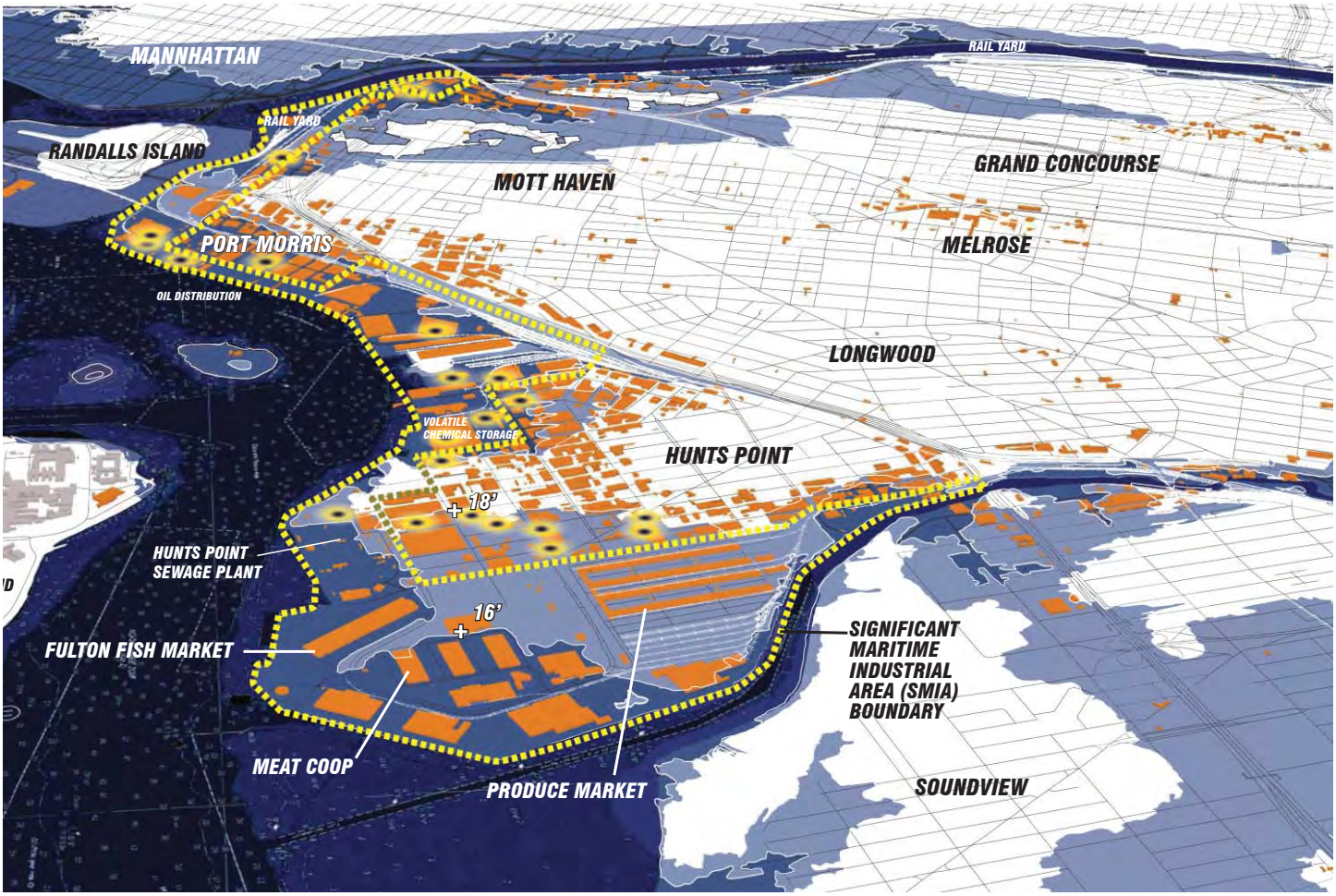
Thus, immediate and local storm risks include property damage, infrastructure damage, business revenue loss, and environmental cleanup. Ongoing impacts of a major storm in Hunts Point could include the loss of businesses and jobs, and a reduction in new business and job creation as businesses choose to locate on less vulnerable ground. But of course the impact of a major blow to the food cluster would be felt far beyond Hunts Point. As the regional food hub, damage to Hunts Point would result in an immediate and potentially catastrophic disruption of the metropolitan food supply chain. Ongoing impacts could include additional costs for down-stream businesses sourcing elsewhere, and regional job loss.

FLOOD RISK now and in 2050
(assuming 31" of sea level rise).

ECONOMIC VULNERABILITY

Our team's regional economic vulnerability analysis recognized that, in a region where capital is highly mobile, rising flood insurance rates and the costs of repetitive storm damage will create two different coastal development trajectories: first, concentrations of high end housing where residents have the means to self-insure, forgoing mortgages and flood insurance and creating concentrations of wealth; and second, concentrations of housing and industry that would decline in quality, density, and economic activity after mobile capital took flight. The team further split this second, vulnerable trajectory into three at-risk categories. Places with residential capital at risk of flight were defined as low- to upper-middle income communities with significant but reversible recent income growth. Places with residential capital at risk of dissolution included middle-income communities with low to moderate income growth. Finally, places with commercial and industrial capital at risk of flight were mapped by identifying centers of high employment located in otherwise low and moderate income communities.

Based on our team's regional economic analysis, Hunts Point fits the category of commercial and industrial capital at risk of flight. This risk is partly a function of physical vulnerability: the food cluster's businesses and jobs are located in current and future floodplains. But the particulars make a difference in Hunts Point. Two of the three big wholesale markets – the produce market and the meat market – are housed in aging, overburdened facilities that will need to be replaced in coming years. These markets will soon be considering large capital investments, investments that they might rationally choose to make in a less risky location. And although the New York City Economic Development Corporation (EDC) owns the FDC market lands and the State of New York has dedicated them to food distribution in



$5B
ANNUAL REVENUES at the FDC

perpetuity, the current leases held by the markets are relatively short term: exiting will become an option within the next decade.

The three FDC markets make up only a portion of the Hunts Point food cluster, but that portion is critical. Without these anchors, smaller food-related businesses that are reliant on proximity to the FDC may choose to decamp as well. Conversely, businesses that choose to stay are less likely to attract public or public-private investment in physical protection. Economic vulnerability in Hunts Point could lead to continued physical vulnerability once businesses start leaving.

New Fulton Fish Market

Hunts Point Meat Market

Hunts Point Produce Market

VULNERABLE INDUSTRY: Most of the SMIA—and thus most of the Hunts Point food cluster—lies within the future floodplain. In addition, flooding of businesses that store hazardous chemicals could mobilize contaminants.

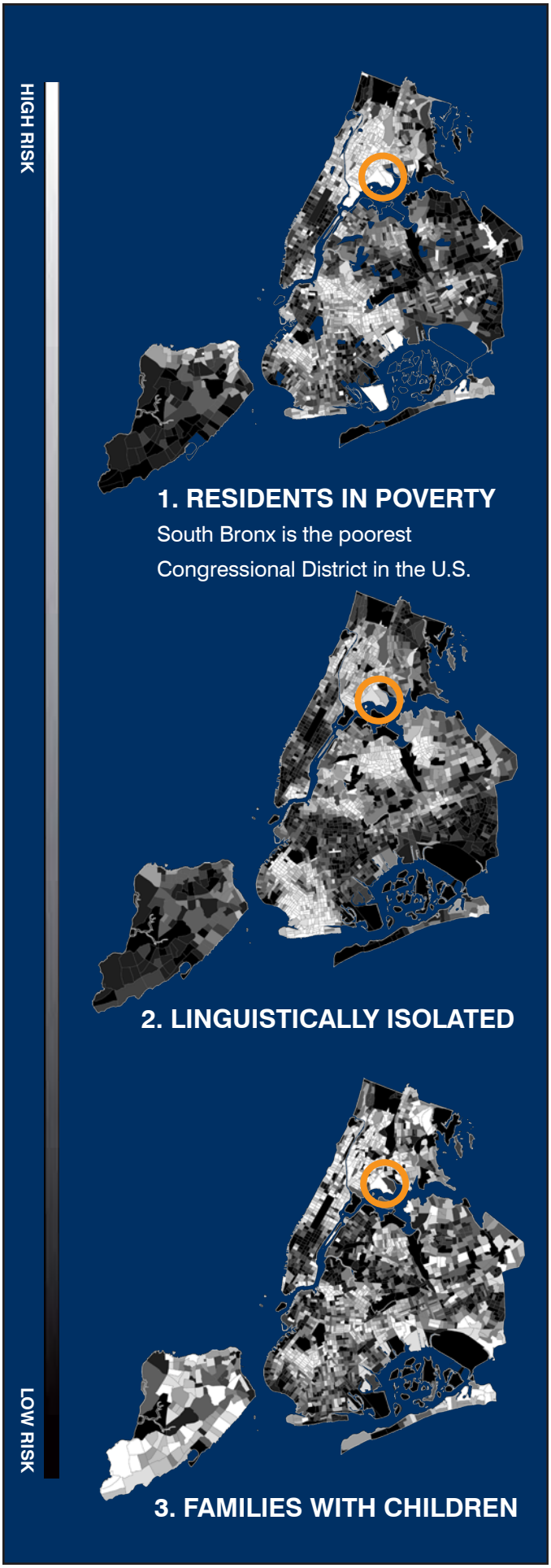
SOCIAL VULNERABILITY

Regional social vulnerability analysis identified census tracts with populations at high risk from disaster, based on the social indicators defined by HUD's Hurricane Sandy Rebuilding Strategy. We mapped the six of eight criteria available from census data: poverty rate, residents less than 10 years old, residents greater than 65 years old, linguistically isolated residents, immigrants, and individuals with disabilities.

Topographically, the Hunts Point peninsula can be divided into a high, central ridge and a surrounding ring of lowlands. This topography organizes land use: industry is located primarily in the lowlands, while the residential neighborhood and commercial corridors are confined to the ridge. For this reason, the risk of direct flooding in the residential neighborhood of Hunts Point is very low. But the industrial lowlands are an important source of living-wage jobs in a community that desperately needs them. The unemployment rate in Hunts Point is 20 percent, and 50 percent of Hunts Point residents live below the national poverty line.[1] Thus the physical vulnerability of the Hunts Point food cluster compounds the social vulnerability of the Hunts Point neighborhood, and much of the adjacent South Bronx—the poorest congressional district in the City.[2]

Even though the food cluster offers good jobs, Hunts Point residents have reason to be ambivalent about their industrial neighbors. Approximately 1,500 trucks traverse the neighborhood daily, threatening pedestrian safety and producing significant air quality impacts[3]. Asthma hospitalization rates for

1. U. S. Census Bureau, Census 2010.
2. Ibid.
3. Sheridan Expressway-Hunts Point Planning Study. NYC DOT, 2012.



children are between two and four times as high as those in most of Manhattan and Brooklyn.[1] Legacy contamination from industrial uses preceding the FDC remain in the soil on many industrial sites. Combined with the need for industrial security, site contamination limits the potential for waterfront access. A 2013 Coalition Against Hunger report estimated that 36 percent of Bronx residents lack food security.[2] And although an enormous volume of fresh, high quality food flows through Hunts Point every day, a lack of retail outlets means Hunts Point residents have little access to it. In our extensive community engagement, we heard repeatedly that residents value the food cluster for the jobs it brings, but they wish their streets were safer, their air cleaner, their waterfront accessible, and that they had access to the fresh food that Hunts Point is known for.

COMMUNITY CAPACITY

Hunts Point businesses and residents are far from helpless in the face of these challenges. The neighborhood is home to an informed, politically engaged citizenry, and a number of highly effective community-based organizations including The Point CDC, Sustainable South Bronx, Rocking the Boat, and Mothers on the Move. Working with city agencies, these organizations have developed and approved vision plans for the neighborhood and waterfront. Although these plans lack implementation funding, they enjoy broad support and can be fruitfully integrated with physical resilience measures. The Hunts Point community is vulnerable, but it also possesses extraordinary capacity. It is thus an ideal partner for Rebuild by Design and the PennDesign/OLIN team's strategy of blending local knowledge, national resources, and regional impact.

1. United Health Fund 2010.
2. "Superstorm of Hunger." New York City Coalition of Hunger. 2013.

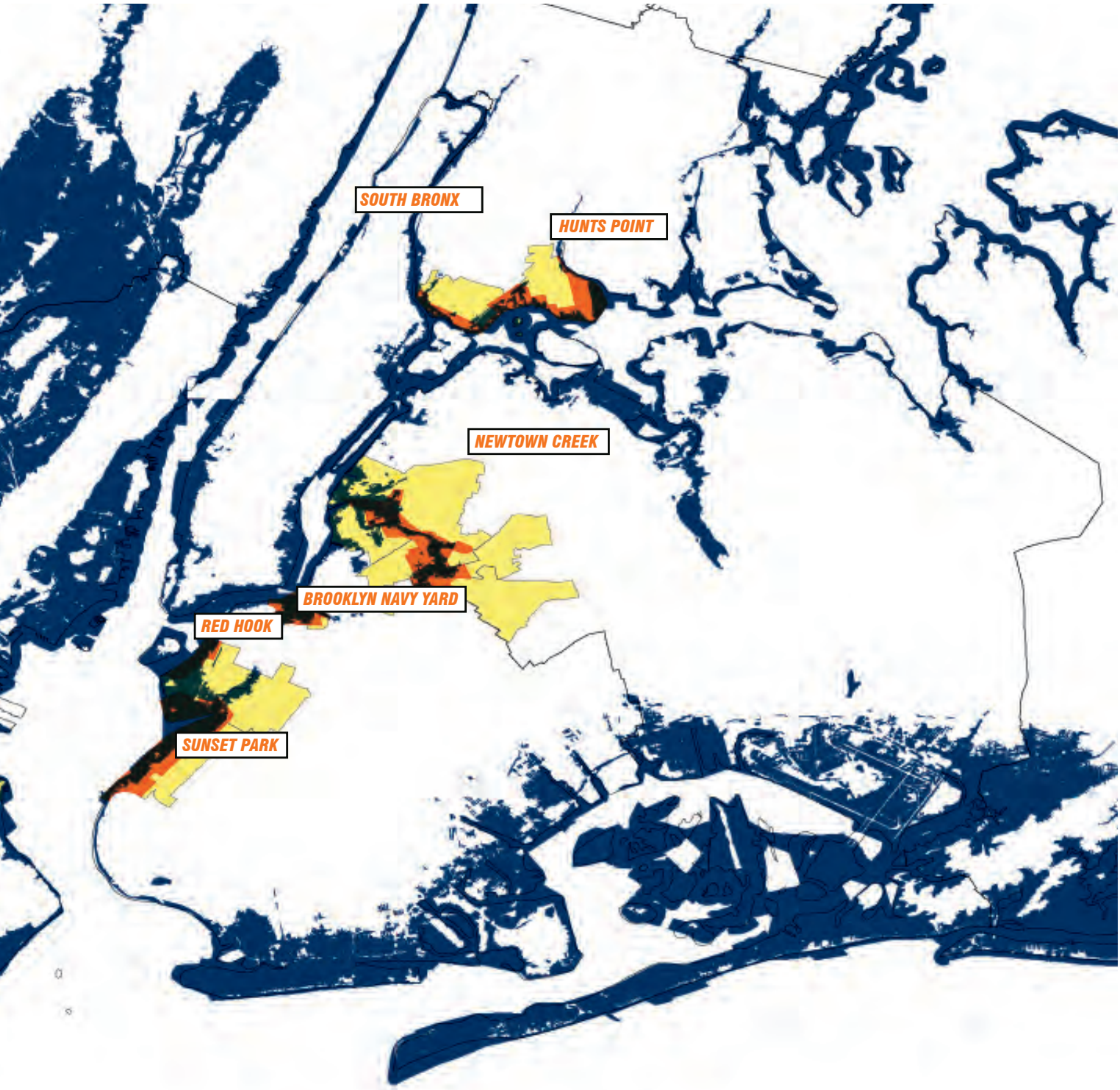
Participants in the Slambake Food Project

Hunts Point Avenue

Kellie Terry of THE POINT CDC

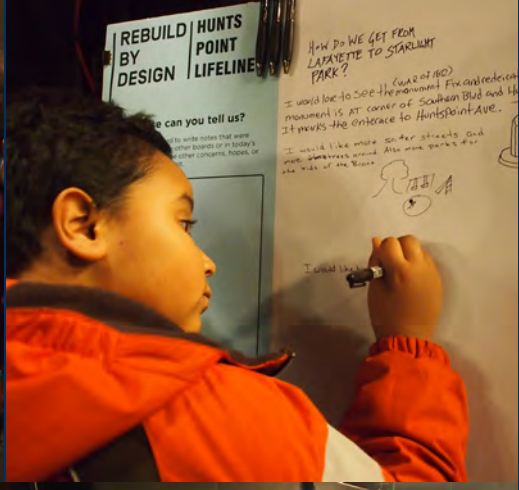
REGIONAL APPLICABILITY AND REPLICABILITY

The regional impact of a resilience strategy for Hunts Point extends beyond the critical food supply chain. Hunts Point is one of six designated Significant Maritime Industrial Areas (SMIAs) in New York City. As home to large clusters of often water-dependent industry in low, flat areas, SMIAs are, by definition, vulnerable to flooding and sea level rise. They also tend to be located adjacent to environmental justice neighborhoods like Hunts Point, neighborhoods that depend on the SMIAs for jobs but suffer from substantial environmental externalities. Thus the strategy, process, and suite of design solutions developed for Hunts Point will suggest a model for SMIAs throughout the region. If we can figure out how to protect industry and jobs in Hunts Point while providing waterfront access, building waterfront equality, addressing legacy contamination, and improving air quality, we will have the opportunity to retain an improve some of our country's most vibrant and critical clusters of central city industry.



MARITIME INDUSTRIAL AREAS

- Significant Maritime Industrial Area
- Adjacent Environmental Justice Communities
- Sandy Surge Floodplain



Evening community workshop at The Point, 940 Garrison Avenue, Hunts Point, January 28, 2014

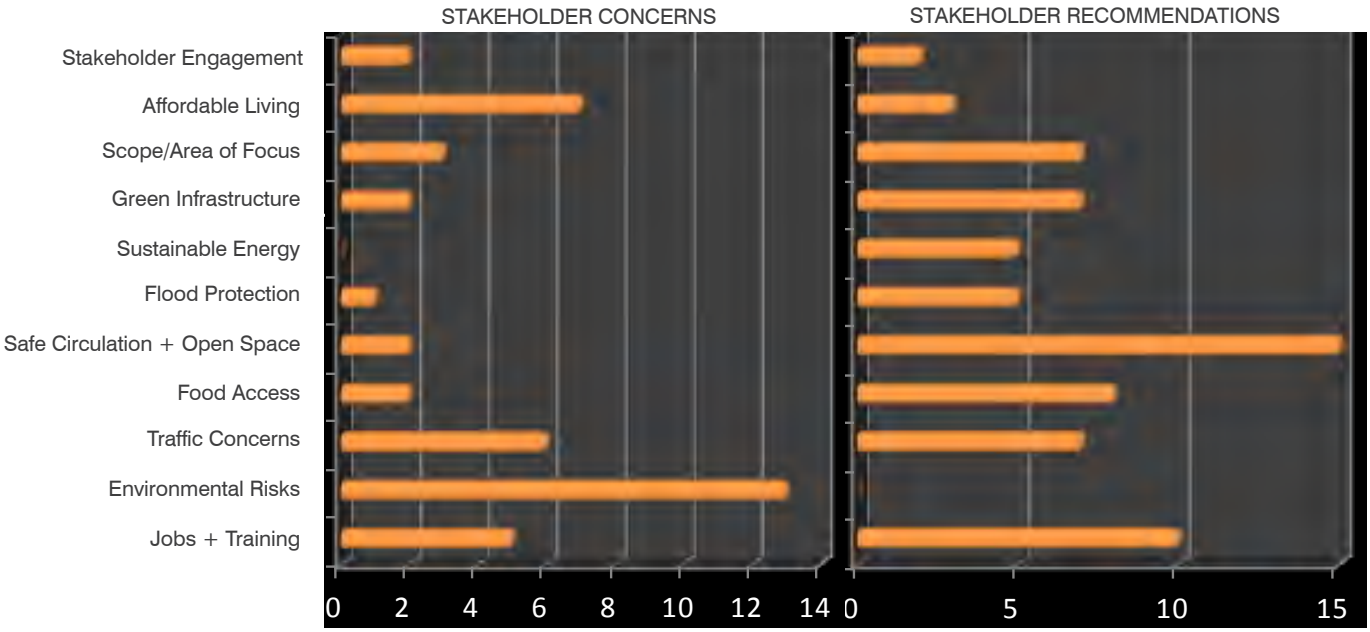
Business lunch and slide show in the Anheuser Busch conference room, Food Center Drive, January 23, 2014

COALITION

The Hunts Point Lifelines proposal highlights living wage jobs and the region's food distribution facilities as critical pieces of resilience infrastructure. The proposal posits that a deeply engaged community can inform resiliency planning processes to achieve broad economic, social, and ecological objectives that ripple far beyond the water's edge.

The PennDesign/OLIN team's process engaged multiple stakeholders—including business owners, entrepreneurs, and neighborhood advocates—to develop site-specific designs for integrated storm protection and green infrastructure, offering high quality social space, restored habitat, and clean water.

During the initial research phase, the PennDesign/OLIN team interviewed local stakeholders who described an ineffectual and at times insensitive planning and recovery process. They described procedures that allocated recovery monies based on the narrow criteria of home ownership, employment and income status, and individual need. While these conditional assessments have provided government agencies with a rubric to create accountability and measure need, metrics like these fail to address the needs of the broader community in aggregate economic or social terms.



FEEDBACK
Priorities and comments from
the first Hunts Point community meeting

Representing Hunts Point

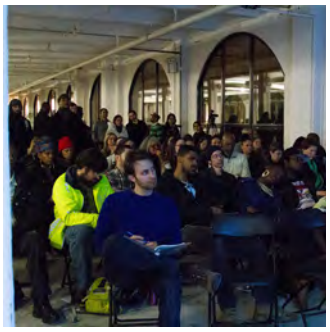
The team's process for identifying participants in the Lifelines project began with an intensive review of past planning efforts in Hunts Point, interviews with acknowledged community leaders, and multi-agency meetings with decision-makers in municipal government. These early conversations were crucial to ensuring that the team had accurately gauged the range of stakeholder concerns it would need to address and had adequately captured the broad scope of the project.

Robust and ongoing feedback advanced the conversation and informed customized design solutions that meet regional imperatives for food access and distribution while incorporating the interests of community members and the living wage workers who share the peninsula. But to understand Hunts Point required more than meetings--it required numerous on-site interviews with small businesspeople, an ongoing dialogue with organized labor and the management of the three publicly-owned wholesale markets, as well as regular check-ins with the leadership of non-profit organizations and businesses in and around the Food Distribution Center (FDC). Many of the critical insights gleaned in these conversations were captured on film, with interviews and engagement led by Barretto Bay Strategies, an outreach consultant selected by The Point, a non-profit community development corporation based in the Hunts Point Neighborhood.

The Slambake Food Project

In the first phase of outreach, interviews and dialogue with community stakeholders culminated in two public planning meetings during the month of January—one aimed principally at the wholesale food sector and convened at the Anheuser-Busch distribution facility in the FDC and a second hosted by THE POINT and primarily targeted to the residential community. A promised third public meeting, framed as a follow-up to the first two and a report back to both the residential and industrial communities, was scheduled for mid-March. A cooking competition for restaurateurs, caterers, and amateur chefs in the peninsula who were asked to source all their ingredients from area wholesalers. The Hunts Point Slam Bake was conceived as a lead-in to the final public meeting and an opportunity for the peninsula's disparate interest groups to break bread together—and sample kimchi, smoked ribs, and shrimp ceviche—while identifying common ground for the ongoing resiliency conversation.








SLAMBAKE attendees - nearly 300 of them - turned out to taste Hunts Point food and participate in the RBD process.

The March 19th event succeeded as a vehicle to drive attendance to the final convening and provide a critically important and exceedingly rare “commons” for business, labor, and the residential community to convene over a topic of mutual concern: preserving, protecting, and enhancing the host community for the world’s largest food distribution center. Business and community stakeholders, at odds for decades over a menu of policy issues—including local hiring, truck routes and engine idling, waterfront access, and availability of retail produce in the residential area—came together for an event celebrating the centrality of the food sector to the economic and cultural vitality of Hunts Point. For a third community stakeholder represented at the event—organized labor—it was the first time in memory that a community planning process had engaged them, called upon their expertise, and sought their consensus.

The Slam Bake and public meeting that followed drew nearly 300 people to a vacant third floor loft in the American Banknote Building, a former currency printing plant located on the boundary of the residential and industrial areas. At the event, members of Teamsters Local 202, United Food and Commercial Workers Locals 342 and 359, non-profit and faith leaders, environmental advocates, business owners, and the management of the Fulton Fishmarket and the New York City Terminal Market, mingled easily with families from the peninsula, teens from several community-based youth programs, city officials, and U.S. Congressional Representative Jose Serrano. Judges drawn from the residential and business communities, as well as from the local workforce, weighed in on the area’s best chefs and, in a hopeful sign, managed to reach consensus on winners in each category. The event managed to simultaneously showcase the breathtaking culinary and cultural diversity of the peninsula as well as the vast reach of its food distribution infrastructure, and to answer the question of why Hunts Point matters.

HUNTS POINT COALITION

Government

- Community Board #2
- Office of Assemblyman A. Crespo 85th District
- Rep. Jose E. Serrano, Member of Congress (NY-15)
- New York City Economic Development Corporation
- Office of the Mayor of New York City
- NYC Department of Environmental Protection
- NYS Department of Environmental Conservation
- NYC Office of Emergency Management

Community Based Organizations

- Hunts Point Economic Development Corporation
- The Blk Projek
- Mothers on the Move
- Bronx River Alliance
- Youth Ministries for Peace and Justice and Hunts Point
- Rocking the Boat
- Wildcat Academy Charter School
- THE POINT Community Development Corporation
- Sustainable South Bronx
- New York City Environmental Justice Alliance
- Food Bank for New York City

Organized Labor

- Brotherhood of Teamsters Local 202
- United Food and Commercial Workers

Food Cluster Industry

- The Hunts Point Terminal Produce Cooperative Association
- Hunts Point Cooperative Market
- New Fulton Fishmarket at Hunts Point
- Smitty's Filet House (fish wholesaler)
- Nathel & Nathel (produce wholesaler)
- Vista Food Exchange
- Anheuser-Busch Distributors, Hunts Point Distribution Center
- Il Forno Bakery
- Oak Restaurant & Grill
- Mo Gridder's BBQ

LIFELINES

Integrated Flood Protection

- Flood Protection
- Ecological Enhancement
- Green Infrastructure Innovation

Livelihoods and Leadership

- Local Construction
- Local Labor Bid Process
- Business Supply Chain Monitor
- Green Tech Jobs
- Operational Jobs
- Outreach Programming

Cleanways

- Safe Streets
- Traffic Circulation Enhancements
- Air Quality Mitigation
- Access to Healthy Food
- Fail-safe and Clean Energy

Maritime Highways

- Emergency Readiness
- Commercial Fishing Dock

Coalition Of Support

The result of this intense engagement effort has resulted in a broad coalition of support. The three major wholesale markets in the peninsula—The Hunts Point Terminal Market (produce), the Hunts Point Cooperative Market (meat), and the New Fulton Fishmarket—have all endorsed the project as an essential measure to ensure the long-term viability of the Food Distribution Center. The leadership at each market views the elements of the proposed plan as critical to meeting operational needs in the event of extreme weather and other potential disruptions. Leaders of the major organized labor locals in the FDC—Teamsters Local 202 and United Food and Commercial Workers Locals 342 and 359—have likewise endorsed the proposal and praised it for ensuring the long-term competitiveness of the wholesale markets. Community Board 2 and nearly all non-profit organizations in the area—including THE POINT Community Development Corporation, Mothers on the Move, Rocking the Boat, the Hunts Point Economic Development Corporation, the Hunts Point Chamber of Commerce, and Sustainable South Bronx—have endorsed the plan as meeting their objectives for improving the quality of life in the peninsula. The area's Congressman, Rep. Jose E. Serrano (NY-15) has provided his endorsement and offered opening remarks at the final public meeting.

The planning team's work has also been informed by the perspectives of teenagers from the peninsula, incorporating their observations about the vitality of Hunts Point in a short video that provides images and narration about the area's challenges and opportunities. An experienced artist and videographer, Sahar Coston, worked with the teens to direct their inquiry, edit the film, and help ensure that the content was accessible to a broad audience. The young people succeeding in capturing a range of perspectives, including how their peers think about the future of their community, about climate, and the sustainability of cities.

LETTERS OF SUPPORT

The PennDesign/OLIN team is pleased that our proposal has met with widespread support from local government and community-based organizations. The early letters of support for Lifelines are included in Appendix A. They are from:

-Community Board 2
-Congressman Jose E. Serrano
-Fulton Fish Market
-Hunts Point Cooperative Market, Inc.
-Hunts Point Economic Development Corp.
-Hunts Point Produce Market
-Mothers on the Move
-New York City Environmental Justice Alliance
-THE POINT CDC
-Rocking the Boat
-Senator Charles E. Schumer
-Sustainable South Bronx
-Teamsters Local Union No. 202
-United Food and Commercial Workers International Union, Northeastern Region

FLOOD PROTECTION
Operations

FLOOD PROTECTION
Construction

LEVEE LAB
Experimental Monitoring

LEVEE LAB
River Ecology

LIFELINES
Integrated Flood Protection

In this chapter, we summarize our analysis of water dynamics at Hunts Point, flood protection parameters, and the stormwater management requirements of flood protection. The physical design is a combination of a protective levee, wetland system, and connective waterfront greenway integrated with the South Bronx Greenway and a string of destinations, designed ecologies, research stations, and critical utilities, all of which will bring life and use to the water's edge.

Integrated Flood Protection

This chapter describes the central focus of Hunts Point Lifelines—the flood protection system itself. The chapter is broken into sections that organize the detailed material that constitutes the flood protection design proposal.

Water Dynamics P42

Wave energy and exposure to surge at the Hunts Point peninsula are moderate, with heights along the edges between 3 and 5 feet. Our analysis focused on planning for protection from various flood heights up to the 0.2% storm in 2050, assuming sea level rise of 31 inches. Because the assets at Hunts Point are critical to regional resilience, a 1% chance of flooding in any given year is considered an unacceptably high risk. The moderate exposure of Hunts Point is a call to action—the risks are serious—but also an asset. Careful analysis indicates this is one of the industrial areas that can be effectively protected at reasonable cost.

Flood Protection Strategy & Parameters P47

The flood plain for the 0.2% probability flood in 2050 is an extensive area that encompasses much of the Food Distribution Center and food cluster below elevation 18'. Our preliminary analysis and design leads us to recommend a mix of resilience measures behind the levee, a roughening of the outer edge of the levee, and an increase of the existing edge from 8 to 10 feet at its lowest to a preliminary designed height of 16 feet. What engineers call "permissible overtopping" is managed by the stormwater design and a limited number of hardening measures that can be integrated with market modernization over the next 35 years as sea level rises. This focus on a layered approach to protection sets the design parameters for a reasonable cost levee that can be integrated with a generous public greenway. The flexible design of the flood protection system will accommodate extension of the levee if sea level or water dynamics change more quickly than anticipated.

South Bronx Greenway P58

The flood protection system is integrated with a waterfront alignment of the South Bronx Greenway, a long-standing project of great importance to the community that was incorporated into NYC EDC's Hunts Point Vision Plan. The Greenway design is integrated with flood protection—an update that reflects new resilience concerns while respecting the design intent and intelligence of the original plan. We propose to use the flood protection program and mitigation funding opportunities to help the City create a more generous public space that will link to the Bronx River Greenway, the Harlem River Greenway and Manhattan greenways via the Randall's Island Connector.

These new greenways of the Bronx will open up access to the best open space opportunity in the densely settled borough—the water. The PennDesign / OLIN design includes a string of destinations and public amenities such as the sailing program boathouse (proposed by Rocking the Boat) and seafood restaurants (proposed by the Fulton Fish Market), that grow out of the ideas of local residents and business people. These destinations will be cared for and programmed by private and non-profit institutions.

Levee Lab P60

Our design proposal for Hunts Point flood protection incorporates an applied research model that we call Levee Lab—a series of designed ecologies, research stations and critical utilities, all of which will bring life, inquiry and use to the water's edge. The concept of Levee Lab was inspired by the specific assets and constraints of the Hunts Point site and community, and also by a series of experimental ecology projects along the Thames River in London which demonstrated an intelligent approach to scaling up research results to benefit working waterfronts throughout the UK and pioneering a new regulatory framework.

Stormwater Design P74

Protecting Hunts Point at the edge alone is not enough to prevent flooding; inland stormwater must also be managed. A high volume stormwater design is proposed to avoid flooding of necessary infrastructure in storm scenarios where there is a large amount of rainfall that could create a bathtub effect behind the surge protected edge. These stormwater features are also designed to improve water quality and habitat in typical storms.

Technical Support For Recommendations

The design concepts in this chapter were developed with support from eDesign Dynamics, McLaren Engineering Group, Level Infrastructure, Buro Happold Consulting and Philip Habib Engineers.

Policy And Funding Context

Preliminary research into federal funding initiatives suggests that an integrated flood protection system for the regional food hub has high benefits relative to costs, especially when flood protection is integrated with a range of additional public amenities including a greenway, park, research and resilience measures, and maritime supply chain facilities along the levee. (Refer to cost estimate and benefit-cost analysis section)

FEMA's National Preparedness System is a framework supporting eligible mitigation activities that protect life, protect property, and reduce disaster losses. Integrated flood protection paired with public amenities is in line with FEMA's National Preparedness efforts, which are aimed at building "a secure and resilient nation with capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk." In particular, FEMA attempts to build and sustain five core capabilities: Prevention, Protection, Mitigation, Response, and Recovery. This program offers assistance for "planning, operations, equipment acquisitions, training, and construction and renovation." The IFPS and Levee Lab design are intended to connect with these core capabilities and the FEMA National Preparedness focus on "identifying and assessing risk, building and sustaining capabilities, and reviewing and updating measures for effectiveness and efficiency." The IFPS and Levee Lab design could help bring much needed resilience measures to Hunts Point, protecting local residents and businesses while inviting private investment.

By partnering with the City and New York State, Hunts Point could have access to three assistance programs: Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), and Flood Mitigation Assistance (FMA). Each program provides funding for different activities that could help initiate investment in flood protection.

HMGP are finite grants that support the implementation of long-term hazard mitigation measures after a major disaster scenario. In addition to government entities, private non-profits may also apply for HMGP funding. PDM is an annual funding stream that aims to help reduce overall risk to a population and its structures while reducing reliance on federal assistance. Using this money to invest in integrated flood protection helps protect Hunts Point FDC, the surrounding food cluster, and local population, as well as decreasing long-term dependence on federal funding. FMA provides funding for structures within National Flood Insurance Program (NFIP) boundaries. Such funding could be used in the short-term to shore up flood protection while more extensive measures are under construction.

The Lifelines cost projection assumes that significant support from FEMA may be available for Hunts Point mitigation that could match physical flood works and the pier to local residential and commercial capacities. Some support for greenway and park elements and programmatic features such as the boathouse may be available from the City of New York and private philanthropies.

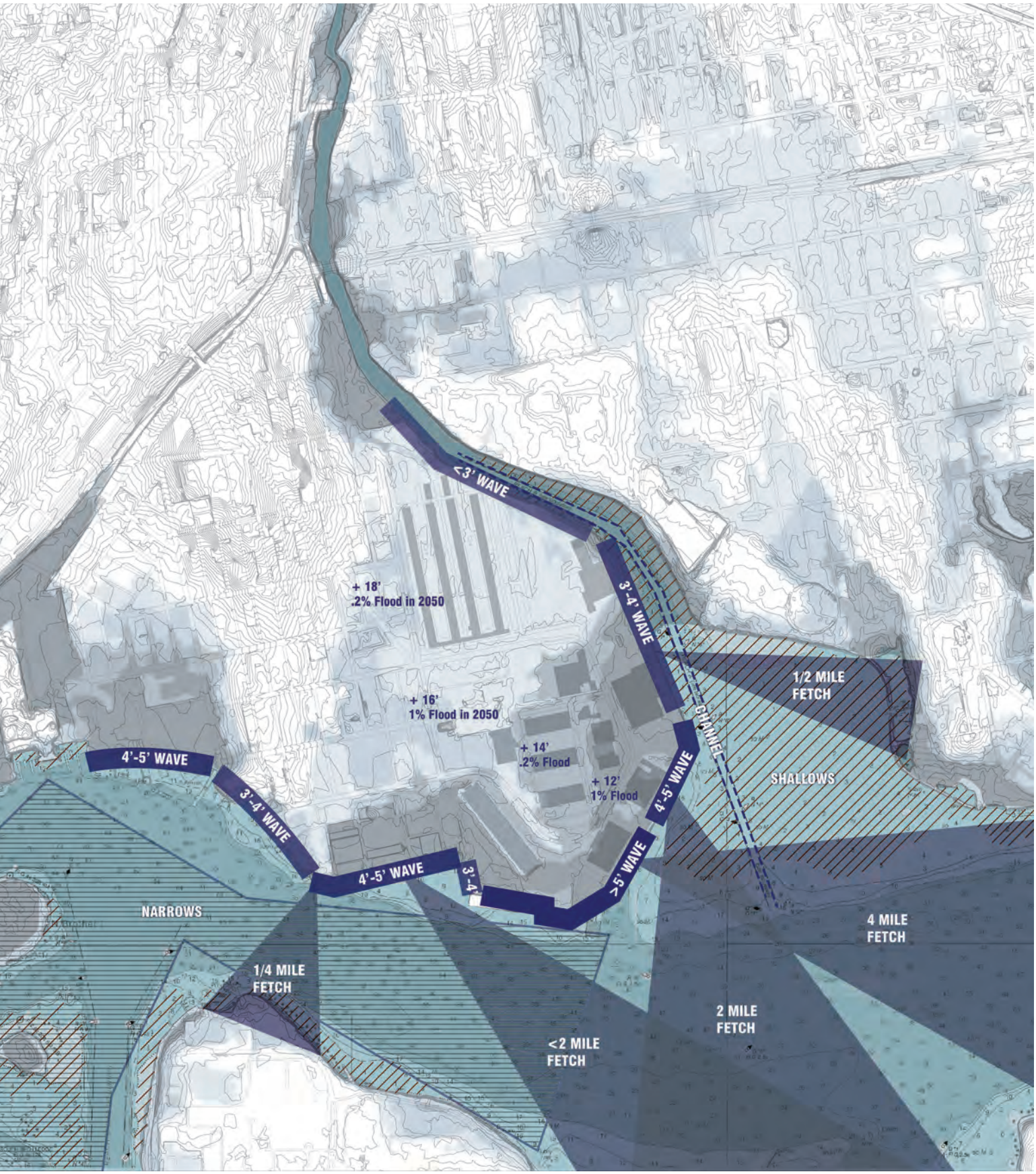
Integrated flood protection (potentially paired with maritime access and disaster relief training, as outlined in the Maritime Supply and Livelihoods chapters) aligns with the goals of Hunts Point residents and businesses. Based on our conversations with the market general managers and business community, federal investment in Hunts Point infrastructure will stimulate private investment in new and upgraded facilities.

WATER DYNAMICS

The water levels during a storm scenario comprise multiple factors including tides, storm surge, and waves. The tides are dependent on lunar cycles and can be predicted with reasonable accuracy. During a hurricane event, the storm surge is produced by water being pushed toward the shore by the force of the winds moving cyclonically around the storm. It is important to note that the term 'storm tide' is the combination of the tidal and storm surge effect on the water elevation. The waves, which are typically characterized by wave height and period, are primarily influenced by four factors that include: wind speed and duration, fetch length and water depth.

Datum (NAVD 88)		Value
Mean Higher High Water	MHHW	+3.41
Mean High Water	MHW	+3.06
Mean Sea Level	MSL	- 0.16
Mean Low Water	MLW	- 3.39
Mean Lower Low Water	MLLW	- 3.66
10-Year Stillwater (FIS)	SWL_{10}	+ 9.70
50-Year Stillwater (FIS)	SWL_{100}	+12.10
100-Year Stillwater (FIS)	SWL_{100}	+13.10
500-Year Stillwater (FIS)	SWL_{500}	+15.20
100-Year Base Flood Elevation (FEMA)	BFE	+ 16.00
100-Year Extreme Water Elevation (NOAA)	--	+ 12.26

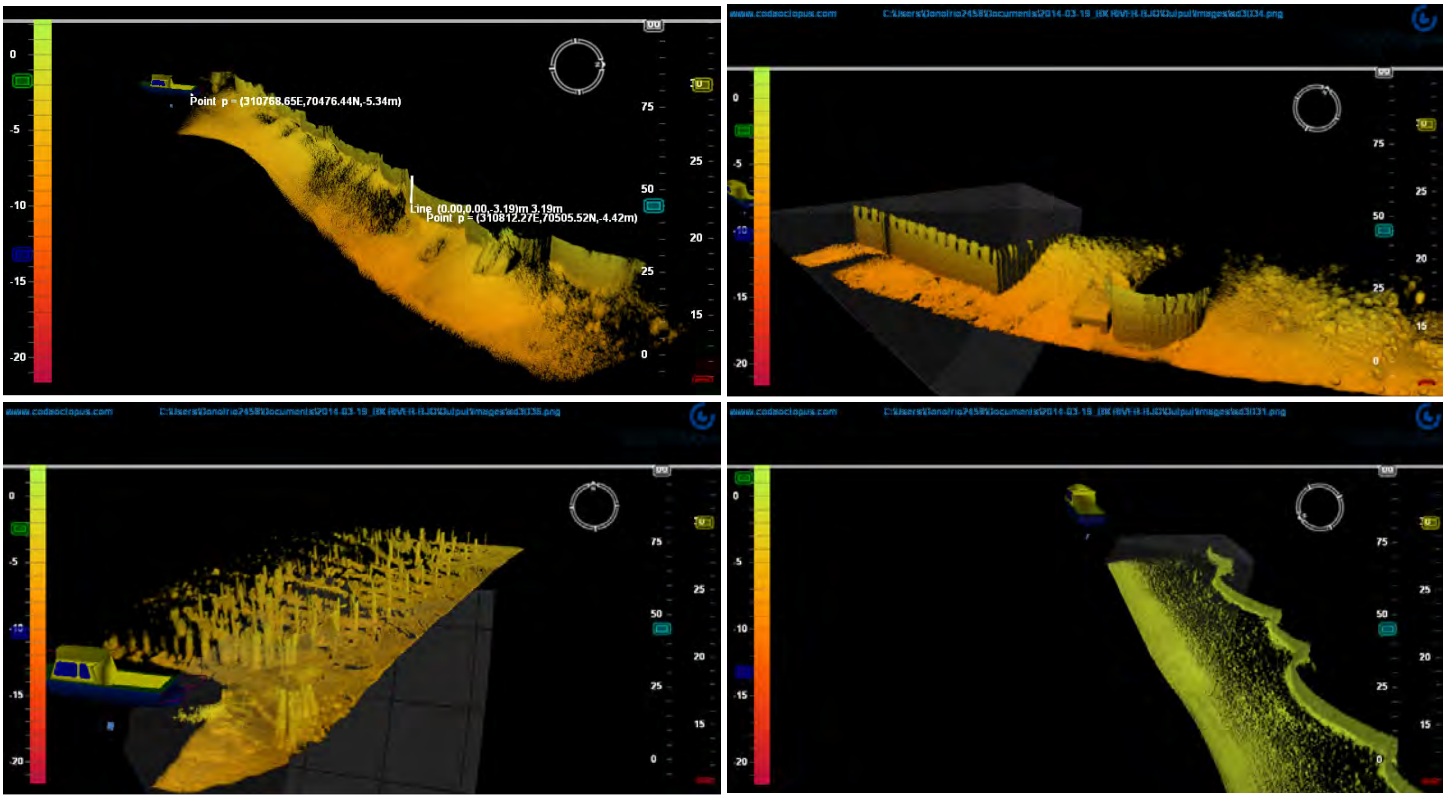
INTEGRATED FLOOD PROTECTION ENGINEERED FOR WAVE HEIGHT AND FETCH



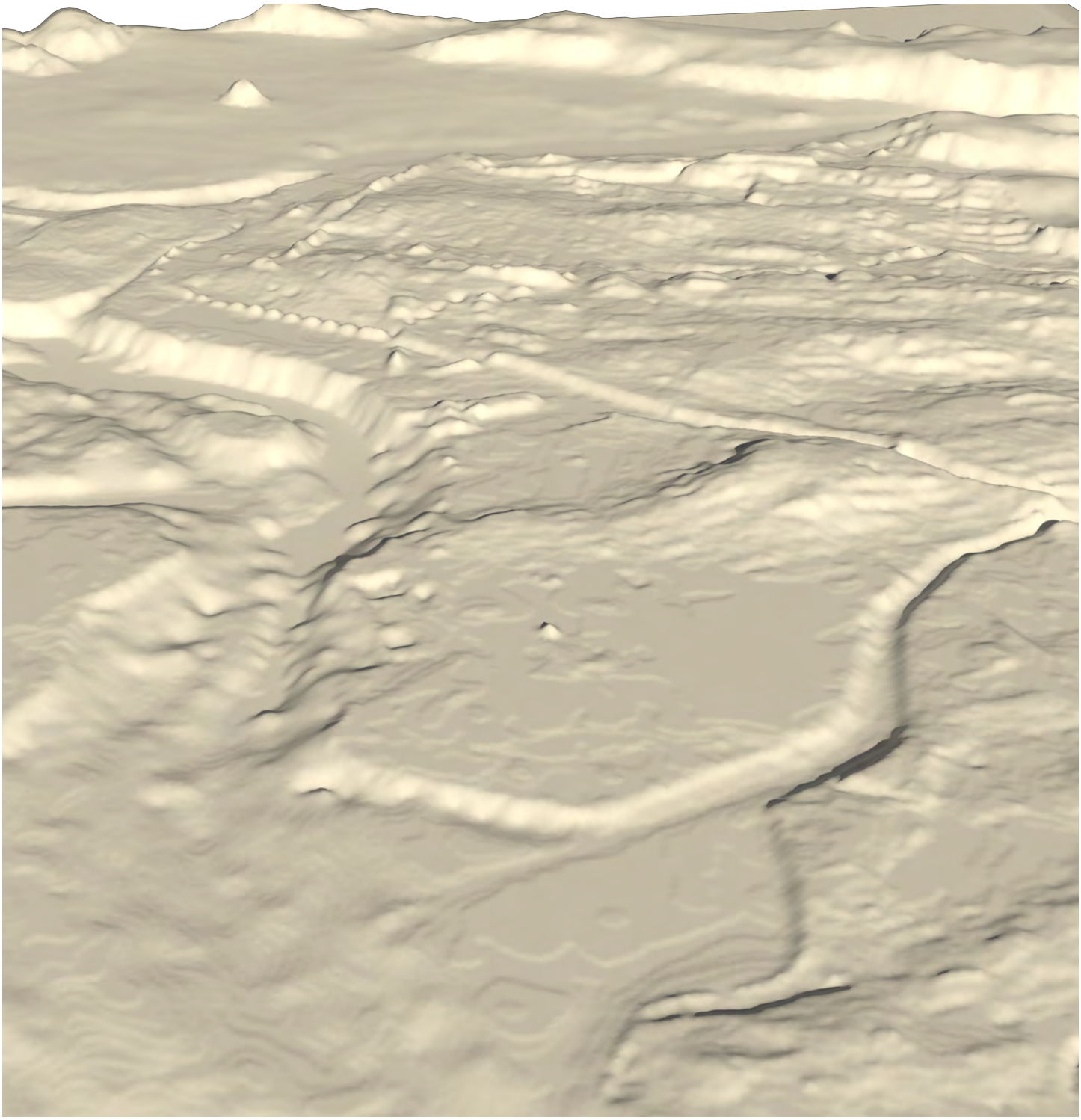
At Hunts Point, the tidal range can be predicted from the information received at NOAA's Hunts Point Station (8518621). This is a reference station from Kings Point (8516945), but the data is locally accurate. The storm surge is generally predicted from advanced numerical models or statistical models using historical data. At Hunts Point, the extreme water level due to storm surge or other effects for varying recurrence intervals can be approximated using NOAA research or the Flood Insurance Study (FIS). The NOAA approximated extreme water levels are provided in the chart below. The extreme water levels shown include a mean sea level rise (SLR) trend of 2.4 millimeters (0.09 inches) per year with a 95-percent confidence interval of+/- 0.24 millimeters (0.01 inches).

The anticipated waves at Hunts Point vary primarily with bathymetry and fetch. The project site is generally exposed to the south and southeast. Wave characteristics (height/period) are a function of the fetch along with the wind speed and duration. Assuming only minor variations in the design wind speed and direction throughout the project site during the storm event, the governing parameter for wave characterization is the fetch length—between a half mile and four miles at Hunts Point. Depending on fetch, the anticipated wave height during the design storm event varies from less than 3 feet to greater than 5 feet.

Bathymetry and waterway shape also play a role. Shallow areas and mud flats along the east coast of Hunt's Point provide some wave protection. However, during events with elevated water levels this protection will decrease. A reduction in the size of a waterway will increase water velocity and surge depth. This condition may occur south of Tiffany Street Pier as the waterway is split by North Brother and Rikers Islands.



Sonar imagery of the Hunts Point peninsula, taken by McLaren Engineering Group for this project, gives a view of underwater structures and slopes to better design site specific protective interventions, according to shoreline structures and morphology



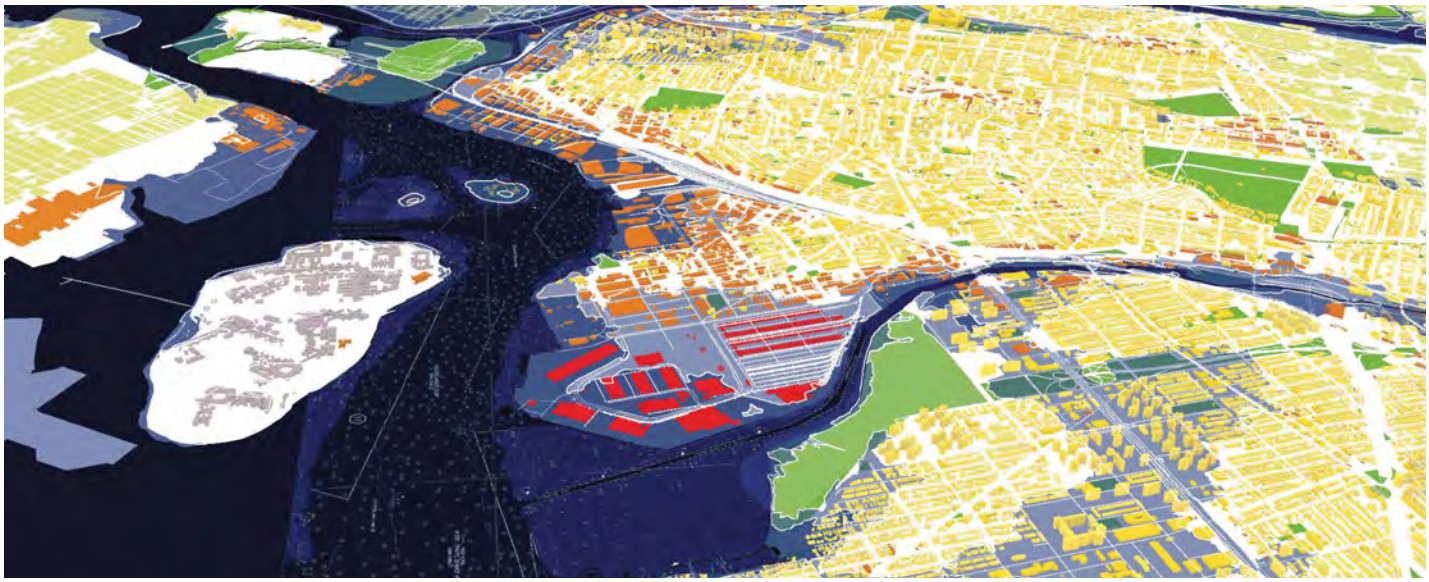
An elevation model of the Hunts Point peninsula shows the variety of water depths and edge heights

FLOOD PROTECTION

Consideration of current and predicted flood heights along with cost benefit analysis leads us to recommend a strategy of multiple flood protection layers. Because highly developed and dependent regional infrastructure, along with jobs and properties, are located in the flood-able lowlands, close to the water, edge defenses are key to anchoring the protection strategy. Other layers, such as roughening the outer edge and developing resilience strategies behind the levee, strengthen the system. The design allows for adaptation if sea level or water dynamics change more quickly than anticipated.

Phased Protection

Flood protection design can be implemented in two phases. The first phase protects the critical infrastructure of the regional food supply and Waste Water Treatment Plant while taking advantage of a contiguous stretch of City agency-owned land along the waterfront. In each phase the levee is designed to tie back to high ground, allowing continuous flood protection for each section.



Overview of flood risk and adjacent land use in the South Bronx, with industry shown in orange, the FDC in red, and residential in yellow

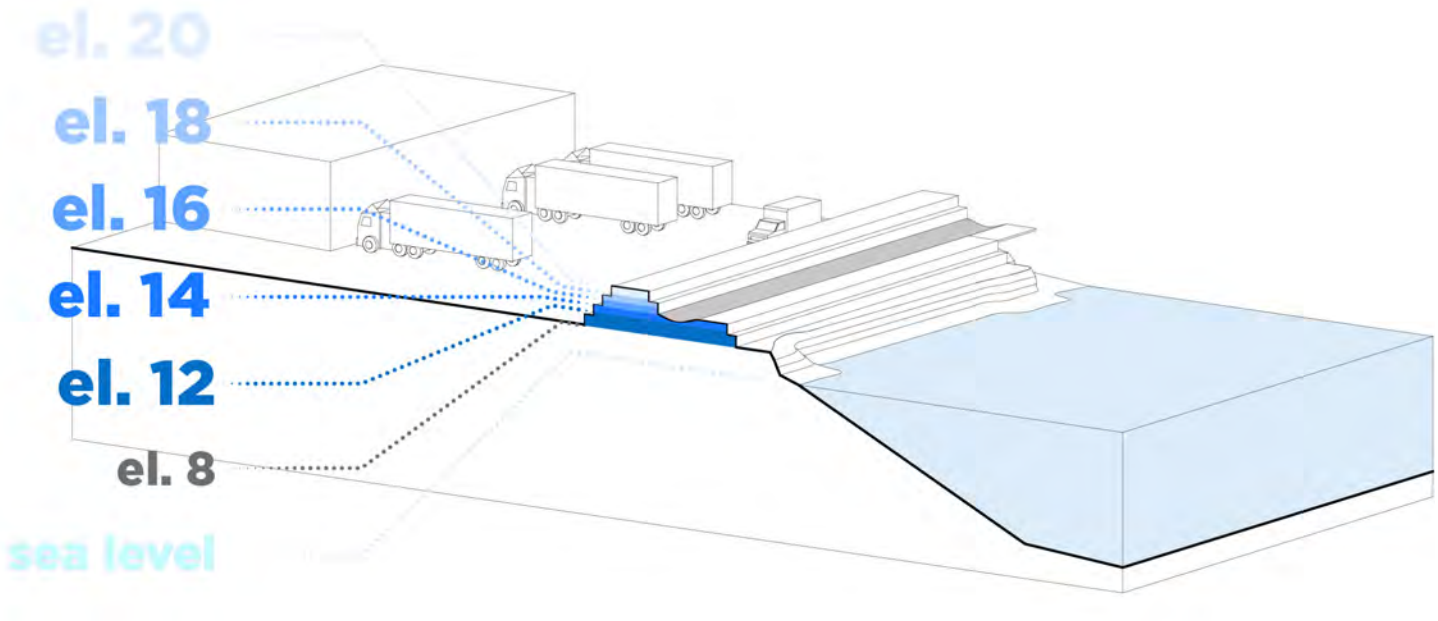
Protection of the SMIA is developed in a two phased approach. Phase 1, protection of the food supply, is recommended for immediate implementation

Flood Protection Parameters

Based on our preliminary Stage 3 technical and cost-benefit analysis, we assume a perimeter flood protection level of 16 feet (NAVD 88 Datum). This elevation corresponds to the current FEMA 100 year Base Flood Elevation (BFE) at the shoreline—in the VE zone. It is also the projected 100 year still water flood elevation in 2050, assuming 31 inches of sea level rise. The flood protection design manages overtopping through a flood ways system.

Overtopping

“Permissible overtopping” is managed by the stormwater design and a limited number of hardening measures that can be integrated with market modernization over the next 35 years, as the sea level rises. Overtopping first occurs when the wave crest is below the flood wall elevation, but the wall elevation is exceeded by the wave run-up. As the wave height or water elevation increases, the crest elevation will exceed the flood wall elevation. Due to overtopping effects, designing the flood wall to the wave crest elevation, which is between 16 and 17 feet based on the FEMA BFE, will not prevent all water from entering the protected system.



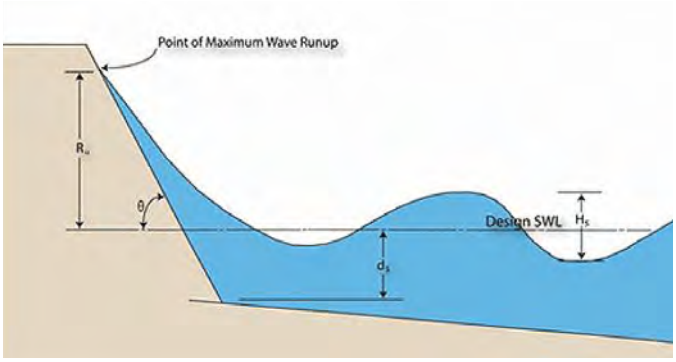
Levee elevation design analysis

The permissible water volume, which is also designated as the allowable overtopping rate, varies depending on structure geometry and the composition (see table to the right). The design considers some wave overtopping to account for sufficient sizing of water management systems behind the edge protection.

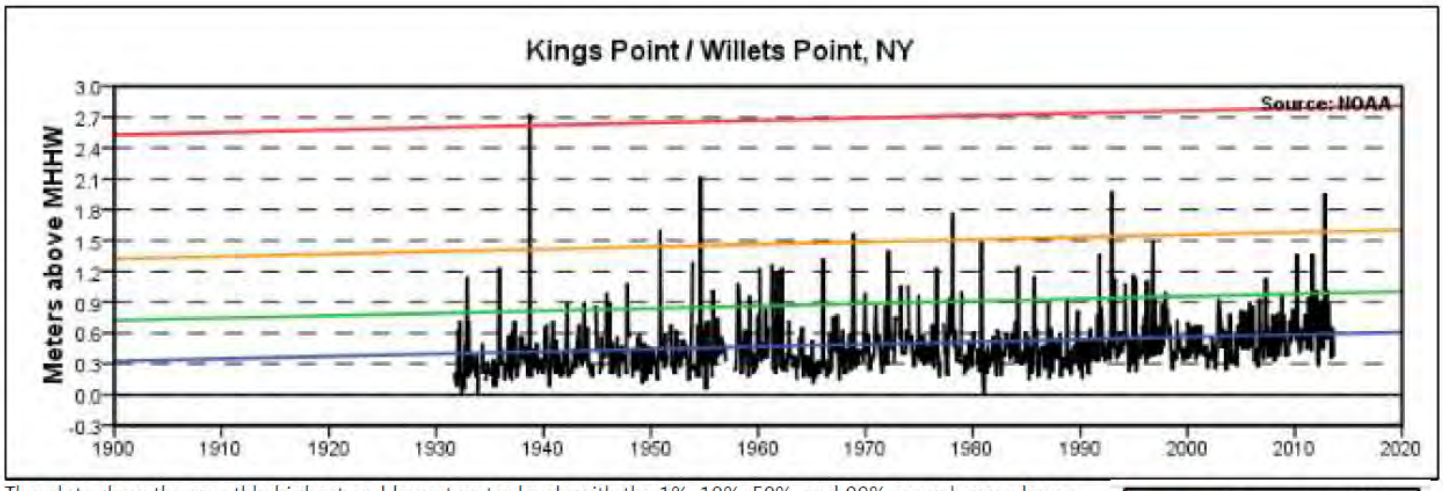
Representative wave heights are estimated at 3-5 feet for the project site. However, because the amount of overtopping is dependent on an array of variables, it will be necessary to perform further coastal analyses to better estimate these variables prior to setting the final flood wall elevation.

Both active (powered) and passive systems for evacuation of the overtopping volumes are recommended. It is important to keep in mind that floodwaters at the site will be influenced by the tides, resulting in fluctuating high water and shorter term flood levels than in purely riverine systems. By preparing for a prescribed amount of overtopping due to wave energy, the design is both more economical and redundant. The redundancy comes from considering the overtopping volume by adding this to the site rainfall volume to arrive at a total number for the system to consider.

Type	Surface Armoring and Other Considerations	Recommended Permissible Overtopping Rate (gps/lf)	Overtopping Volume per Linear Ft		
			(1-Hr Duration)	(2-Hr Duration)	(3-Hr Duration)
Vertical Seawall	Pavement on ground	16.1080	57989	115978	173967
	No Pavement on ground	4.0270	14497	28994	43492
Inclined Seawall	Concrete on front slope, Crown and back slope	4.0270	14497	28994	43492
	Concrete on front slope and crown, with soil on back slope	1.6108	5799	11598	17397
	Concrete on front slope, with soil on crown and back slope	0.4027	1450	2899	4349
Pavement	Interlocking Blocks	0.8054	2899	5799	8698
Vehicles	Stopped or Low Speed	4.0270	14497	28994	43492
	Driving or no damage	0.0009	3.2	6.4	9.6
Pedestrians	Attentive	0.0081	29	58	87
	In-attentive	0.0024	8.7	17.4	26.1
Buildings	Structural Damage	0.0024	8.7	17.4	26.1
	No damage	0.0001	0.3	0.6	0.9



Wave overtopping

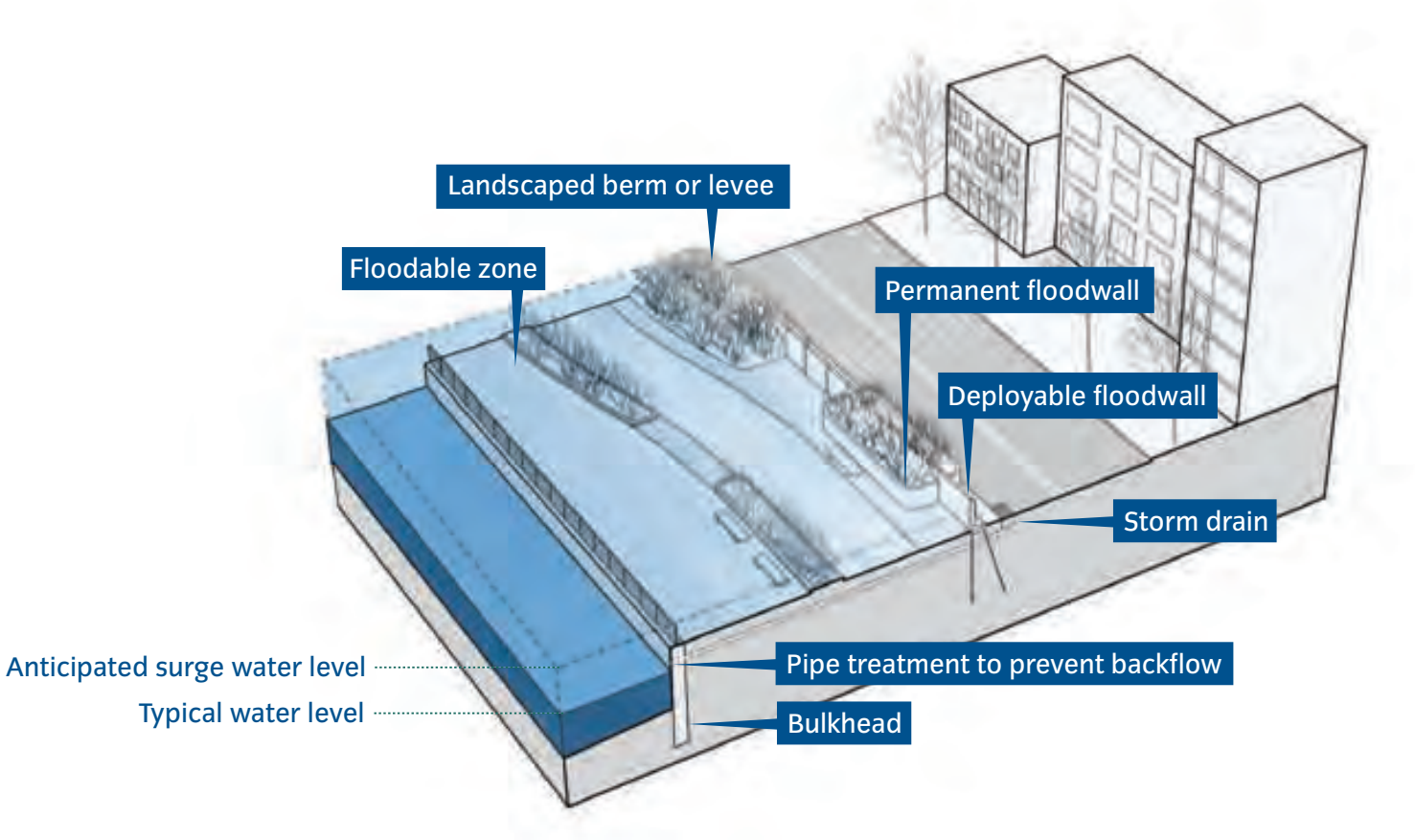


The plots show the monthly highest and lowest water levels with the 1%, 10%, 50%, and 99% annual exceedance probability levels in red, orange, green, and blue. The plotted values are in meters relative to the Mean Higher High Water (MHHW) or Mean Lower Low Water (MLLW) datums. On average, the 1% level (red) will be exceeded in only one year per century, the 10% level (orange) will be exceeded in ten years per century, and the 50% level (green) will be exceeded in fifty years per century. The 99% level (blue) will be exceeded in all but one year per century, although it could be exceeded more than once in other years.

Flood Control Structures

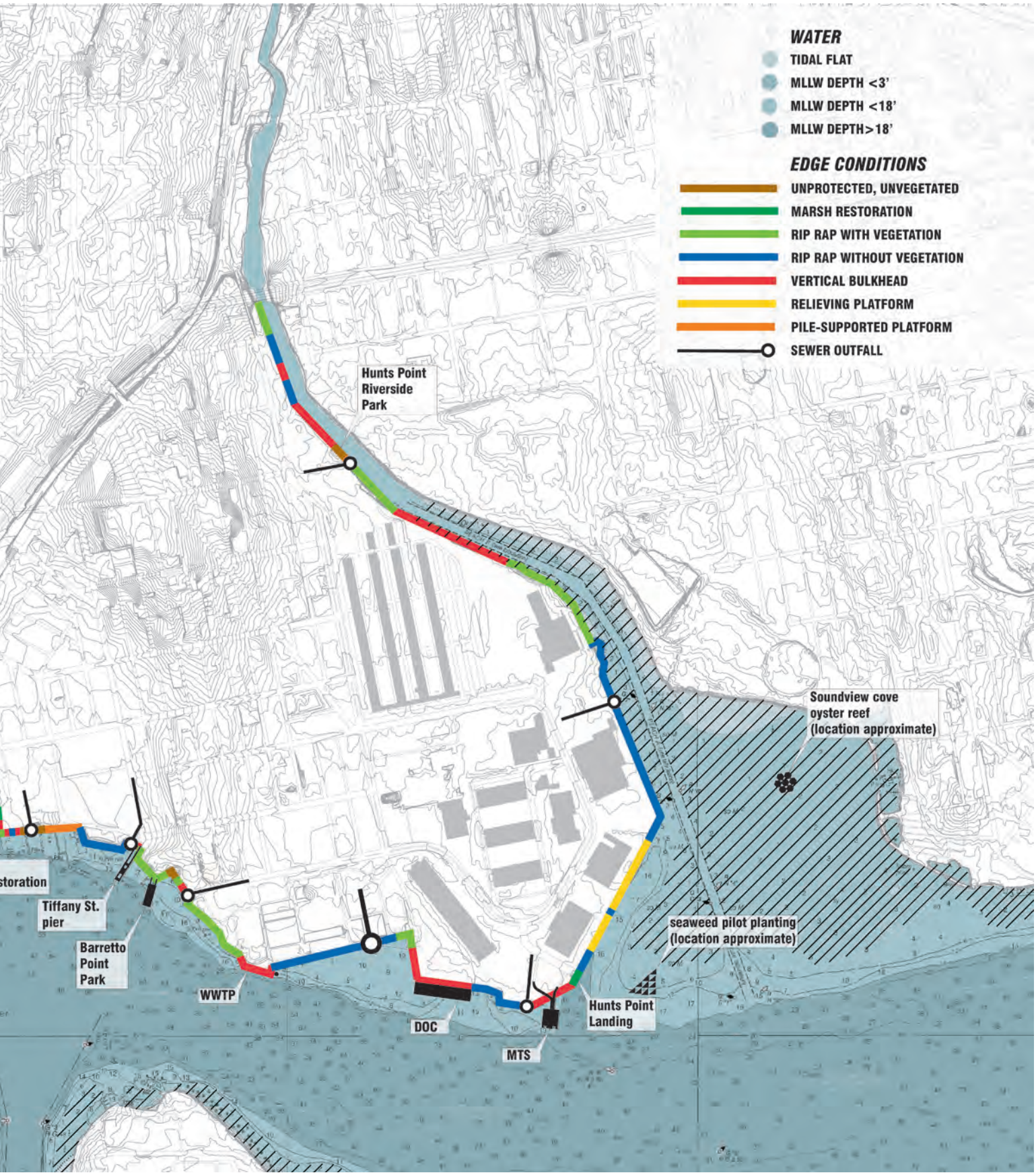
The flood protection design for Hunts Point uses the PlaNYC Special Initiative for Rebuilding and Resiliency 2013 Report's concept of integrated flood protection Designing for flood protection in Hunts Point requires not just an understanding of the water dynamics, but consideration of the necessary industrial operations that take place along the water's edge along with the community goal of integrating a continuous greenway along the waterfront.

Once an appropriate flood design height is set for the varied water forces, design of the edge protection is informed by the amount of space available, necessary security near industrial operations, existing edge construction/condition, and the opportunity to embed constructed ecologies. The existing edge conditions are highly varied around the peninsula and range from rip rap to coffer dam and relieving platform. Likewise, space between the water's edge and the Food Distribution Center property operations and the Waste Water Treatment Plant also vary, from less than 10' to greater than 50'. Based on these conditions and a goal to have a continuous greenway of 15' width, three basic typologies of flood protection are formulated: thick, thin, and adaptive.



INTEGRATED FLOOD PROTECTION SYSTEM
PlaNYC "A Stronger More Resilient New York", Special Initiative for Rebuilding and Resilience Report 2013

INTEGRATED FLOOD PROTECTION
MAPPING OF SHORELINE AND BATHYMETRIC CONDITIONS



Adaptive Edge

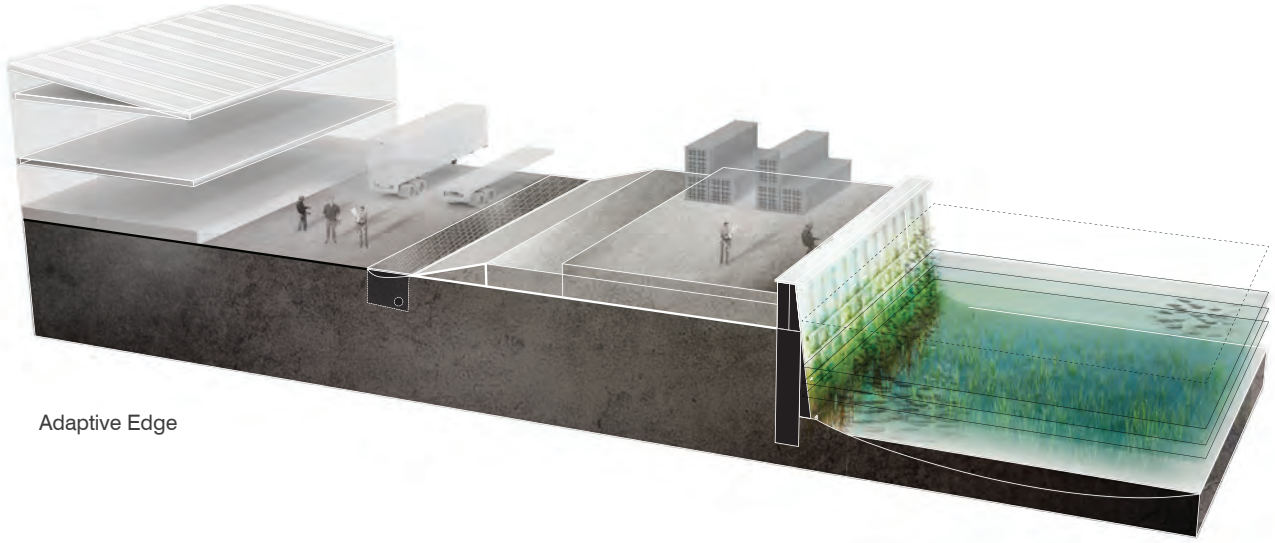
Adaptive edges are located in places where there is either no room to build flood protection on land, based upon industry operations. or at strategic locations where at-grade access to the greenway or waterfront is desired. Adaptive edge protection measures are an active part of the waterfront use that transform into a flood barrier during a storm event. Typically, these structures deploy due to buoyancy forces as flood waters rise. Taking cues from the use of vehicular flood gates that are currently being installed at access openings in flood systems such as levees, the adaptive edges are devised as walkways and public surfaces that automatically react to floods to protect areas or fill in gaps in the adjacent levees and bulkheads. These systems enable simplified access and egress during normal operation while preventing flooding during the design events. Derived from European technologies, the swing-gate and dock-gate structures provide value for everyday use as pedestrian walkways, or floating docks but are deployed into place by rising water levels creating a watertight flood barrier.

Thin Edge

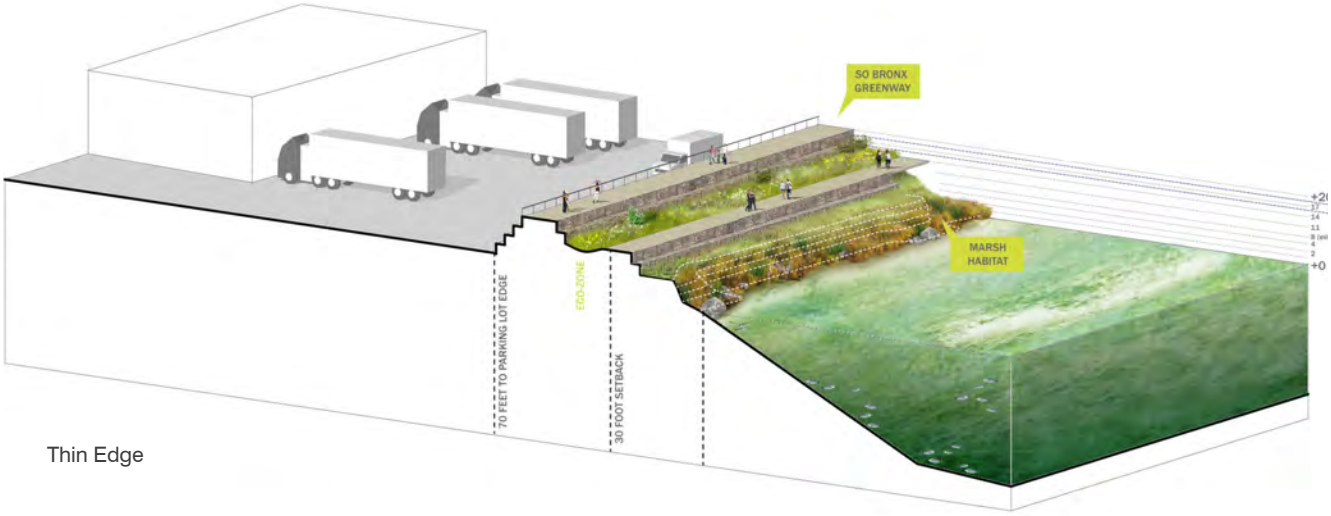
Thin edges are where space is restricted by operations or existing necessary infrastructure and where there is not room to make a more dynamic tidal slope. The flood protection along these thin edges is accomplished either by steep stabilized earth or constructed walls and bulkheads. The thin structures differ from levees in that they are typically constructed directly adjacent to the water boundary; therefore, they can protect assets near the waterway. As they are constructed directly adjacent to the water boundary, these systems are designed to hydrodynamic loads and have higher initial costs when compared with levees. These structures are typically constructed of a concrete wall supported by a steel or concrete sheet pile foundation; however, innovative material uses, combinations, and forms can be tested to achieve a more ecologically productive thin edge than is typically constructed (refer to the levee lab section for examples). Designing these edges to accommodate a generous greenway in a tight space also pushes against the typical notion of a bulkhead, since the walls can be tilted to minimize wave reflectivity and walkways cantilevered to minimize fill in the waterway, all while creating a better sense of open space along the public way.

Thick Edge

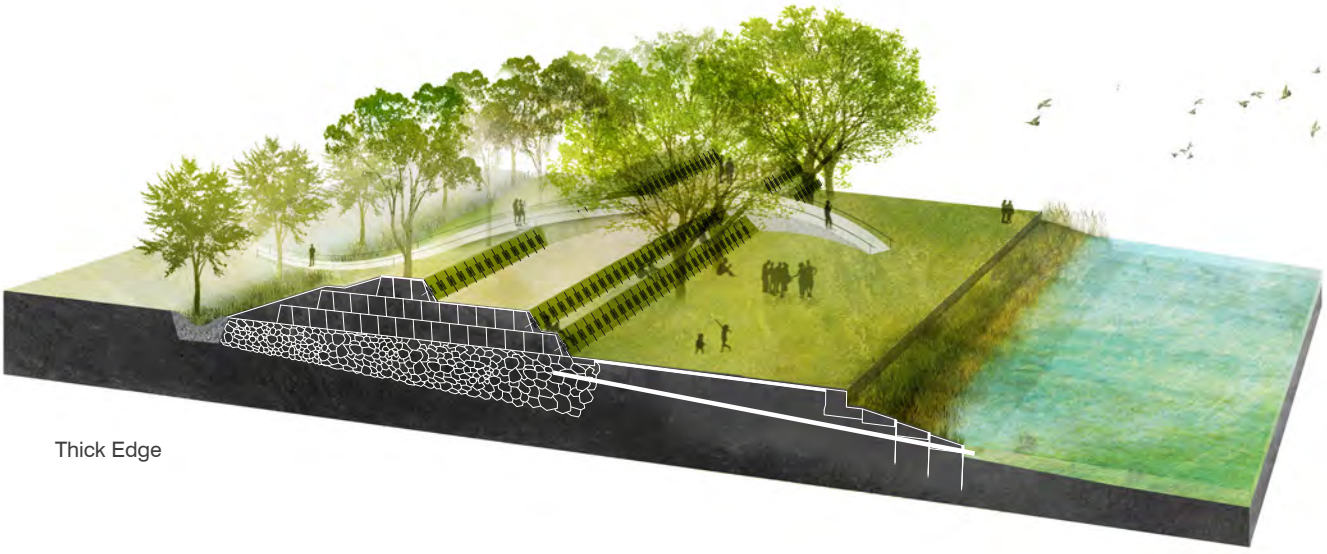
Thick edges are where there is room to cut into land, creating a more tidally dynamic shoreline and building up an earthen berm away from the water's edge. The flood protection aspect of thick edges is most associated with typical levee construction, where the berm is located within the flood plain and not directly adjacent to the water. By constructing the levee slightly inshore, a mild sloping buffer is created during a flood event, which becomes inundated prior to the water level reaching the structure. This buffer provides two important protective measures. The first measure is that the mild slope will induce wave breaking and dissipate wave energy prior to having an effect on the structure. By dissipating the wave energy, the applied lateral loads and anticipated erosion are reduced, thus increasing the reliability and reducing the overall system cost. The second advantage, which generally applies to river flood protection, is that the increased area will reduce the overall flood depth.



Adaptive Edge

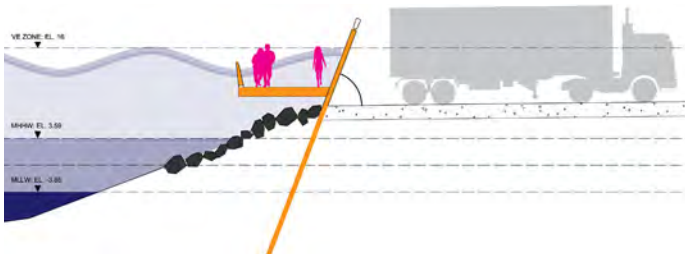


Thin Edge



Thick Edge

FLOOD PROTECTION TYPOLOGIES: Available space for ecology and public use varies



Threading the South Bronx Greenway and integrated flood protection between industry and the water's edge.

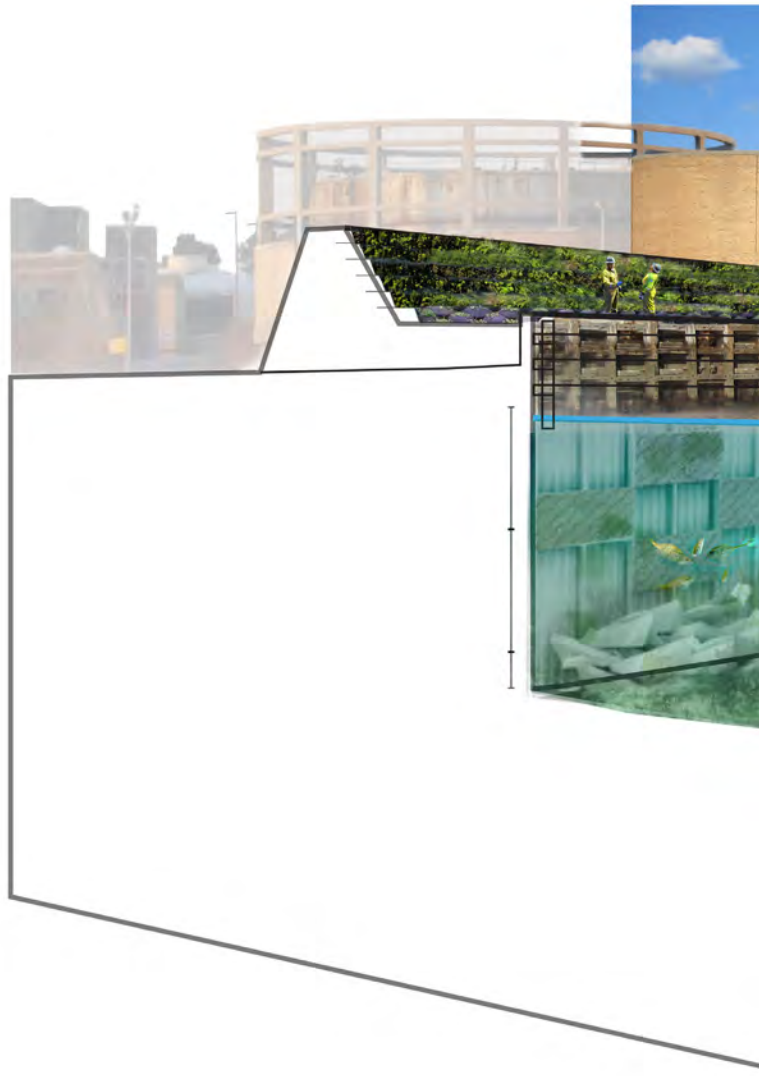
Protecting the Hunts Point Waste Water Treatment Plant

In October 2013, the New York City Department of Environmental Protection (NYCDEP) released the NYC Wastewater Resiliency Plan, which presents a comprehensive assessment of facilities that are at risk from tidal surge and sea level rise. This plan identified all Hunts Point Wastewater Treatment Plant (WWTP) equipment located within the 100 year flood event (accounting for SLR) and options for "flood-proofing" the facility by protecting this equipment, either by sealing buildings, constructing barriers, elevating equipment, or a combination of various methods. NYCDEP estimated this cost of flood-proofing this equipment to be $24.3 million dollars.

NYCDEP's flood protection strategy is a basic strategy that ensures equipment is not damaged and can be used after the 100 year storm surge plus sea level rise has occurred. This strategy, however, does not protect the entire facility or allow for continuing operations during the storm. This can result in combined sewerage backups in the communities directly adjacent to the plant. In order for the plant to continue to operate during the extreme storm, it would need to be incorporated within the IFPS and also receive a new pump station that can discharge the plant's maximum capacity of 400 million gallons per day. By protecting the WWTP with the IFPS and installing a new pump station, no additional resiliency upgrades will be required by NYCDEP.

Hunts Point Waste Water Treatment Plant

Two main edges conditions exist at the WWTP that can be protected by both thin and adaptive strategies, providing protection but also access for the sludge boats to dock and collect their goods.



Perimeter protection of Hunts Point Waste Water Treatment Plant allows barge service transfers and maintains operability of the plant during storms

SOUTH BRONX GREENWAY

The flood protection system is integrated with a waterfront alignment of the South Bronx Greenway, a long-standing project of great community importance that was incorporated into NYC EDC's Hunts Point Vision Plan. The Greenway master plan is integrated with flood protection—an update that reflects new resilience concerns, while respecting the design intent and intelligence of the original plan.

We propose to use the flood protection program and mitigation funding opportunities to help the City create a more generous public space that will link to the Bronx River Greenway, the Harlem River Greenway, and Manhattan greenways via the Randall's Island Connector. These new greenways of the Bronx will open up access to the best open space opportunity on the densely settled borough: the water. The waterfront greenway is connected with the inland neighborhoods through a series of connectors described in the Cleanways chapter.

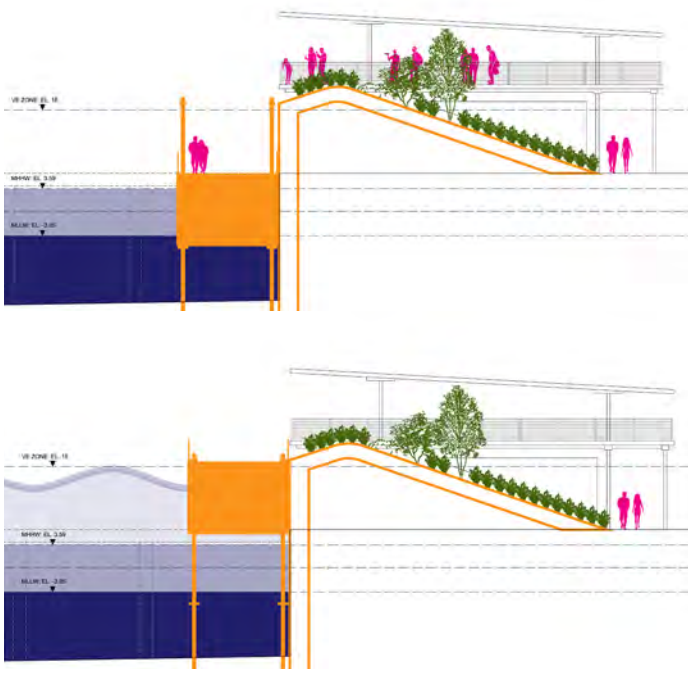
Our design increases the recommended minimum width of the waterfront greenway path to 15 feet, allowing for active bike use and safe separation of speeds in an area of the Bronx that is expected to grow in population significantly over the next 20 years.

The greenway design includes a string of destinations and public amenities such as the sailing program boathouse (proposed by Rocking the Boat) and seafood restaurants (proposed by the Fulton Fish Market)—programmatic proposals that grow from the ideas of local residents and business people. Private and non-profit institutions will be invested in facilities needed to extend their capacities, ensuring these destinations will be better cared for and programmed by real constituencies. The design allows for additional features and programs to be added over time.

An Integrated Flood Protection System for Hunts Point will make it possible to achieve the long-term alignment of the South Bronx Greenway proposed in EDC's phasing plan above and the Hunts Point Vision Plan.

A social levee on the waterfront edge shown in blue (above) will connect the Bronx River Greenway to Riverside Park, Hunts Point Landing, and greenway streets that link to the Harlem River Greenway, Randalls Island and points south.

Hunts Point Vision Plan 2005



Levee profiles at the seafood retail center

LEVEE LAB CONCEPT

Our design proposal for Hunts Point flood protection incorporates an applied research model that we call Levee Lab: a series of designed ecologies, research stations, and critical utilities, all of which will bring life, inquiry and use to the water's edge. The concept of Levee Lab was inspired by the specific assets and constraints of the Hunts Point site and community, and also by a series of experimental ecology projects along the Thames River in London. These projects demonstrated an intelligent approach to scaling up research results to benefit working waterfronts throughout the UK and pioneering a new regulatory framework.

The concept of a Levee Lab has four site-specific rationales in Hunts Point:

1. The shoreline and subsurface conditions of the Bronx and East Rivers along the line of the proposed flood protection system are extremely diverse. Our team's observations from McLaren Engineering's boats, McLaren's past dives and evaluations of Tiffany Pier and the Department of Corrections jail barge, 3D sonar mapping of the 3.85 miles of the Phase 1 levee alignment, and past borings and marine conditions studies for the South Bronx Greenway, indicate a wide variety of construction methods, degrees of structural integrity, uses and assets. Much of the shoreline is in need of investment even if sea level rise and surge are disregarded. Depths range from mud flats to 65 feet just offshore.

New access to the water is brought about through flood protection

2. The success of ecological pilots in the waters of the Hunts Point peninsula demonstrates that this is a promising site for ecological experimentation. The Bronx River oyster reef is the most successful restoration in the estuary, possibly due to the low energy of the shallow mud flats at the river mouth and the reef's proximity to the Sound. Pilot kelp and mussel racks, strategically placed in the current downstream of sewage plant effluent, have grown much faster than anticipated. These projects are poised to be scaled up and replicated after refinement of methods for best cost to output ratio for a range of conditions.

3. Local institutional capacity for creating and monitoring these sub tidal pilot projects and other environmental science and stewardship efforts is exceptional. Community-based organizations have actively participated in the creation, management, and monitoring of habitat in collaboration with research institutes. All of the local organizations involved—Rocking the Boat, The Point, Youth Ministries for Peace and Justice, Sustainable South Bronx, The Bronx River Alliance—involve youth aged 14 to 24 in the work, and offer education programs and career development support. All extend their capacity and reach by actively collaborating with wider partnerships for improvement of the estuary like the Harbor Coalition, the Natural Resource Group of the NYC Department of Parks, the Harbor School, NYC Environmental Justice Alliance and others.

4. There is a strong local appetite for environmental action and aesthetics in Hunts Point and the South Bronx. The long line of the Greenway will better express locality—the genius of the place—and attract greater devotion if it embraces the local imperative for ecological performance.

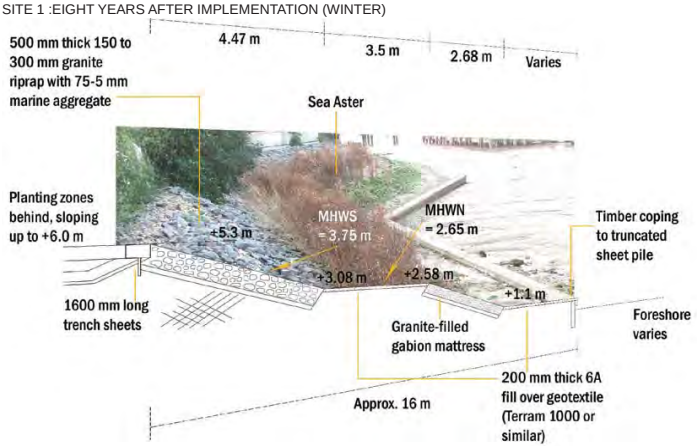
PRECEDENT FOR LEVEE LAB APPROACH IN THE UK

The concept of levee lab was also inspired, in part, by a series of experimental projects along the Thames River and an intelligent approach to scaling up the benefits throughout working waterfronts in the UK by using them to pioneer a new regulatory framework.

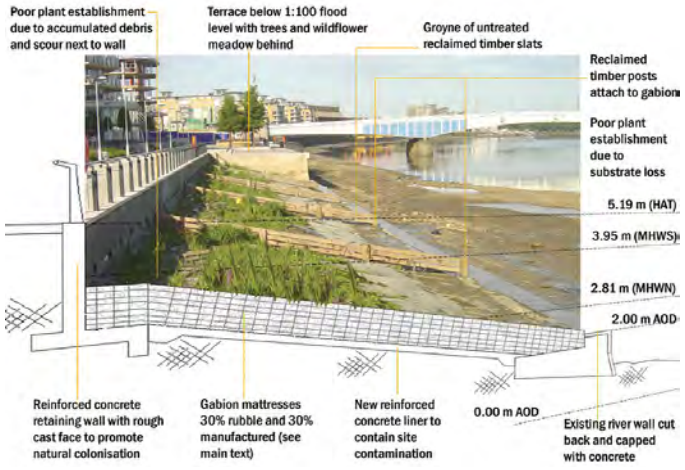
Beginning in 2006, Biodiversity by Design, an ecology consulting firm based in Bath, UK, worked with the Thames Estuary Partnership to create a series of experiments in tidal river restoration along the varied working waterfronts of the Thames River. These experiments aimed to create ecological resources within the narrow confines of a hardened industrial waterway, with a focus on practical strategies for retrofitting and creating vertical (or near vertical) edges that support both water-dependent commerce and ecological function. Rigorously monitored and evaluated, the experiments added to a larger body of research regarding ecological resiliency within tidal rivers, particularly within urban areas. Biodiversity by Design's research was compiled in a how-to manual called "Estuary Edges: Ecological Design Guidance", which was adopted by the federal government as the national guidelines for development along tidal rivers in the UK. The Thames guidelines were crucial in pioneering new regulatory directions and clarifying mandated compensation for ecological impacts of development.

BARKING CREEK AT BARKWOOD BARRIER:
DETAIL OF BRUSH PACKING

GREENWICH PENINSULA, LONDON:
SITE 1 :EIGHT YEARS AFTER IMPLEMENTATION (WINTER)



BATTERSEA BEACH, THAMES, LONDON:
GABION MATRESS



DEPTFORD CREEK, LONDON:
TIMBERING TO RIVER WALL

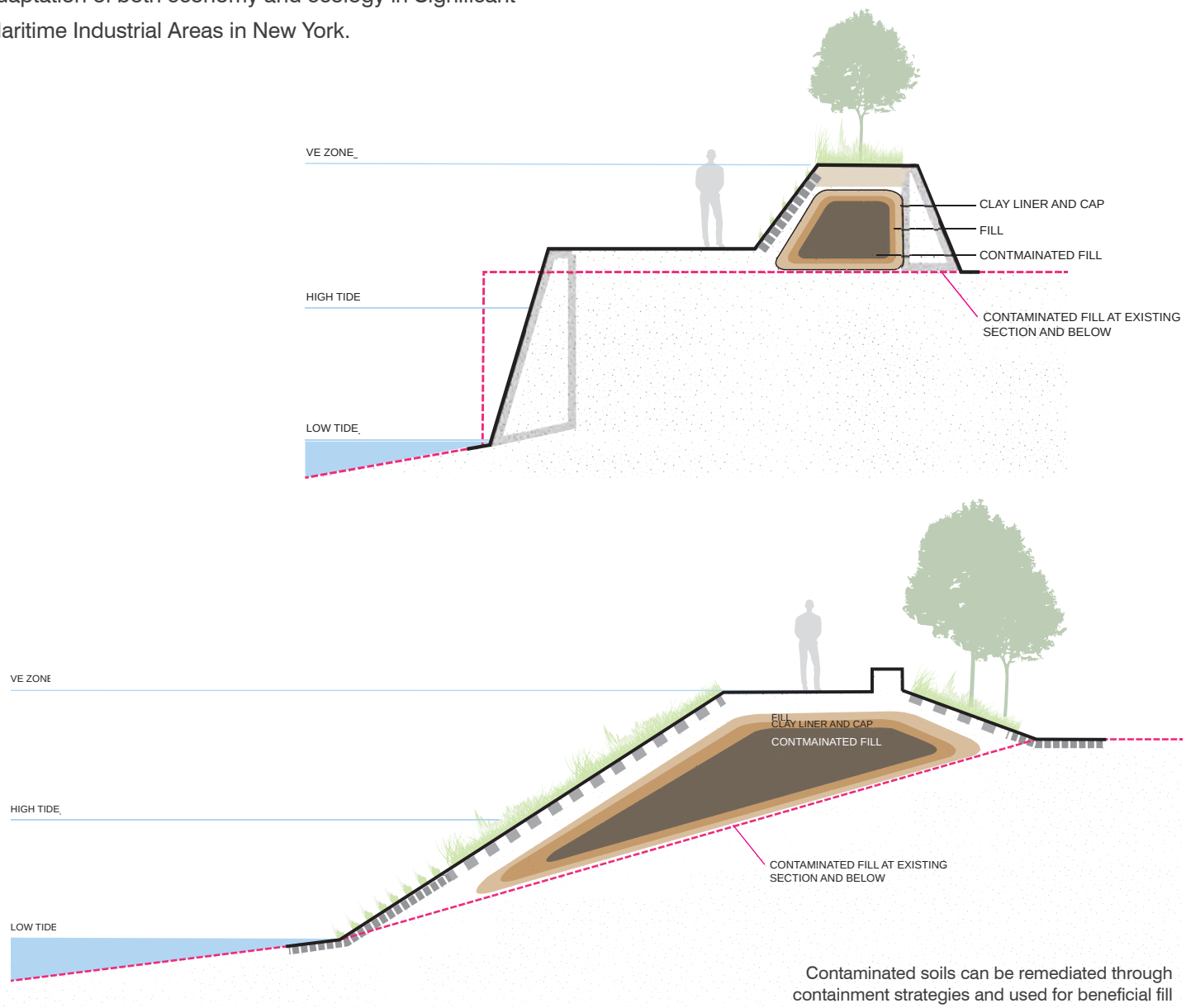
Thames Estuary Partnership 2006

REGULATORY INNOVATION FOR CLIMATE ADAPTATION IN MARITIME AREAS

In initial meetings with the NYS Department of Environmental Conservation, Region 2 leadership expressed interest in the potential for adapting the Thames approach to the New York working waterfront and confirmed our team's sense that Hunts Point was a promising location based on the diverse mix of conditions, the success of ecology pilots projects in the area, and local capacity for environmental monitoring.

Adaptation of the Thames approach could provide much-needed information to environmental regulators and, ultimately, the markets concerning conditions of waterfront redevelopment in light of new resilience imperatives. This information is critical for stimulating reinvestment and adaptation of both economy and ecology in Significant Maritime Industrial Areas in New York.

The NYS DEC's interest in incorporating climate adaptation into the State's regulatory framework creates a major opportunity for public / private partnerships to create innovation. Such partnerships may extend to beneficial reuse of contaminated soils as a levee building material. NYS DEC's pioneering agreement with Steve Smith / Brightstarr Homes to clean a contaminated waterfront site in Oak Point by using soils to elevate a development pad above the floodplain and create a wetland shoreline is exemplary. Similar potential exists at Hunts Point and may be of interest to ConEdison, which has a voluntary cleanup agreement with New York in connection with its former coal gasification works at Hunts Point.



Contaminated soils can be remediated through containment strategies and used for beneficial fill

PALETTE AND EXPERIMENTAL APPROACHES

The Levee Lab approach focuses on two kinds of experiments: materials innovation, and construction and management innovation connected with jobs, as outlined in the Livelihoods section.

1. MATERIAL INNOVATION

Because the length of the flood protection edge is long (4 miles for Phase 1, 3 miles for Phase 2) and the uses are practical, we have assumed that a considerable stretch of the integrated levee and greenway will use an efficient, or "workhorse," palette of materials and apply design to create the most interesting experiential and ecological effects with those materials. In selected areas, we also propose to experiment with new materials and techniques, rigorously evaluating the effects to determine if the materials merit wider testing and application. With support and time for survey work to advance feasibility and design, we will focus effort on selecting the appropriate materials from a deeper inventory and developing site-specific applications of Levee Lab. Workhorse and experimental material palettes are shown on the following pages.

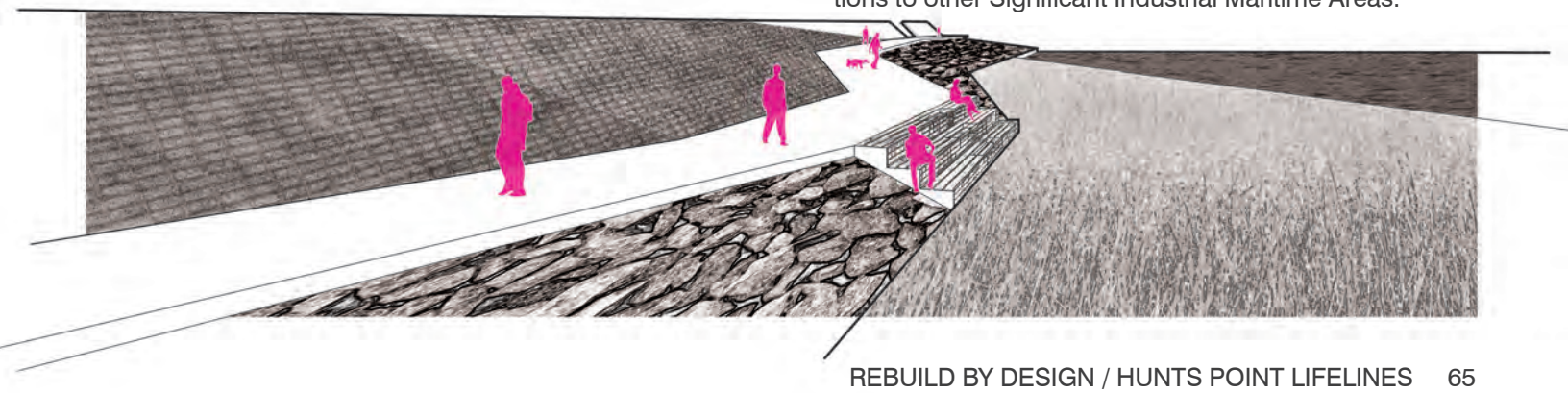
The locations for experimentation will likely be dictated by constraints that make standard approaches awkward. For example, in preliminary meetings with NYS DEC, we were told to investigate alternatives to fill involving cantilevered decks and decking on light structure where operations make it impossible to build the greenway on land. Problem solving for selected locations involves accommodation of loaded freight trains on top of a coffer dam, sludge boat service to the waste water treatment plant, and other pragmatics of the working waterfront and intermodal access.

In the design phase, we may expand the expertise of the team and recommend some fees for consulting and peer review of experimental designs to ensure that the experience of colleagues at Biodiversity by Design and SCAPE are incorporated into the design of the integrated flood protection system. These consultations in the feasibility stage may well lead to designed experiments, authored and documented by other experts, but integrated into the flood protection system.

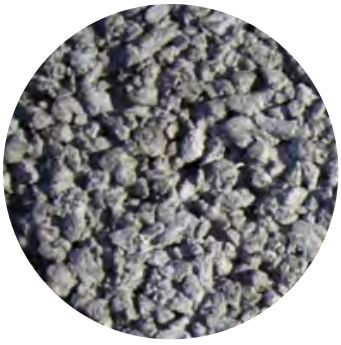
2. CULTURE SHIFT

The second component of the Levee Lab concept is integrating community participation in climate adaptation to understand its dynamics and risks, and to benefit from the investments government is making in resilience—without compromising the integrity of a flood protection project or the intent of procurement safeguards. A range of possible options for local participation are outlined in the Livelihoods chapter.

Levee Lab imagines a backbone of workhorse materials with an overlay of smaller projects that test replicable strategies for material innovation. Similarly, we propose a strong flood protection armature that will be built by well-insured construction companies. This armature can also be designed to support appropriate contributions to the built project, especially its "afterlife" as a lived and maintained place of importance to a community. Ongoing monitoring of ecological productivity is one of the major roles the Levee Lab creates, by focusing attention on study, documentation, and technical transfer of innovations to other Significant Industrial Maritime Areas.



LEVEE LAB: Workhorse material palette



PERMEABLE CONCRETE

-Little or no fine aggregate creates voids for storm water infiltration
-Permeable concrete Flow rate is generally 2 to 18 gal/min/ft sq., depending on void sizes
-Federal and NYC agencies are testing the material

PERMEABLE ASPHALT

-Little or no fines creates voids for storm water infiltration
-EPA testing shows it retaining the 25 year
-24 hour storm
-Federal and NYC agencies are testing the material

GABION AND MECHANICALLY STABILIZED EARTH

-Effectively stabilizes very steep slopes
-Filler material can be recycled
-Vegetative growth can be promoted through mesh

EPA - EDISON TEST LOT, NJ

PERMEABLE AND NON-PERMEABLE

VEGETATED MSE

KEN SMITH - BAM PLAZA, NYC

TOPOTEK-SUPERKILEN, COPENHAGEN

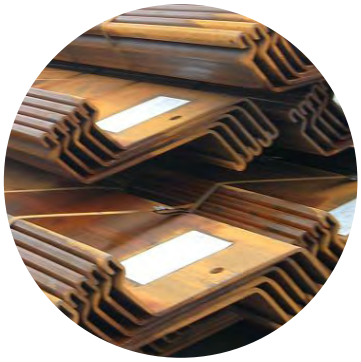
WEISS/MANFREDI - O.S.P., SEATTLE

RIP RAP

-Easily sourced basic construction method for slope retention and wave attenuation
-Large voids promote habitat creation
-Recycled concrete can be used as an alternative rockery

FASCINES AND LIVE FASCINES

-Low labor and material costs
-Installation is not complex
-Can hold 1:2 slopes
-NY DEC has specifications for this material



STEEL SHEET PILES

-Universal construction material
-Cost effective for large scale earth retention
-Able to hold very large weight loads in vertical position

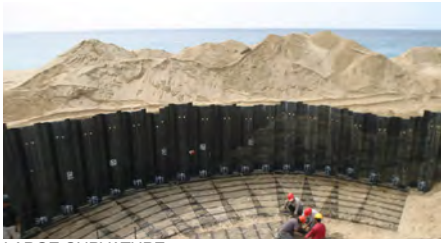
MVVA - BROOKLYN BRIDGE PARK, NYC

REKLTIVIERGUN, DENMARK

INTERDIGITATED HEIGHT PATTERN

REUSED CONCRETE - WRIGHTS BEACH, NC

REKLTIVIERGUN, DENMARK



LARGE CURVATURE

LEVEE LAB: Workhorse material palette

CONCRETE AND GLASS CRIBBING

-Basic engineering technique for stabilizing slopes
-Cribbing technique allows for variety of backfill materials
-NYS DOT has specifications for concrete cribbing

STEEL SHEET PILES

-Modularity of material gives needed structural flexibility in shaping levee system and water's edge
-Crenellated surface holds promise for ecological fittings

SHEET PILE REINFORCED CONCRETE

-Universal construction material
-Combination of materials allows for curvature, verticality, and strength that are highly effective in surge attenuation

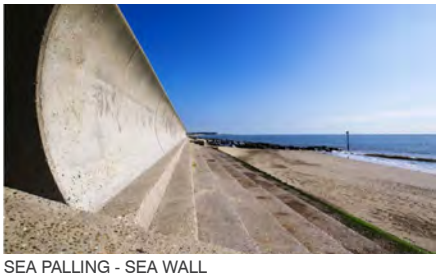
CONCRETE CRIBBING INSTALLATION

HEIGHT AND CURVATURE VARIABILITY

SEA PALLING-SEA WALL

SHORELINE CRIBBING

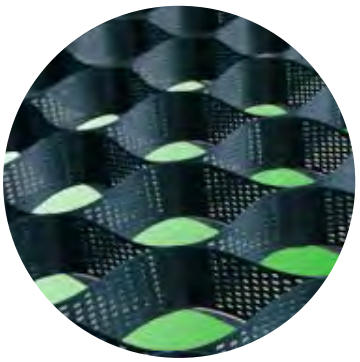
TONY HOBBA ARCHITECTS-3RD WAVE KIOSK



SEA PALLING - SEA WALL

COIR NETTING

-Natural coconut husk fiber, 100% biodegradable
-Netting is planted with organic material that adds to overall strength of the material
-Rolled coir is netting can be effectively staked with live fascines



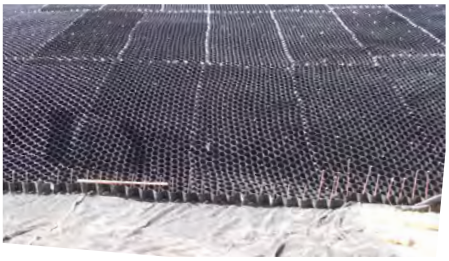
GEOCELL

-Can hold 1:1 slopes
-Promotes drainage and vegetative growth
-Technology developed by US Army Corp of Engineers, used and tested since the 1970s

OYSTER SHELL MULCH

-Source of calcium carbonate that can enrich coastal soils
-Oyster shell recycling programs exist in multiple US states
-Experimental oyster reefs in NYC waterways could be source for this material

STAKED NETTING



STEEP SLOPE INSTALLATION

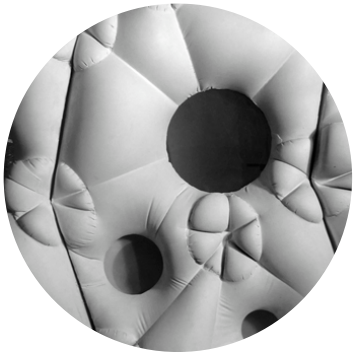
OYSTER SHELL MULCH WITH NATIVE PLANTS

WOODS HOLE GROUP - SEABURY, MA

PEG/OLA - GEOCELL PLOT, PHILADELPHIA

WEST 8 - EAST SCHELDT SURGE BARRIER

LEVEE LAB: Experimental material palette



SEMI-PERMEABLE FABRIC FORMED CONCRETE

-Installation of material is inexpensive
-Permeability of fabric creates a more durable concrete with fewer surface defects
-Ability to easily create perforations in concrete that relieve hydrostatic uplift

LAND TILES AND CONCRETE JACKS

-Precast elements are highly replicable
-Casting technique allows for rigorous testing of different chemical compositions of tiles
-Interlocking pieces create relational strength

SCORED CONCRETE PANEL FOR MARINE COLONIZATION

-Allows vertical elements to be effectively colonized by marine life
-Concrete scoring in place or precast is easy and inexpensive
-Active experiments with material exist in NYC

ALLEGHENY RESERVOIR, NEW YORK STATE

MARCELO SPINA - SCI ARC INSTALLATION

U OF WASHINGTON - FISH HABITAT PANEL

JAPANESE SLOPE ENGINEERING

CONCRETE JACK INSTALLATION-UAE

KEN SMITH - EAST RIVER, NYC

E-CONCRETE

-Concrete is precast with pockets to hold marine life
-Chemical composition of concrete is adapted for marine growth
-Interlocking pieces create relational strength

ECONCRETE SHORELINE STABILIZATION

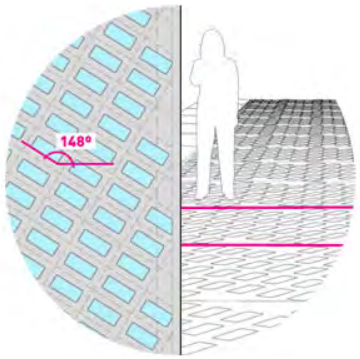
MARINE GROWTH ON SURFACE

RECYCLED PLASTIC FISH HABITAT STRUCTURE

-Recycled plastic is inexpensive
-Construction method is easy
-Developed in field by fishermen and ecologists
-Could be source of local jobs

HABITAT STRUCTURES - LAKE JULIA, PA

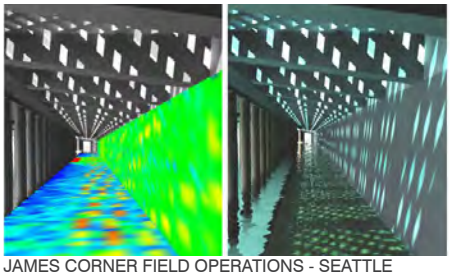
ALGAE COLONIZATION



LIGHT PENETRATING DECK

-Reduces shading under outboard walkways along shoreline
-Opportunity for art intervention with light and glass
-Wall below deck has aquatic growth textures

JAMES CORNER FIELD OPERATIONS - SEATTLE



JAMES CORNER FIELD OPERATIONS - SEATTLE

LEVEE LAB: Experimental material palette

EXPRESSED TIE BACK RODS

-Technique performs at all building scales
-Holds great possibility for ecological fittings
-Effectively pins down mat vegetative surfaces

GEOTUBES FOR CONTAMINATED FILL

-Can effectively contain contaminated soils sub grade
-Relatively inexpensive method of containment that can span large areas

SCAPE SIMs PIER

-Existing experimental test site within Sunset Park SMIA
-SCAPE'S experimental fuzzy rope is intended to promote the growth of marine life on its surface

TIEBACK EXTENSIONS

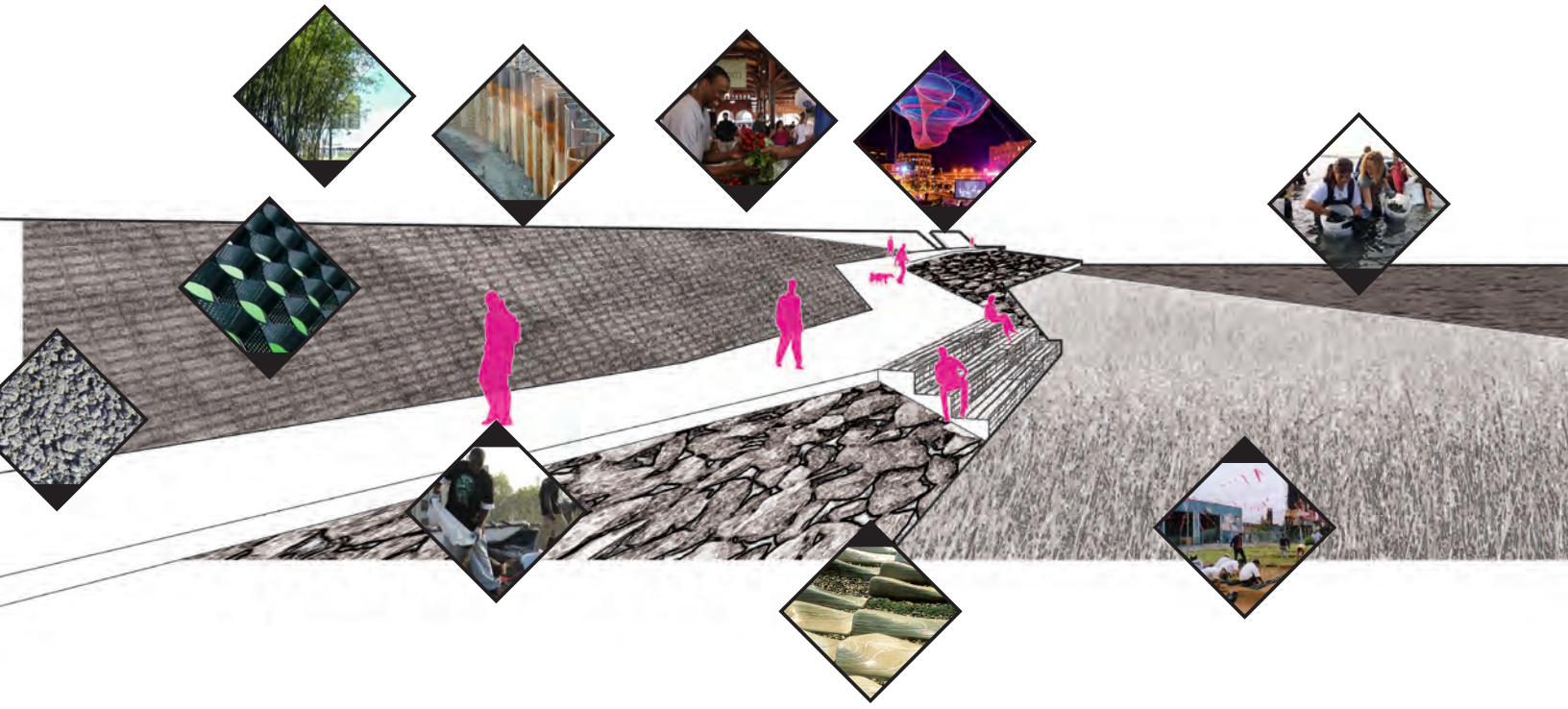
IMPERMEABLE SURFACE

FUZZY ROPE AT SIDE OF PIER

PINNED MAT VEGETATION

COVERED WITH RIPRAP

SIMS PIER AS BUILT



STORMWATER DESIGN

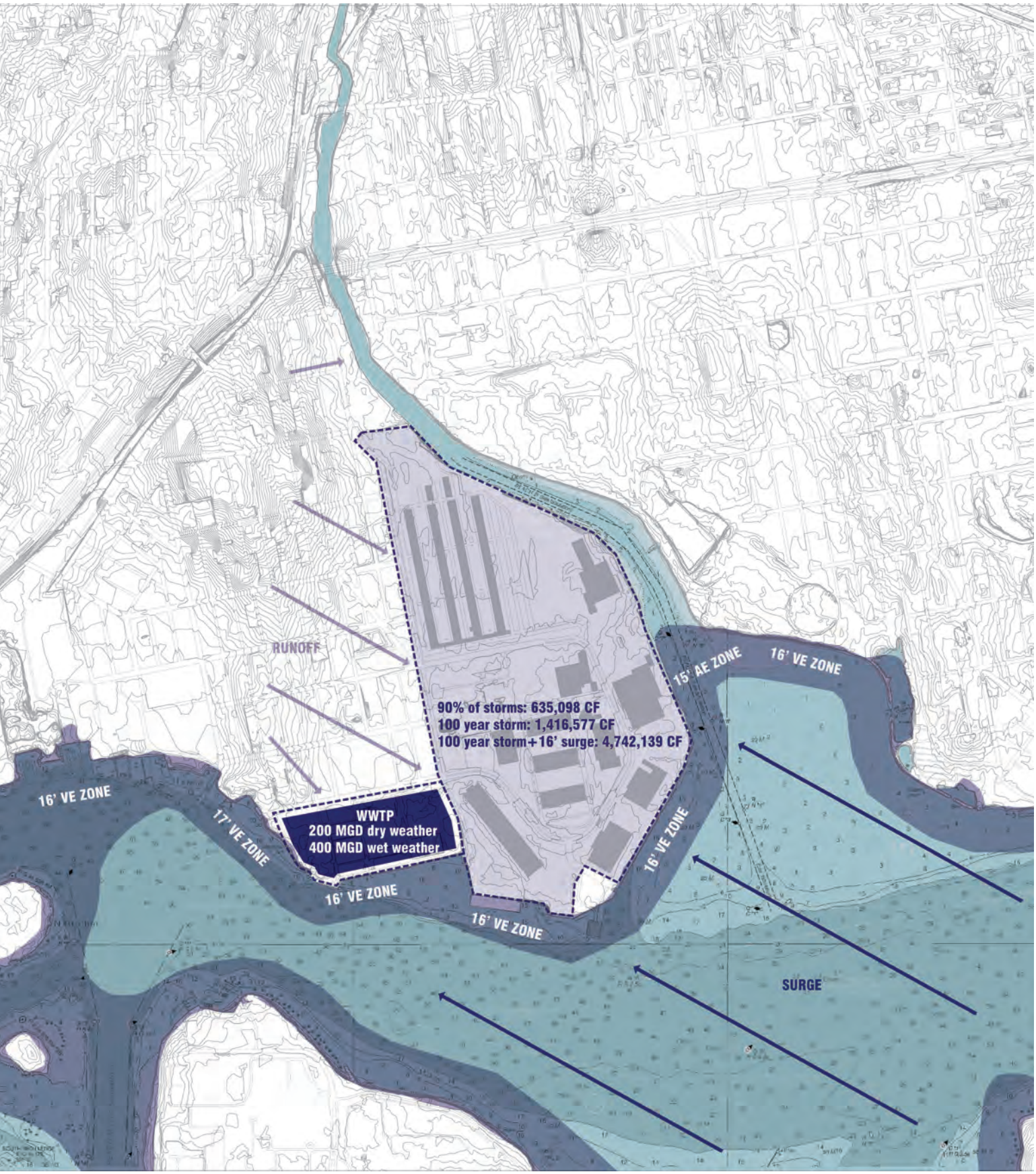
Protecting Hunts Point at the edge alone is not enough to prevent flooding; inland stormwater must also be managed. A system of high volume stormwater treatment wetlands is proposed to avoid the flooding of necessary infrastructure in storm scenarios where there is a large amount of rainfall that could create a bathtub effect behind the surge protected edge. These stormwater features are also designed to improve water quality and habitat in typical storms.

Stormwater Design Parameters: Sandy Meets Irene

The treatment wetlands are all designed to control two types of rain events: first, the rainfall event that corresponds to the New York State Department of Environmental Conservation's (NYCDEC) Water Quality Volume, or the runoff resulting from the 90th percentile rainfall event; and second, the 100-year 24-hour rainfall event.

Using data provided by the NYSDEC, a 1.23 inch rainfall depth was estimated as the 90th percentile rainfall event for Hunts Point. The treatment wetlands were sized to manage the Water Quality Volume through a 24-hour detention period as per the NYSDEC's stormwater management guidelines.

In addition to being sized for the NYSDEC Water Quality Volume, a stormwater model was created to determine the volume required for the treatment wetlands to manage the 100-year rainfall event. Using data obtained from the National Oceanic and Atmospheric Administration (NOAA), a typical 7.2 inch, 24-hour rainfall event was created based on the NRCS (National Resources Conservation Center, formerly SCS) Type III rainfall distribution. All treatment wetlands were modeled with a tide gate at each outfall and with tide data obtained from NOAA's tide monitoring station at The



Battery. By running the model, the treatment wetland depths were adjusted to allow all stormwater to be managed throughout the duration of the 100-year storm.

To prepare for the worst case scenario, hydrologic design parameters were used to model the “extreme” storm event where a 100-year, 24-hour rainfall event occurs during a 100-year storm surge plus 31 inches of sea level rise (SLR). For this event, the same 100-year rainfall event was simulated and the tide data were modified to match the 100-year storm surge plus 31 inches of SLR.

Tidal modifications were made by obtaining the maximum surge that occurred at The Battery during Hurricane Sandy and subtracting it from 16, which is the 100-year tidal surge plus SLR. This difference was then added to the 24-hour tidal cycle that occurred 12 hours before and 12 hours after the time of the maximum surge. To model the extreme scenario, the time of the maximum surge was placed to occur around the time of peak runoff. By running this hydrologic simulation, the treatment wetlands did not have the capacity to manage all stormwater. For stormwater to be managed in such an extreme event, pumps would need to be used to overcome the high pressure occurring from the tidal surge. Another option is to allow for parking lots adjacent to the treatment wetlands to flood for a short period of time, thus avoiding the use of pumps. This option will be studied further during Stage 4.

Catchments and Conveyance

A preliminary hydrologic and hydraulic analysis of the Hunts Point peninsula indicated that excessively large channels, with widths exceeding 400 feet, would be required to manage peak flow rates resulting from a 100-year rainfall event throughout the peninsula. To better manage stormwater, the team created sub-catchments within the peninsula. These sub-catchments were delineated based on: (1) Existing conditions; (2) available area for stormwater management; and (3) feasibility for proposed topographic changes.

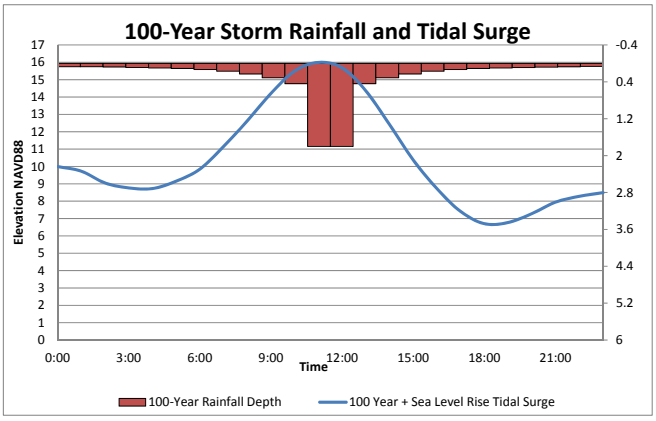


Figure 2: Rainfall and tide data inputted in model for "extreme" storm event.

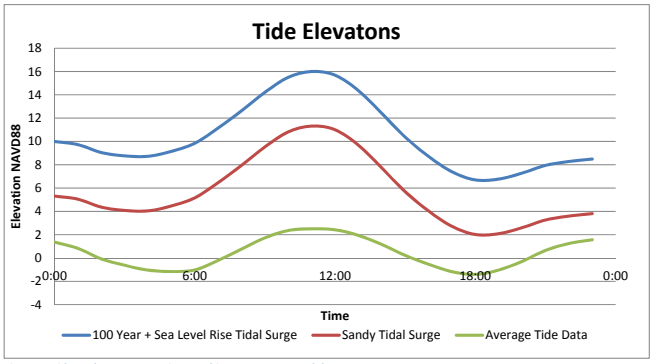
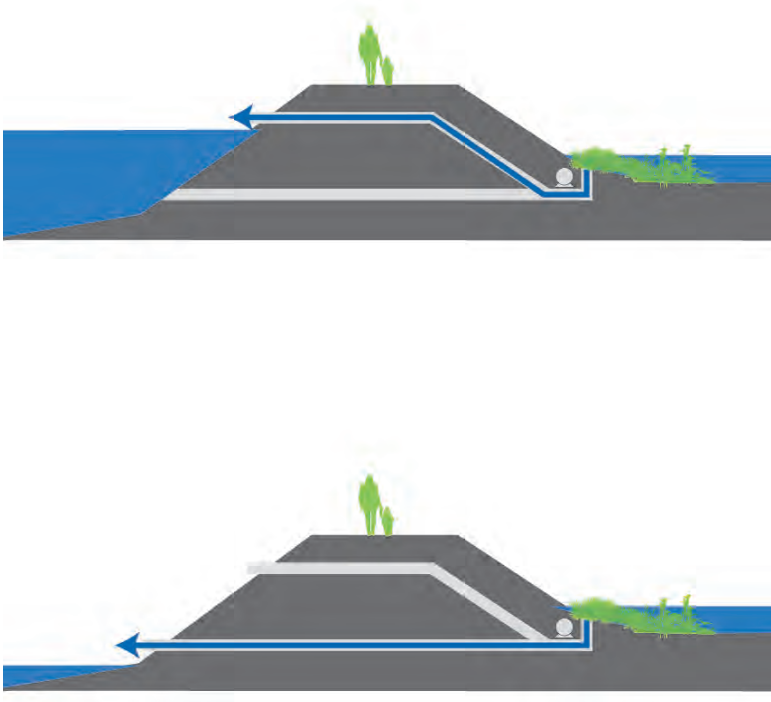


Figure 1: Tide Cycle parameters inputted in stormwater model.



Treatment wetland and levee stormwater management

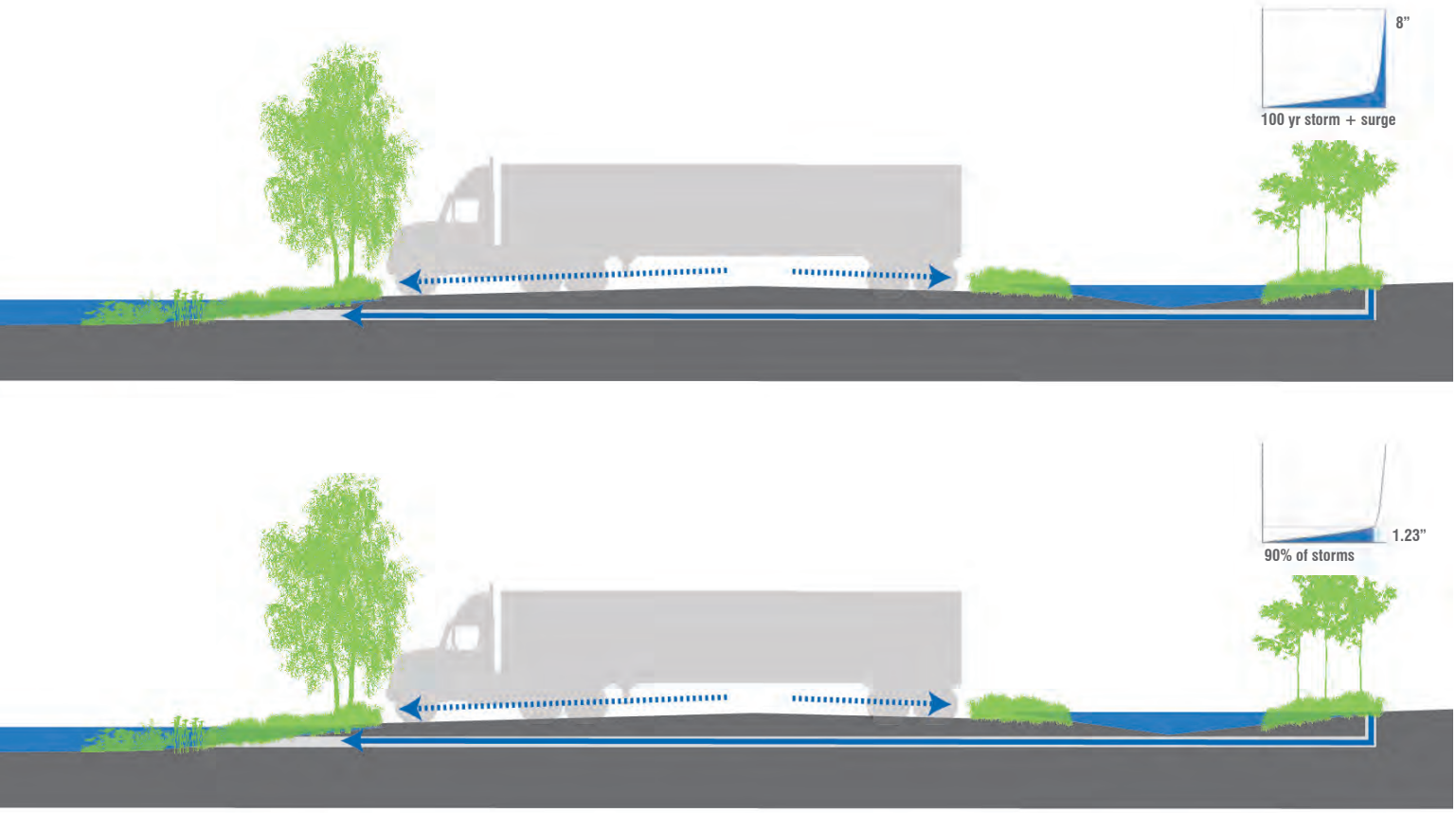
Existing conditions include topographic breaks such as walls, medians, and curbs, locations of separate storm sewers versus combined storm sewers, and locations of existing discharge outfalls. An existing wall surrounding most of the produce market allowed for the creation of a separate “produce” sub-watershed. Modifications will need to be made to formalize the sub-catchment, either by modifying local topography, extending the wall to the proposed IFPS, or a combination of both. Dedicated storm sewers will also need to be placed within the sub-catchment to convey stormwater to the proposed treatment wetland.

The existence of a separate storm sewer system and stormwater outfall allowed for the creation of the “meat” sub-catchment. By intercepting the discharge pipe that connects to the outfall, no additional infrastructure would be required to convey stormwater to the proposed treatment wetlands from this sub-catchment. Outside the “meat” sub-catchment, two additional sub-catchments are proposed that also discharge to the proposed treatment wetland. Minor adjustments to the local topography may be required to convey the stormwater to the treatment wetland from these two small sub-catchments.

The final sub-catchment covers the remaining area within the food distribution center. Construction of a separate storm sewer system is proposed beneath the only portion of Food Center Drive that currently maintains a combined sewer, allowing for stormwater to be conveyed to the treatment wetland. As in the previous sub-catchments, modifications to the topography may be required to ensure runoff is conveyed to the storm sewer or directly to the treatment wetland.

Treat and Release

All treatment wetlands are designed to manage stormwater runoff that occurs behind the IFPS. Runoff will be conveyed to the treatment wetlands through a system of proposed separate storm sewers and vegetated swales. The wetlands will be lined with an impermeable EPDM liner and placed above the water table. An orifice sized for the 90th percentile rainfall



event will manage and release this water volume within 24 hours. An additional inlet will be placed above the first one, and will be sized to release water from the 100-year rainfall event, also within 24 hours. Both orifices will release stormwater to the waterways by gravity alone.

The elevations of the two inlets will create two different planting zones, which will ensure that plantings can thrive throughout the year. Permanently saturated soil will allow for emergent wetland plants to be established and upland plantings will be planted in the floodplain zone, which will only be inundated during the 100-year rainfall event. These variations in planting regimes will improve the diversity and resiliency of the wetland habitats.

Water Quality and MS4 Compliance

As per federal law, NYSDEC issues permits for stormwater discharges from Municipal Separate Storm Sewer Systems (MS4). For municipalities to be in compliance with the State's MS4 permit, NYSDEC requires management of the Water Quality Volume equivalent to all stormwater occurring from a 90th percentile rainfall event. The team used the 90th percentile rainfall event in its calculations, however, it should be noted that a specific storm is not outlined in the existing Draft MS4 Permit pertaining to New York City. By sizing the treatment wetlands to manage the Water Quality Volume and placing an inlet that drains the Water Quality Volume within 24 hours, the treatment wetlands allow for flood protection while also complying with state regulations regarding stormwater management.

SHORELINE ECOLOGY

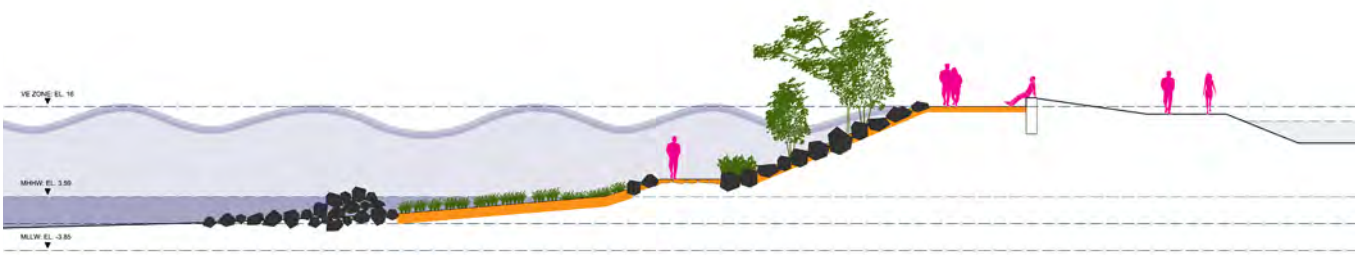
Ecosystem specialists in the New York region have had the most success restoring low salt marsh, in comparison to other habitats, which have proven more challenging. Successful salt marsh restoration is predicated on: (1) Proper substrate; (2) proper elevations; (3) proper light regime; (4) creating a low energy system; and (5) ensuring that the ecosystem drains. Standard low marsh design entails importing clean sand to a depth of 1.0 foot, bringing the elevation to between mean high water and 2/3 tide, and grading the marsh to a 3% slope. The restorations need to be in full-sun zones. When all the criteria are met, successful growth of salt marsh cordgrass (*Spartina alterniflora*) is achieved.

The team's initial strategy for dissipating wave energy was to set a wave break at an elevation of at least one foot above the mean higher high water (MHHW) elevation. This one foot "allowance" was meant to provide energy dissipation from waves, thus protecting the intertidal habitat. As the team progressed, we continued the discussion on sea level rise (SLR). As we are designing for a 50-year life (which is associated with a 100-year storm event), we considered SLR projections over the next 50 years and added an additional 2.5 feet of elevation to the wave break.

Self-Mitigation

The design process focused on meeting all of NYSDEC's typical regulatory concerns within marine ecosystems. The first goal was to avoid harmful impacts to the greatest extent possible. Accordingly, a strong focus was put on both limiting the filling of intertidal waters and on creating shade. For unavoidable impacts, the team developed a self-mitigating project by including salt marsh creation and sub-tidal enhancements within its design.

A tidal inlet and stormwater treatment basin meet in a beach



LIFELINES

Livelihoods & Community Resilience

The Livelihoods chapter describes the Lifelines proposal for integrating local benefit from resilience investments and human resources into the physical design, maintenance and operations plan for flood protection and cleanways. It lays out a range of options for innovation in the design of human infrastructure.

LIVELIHOODS
Business Growth & Diversification

LIVELIHOODS
Operations

LIVELIHOODS
Construction

LIVELIHOODS
Experimental Monitoring

REBUILD BY DESIGN | HUNTS POINT LIFELINE
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Livelihoods

This chapter makes the case for incorporating a jobs creation and local benefit strategy directly into the design of flood protection. It responds to the most frequently stated interest of the Community Board 2 Environmental Committee, leaders of local community-based organizations and residents who participated in our public meetings: Job creation should be considered resilience infrastructure in communities like Hunts Point where poverty creates major vulnerability to storms and other disasters.

Why Focus On Jobs? P86

An important aim of our proposal is to demonstrate that local communities can participate in climate adaptation, understand its dynamics and risks, and benefit from investments the government is making in resilience without compromising the integrity of the flood protection project or the intent of procurement safeguards. If this is possible, it will not only build community economic assets needed for resilience, but can also generate a range of benefits including learning, awareness of waterfront dynamics, perception of risk, informed citizenship, and deeper sense of locality and personal investment. These are all meaningful contributions to the cultural shift that we believe is instrumental to the larger transformation that Rebuild by Design hopes its demonstration projects can make.

Livelihoods Palettes P86

In order to think constructively about the best way to integrate resilience benefits into the physical design of the levee, we have developed a palette of options for the consideration of HUD, the City and the community of Hunts Point. The Livelihoods chapter outlines a number of possible arrangements for construction, maintenance and ongoing monitoring of ecological productivity. Our research has been highly attentive to possible sources of funding and intersections with US, State and City resilience agendas, recognizing that job creation is an interest of every level of government, as well as a major funding challenge.

Support For Concept

Local project partners in Hunts Point—the Environmental Committee of Community Board 2 and The Point—as well as leaders of other CBOs and residents participating in public meetings are enthusiastic about the focus on jobs as a key Lifeline. The business community and FDC food market managers are highly supportive of public investment in flood protection and credits for resilience upgrades to facilities.

Past Relevant Studies

-Assessing the Economic Impact of Regional Food Hubs, Kay, Schmit & Jablonski, 2013

-Community Benefits Agreements: Making Development Projects Accountable, Gross, Janis-Aparicio, LeRoy, 2005

-Location—Based Preferences in Federal and Federally Funded Contracting: An Overview of the Law, Luckey & Manuel, 2010

-Sustainable Economic Democracy: Worker Cooperatives for the 21st Century, MIT Community Innovators Lab, Hoyt, Iuviene & Stitely, 2010

-Understanding New York City's Food Supply, Columbia University and the New York City Mayor's Office of Long-Term Planning and Sustainability, 2010

Economic Context

Hunts Point is in the poorest congressional district in America. It is also a neighborhood widely recognized as a pioneer in effective community development projects and training tied to environmental goals—a nationally recognized green jobs success story. This is an excellent place to pioneer a new approach to planning, design, procurement and operations that supports the larger resilience goals and needs of the community.

The Hunts Point business community also has significant capacity to create new jobs in Hunts Point. Growth is strong and estimated at 9% over the last 4 years. Targeted public investments in flood protection and modernization of the food cluster can be used to support and leverage major private sector reinvestment in a high and dry industrial park.

Policy And Funding Context

Each of the jobs concepts outlined in the palettes is connected with possible funding sources and partnerships that could create significant jobs without placing an undue burden on the City. Many of the job concepts grow out of or align with the traditional programs and goals of HUD and other federal and New York State agencies. The palette is intended to create a strong starting point for discussion with the federal, state and city governments and with private philanthropies through which approaches are most easily integrated into the Lifelines program, into HUD's community-based planning aspirations for Rebuild by Design, and the community's own plans and capacities.

To begin to shape a jobs implementation plan, PennDesign / OLIN has collaborated with The Point on a $200,000 grant proposal to the US Department of Interior to support a broader community resilience planning effort. With this grant support, our team, under The Point's leadership, would develop the most promising jobs concepts in consultation with the residents, government partners and the business community.

Why Focus On Jobs?

An important aim of our proposal is to find ways for communities like Hunts Point to participate in climate adaptation, to understand its dynamics and risks, and to benefit from the investments government is making in resilience, without compromising the integrity of the flood protection project or the intent of procurement safeguards.

Infrastructure design always involves trade-offs between investment in capital and maintenance. Turn-key operations are more expensive up front, and often simpler over the long term. Labor-intensive approaches can be less expensive in the near-term and have a range of benefits including learning, wages from green jobs, awareness of waterfront dynamics, perception of risk, informed citizenship, and deeper sense of locality and personal investment.

In a sense, the idea of focusing on who will build our climate adaptations is radical. It is certainly an awkward fit for how we build public works today, particularly flood protection. But we do have examples of this approach, like the Civilian Conservation Corps. Many developing countries design and build major infrastructure, even quite complex systems, with local labor and development in mind.

With careful attention to the design of a strong flood protection armature, to be built by well-insured construction companies, we can find appropriate means for local contributions to the built project, and in particular its "afterlife" as a lived and maintained place of importance to a community. With good planning and design, local participation is possible without a dramatic increase in the complexity of the building project, and with significant benefits to local resiliency and opportunity. Because of its community-based planning capacity, long-term cooperative relationship with the City, building culture and organization, Hunts Point is a perfect place to test carefully constructed strategies for a shift from walk-away flood protection to a manned interface with the sea.

Livelihoods Palettes

To help project partners and potential funders think constructively about the best way to integrate jobs and economic resilience benefits into the physical design of the levee, we have developed a palette of options for the consideration of HUD, the City and the community of Hunts Point.

We outline a number of possible arrangements rather than preferred options, recognizing that our role is primarily one of facilitation and, later, the translation of various players' preferred options into a charismatic physical design. These arrangements cover construction, maintenance and ongoing monitoring of ecological productivity.

The focus of our Stage 3 research has been highly attentive to possible sources of funding and intersections with US, State and City resilience agendas, recognizing that while job creation is a strong interest in the current administrations at all three levels of government, it is also a major funding challenge.

The palettes are organized by project phase and locus of job creation.

COMMUNITY BASED PLANNING

COMMUNITY IS FUNDED PARTNER IN PLANNING

-Community organizations with proven planning capacity lead comprehensive resilience planning integrated with Rebuild projects
-Community partners paid for specific deliverables as consultants to the team
-Low carbon footprint and local labor involvement

STRENGTHENS LOCAL LEADERSHIP

HUNTS POINT VISION PLAN

SOURCES OF FUNDING

US Department of Interior grant program for comprehensive resilience planning

ART+SCIENCE PROGRAMMING

NATURALLY OCCURRING ARTS DISTRICT

-Provides access to community arts network
-Enables organizations to scale-up local experience for citywide applications
-Advocates policies for, and development of, local creative economy

EMPOWERS LOCAL ARTS CULTURE

BRONX COUNCIL ON THE ARTS

POTENTIAL FUNDING STREAMS

-NYSCA Decentralization Community Arts Grant
-BCA/DCA Community Arts Fund

PLANNING, DESIGN AND CONSTRUCTION

Community-Based Planning

New York City's PlaNYC recommendations established a strong analytic framework for action on climate adaptation. One year later, there is tremendous, widespread interest in government and in communities in developing examples of true community-based, site-specific implementations of that analysis. The goal is to create common cause and planning approaches that make each resilience investment transformative at the scale of neighborhood life, and a stimulus to the future economy in order to make continued investment possible.

Local community groups in Hunts Point and the South Bronx have demonstrated knowledge and capacity to make major improvements to the environment. This knowledge and planning capacity is institutionalized in established community groups such as the Point Community Development Corporation, Sustainable South Bronx, the Bronx Overall Economic Development Corporation and others. Together, these groups have generated multiple neighborhood redevelopment plans, including the Hunts Point Vision Plan, a collaboration with NYC EDC. This comprehensive document forms the basis for planning and development strategies of Hunts Point Lifelines. The robust planning history and capacity of Hunts Point makes this neighborhood an excellent place to invest in a demonstration of the power of community-based resilience planning.

Hyperlocal Fabrication

Hunts Point Lifelines has potential for hyperlocal construction and fabrication or cultivation of selected elements. Various businesses located in Hunts Point, such as Casa Redimix Concrete Corporation, are capable of building precast elements of the integrated flood protection system to be designed by our team. (The benches and flooring planks of the High Line in Manhattan are examples of custom-designed, non-patented, precast park elements.) Appropriately designed components can detail prefabrication and account for the logistics and space available to local fabricators.

There are several precedents for hyperlocal fabrication, both in New York City and at the federal level. Bronx Overall Economic Development Corporation's "Buy Bronx" campaign successfully secured construction contracts and material sourcing contracting for South Bronx businesses. The stimulus to local industrial businesses was well received.

The NYC Department of Parks and Recreation Native Plant Center and the DPR Natural Resources Group have collaborated on project-specific temporary nurseries that provide low cost, native plants for public projects. To propagate material for the Concrete Plant Park in the Bronx River, Parks partnered with Bronx River Alliance to utilize low-tech solutions and grow material on-site. The Bronx Concrete Plant Park is a highly successful example of an on-site program where the City's expertise supports local endeavor and learning. The project reduced material transportation costs, carbon, and the construction budget. At the federal level, there may also be examples such as the Federal Highway Administration's programs that take advantage of non-proprietary prefabrication techniques to help local manufacturers more effectively participate in bridge reconstruction projects and reduce transport carbon.

Locally fabricated art may also be an option, as public art can involve non-traditional, participatory fabrication. Working with the community and City, the PennDesign / OLIN could add local artists to the design team and develop specific projects. This approach might be supported by the Naturally-Occurring Arts District program, which designates a cultural district that values local arts assets at the same level as Business Incentive Districts, Historic Districts, and Industrial Areas. Hunts Point certainly qualifies as a Naturally-Occurring Arts Districts with organizations such as the Bronx Council on the Arts regularly hosting exhibitions and performances, The Point's arts-based placemaking programs of all kinds. Funding sources may provide fellowships and individual commissions for artists that can be integrated into the flood protection system and the design of other Lifelines.

SPEC IT LOCAL

PRECAST CONCRETE ELEMENT MADE LOCALLY

-A non-patented design element such as a new concrete bench, panel, or erosion cribbing designed by the team could be manufactured locally by Casa Redimix
-Low carbon footprint and local labor involvement

TEMPORARY NURSERY

PLANT MATERIAL FOR CONSTRUCTION

-Low cost, low carbon method for growing plant material for restorations “just in time”
-Allows for community, in concert with Parks Department’s Native Plants Center, to serve as growers on vacant parcels

PRIVILEGES HUNTS POINT BUSINESSES

BOEDC “BUY BRONX” CAMPAIGN

CASE STUDY SUMMARY

BOEDC has been successful at procuring construction contracts, sourcing materials, and securing job training funds for local Bronx and M/WBE businesses

GREEN JOBS AND LOCAL CONTRACTS

CONCRETE PLANT PARK, BRONX RIVER

CASE STUDY SUMMARY

Plant material for Concrete Plant Park was built for the Bronx River Alliance / Parks Department using low tech methods in a temporary nursery on-site

Any element of Lifelines that is privately funded by philanthropies can operate outside the public procurement rules, and specify a non-profit recipient capable of managing a project input or element such as the growing of plant material, fabrication of floating kelp and mussel racks, or the construction of a food retail outlet. Philanthropic participation in the jobs demonstration could help develop means to make targeted procurement safe for government and take the approach to scale in other low income communities.

Geographic funding targets: CDBG and HUBZone

The Hunts Point peninsula qualifies for several programs that can help channel funding into local development. Government programs with geographic privilege help keep assets within the community, and invite investment by acting as seed money for entrepreneurs and local businesses. The Community Development Block Grants program allocates funds for the redevelopment of housing and infrastructure in areas of greatest need around the country. Section 3 of the CDBG grant rules guides the allocation of funds toward low- and very-low income persons in the project location. In particular, several program eligibility requirements may help Hunts Point residents and businesses secure job and bid procurement advantages: businesses with more than 30% of their full-time employees living in the project area, and businesses than are more than 51% owned by residents of the project area.

The federal Historically Underutilized Business Zone (HUBZone) program could be used to help Hunts Point businesses qualify for construction contracts for any public bid. Because much of the South Bronx is mapped as HUBZone, businesses within this area can apply for HUBZone status. This status gives designated businesses several benefits, including access to the 3% of all federally funded contracting dollars that are allocated specifically for HUBZone businesses. The program increases the number of projects available to designated businesses, and decreases the competition pool for some RFPs. In addition, HUBZone businesses receive a 10% price evaluation preference for any public bid, helping them to compete with larger businesses and go after projects they might not otherwise be capable of building.

Heeter Construction, a HUBZone designated business based in West Virginia, won the contract for Elkwater Fork Water Supply Dam. This project required 80 employees and over 15,000 payloads, and went through several bidding processes. Their 10% price evaluation preference directly contributed to their procurement of the bid. Hunts Point businesses, once designated, can bid to build construction projects associated with integrated flood protection system or smaller associated projects such as the boathouse.

Negotiated Roles and Benefits

Community Benefits Agreements can provide a range of roles in a project or funding for selected components of a larger project. Although Community Benefits Agreements are often between developers and communities, they can also be connected to public projects. An example of a successful community benefits planning process between the City and Hunts Point community is the plan developed by NYC DEP in connection with sewage digester upgrades to its waste water facility. This plan brought the floating swimming pool to Barretto Park, an asset that is greatly appreciated by the community.

CBAs can establish a broad range of conditions, including living wage requirements and annual stipends for public use to recreational facilities and environmental building construction standards. The 2013 benefits agreement for the Kingsbridge Armory redevelopment is an example given by the community of a successful collaboration of 27 South Bronx community groups that resulted in a range of provisions for living wages, 51% of jobs related to the development going to Bronx residents, 25% of construction contracts going to M/WBE Bronx businesses, and contributions to operating and maintenance of public facilities.

HUNTS POINT HUBZone

HISTORICALLY UNDERUTILIZED BUSINESS ZONE

-Enables access to 3% of all federal funded contracting dollars
-Decreases competition pool
-Receive 10% price evaluation preference

CDBG SECTION 3

COMMUNITY BLOCK DEVELOPMENT GRANT

-Hiring preference given to low-income people and businesses in the community where a CDBG project (like Rebuild by Design) is located.

PRIVILEGES HUNTS POINT BUSINESSES

HEETER CONSTRUCTION, WV

CASE STUDY SUMMARY

Heeter Construction won the contract for Elkwater Fork Water Supply Dam requiring 80 employees and over 15,000 payloads.

PRIVILEGES BRONX RESIDENTS

HUNTS POINT PENINSULA

PROGRAM ELIGIBILITY

-Proof of residency & income
-Businesses >51% owned by residents

Cooperative Development

Worker cooperatives offer a place-oriented business model in the context of unstable financial markets and economic recession. This model is rooted in a socio-economic arrangement whereby worker-owners control local, for-profit economic institutions. While their success and popularity in the U.S. has varied over the years, the Evergreen Cooperative Initiative in Cleveland, Ohio and the exceptional growth of Mondragon Cooperative Corporation in Basque Country, Spain, illustrate the capacity for such models to expand far beyond simple food co-ops in upscale neighborhoods. Mondragon employs over 80,000 people in nearly 300 separate cooperatives. These companies are networked across 4 primary sectors: finance, industry, retail, and knowledge. In addition to these 4 sectors, a number of Mondragon's cooperatives form a secondary support network, including training, financial and business consultation, and similar development services.

The Bronx Cooperative Development Initiative is actively involved in advocating for a worker cooperative network with multiple tiers and sectors. The food cluster may be a promising sector, particularly with support from philanthropies or seed capital from investors or NGO entrepreneurship loan programs. Such cooperatives could find roles in construction and in operations of Lifelines projects at a range of scales.

BENEFITS AGREEMENT

COMMUNITY BENEFITS AGREEMENT

-Negotiates and manages the partnership between developer and community
-Covers wide range of conditions, from annual revenue to wage floors to jobs contracts
-Government oversight carries legal power

CERTIFIES COMMUNITY BENEFITS

KINGSBRIDGE ARMORY CBA

CASE STUDY SUMMARY

Kingsbridge Armory CBA covered a range of jobs provisions and more. The DEP community benefit plan for Hunts Point is an example of effective consultation.

WORKER COOPERATIVE

BRONX COOPERATIVE DEVELOPMENT INITIATIVE

-Institutionalizes economic democracy through for-profit worker cooperative model jointly owned by “worker-owners”
-Enables more fluid networking between businesses, organizations, and institutions to tackle large and complex projects

CREATES WEALTH THAT STRENGTHENS COMMUNITIES

MONDRAGON COOPERATIVE CORPORATION

CASE STUDY SUMMARY

Mondragon Cooperative Corporation includes 289 companies and employs 80,000+ worker-owners across industrial, retail, financial, and knowledge-based sectors.

OPERATIONS

Landscape Management and Systems Maintenance

Long-term job security and human capital incubation can also come through the maintenance and operations design of the flood protection system, Levee Lab and greenway. Landscape management, systems maintenance, and redevelopment for adaptation will create green jobs that might be managed through a greenway conservancy. The Bronx River Alliance could extend its reach to support operations of the South Bronx Greenway through a cooperative agreement with Hunts Point organizations and the City.

A range of job types are involved in the Lifelines from green collar and grey collar sectors. Grey collar jobs include everything from agribusiness, fishing, and farming to high-tech technicians and skilled trades. Integrated flood protection is a complex system, and maintenance and management staff can gain work experience to expand their market potential. Green collar jobs include nurserymen, landscape management and horticulturalists, solar and wind energy engineers, eco-technology workers and technicians. Many of these are in growth sectors.

Sustainable South Bronx (SSBx) has had great success with two of their green jobs programs: Bronx Environmental Stewardship Academy (BEST) and SmartRoofs. Since 2003, BEST has prepared low-income New York and South Bronx residents for the green jobs market, offering training and education as well as career development and externship placement services. SSBx/SmartRoofs, LLC is a social enterprise composed of BEST Academy graduates. As an LLC, SmartRoofs provides BEST Academy graduates with income and professional experience, all while helping to make NYC a greener city.

Collaborative Innovation

The Levee Lab concept described in the Integrated Flood Protection chapter would create a range of high quality, high-learning jobs, especially for youth in Hunts Point and the South Bronx. Experimental technologies can be tested and incubated in Hunts Point, and later replicated in other Significant Maritime Industrial Areas with support from technical assistance programs that could be run by Sustainable South Bronx or other local organizations. Our team member, eDesign Dynamics and Franco Montalto, the Drexel University faculty member who founded the ecology and hydrology practice, has been working with organizations in the Bronx to do this kind of work, and to publish the results of community-based science and applied technology studies. Franco Montalto's role as leader of the federal standards creation process will create a direct link between local innovation and federal standards innovation, as outlined in the Levee Lab section. Such studies provide rich work experiences and paid employment for young people.

LANDSCAPE MANAGEMENT

MAINTENANCE AND GARDENING CONTRACTS

-Supports career development in environmental sustainability, gardening + horticultural
-Potential for collaboration on maintenance contract with the Bronx River Alliance

SYSTEMS MAINTENANCE

SITE ENGINEERING & MAINTENANCE

-Aids career development in technical fields
-Promotes awareness of flood protection and the local environment

CREATES GREEN JOBS + OWNERSHIP

SUSTAINABLE SOUTH BRONX SMARTROOFS

POTENTIAL FUNDING STREAMS

-EDA Economic Adjustment Grant
-EDA Public Works Grant

CREATES TECHNICAL JOBS

SUSTAINABLE SOUTH BRONX BEST ACADEMY

POTENTIAL FUNDING STREAMS

-Green Innovation Grant Program
-Small Business Environmental Assistance Program
-EDA Economic Adjustment Grant

LEVEE LAB MONITORING

FLOOD PROTECTION + EXPERIMENTAL ECOLOGY

-Broadens future work opportunity spectrum
-Advances Hunts Point capacity for innovation in environmental education and training
-Helps develop critical mass of human capital in technical environmental research

ART COLLABORATIONS

NATURALLY OCCURRING ARTS DISTRICT

-Public space and infrastructure can incorporate projects conceived by and built with the help of local working artists
-Art commissions allow for a range of non-traditional construction processes that supports local manufacturing and suppliers

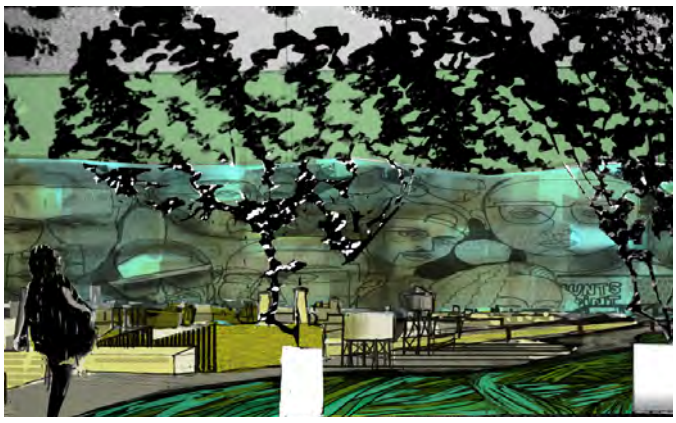
CREATES GREEN JOBS FOR YOUTH

ROCKING THE BOAT, SOUTH BRONX

POTENTIAL FUNDING STREAMS

-EDA Public Works Grant
-FEMA Hazard Mitigation Assistance Grants

EXPRESSES COMMUNITY ASSETS IN DESIGN



VILLAGE OF MURALS / CAREY CLARK

CASE STUDY SUMMARY

Village of Murals project of The Point and numerous local artists is transforming street scapes, identity and wayfinding

PRIVATE SECTOR JOBS: MARKET RESILIENCE

Hunts Point Lifelines is highly focused on creating a better and more secure environment for business. Hunts Point has one of the highest concentrations of living wage jobs in the City of New York. It also has a thriving cluster of small businesses, many of them created by immigrant entrepreneurs.

While speculating about the future of food distribution centers is outside the scope of this project, our team outlined a few trends and opportunities that may be relevant to local businesses. This exercise, captured here in a palette of possibilities, helps us imagine a range of future transformations for Hunts Point. The most significant of these may be driven by directions outlined in the Maritime Supply Chain chapter.

The private sector job palette recognizes that food hubs are changing, and that economic restructuring creates opportunity for useful stimulus. It is possible that the best means of living wage job creation for South Bronx residents might focus on strategic support of infrastructure for private sector growth. One significant example of this potential is our recommendation for the feasibility study for creation of a Tri-Gen Power Plant that could dramatically reduce carbon and refrigeration costs of food businesses.

Market dynamics in the food sector are increasingly focused on food distribution within a small region, and on fresh produce and farm-to-table supply chains. A 2007 on the feasibility of a New York City Wholesale Farmers Market illustrated the massive demand for fresh local produce. The USDA has several programs aimed as supporting development of regional food hub programs.

The Agricultural Marketing Service (AMS) currently supports two programs applicable to expanding wholesale produce markets. The Farmer Market Promotion Program (FMPP) aims to provide funding to “expand domestic farmers’ markets, […] community-supported agricultural programs, […] and other direct producer-to-consumer market opportunities.” This program helped fund the open air Wholesale Greenmarket in Hunts Point, and could help establish an indoor retail food market serving the South Bronx.

The Federal-State Marketing Improvement Program (MIP) provides funding to “assist in exploring new market opportunities for U.S. food and agricultural products, and to encourage research and innovation.” Hunts Point suppliers and distributors are uniquely positioned to take advantage of innovative markets, given their existing import suppliers and the proximity to Hudson River and Long Island farmers by way of truck, rail, and waterway.

Co-location of new facilities within the Food Distribution Center can have a huge impact with relatively minor new development. These facilities may appeal to both local businesses and to the community from the standpoint of job creation. In 2013, Farm to Table Co-Packers received $775,000 from New York State for facility upgrades. Co-Packers is a full service packaging facility that can freeze, jar, can, and pickle. This service helps to prolong the edible lifespan of fruits and vegetables, and helps diversify the supply chain for regional farmers and local grocery stores. Similarly, the Women’s Housing and Economic Development Corporation’s (WHEDco) Urban Horizon’s Kitchen offers a full-service commercial kitchen for start-ups and small businesses. Incorporating such a facility into the FDC could help expand its supply and distribution potential, as well as its client base and marketing potential.

Besides co-location, upgrades to existing market facilities such as flash freeze capacity have been discussed by the markets as potential resilience assets. The Produce Market’ plans to invest in new Cold Chain FDA-compliant facilities is a major investments in modernization than can be coordinated with flood protection design and public investments to support job growth. Such investments will also reduce carbon emissions, save energy and improve air quality.

COMMERCIAL KITCHEN

COMMERCIAL-SCALE FOOD PREPARATION

-Reduces spoiling and commodity surplus
-Diversifies market potential
-Diversifies job base
-Diversifies supplier and consumer base

ADDS DIMENSION TO PRODUCT LINES

WHEDco KITCHEN INCUBATOR

POTENTIAL FUNDING STREAMS

-USDA Federal-State Marketing Improvement Program
-EDA Economic Adjustment Grant

INDUSTRIAL PROCESSING

INDUSTRIAL-SCALE FOOD PROCESSING

-Reduces spoiling and commodity surplus
-Diversifies market potential
-Diversifies the job base
-Diversifies supplier and consumer base

ADDS DIMENSION TO PRODUCT LINES

FARM TO TABLE CO-PACKERS

CASE STUDY SUMMARY

Farm to Table Co-Packers received $775,000 from New York State in 2013 for facility upgrades to increase flash freezing and canning capacity.

MARKET MODERNIZATION

MARKET UPGRADES TO UNBROKEN COLD CHAIN

-Creates jobs by expanding market facilities
-Increases public health by reducing pollution
-Increases facility efficiency
-Helps keep Hunts Point competitive

FOOD CLUSTER GROWTH

RAPID FOOD CLUSTER GROWTH OUTSIDE MARKET

-Supports entrepreneurship opportunities for low- and middle-income Hunts Point residents
-Increases investment possibility by decreasing risk associated with flood zone
-Strengthens local supply chain network

CREATES JOBS + INCREASES FOOD SAFETY

PHILADELPHIA WHOLESALE PRODUCE MARKET

POTENTIAL FUNDING STREAMS

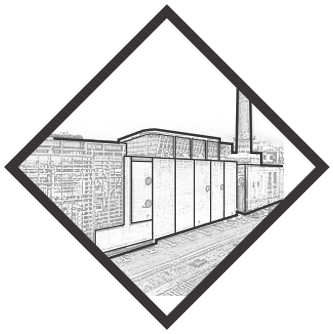
-USDA Federal-State Marketing Improvement Program
-EDA Economic Adjustment Grant

PROTECTS SMALL BUSINESS FOOD CLUSTER

HUNTS POINT FUTURE FOCUS

CASE STUDY SUMMARY

Next Street is currently providing workshops to help Hunts Point 'food cluster' businesses network, establishes best practices, and strategize for growth.



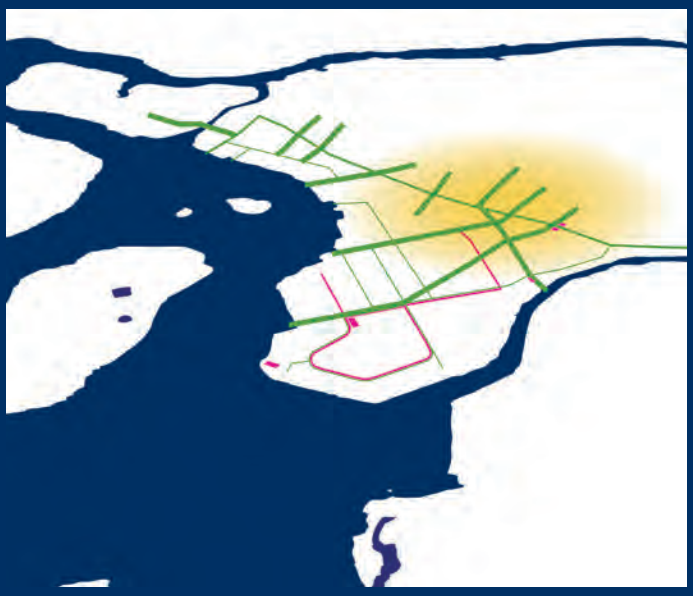
CLEANWAYS
Peninsula Power

LIFELINES
Cleanways

CLEANWAYS
Retail Fresh Food Access

CLEANWAYS
Air + Transportation

A true resilience strategy for Hunts Point must go beyond protection of the industrial edge to address deeper vulnerabilities. It should connect neighborhood, industry, and waterfront, and it should minimize the impacts of the food cluster on its residential neighbors. “Cleanways,” one of the four Hunts Point Lifeline systems, directly addresses these concerns through physical design, policy, and operations.



The Objectives

of the Cleanway Lifeline are to:

-improve air quality
-increase access to fresh and healthy food
-improve access to open space, particularly on the waterfront
-provide mobility and safe passage through freight routes
-offer a more efficient and resilient power supply for the FDC

The cleanway lifeline is made up of multiple initiatives, summarized on this page and described in greater detail in the following chapter.

Better Truck Routes P106

An estimated 1,500 trucks pass through Hunts Point each day. The existing truck routes are problematic for both the business and residential communities of Hunts Point: congested and inefficient on the one hand, unsafe for pedestrians and cyclists on the other. Minor revisions to existing surface street routes can improve conditions, but implementation of the Oak Point ramps proposed by the Sheridan Expressway-Hunts Point Land Use and Transportation study could be truly transformative, significantly decreasing travel time to the Hunts Point food cluster and improving resident health and safety.

Safe Pedestrian and Bike Routes P106

In tandem with the proposed changes to existing truck routes, the Lifelines builds on the South Bronx Greenway Master Plan's proposal for a street-based network of pedestrian and bicycle routes that connect Hunts Point and the rest of the South Bronx to the waterfront. Streetscape improvements to these routes provide additional ecosystem services, including stormwater management and air pollutant removal.

Stormwater Management P107

Street-based green infrastructure can reduce the load on the existing sewer system and decrease the frequency of Combined Sewer Overflows (CSOs). For a discussion of stormwater management in the FDC, integration with flood protection measures, and proposed resilience upgrades to the Hunts Point Wastewater Treatment Plant, see Integrated Flood Protection.

Air Quality P107

Hunts Point suffers from some of the worst air quality in New York City, in part due to diesel emissions from trucks serving the food cluster. Recognizing that an investment in flood protection for the food cluster means continued industrial operations, Lifelines addresses air quality through three initiatives: proposed changes to existing truck routes (outlined above), expanded refrigeration and advanced truck stop electrification to reduce idling at the FDC, and plantings optimized for air pollutant removal.

Resilient Energy P110

After flood protection has been established for the Food Distribution Center on Hunts Point, the area will remain vulnerable to other resilience risks such as electrical grid outage. Facilities currently do not have sufficient backup generation to keep food refrigerated for 24 hours, thus such an outage results in tens of millions of dollars of spoiled food and major economic impact on the region. The long-term resilience concept for the Food Distribution Center is to create a Micro-Grid for the peninsula which can operate independently in the event the wider grid fails. On-site natural gas-fired turbines create the core element to a micro-grid which

will have the capacity to generate full electrical power requirements. Utilizing waste heat from the generation turbines, steam and chilled water can be generated for free to reduce energy costs and carbon emissions. The proposed energy resilience plan could reduce the energy cost burden for FDC tenants by 40% and lower carbon emissions by 50%.

Community Food Access and Security P113

Despite the tremendous volume of food that flows through Hunts Point each day, residents have limited access to fresh food. Four initiatives form the Lifelines response to local food access and security in Hunts Point. A permanent, six-day per week farmer's market near the FDC could provide a public face and retail portal to the wholesale cooperative markets. A regional food bank in Hunts Point would create a supply chain for the under served. A nutrition center would offer food education. And further promotion of urban farming and gardening would support healthy eating habits, increase food literacy, and build community ties.

CLEANWAYS

CLEANWAY CONNECTIONS

- GREENWAYS/PEDESTRIAN AND BIKE CORRIDORS
- TRUCK ROUTES + AIR QUALITY CORRIDORS
- CULTURAL CORRIDOR
- JOBS CORRIDOR

CLEANWAY POWER

- RESILIENT ENERGY

CLEANWAY ZONES

- STORMWATER INFILTRATION
- RESIDENTIAL AREA
- LIGHT INDUSTRIAL AREA
- PROPOSED METRO NORTH STATION
- EXISTING SUBWAY STATION

BETTER TRUCK ROUTES

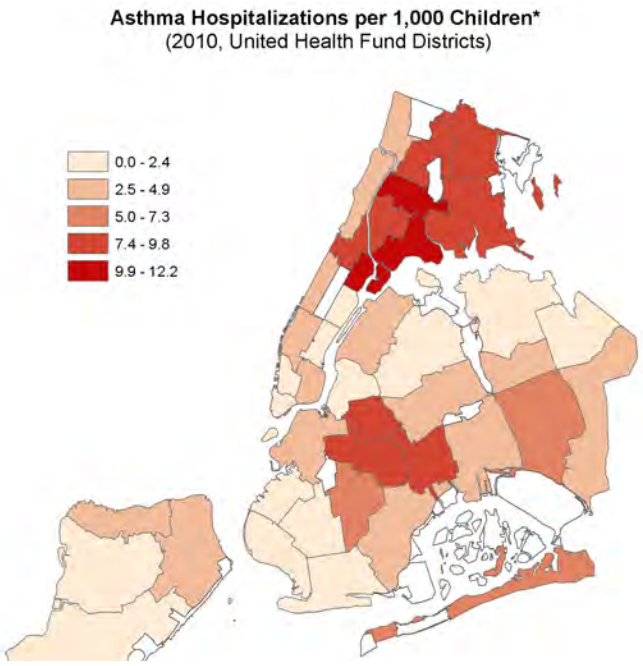
Truck routes that follow congested neighborhood streets exacerbate the safety and air quality hazards posed by trucking in Hunts Point while decreasing the efficiency of food cluster businesses. For this reason, the PennDesign/OLIN team endorses the Sheridan Expressway-Hunts Point Land Use and Transportation Study's proposal for new ramps connecting the Bruckner Expressway to Oak Point Avenue – a proposal that also enjoys broad support from both the business and residential communities of Hunts Point. These "Oak Point Ramps" would provide a more efficient and convenient linkage to the food cluster while dramatically reducing truck traffic on Tiffany Street, one of the primary neighborhood connections to the waterfront and a key street in the South Bronx Greenway Master Plan. The Oak Point Ramps also reflect a more general strategy of directing major truck traffic away from the residential neighborhoods and calming truck traffic on minor industrial streets that require access only for loading. This strategy would both minimize conflicts with pedestrian and cyclists and reduce emissions in the residential core of Hunts Point.

SAFE PEDESTRIAN AND BIKE ROUTES

Building on the work of the South Bronx Greenway Master Plan, Hunts Point Lifelines proposes a street-based network of pedestrian and bicycle routes that connect Hunts Point and the rest of the South Bronx to the waterfront. At the minimum, implementation of these routes would separated bike lanes, streetscape enhancements, and intersection improvements where the pedestrian and bicycle routes cross truck routes. Streetscape enhancements would be integrated with two other Cleanway initiatives, stormwater management and air quality plantings.

STORMWATER MANAGEMENT

Outside the FDC, sewer separation and the diversion of stormwater to treatment wetlands will not be feasible; sewers are likely to remain combined. To reduce the load on the sewer system and decrease the frequency of Combined Sewer Overflows (CSOs), the team recommends distributed green infrastructure – water receiving landscapes that can absorb or retain stormwater flows before they enter the piped system. Such landscapes on private property are beyond the scope of this effort, but street-based stormwater management can be integrated with other Cleanway initiatives, notably the Air Quality Plantings and the Safe Pedestrian and Bike Routes. These systems could be right-of-way bioswales, or other stormwater greenstreets. Their locations would depend on street topography, location of existing utilities and subgrade permeability conditions.



AIR QUALITY

The South Bronx in general, and Hunts Point in particular, suffer from some of the worst air quality in New York City. The rate of hospital admissions for asthma in the Bronx is twice the rate in Manhattan and Brooklyn. Roughly one in three children living in Hunts Point has asthma.

As in any urban area, the sources and dynamics of air pollution are complex, but diesel emissions from trucking play a crucial role in Hunts Point. The residential community of Hunts Point lies between the Bruckner Expressway to the north and the FDC to the South, with significant truck traffic on local streets. Approximately 1,500 trucks pass through the neighborhood daily, and idling is a major source of emissions at the FDC. To be truly resilient, a plan for Hunts Point must address what is one of the primary impacts of ongoing FDC operations and a major public health issue for Hunts Point and the South Bronx.

Although air quality is commonly and appropriately considered a matter of national and regional policy, local actions at Hunts Point could reduce and mitigate emissions of key air pollutants. The proposed changes to neighborhood truck routing, described earlier in this chapter, would reduce congestion while moving truck traffic away from the residential core. In addition, the Lifelines proposal for air quality includes infrastructure upgrades to the FDC and plantings that provide multiple benefits but are optimized for pollutant removal.

Clean And Cold Markets

Facility modernization is critical to the FDC's continued success—and the health of the community. Currently, the produce market lacks adequate refrigerator storage and is not "cold chain compliant," meaning that produce cannot be kept at a low, constant temperature during loading, unloading and storage. Comparable markets with newer facilities, like the Philadelphia Wholesale Produce Market, offer cold chain compliance, a significant competitive advantage.

Redevelopment of the produce market – likely to happen within the next decade – should add refrigerated storage and bring it into cold chain compliance. But in the interim, the market keeps an estimated 1,000 refrigerated trucks idling to provide "flex" storage. This temporary solution is extraordinarily energy inefficient, and contributes significantly to Hunts Point's poor air quality.

A recent pilot project could point the way to a cleaner and more efficient solution, even before the market is rebuilt. Advanced truck stop electrification (ATE) technology provides electrical, HVAC, and telecom connections to trucks during layovers. Because these services are powered by electricity, they use of ATE technology can dramatically reduce emissions. Monitoring of the Hunts Point ATE pilot found that "using electricity to provide HVAC service to a truck's cab during layover releases to the atmosphere about 70% less carbon dioxide, 95% less nitrous oxide, 98% less particulates, 99% less volatile organic compounds, and 99% less carbon monoxide than running the engine".[1] Widespread deployment of ATE at the produce market could eliminate the need for idling flex storage trucks in the short term, while in the long term eliminating the need for idling during layovers. The other major distribution centers, both inside and outside the FDC fence, would benefit too from this technology. Particularly when integrated with local cogeneration, as described below, use of ATE technology would significantly increase the energy efficiency of FDC operations and reduce carbon emissions.

1. Roskelley, TJ. "NESCAUM GHG Case Study The Hunts Point Truck/Trailer Electrification Pilot Project." 2005. Available at: http://www.ct.gov/deep/lib/deep/air/diesel/docs/huntspoint.pdf

Air Quality Plantings

Recent research suggests that dense, evergreen plantings can significantly reduce concentrations of air pollutants -- especially small particulates (PM2.5 and PM10), which are among the most toxic and strongly associated with diesel emissions. While concentrations of some pollutants, like Carbon Monoxide and Nitrous Oxides (NOx), diminish quickly with distance, concentrations of small particulates do not.[2]

2. Baldauf, Rich. "EPA Policy and Research Related to Near Road Air Quality. Presented at the HEI Annual Conference, Chicago, IL. April 7, 2012.

CLEANWAY STREETS like Tiffany St. would perform multiple functions: mediating between truck, car, bicycle, and pedestrian traffic, filtering air, and absorbing stormwater

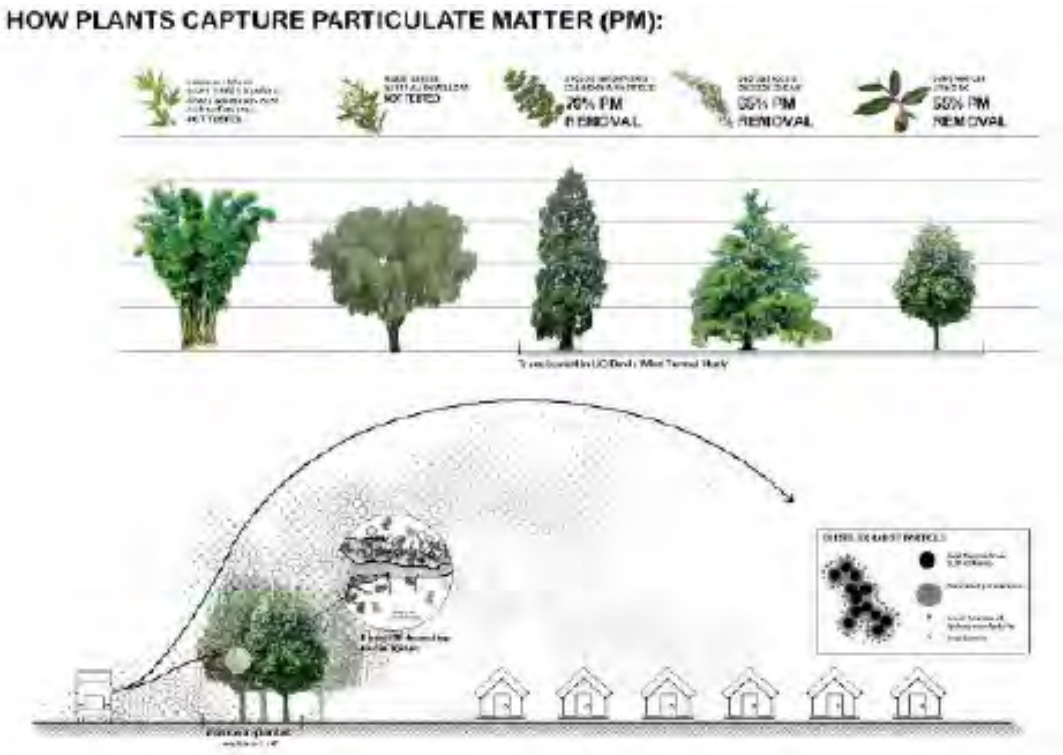


Image: Urban Biofilter
www.adaptoakland.org

Thus, moving truck routes away from the residential neighborhood will not significantly reduce particulates – but plantings can. Hunts Point Lifelines proposes plantings with dense foliage near emissions sources, where particulate deposition can be maximized. On major truck routes like East Bay Avenue, Oak Point Avenue, Tiffany Street, and Halleck Street, air quality plantings could be integrated into the streetscape. Thicker plantings could buffer the FDC markets from adjacent streets and the waterfront path. In keeping with the multi-functional, landscape-based approach of Lifelines, air quality plantings would offer other ecosystem services, including stormwater absorption, heat island mitigation, carbon sequestration, and human enjoyment.

RESILIENT ENERGY

After flood protection has been established for the Food Distribution Center on Hunts Point, the area will remain vulnerable to other resilience risks such as electrical grid outage. Even though the New York City electrical grid is one of the most reliable electrical networks in the world due to the high percentage of underground distribution and local generation, there have been at least 3 outages for more than 24 hours in the past 50 years. Facilities currently do not have sufficient backup generation to keep food refrigerated for 24 hours, thus such an outage results in tens of millions of dollars of spoiled food and major economic impact on the region.

The long-term resilience concept for the Food Distribution Center is to create a Micro-Grid for the peninsula which can operate independently in the event the wider grid fails. On-site natural gas-fired turbines create the core element to a micro-grid which will have the capacity to generate full electrical power requirements. Utilizing waste heat from the generation turbines, steam and chilled water can be generated for free to reduce energy costs and carbon emissions.

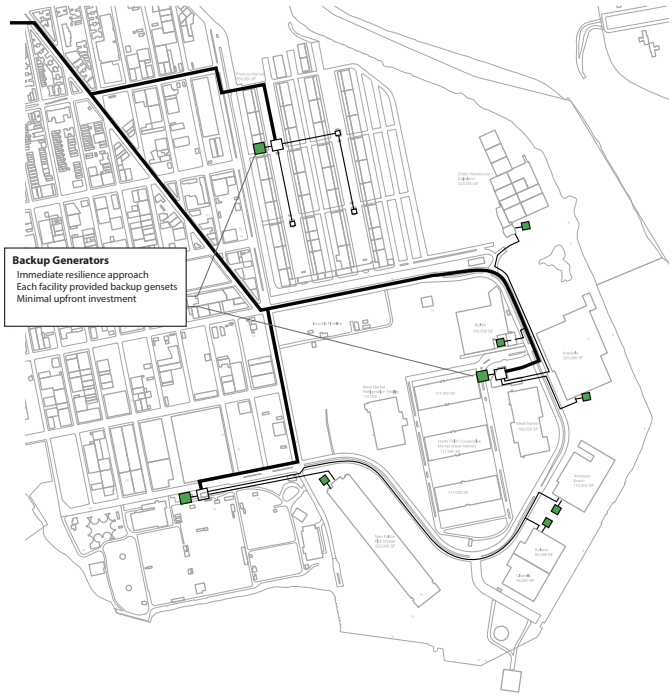
A Phased Approach

The existing electrical supply network for the Hunts Point district is fed from the new Mott Haven Substation and has sufficient capacity for foreseeable growth. And the long-term resilient approach of a micro-grid with district cooling facility requires significant funding and regulatory approvals. Thus a near-term resilience approach to ensure uninterrupted electrical supply in the case of a regional grid outage would be to install diesel backup generators at the incoming electrical service location at each facility. The electrical load for the primary tenants on the peninsula is over 25MW, so backup generators totalling at least 25MW would be required.

This approach mitigates grid outage risk in one to two years with few regulatory or financial hurdles. But it does not serve a wider opportunity to provide energy savings or carbon savings in the district.

Tri-Generation Facility

All fossil fuel-fired electrical generation facilities output between 60% and 70% of input energy into waste heat due to the thermodynamic cycle of electrical generation. This waste heat can be captured from the hot exhaust



Existing electrical network with diesel backup generators at each facility

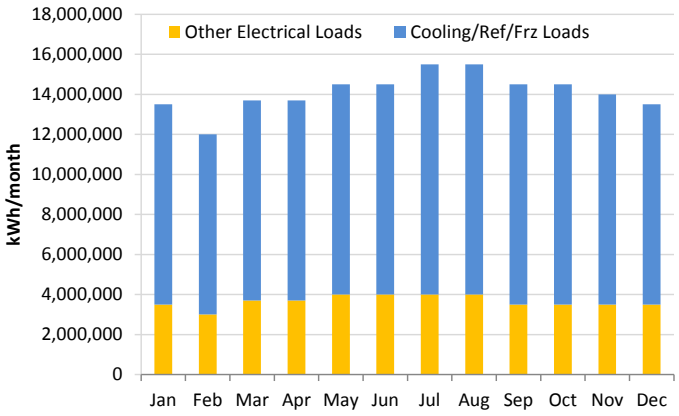
100%
Backup Power

53%
Carbon Emissions Reduction

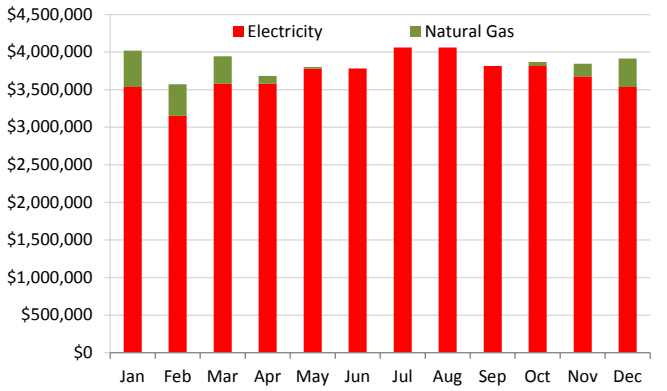
42%
$$ Energy Cost Savings

Concept for Micro-Grid for FDC

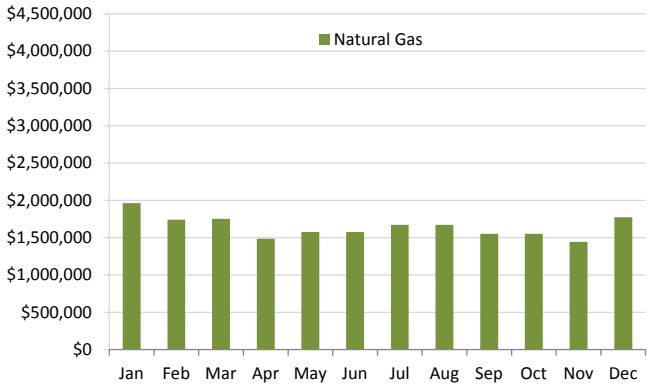
Tri-Generation Facility



Monthly electrical consumption
(based on 2008 EDC energy report)



Estimated future monthly electricity and natural gas energy costs for FDC businesses



Estimated future monthly natural gas energy costs for full micro-grid with tri-generation

gasses and be converted into low-grade steam. This 'free' co-generated steam can be used for heating demands in the winter, but more importantly it can be used to generate chilled water through steam-driven absorption chillers.

Nearly two-thirds of the electrical demand of FDC existing facilities go to cooling, refrigeration and freezing demands. And refrigeration loads will only further increase in the future as facilities grow and become cold-chain compliant. Since these refrigeration loads are fairly constant year-round, a district-wide chilled water network has the potential to be economically justified.

Though most cogeneration facilities are designed to supply base loads and operate at full capacity year-round, the concept of this facility is also resilience-based, so it is designed to supply 100% of peak loads thus it will be over designed compared to typical cogeneration facilities.

Energy and Carbon Savings

Utilizing the waste heat from the electrical generation turbines allows up to half of the cooling load from FDC to be generated with 'free' energy. This reduces the overall electrical load and primary energy demand as chilled water is generated from steam instead of electricity.

Generating all of the electrical, refrigeration and heating needs from natural gas provides significant energy savings based on recent low natural gas prices. FDC tenants already pay quite low prices for electricity based on a NYPA energy contract. This subsidy could be eliminated with the proposed tri-generation energy facility and tenants could pay a true cost of energy while still reducing their overall cost burden by over 40%.

Switching from grid-power to all natural gas power also provides carbon emissions savings. Combining the underlying energy efficiency with fuel switching provides over 50% carbon emissions savings for the proposed scheme. Also natural gas is a domestic energy supply which adds energy independence to the many benefits of the proposed resilient energy system.

COMMUNITY FOOD ACCESS AND SECURITY

Hunts Point community resilience depends on access to healthy food. There is broadly shared interest among the New York City Economic Development Corporation, community organizations, food security philanthropies, residents—and likely, upstate farmers—in expanding neighborhood access to the bounty of the peninsula and increasing food security in the South Bronx.

The Food Bank for New York City—the City's hub for food poverty assistance, food distribution, income support, and nutrition education—is based in Hunts Point. Considered a model, it supplies 60 million pounds of food, including fresh produce, every year through its 90,000sf warehouse in the Food Distribution Center, via tractor trailers that move the food to schools, food pantries, soup kitchens, and other points of service throughout the City. The Food Bank For New York City's CookShop program uses hands-on workshops to teach cooking skills and nutrition information, beginning in elementary schools, and promote fresh food and affordable fruits and vegetables. Alongside City Harvest, the Food Bank For New York City has pioneered Mobile Markets, a program that brings hunger relief to the impoverished.

A 2012-2013 study funded by the University of Pennsylvania Center for Public Health Initiatives, titled "Food Relief Goes Local," identified a trend among food banks toward offering a broader array of services, similar to those offered through the Hunts Point-based bank. Of the programs suggested in the report, offering prepared food to points of service might be the most appropriate for consideration in Hunts Point, if support could be found. This diversification has the potential to create local jobs as well as increase food security.

There are three other food program options that may help increase food security and improve public food access: an indoor retail outlet for fresh food, a nutrition center, and an urban farming operation. These ideas are outlined in the palette of food options in this section. An indoor retail outlet for fresh food would build on the work of the BLK ProjeK to increase access to organic food in the neighborhood via mobile market, and the success of the outdoor farmers' market that offers locally grown produce.

The Stop Community Food Centre in Toronto, is a strong example of the nutrition center model. The Stop has demonstrated an exceptional capacity for integrating food relief with coalition building. Their diverse offerings include after-school programs, sustainable food systems education, urban agriculture, and community cooking workshops, in addition to basic drop-in, community advocacy, and family support services. Urban farming may be a useful food security program in Hunts Point, although past research indicates that it may not be financially self-sustaining.

Food security philanthropies are active in the South Bronx and may be interested in opening the resources of the food hub to low-income residents. Three federal programs could support the food initiatives outlined above: USDA Agricultural Marketing Service (AGS), EDA Economic Adjustment, and the USDA Food and Nutrition Service (FNS). The USDA Agricultural Market Service is committed to expanding access to fresh food and supporting innovative food markets. The Farmers Market Promotion Program (FMPP) and the Federal-State Marketing Improvement Program both provide funding for new market opportunities and direct producer-to-consumer supply streams. GrowNYC's Wholesale Greenmarket was funded through this program, indicating support for the idea and giving precedent for its success in Hunts Point.

The EDA Economic Adjustment grant aids in hard construction and non-infrastructure projects. New market facilities with demonstrated market potential or facility upgrades for improved efficiency and access both qualify for such funding. The USDA FNS is committed to helping end hunger and obesity through fifteen different food assistance programs. Four FNS programs could provide funding and assistance: Supplemental Nutrition Assistance Program (SNAP), Special Supplemental Nutrition Program for Women, Infants and Children, the National School Lunch Program, and Child and Adult Care Food Program. Where the AGS and EDA support facilities and business development, the FNS can complement with community outreach and coalition building.

FARMERS' MARKET

6-DAY FARMERS' MARKET

-Increases local fresh produce supply
-Increases public health
-Privileges pedestrian traffic
-Diversifies supplier and consumer base

INCREASED ACCESS TO FRESH PRODUCE

DETROIT EASTERN MARKET

POTENTIAL FUNDING STREAMS

-USDA Supplemental Food Assistance Program
-USDA Farmers' Market Promotion Program

NUTRITION CENTER

FOOD & NUTRITION EDUCATION RESOURCE CENTER

-Elevates public health
-Hosts food events and fairs
-Promotes outreach to school

URBAN FARMING

SMALL-SCALE URBAN GARDENS & FARMS

-Advances nutrition education
-Increases local fresh produce supply
-Strengthens local safety net and support
-Diversifies potential jobs and education

PROMOTES HEALTHY LIVING

THE STOP, TORONTO

POTENTIAL FUNDING STREAMS

-USDA Farmers' Market Promotion Program
-USDA Federal-State Marketing Improvement Program
-EDA Economic Adjustment Grant

SUPPORTS HEALTHY LIVING

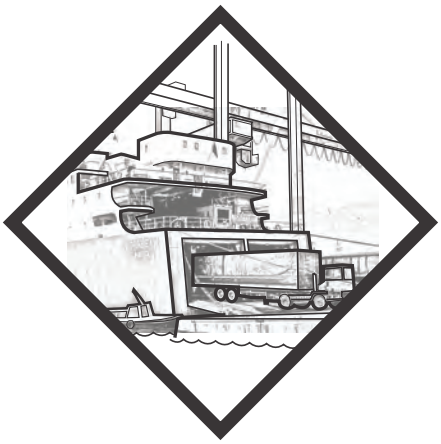
FINCA DEL SUR

POTENTIAL FUNDING STREAMS

-USDA Supplemental Nutrition Food Program
-USDA National School Lunch Program

LIFELINES
Maritime Supply Chain

This chapter looks at the opportunity for creating a high-ground base of operations for the distribution of goods, personnel, and equipment to areas under emergency, particularly when roads, tunnels and bridges are down. Once built, the necessary infrastructure makes it possible to increase reliance on marine highways for regular interstate commerce, increasing resilience, reducing carbon emissions, and stimulating growth in Hunts Point.



MARINE SUPPLY CHAIN
Emergency Relief Hub

Once built, the emergency supply pier can accommodate deliveries to the Fulton Fish Market and other water-dependent uses

Disaster Relief Supply Chain P120

The September 11, 2001 attacks, the 2003 black out, the 1997 blizzard and the 2011 and 2012 hurricanes provided stark evidence of the vulnerability of New York's road- and subway-based transportation network to a range of threats. The first mode of transportation restored after most events is maritime access, and more than 15 million people in the New York metropolitan area live within a few miles of navigable waterways, including New York Bay, the East River, Long Island Sound, and the Hudson, Passaic and Raritan rivers.

Hunts Point's 390-acre Food Distribution Center and surrounding large-scale wholesale distribution businesses have the capacity to support large scale disaster relief efforts in New York and in any city or area that can be accessed via navigable waterway. Hunts Point is well-situated on the Intercoastal Waterway, has deep water access and a freight railyard. If back up power generation and grid island capacity are expanded, as Lifelines recommends, Hunts Point will strengthen its position as a potential hub for a waterborne / multi-modal network for emergency distribution of equipment, supplies and personnel.

Marine Highways P125

Historically, our regional economy grew around maritime passage and rail movement. Supply chains for interstate commerce have since shifted to trucks with major impacts on roadway maintenance, traffic, air quality and safety. Hunts Point presents an opportunity to strengthen the waterways as commercial highways and to connect with larger regional and federal initiatives for intercoastal distribution and diversification of trade routes and means for resilience.

Expansion of regional maritime shipping to diversify commodities and distribution networks builds on existing assets: New York's great natural harbor, the strength of freight rail infrastructure in the Bronx, and the 390-acre city-owned industrial park at Hunts Point which has room to expand.

Support For Concept

The NYC Office of Emergency Management supports continued investigation of the feasibility and benefit of the emergency supply chain hub at Hunts Point. Some community members have expressed interest in this opportunity to increase local security and local economy, and perhaps in the future, to reduce the 20,000 weekly truck trips to Hunts Point without reducing growth. Research by the US DOT into new vessels and intermodal technologies for shipping and refrigerating food suggest that innovations in shipping may emerge and that facilitate transformations of the food markets that are environmentally and economically desirable for the City and Hunts Point Community members.

Technical Support For Recommendations

The concepts in this chapter were developed with support from McLaren Engineering Group and the University of Pennsylvania.

Past Relevant Studies

-Analysis of market for direct delivery of fish from day boats to Hunts Point commissioned by New Fulton Fish Market, 2010.

-Ohio Department of Health Management Information Systems Web-based IT Stand-alone Warehouse Response System, 2005

-Private Enterprise's Response to Hurricane Katrina, Horwitz, 2009

-Optimizing Hurricane Disaster Relief Goods Distribution:

Model development and application with respect to planning strategies, Downs & Horner, 2010
-Private/Public Partnerships in the Development of Disaster Resilient Communities, Chen, Chen, Park, Vertinsky & Yumagalova, 2013
-Role of Ports in Supply Chain Disruption Management, Loh & Thai, 2012

Physical Context

The businesses in the Hunts Point Food Distribution Center (FDC) move up to 60% of New York City's food supply, and much of the region's food. Other large wholesale businesses on the peninsula, such as Jetro Cash and Carry, are also key parts of the City's supply chain to individual families, particularly those in flood-vulnerable neighborhoods. The food sector has been growing in Hunts Point since 2000, with an estimated growth rate of 9% over the last 4 years, and its centrality as a food hub is likely to increase if it can be protected.

As Sandy demonstrated, large paved, tactical areas like those at Hunts Point's FDC, are essential for temporary emergency operations centers. The site of the Department of Sanitation's retired Marine Transfer Station, now in the process of being torn down, offers deep water access to the Intercoastal Waterway, and a disturbed site with foundation structures, adjacent to City-owned waterfront property that could be repurposed (These include a DSNY salt shed and yard, and the Department of Corrections Bain jail barge docking and parking area.) The water depths, channels and the upland access routes are already in place, but a new pier would be required. The MTS is currently in poor structural condition and is slated to be demolished as mitigation for construction of other Department of Sanitation MTS facilities over water.

McLaren Engineering Group has suggested that a pier measuring 60' wide x 300' long would be sufficient to support docking and loading of Roll-On/Roll-Off vessels and other emergency equipment as well as regular water-dependent shipping uses such as delivery of fish to Fulton Fish Market. McLaren has examined the underwater condition of the MTS with sonar to confirm existing condition and likely viability with further study. The approximate cost of the facility is $20,750,000. The benefit to the marine highways program and regional disaster relief network is difficult to quantify at this preliminary stage.

Policy and Funding Context

Preliminary research into federal initiatives suggests that a maritime supply hub at Hunts Point is highly attractive from the standpoint of leveraging existing infrastructure and industrial facilities, community and business interests, and solving a key regional resilience problem—logistics for disaster mitigation and relief.

Five existing federal initiatives may apply and have significant capacity to attract investment to Hunts Point and the City: FEMA Hazard Mitigation Assistance, FEMA Emergency Management Performance, Cities Readiness Initiative, the Strategic National Stockpile, and the Marine Highways Program. As the federal government studies how its investments in preparedness, relief and recovery can benefit communities in greater need, a traditional mission of HUD, this site is extremely attractive. Hunts Point offers an intersection of need, desire and logistical, business, government and physical capacity.

Disaster Relief Supply Chain

FEMA's National Preparedness efforts are aimed at building "a secure and resilient nation with capabilities required across the whole community to prevent, protect against, mitigate, respond to and recover from the threats and hazards that pose the greatest risk." By identifying and assessing risk, building and sustaining capabilities, and reviewing and updating measures for effectiveness and efficiency, Hunts Point can play a major role in disaster relief for New York and other cities. Working within FEMA's National Preparedness System, Hunts Point can qualify for several FEMA grants aimed at disaster relief and hazard mitigation.

Over $350M has been allocated through The Emergency Management Performance Grant program in 2014, a program specifically designed to help further FEMA's National Preparedness Goal. In particular, it atte build and sustain five core capabilities: Prevention, Protection, Mitigation, Response, and Recovery. Integrated flood protection paired with maritime access and disaster relief training aligns with the goals of Hunts Point residents and businesses. This program offers assistance for "planning, operations, equipment acquisitions, training, and construction and renovation" and can help prepare Hunts Point FDC for disaster scenarios, establish maritime access, secure transportation routes, and train first responders.

In addition to emergency management, Hazard Mitigation Assistance grant programs can help secure Hunts Point as a disaster relief hub. FEMA's aim is to support eligible mitigation activities that protect life, protect property, and reduce disaster losses. By partnering with the City and New York State, Hunts Point could have access to the three assistance programs: Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), and Flood Mitigation Assistance (FMA). Each program provides funding that could help kickstart investment in the pier as well as flood protection measures.

MARINE HIGHWAYS

US MARINE HIGHWAYS PROGRAM

-Improves public safety and security through redundancy and alternative transit
-Relieves truck traffic
-Reduces carbon emissions
-Increases economic competitiveness

EXTENDS THE U.S. SURFACE TRANSPORTATION SYSTEM

HUDSON RIVER FOOD CORRIDOR

POTENTIAL FUNDING STREAMS

-Maritime Administration Marine Highway Grant
-USDA Federal-State Marketing Improvement Program

DISASTER RELIEF

DISASTER RELIEF SUPPLY CHAIN

-Reinforces security and protection of coastal edge and transportation infrastructure
-Strengthens public-private partnerships

READINESS INITIATIVE

CDC CITIES READINESS INITIATIVE

-Locates Strategic National Stockpile and improve public health security via CDC
-Improves logistics training and education
-Privileges Hunts Point for future funding

BUILDS ON HUNTS POINT'S LOGISTICS

WAL-MART + RED CROSS KATRINA RELIEF

POTENTIAL FUNDING STREAMS

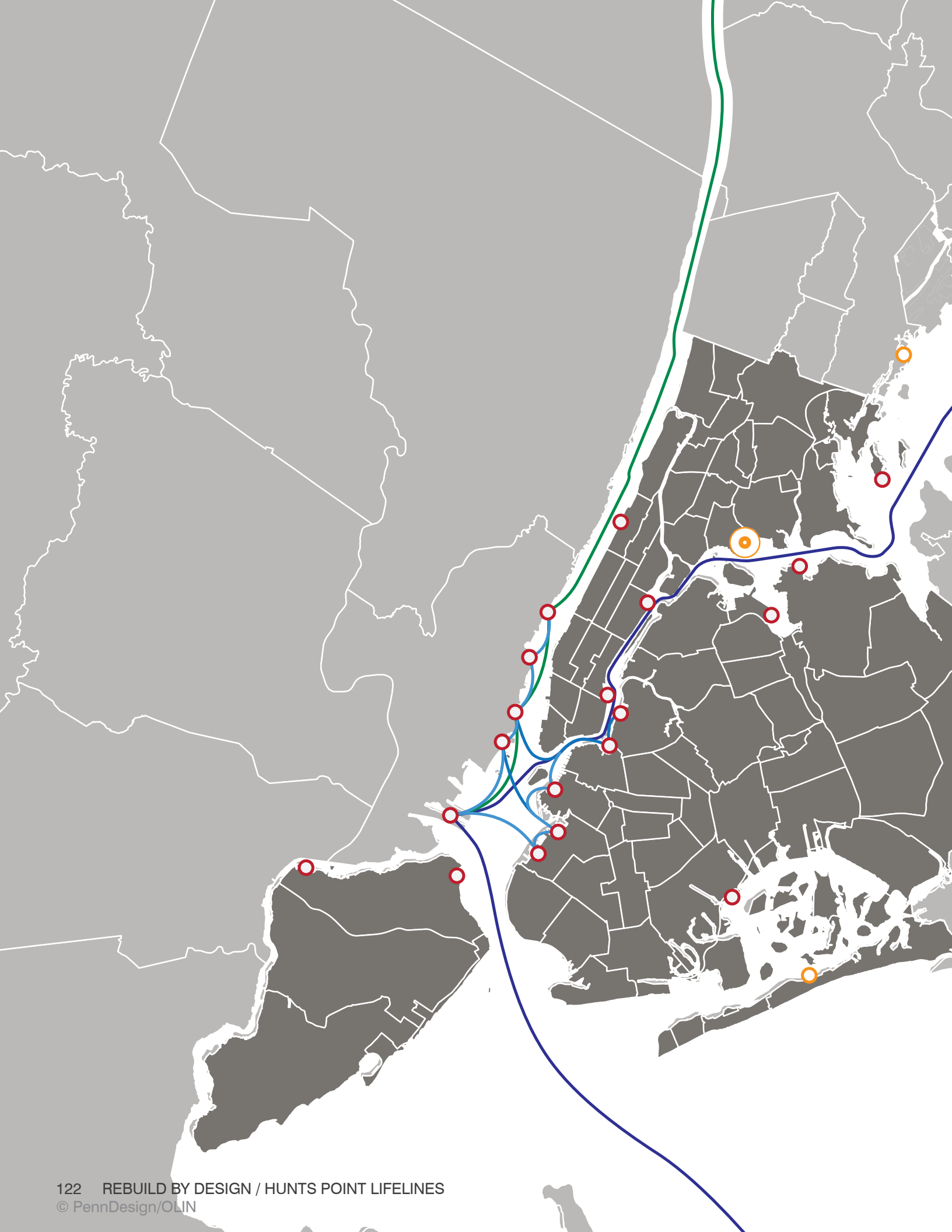
-FEMA Emergency Management Performance Grants
-FEMA Hazard Mitigation Assistance Grants

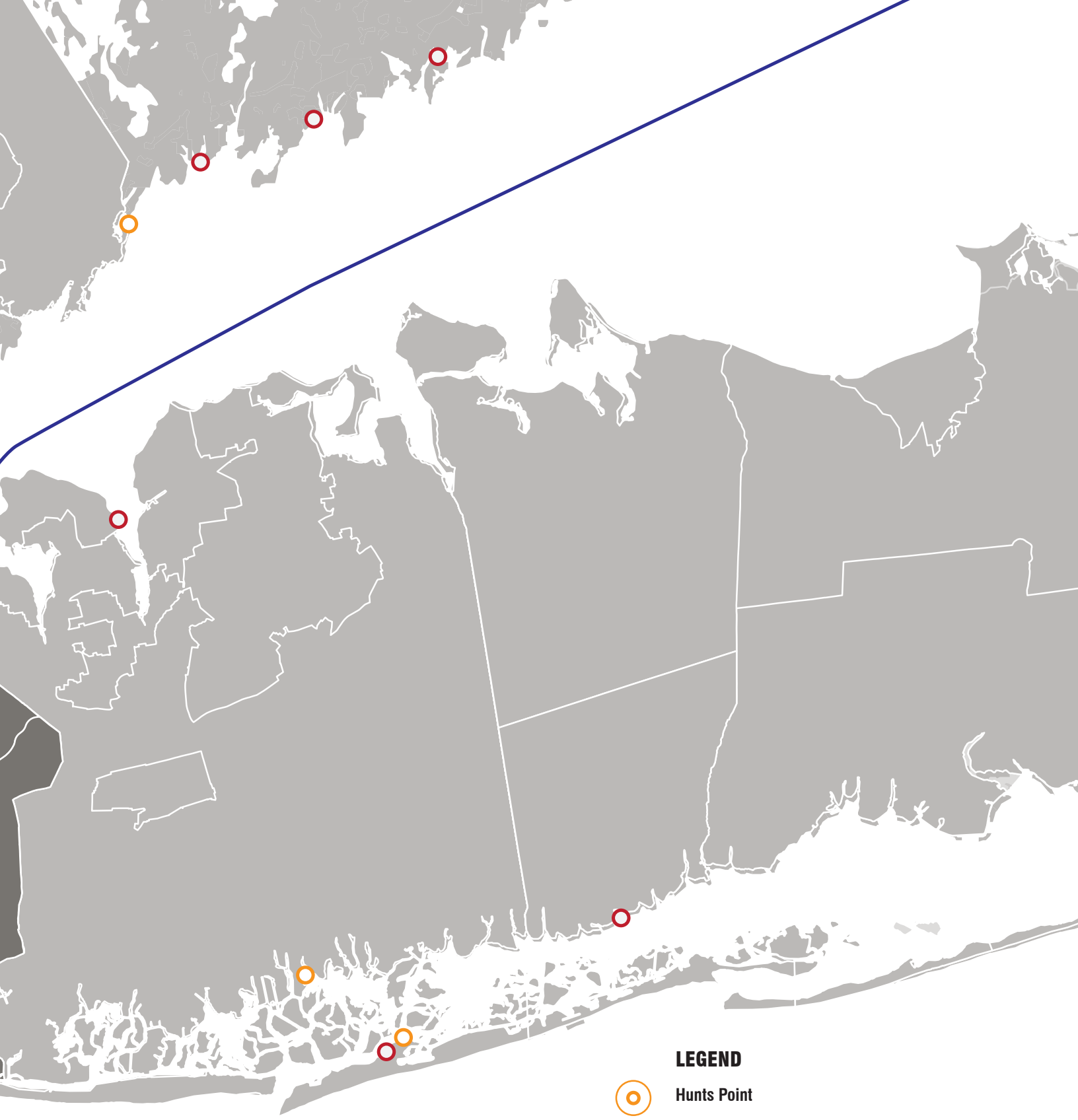
REINFORCES HUNTS POINT'S VALUE

OHIO DEPARTMENT OF HEALTH

POTENTIAL FUNDING STREAMS

-Cities Readiness Initiative annual funding allocation
-FEMA Emergency Management Performance Grant





FMA provides funding for structures within National Flood Insurance Program (NFIP) boundaries. Such funding could be used in the short-term to shore up flood protection while more extensive measures are under construction. PDM is an annual funding stream that aims to help reduce overall risk to a population and its structures while reducing reliance on federal assistance. Using this money to invest in integrated flood protection helps protect Hunts Point FDC, the surrounding food cluster, and local population, and decrease long-term dependence on federal funding. HMGP are finite grants that support the implementation of long-term hazard mitigation measures after a major disaster scenario. In addition to government entities, private non-profits may also apply for HMGP funding.

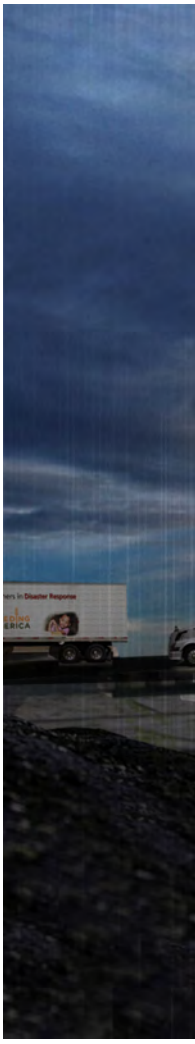
The Lifelines cost projection assumes that significant support from FEMA may be available for Hunts Point mitigation that could link physical flood works and the pier to the capacities residents and businesses (see Implementation Strategy). The map indicates locations in the immediate vicinity of Hunts Point that have some sort of docking facilities that could receive vessels bringing supplies via water. The map for the eastern US would include hundreds of dots.

Cities Readiness Initiative

The CDC has developed two programs that aim to increase national resilience for disaster scenarios: the Strategic National Stockpile (SNS), and the Cities Readiness Initiative (CRI). These two programs are designed to re-supply large quantities of medicine and medical supplies to protect the American public in a public health emergency. As a high and dry disaster relief supply chain hub, Hunts Point could play a role in the stockpile and distribution of such goods. The pier and support area could be designed to accommodate floating hospitals.

Proposed in 1999 and established in 2002, the Strategic National Stockpile revolves around rapid coordination and transport of medical supplies between governmental and non-governmental agencies. In the case of an emergency, the CDC is committed to supplying relief within 12-hours anywhere in the country. These packages are known as 12-hour Push Packages, and are designed for truck, rail, and container transportation. As an intermodal disaster relief hub, Hunts Point could serve as a distribution point for SNS 12-hour Push Packages.

As a subsidiary of the SNS, the Cities Readiness Initiative project exists under the CDC's Public Health Emergency Preparedness cooperative agreement. This project provides annual funding for Metropolitan Statistical Areas in all 50 states, as well as Chicago, Los Angeles, Washington D.C., and New York City. If Hunts Point were included within the CRI planning and strategy, Hunts Point could secure funding and technical assistance for integrated flood protection and marine access, and supply New York City and State, and East Coast cities in a range of disaster scenarios.



EMERGENCY MARITIME SUPPLY
A pier at the former Marine Transfer Station site supports emergency distribution of food, equipment, and personnel.

These investments and co-locations may invite private investment and diversification of business operations and types, which increases resilience in an economic down turn or during restructuring of the dominant industry.

Marine Highways

America's Marine Highway System consists of more than 29,000 nautical miles of federally designated navigable waterways. The Marine Highways Program is a US Department of Transportation (DOT) effort to expand this network of coastal, inland, and intercoastal waterways and encourage their integration with the US surface transportation system. The aims are to increase environmental sustainability by reducing ground traffic congestion and energy use, increase public safety and transportation system resiliency by creating alternative and redundant supply and distribution routes, create jobs, and increase competitiveness. This program naturally aligns with the goals and objectives of many Hunts Point residents and businesses. Hunts Point's unparalleled concentration of road and rail transportation lines and position on the Intercoastal Waterway make it a strong potential point of connection between surface and water traffic, and therefore a desirable node on a new Marine Highway.

There are several ways in which Hunts Point can be integrated into a Marine Highway. Besides existing routes, the Maritime Administration (MARAD) periodically publishes a "Call for Projects" that allows local and state agencies to propose new Marine Highways. These projects receive administrative and monetary support, as well as preferential status for any future federal assistance that might be available. The most recent Call resulted in eight new project designations, each of which provides a positive cost-benefit analysis and illustrates

the proposed route's capacity for increasing redundancy, environmental sustainability via reduced emissions, and economic sustainability via job creation. In addition to the eight new projects, MARAD designed six proposals as "initiatives." These proposals are defined as having enough promise to warrant continued support from the DOT and MARAD, but not enough to warrant project status and federal funding. Hunts Point is well situated for integration into two of the eight MARAD / DOT projects, and one of its six initiatives.

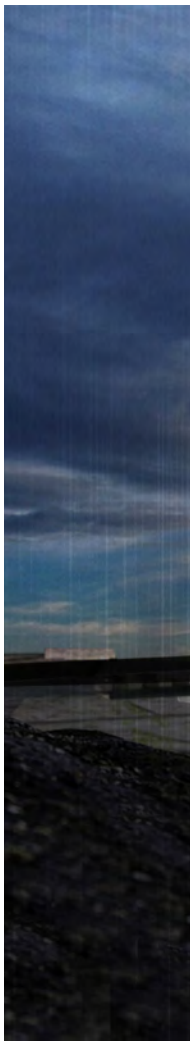
New England Marine Highway Project

The New England Marine Highway Project (NEMHP) is designed to expand the existing container-on-barge service that already links Newark, New Jersey with Boston, Massachusetts and Portland Maine. The previous Marine Highway (1995-2007) alleviated over 12,000 truckloads of freight from I-95 between New Jersey and Maine over its sporadic lifespan. Securing continuous service makes the NEMPH a potentially valuable asset in alleviating traffic congestion and air pollution while increasing pedestrian safety in the Hunts Point industrial area.

The NEMHP has begun with a detailed analysis of the existing route conditions between the terminal locations, and will focus on the design of a new ship that would make the route cost- and energy-efficient. Proposing an articulated tug and barge that rigidly connects two vessels, the project imagines transformation of shipping via vessel design and new docking mechanisms. Such future vessels could have a significant impact on the Benefit Cost Analysis for a pier at Hunts Point in the future. Roll-On / Roll-Off docking capacity is likely to integrate well with the New England Marine Highway direction.

Trans-Hudson Freight Connector Project

The Trans-Hudson Freight Connector Project aims to increase the quality and capacity of on-going cross-harbor service. By integrating a second barge with increased capacity and reliability into the existing rail float service operating between New Jersey and Brooklyn within New York Harbor, this project offers direct benefit to the New York metropolitan area. Expanding the use of freight rail provides massive immediate benefit, freeing up to four trucks from road traffic for every railcar moved by barge. This process provides added value by shifting the industry focus back toward rail, as rail has designated passageways across the waterways and does not compete with non-commercial traffic. Rail and rail float use considerably less energy per unit of cargo than trucks, conserving energy and reducing emissions. In addition, rail and rail float have a greater capacity for carrying large goods, which enables buyers and sellers to diversify their supply and distribution chains. The concentration of rail at Hunts Point makes it a potential transfer point for connecting rail float across New York Harbor, helping cargo from Newark reach through South Bronx to Greater New York.



NON-EMERGENCY MARITIME SUPPLY
The distribution pier is used on a daily basis for commercial and public uses, until the next emergency.

Hudson River Food Corridor Initiative

The Hudson River Food Corridor Initiative is a feasibility study currently analyzing alternative means of transporting fresh produce from the agricultural regions of North-Central New York along the Hudson River and Long Island Sound to the New York-Newark metropolitan area. This study focuses on the possibility of an intermodal supply chain utilizing refrigerated cargo containers, as well as alternative energy sources for powering the refrigerated containers both in transit and in storage.

Because of the focus on food, intermodality, and connections between upstate and downstate in an important economic sector, the Hudson River Food Corridor Initiative could play a role in container technology innovation that would transform shipping, reducing traffic congestion, air pollution, energy waste and food costs, while increasing food quality.

While relatively few fresh foods are transported by rail to Hunts Point now, changes over time in the goods distributed through Hunts Point, in refrigerated cargo technologies and in the supply chain for agricultural products—all of which are transforming—mean that intermodality may play a much bigger role in the future of Hunts Point.

Further investigation of the intersection between the Hudson River Food Corridor and Hunts Point capacity and products, may be of interest to New York State and food philanthropies.

The Marine Highways program could introduce a valuable set of partners for an integrated flood protection system in Hunts Point, including the US Department of Transportation, New York State DOT, the I-95 Corridor Coalition and New York City Soil and Water Conservation District.

PERFORMANCE
MONITORING AND METRICS

"…a resilience metric needs to be open and transparent, so that all members of a community understand how it was constructed and computed. It needs to be replicable, providing sufficient detail of the method of determination of a community's resilience so that it can be checked by anyone using the same data. It must also be well documented and simple enough to be used by a wide range of stakeholders."

– "Disaster Resilience: Committee on Increasing National Resilience to Hazards and Disasters" Engineering and Public Policy Committee on Science, Policy and Global Affairs, the National Academies

The square mile of geography that comprises the food cluster of Hunts Point is an intersection of scales of resilience involving the critical infrastructure of the food supply, the living wage jobs associated with an over 5 billion dollar industry, and the needs of an under served and environmentally challenged neighborhood. The value of resilience improvements for Hunts Point and the Greater New York region are best measured through the four interconnected Lifelines proposals for this hard-working waterfront. Complementing these project aims are the innovative systems and programs that build the project according to environmental and ecological benefit criteria which are reported throughout the proposal.

INTEGRATED FLOOD PROTECTION SYSTEM

Goal: Insure Disaster Readiness to Maintain the Food Supply

The core regional criteria focus on protection and maintenance of operations of properties relating to the wholesale food distribution markets and supply chain. The principal threats to the operations of the markets are flooding of properties, loss of power and refrigeration, and disruption of routes to and from the markets during inclement weather.

Wetland Levee System

Hydrologic design parameters were used to model the “extreme” storm event: the 100-year rain and storm surge event with 31 inches of sea level rise (SLR). For this event, the same 100-year rainfall event was simulated and the tide data were modified to match the 100-year storm surge plus 31 inches of SLR.

Multiple Layers of Defense

Flood defense can be upgraded to meet the 500 year event plus 31” SLR through multiple layers of flood defense systems including:

-Elevation of service utilities and select industrial parcels
-Flood vents, Treatment Wetlands and Diversion Bioswales
-Ejector Pumps
-Deployable and Automatic Passive Flood Barrier Systems

Flood Protection Monitoring

Flood Defense Performance Analysis will be updated periodically, according to sea level rise data and projections from the following sources:
-New York City Panel on Climate Change (NPCC)
-NOAA’s Center for Operational Oceanographic Products and Services (CO-OPS)
-Intergovernmental Panel on Climate Change (IPCC)

Integrated Flood Protection Routine Conditions Assessment

Levees and revetments will undergo routine conditions inspection for the flood control projects. When conducting inspections, levee personnel will document the condition of the project in an annual inspection report and also in the emergency preparedness plan.

Levee Lab Biological Performance Criteria

Monitoring of the Levee Lab experiments will be carried out in partnership with local non-profit environmental organizations such as Sustainable South Bronx and Rocking the Boat. Metrics might include:

-Presence and number of target species
-Biodiversity (species richness)
-Material durability

These metrics will be compared to those for the “workhorse” materials elsewhere.

LIVELIHOODS AND LEADERSHIP

The future of effective resilience planning will be measured by its ability to integrate diverse interests, respond to local environmental conditions, and deliver net benefits to the entire community in a transparent way. A support system for organizing the social capital of a given locality must be supported through an organized funding stream that equitably funds community participation in the planning process. In addition to the requested communication participation funding sought in this proposal for Hunts Point, we have assisted The Point CDC and NYC Environmental Justice Alliance in companion funding through the Department of Interior Hurricane Sandy Coastal Resiliency Competitive Grants Program.

-Metric: Community Survey of Process Transparency
-Metric: Fullilove's Nine Elements of Urban Restoration

Growing Employment

The Bronx has the highest unemployment rate of all the boroughs; in Hunts Point, unemployment is 19%. Therefore, growing employment opportunities in the South Bronx SMIA takes on greater urgency. The construction of the flood protection system will create an estimated 7,000 jobs along the peninsula over an assumed 10 year period of construction. The Lifelines proposal will work to develop a strong local labor and construction procurement strategy built on successes demonstrated by organizations such as the Bronx Overall Economic Development Corporation. With the Livelihoods and Leadership proposal, jobs will also grow through a shoreline green infrastructure evaluation program, Levee Lab. Working in concert with New York State Department of Environmental Conservation and EPA's Workforce Development Program, the Levee Lab shoreline study program will evaluate the performance of shoreline revetment systems that enhance ecological diversity to tidal and sub-tidal flora and fauna. Additionally, ongoing programs related to the proposed Hunts Point Farmers Market and greenway maintenance and operations will provide permanent employment opportunities along the peninsula.

-Metric: US Economic Census by Evaluation of Wages by Trade

Business Supply Chain Monitoring Program

The food cluster in Hunts Point extends beyond the NYCEDC-managed Food Distribution Center to encompass numerous private small business operations that play a vital role in the wholesale food markets. During a February Chamber of Commerce meeting, the team informally surveyed attendees to determine the number of businesses with flood insurance. None of the attending businesses were aware of having any flood insurance coverage. According to the Institute for Business and Home Safety, an estimated 25 percent of businesses do not reopen following a major disaster.

Even if a business escapes a disaster unharmed and employees are not hurt, establishments may be impacted by upstream and downstream losses. These risks are particularly evident in the food distribution supply chain, where the loss of wholesale supply affects restaurants, community grocers, and small vendors. Mapping supply information becomes critical in disaster events like Sandy, when many routes go down and alternative circulation plans need to be re-formulated to maintain business continuity.

Construction Impact Summary

Impact Type	Output	Employment	Labor Income	Value Added
Direct Effect	$754,555,648	4,640	$393,431,808	$475,139,400
Indirect Effect	$166,333,664	911	$84,075,824	$113,941,700
Induced Effect	$237,498,576	1,410	$96,533,824	$162,354,200
Total Effect	**$1,158,387,840**	**6,961**	**$574,041,472**	**$751,435,300**

The Hunts Point Lifelines project will pilot test the ResilientNYC logistics tools. This is an internet-based application which will allow small businesses to map their supply chains through New York City for daily operations, resiliency planning, and emergency response. Through crowd-sourcing, ResilientNYC will make it possible for local businesses to map their own supply chains, plan for business continuity, and find opportunities for local sourcing and distribution. By combining crowd-sourced data with market intelligence, ResilientNYC will help planners identify bottlenecks and find opportunities to make New York City's supply chains more dynamic and resilient.

CLEANWAYS

The Cleanways program is a multi-pronged proposal to improve the quality of life throughout the Hunts Point neighborhood. As conceived, the Cleanways programs will improve air and water quality and bring energy and food security to the peninsula, according to the criteria outlined below.

Resilient Clean Energy Program

In order to benchmark energy security, interviews were conducted with FDC operators and with NYCEDC and OLTPS. Currently, the markets do not possess back-up power to prevent loss of refrigeration. Power issues are further complicated by a reliance on diesel reefers and container trucks to maintain refrigeration during staging operations, a significant source of air pollution. Additionally, a steady rise in costs per kilowatt hour has had a dramatic effect on the costs of operations for the market wholesalers of the FDC.

Back-up energy design was based upon ensuring energy efficient design criteria and the implementation of redundant systems.

-Capacity Requirements for Back-Up Power Supply for Energy District: 25 MW
-Metric: USDA Cold Chain Improvement Initiatives
-Metric: Congestion Mitigation and Air Quality Improvement Program (CMAQ) truck stop electrification technology

Air Quality and Safe Streets

Modeled on the innovative Adapt Oakland project, the air quality and safe streets proposals locate thick plantings of evergreen tree species along major truck corridors to buffer particulate exhaust from diesel trucking. Recommended minimum dimensions for air quality mitigation are plantings situated 16 feet on center, with 20-40% porosity and a diverse mix of evergreen and climate-appropriate plants.

-Monitoring: Monitor Air Quality pollutant levels in the neighborhood using "Air Casting" technology
-Metric: particulate levels at three major wholesale markets
-Metric: Recommended Clean Air Quality Rules: National Ambient Air Quality Standards (NAAQS)
-Metric: ambient particulate levels in Hunts Point (average of multiple sites at distance from plantings)
-Metric: tree/plant survival rate
-Metric: Number of accidents involving pedestrian or cyclist (NYCDOT)
-Metric: Traffic fatalities involving pedestrian or cyclist (NYCDOT)
-Metric: Volume of pedestrian and cyclist traffic on designated routes (NYCDOT)

Community Food Security Programs

Despite being the hub of food distribution in the tri-state region, food insecurity is a major issue in Hunts Point. In the Bronx, poverty, food insecurity, unstable housing, and lack of access to essential programs create a high risk environment for youth.

-Metric: USDA Economic Research Service: Food Security CPS Survey data
-Metric: City of New York Supplemental Nutrition Assistance Program (SNAP) Data
-Metric: access to food Monitoring Program to survey retail vendors and costs of fresh produce
-Metric: resident participation in food programs

EMERGENCY MARITIME SUPPLY CHAIN

The Maritime Supply chain lifeline will provide critical support for emergency preparedness initiatives. During Hurricane Sandy, localities without power or fuel to prepare food were reliant on food from the produce market in the days following Hurricane Sandy's aftermath. As documented in the New York City Food Bank report, "Hurricane Sandy 100 Days After the Storm," "We were able to distribute 1.1 million pounds of food to all five boroughs within the first week of the storm…" In order to insure the continued distribution of food goods, a freight ferry service is necessary to insure distribution in the wake of a natural disaster. As the Rutgers "Bi-State Domestic Freight Ferries Study " notes, a marine highway system will provide increased security, safety, and emergency response capabilities. The ferry provides an alternate route in the event that a bridge and/or tunnel could not be used. Ferries can provide more flexibility in routes during emergency situations since they require minimal fixed infrastructure for landing and can modify their routes to a degree.

The required facilities to support the ferry system will require a truck ferry pier with a staging area meeting requirements as approved by the New York City Office of Emergency Management. With a truck ferry capability, the pier terminal will be capable of receiving commercial fishing trawlers and cargo deliveries to augment use beyond emergency preparedness requirements. In order for the emergency preparedness distribution system to be successful, McLaren Engineering Group performed a preliminary study identifying piers capable or possessing the upgrade potential to provide a serviceable supply chain for the greater New York area.

Emergency Preparedness Terminal Pier Design Criteria

-FHWA AASHTO Loading requirements
-Heavy Cargo: this includes construction equipment and other large or heavy vehicles or supplies which require machinery to be off-loaded from a barge. The delivery of these materials is currently limited based on the City Dock's weight restrictions.
-Local Fleet: Commercial fishing fleet trawler vessels

Regulatory Approval

-Port Authority of New York
-New York Departments of Transportation
-City of New York Fire Department

Logistics Staging Area (LAS) Design Requirements

The Logistics Staging Area (LSA) Program will bring equipment and supplies into the City before, during, or after a disaster in support of agency response operations or public recovery efforts. The staging area will support operations for City, State, Federal, and non-governmental agency partners to enact operational logistics plans.

This program will coordinate with the Citywide Asset and Logistics Management System (CALMS) Program Manager and the NYCTracker Program Manager to integrate available equipment, supplies, and facilities into the CALMS system.

$816M
Phase 1 Cost

PHASE 1 SUMMARY OF COSTS

Phase I Levee Park	$607,832,732
Phase I Cleanways	$31,356,192
Phase I Energy Resilience	$140,041,087
Phase I Maritime Supply Chain	$21,986,286
Phase I Community Programming	$14,460,616
Total Phase I Estimate	**$815,676,914**

COST ESTIMATE AND BENEFIT-COST ANALYSIS

This chapter summarizes the estimates of Phase I costs and benefits for Hunts Points Lifelines, including the Phase I Levee Park, Cleanways, Energy Resilience, Maritime Supply Chain, and Community Programming. The cost for a comprehensive, innovative Phase 1 resilience project is currently estimated to be $816M and includes a generous 30% contingency considering the conceptual state of the project. A preliminary Benefit Cost Analysis using a FEMA CBA methodology assessed project benefits including avoided property damage, avoided loss of food inventory, avoided loss of business revenue, and avoided downstream impacts of loss of food supply. The analysis concluded the project will provided over $1.1B in present value of avoided damages, making the project-wide Benefit Cost Ratio of 1.6. The fact that the BCR remains greater than 1.0 even considering the holistic, innovative, and comprehensive nature of the scheme demonstrates the scale of potential damages and the importance of implementing the entire Phase 1 project.

50 year NPV of Avoided Damages	$1,107,144,483
50 year NPV of Project Costs	$671,550,087
Benefit to Cost Ratio	1.6

The pages that follow provide further detail on the cost and benefit calculations, including cost by component and phase. Phase I is further broken down into Phase 1A—critical, early-action elements required to protect Hunts Point today—and Phase 1B, elements required to provide comprehensive protection through 2050.

1.6

Phase 1 B/C

PHASE 1A LEVEE PARK

This component includes edge flood protection around the Hunts Point peninsula, protecting a majority of the food distribution facilities in the New York region. Permanent edge protection extends from Barretto Point Park to Site D, with temporary protection and greenway access extending to Hunts Point Riverside Park. The scope costed below includes the park and levee, a conveyance and treatment system to manage stormwater behind the edge protection, and ecological restoration.

Item	Quantity	Cost	Unit	Total
Land Acquisition				
Land to be acquired for levee, park, and stormwater management	24	$2,100,000	ACRES	$50,400,000
Demolition and Site Prep				
General site clearing, non-contaminated material removal	32	$50,000	ACRES	$1,600,000
Deconstruction of existing bulkhead	6500	$1,000	LF	$6,500,000
Treatment and removal of contaminated material	96000	$200	CY	$19,200,000
General site prep, water, power, offices, staging	32	$100,000	ACRES	$3,200,000
Levee Structure				
Temporary Coffer Dam Upgrade	4000	$1,000	LF	$4,000,000
Clean Fill to Elevate Sites	46000	$100	CY	$4,600,000
Contaminated Fill and Barriers	16000	$300	CY	$4,800,000
Sheet Pile Bulkhead Structure	3600	$5,000	LF	$18,000,000
Levee Structures	4000	$8,000	LF	$32,000,000
Concrete Bulkhead Structure	1800	$8,000	LF	$14,400,000
Deployable Structures	500	$20,000	LF	$10,000,000
Drainage and Conveyance				
Improvements to existing piped drainage network	15000	$2,000	LF	$30,000,000
Stormwater treatment wetlands	15	$650,000	ACRES	$9,750,000
Ejector Pumps	200	$150,000	MGD	$30,000,000
Ejector Pump Balance of Systems (pipework, electrical, etc)	100	$100,000	MGD	$10,000,000
Park Landscape				
MTS area park landscape	1	$50,000	ACRES	$50,000
Softscape plantings budget for levee park	32	$200,000	ACRES	$6,400,000
Hardscape and site furniture budget for levee park	32	$100,000	ACRES	$3,200,000
Amenity Site Improvements budget for levee park	32	$100,000	ACRES	$3,200,000
Site Utilities, local drainage, lighting, power, communications	32	$500,000	ACRES	$16,000,000
Signage and other educational materials budget	32	$10,000	ACRES	$320,000
In-Water Ecological Restoration				
Rip Rap Boulder edge condition	8000	$1,500	LF	$12,000,000
Shoreline Habitat Upgrades	3.5	$250,000	ACRES	$875,000
Breakwater	2000	$2,500	LF	$5,000,000
Total Direct Costs				$295,495,000
Total Indirect Costs				$179,485,029
Total Component Cost Estimate				**$474,980,029**

PHASE 1B LEVEE PARK

This component includes edge flood protection around the Hunts Point peninsula, protecting a majority of the food distribution facilities in the New York region. Permanent edge protection and the greenway extend from Site D to the Bronx River bulkhead at the Bruckner Expressway. The scope costed below includes the park and levee, a conveyance and treatment system to manage stormwater behind the edge protection, and ecological restoration.

Item	Quantity	Cost	Unit	Total
Land Acquisition				
Land to be acquired for levee, park, and stormwater management	4	$2,100,000	ACRES	$8,400,000
Demolition and Site Prep				
General site clearing, non-contaminated material removal	4	$50,000	ACRES	$200,000
Deconstruction of existing bulkhead	0	$1,000	LF	$-
Treatment and removal of contaminated material	64000	$200	CY	$12,800,000
General site prep, water, power, offices, staging	12	$100,000	ACRES	$1,200,000
Levee Structure				
Clean Fill to Elevate Sites	0	$300	CY	$-
Contaminated Fill and Barriers	2500	$5,000	LF	$12,500,000
Sheet Pile Bulkhead Structure	2500	$8,000	LF	$20,000,000
Levee Structures	900	$8,000	LF	$7,200,000
Concrete Bulkhead Structure	0	$20,000	LF	$-
Deployable Structures	500	$20,000	LF	$10,000,000
Drainage and Conveyance				
Improvements to existing piped drainage network	0	$2,000	LF	$-
Stormwater treatment wetlands	0	$650,000	ACRES	$-
Ejector Pumps	0	$150,000	MGD	$-
Ejector Pump Balance of Systems (pipework, electrical, etc)	0	$100,000	MGD	$-
Park Landscape				
MTS area park landscape	0	$50,000	ACRES	$-
Softscape plantings budget for levee park	4	$200,000	ACRES	$800,000
Hardscape and site furniture budget for levee park	4	$100,000	ACRES	$400,000
Amenity Site Improvements budget for levee park	4	$100,000	ACRES	$400,000
Site Utilities, local drainage, lighting, power, communications	4	$500,000	ACRES	$2,000,000
Signage and other educational materials budget	4	$10,000	ACRES	$40,000
In-Water Ecological Restoration				
Rip Rap Boulder edge condition	1600	$1,500	LF	$2,400,000
Shoreline Habitat Upgrades	0	$250,000	ACRES	$-
Breakwater	1400	$6,000	LF	$8,400,000
Total Direct Costs				$68,340,000
Total Indirect Costs				$64,512,703
Total Component Cost Estimate				**$132,852,703**

PHASE 1A ENERGY

The scope of this component of the cost estimate includes individual, diesel backup power generators for the existing market facilities and the waste water treatment plant. These generators are raised above the level of current flood elevations.

Item	Quantity	Cost	Unit	Total
Back-Up Generation				
Distributed Backup Generation System	25,273	$750	per kW	$18,955,000
Elevated Concrete Storage Pad Above Flood Elevation	8	5,625	per pad	$45,000
Total Direct Costs				$19,000,000
Total Indirect Costs				$9,161,055
Total Component Cost Estimate				**$28,161,055**

PHASE 1B ENERGY

The scope of this component of the cost estimate includes a micro-grid and associated on-site power generation, co-generating facility, district chilled water plant, anaerobic bio-digester, energy control facility, solar photovoltaics on rooftops of all warehouses, site integrated vertical axis wind turbines, and other energy components of the energy resilience plan.

Item	Quantity	Cost	Unit	Total
Electrical Network				
Upgrade to incoming 13kV service from Mott Haven SS	15,840	$100	LF	$1,584,000
13kV Switching Station	30	$50,000	MVa	$1,500,000
New 13kV distribution network	10,560	$200	LF	$2,112,000
New 13kV building incoming services	15	$25,000	MVa	$375,000
Electrical generating turbine equipment	30,000	$500	kWe	$15,000,000
Balance of system for generating equipment	30,000	$150	kWe	$4,500,000
Natural Gas Network				
Upgrade to incoming high pressure gas service	21,120	$250	LF	$5,280,000
On-Site Fuel Storage	100,000	$50	CUFT	$5,000,000
Gas network balance of system	10,560	$200	LF	$2,112,000
Steam Network				
Heat Recovery Unit on Generator	150	$25,000	MMBTU/HR	$3,750,000
High Pressure Steam Heat Exchanger and balance of system	100	$10,000	MMBTU/HR	$1,000,000
Low Pressure Steam distribution network	10,560	$150	LF	$1,584,000
Chilled Water Network				
Ammonia Chillers	4,000	$500	TONS	$2,000,000
Centrifugal Chillers	4,000	$300	TONS	$1,200,000
Heat Rejection Equipment	6,000	$150	TONS	$900,000
Internal pump network and balance of system	4,000	$250	TONS	$1,000,000
District Chilled Water network	10,560	$150	LF	$1,584,000
District Chilled Water pumping system	35	$25,000	MGH	$875,000
Facility Structure	4,000	$200	SF	$800,000
PV Network				
Photovoltaic Panels	2,000	$1,500	kW	$3,000,000
PV Balance of System	2,000	$1,000	kW	$2,000,000
Anaerobic Digester Facility				
Digester Vessels	10,000	$150	Tons/d	$1,500,000
Balance of System	10,000	$250	Tons/d	$2,500,000
Facility Structure	3,000	$200	SF	$600,000
Energy Control Facility				
Control Building	5,000	$250	SF	$1,250,000
Fit-Out and control systems	50,000	$30	MWe	$1,500,000
Total Direct Costs				$64,506,000
Total Indirect Costs				$47,374,032
Total Component Cost Estimate				**$111,880,032**

PHASE 1A CLEANWAYS

The scope of this component of the cost estimate includes improvements to the street network and streetscape of Hunts Point to promote pedestrian and cyclist safety and to improve air quality.

Item	Quantity	Cost	Unit	Total
Streetscape Improvements				
Bioswale areas within street network	100	$25,000	EA	$2,500,000
Air Quality Plantings (assume 30' width)	20,000	$300	LF	$6,000,000
Restriping	6,167	$1	LF	$6,167
Curb/Sidewalk Reconstruction	8,131	$150	LF	$1,219,575
Total Direct Costs				$9,725,742
Total Indirect Costs				$7,122,239
Total Component Cost Estimate				**$16,847,981**

PHASE 1B CLEANWAYS

The scope of this component of the cost estimate continues improvements to the street network and streetscape of Hunts Point to promote pedestrian and cyclist safety and to improve air quality.

Item	Quantity	Cost	Unit	Total
Streetscape Improvements				
Bioswale areas within street network	100	$25,000	EA	$2,500,000
Air Quality Plantings (assume 30' width)	12,885	$300	LF	$3,865,500
Restriping	6,167	$1	LF	$6,167
Curb/Sidewalk Reconstruction	8,131	$150	LF	$1,219,575
Total Direct Costs				$7,591,242
Total Indirect Costs				$6,916,970
Total Component Cost Estimate				**$14,508,212**

PHASE 1 MARITIME SUPPLY CHAIN

The scope of this component of the cost estimate includes a new pier and approach infrastructure at the site of the existing Marine Transfer Station. The pier would serve as an emergency distribution point and staging area during natural disasters. During normal weather, the pier would serve the fish market and the staging area would function as a public plaza.

Item	Quantity	Cost	Unit	Total
Emergency Distribution Pier and Approach/Staging				
New Pier Construction	1	$12,000,000	Lump	$12,000,000
Approach Road/Staging Area	1	$2,000,000	Lump	$2,000,000
Total Direct Costs				$14,000,000
Total Indirect Costs				$7,986,286
Total Component Cost Estimate				**$21,986,286**

PHASE I COMMUNITY PROGRAMMING

The scope of this component of the cost estimate includes the community facilities and programs required to build social resilience throughout the Hunts Point district. HP LNC! Innovation Workforce (Livelihoods, Nutrition and Culture) programs proposed focus on workforce training for integrated flood protection, including clean-up of contaminated sites, operations and management of project infrastructure and programs focusing on food business development retail, access to local food, nutrition programs and community arts initiatives. Local partner organizations will include: THE POINT, Rocking the Boat, The Hunts Point Alliance for Children, Mothers on the Move, South Bronx Greenway, the Southern Bronx River Watershed Alliance and the New York City Environmental Justice Alliance (NYC-EJA) Waterfront Justice Project.

Item	Quantity	Cost	Unit	Total
Physical facilities				
Community Farmer's Market and Nutrition Outreach	5000	$200	SF	$1,000,000
Boating Facility	2000	$200	SF	$400,000
Community Facilities Occupancy for Project Programs		$1,250,000	5 Years	$1,250,000
Programs and Training				
Brownfield Innovation Program Administration		$200,000	Personnel	$200,000
Brownfield Workforce Training and Employment	1000	$1,200	Per Worker	$1,200,000
Levee Lab Program Administration		$100,000	Personnel	$100,000
Levee Lab Workforce Training and Employment	500	$1,200	Per Worker	$600,000
Garden Keepers Program Administration		$100,000	Personnel	$100,000
Garden Keepers Workforce Training and Employment	200	$1,200	Per Worker	$240,000
Gray Keepers Program Administration		$100,000	Personnel	$100,000
Gray Keepers Workforce Training and Employment	200	$1,200	Per Worker	$240,000
Farmers' Market Retail Nonprofit Administration		$250,000	Personnel	$250,000
Community Rowing and Stewardship Program	200	$1,200	Per Worker	$240,000
Boat Living Wage Job Skills Program		$300,000	Lump	$300,000
Community Arts Improvement Fund		$300,000	Lump	$300,000
Community Arts Open Space, Percent for Art		$6,000,000	Lump	$6,000,000
Total Direct Costs				$9,870,000
Total Indirect Costs				$1,940,616
Total Component Cost Estimate				$14,460,616

PHASE 2 LEVEE PARK

The scope of this component of the cost estimate includes the edge flood protection in the western portion of the project. This component extends from Barretto Point Park to the Willis Avenue Bridge (the western extent of the SMIA). The scope costed below includes the 3.0 miles of park and levee within a 30' wide right-of way. It also includes in-water ecological restoration features such as tidal marsh and mud flat restoration with protective breakwaters.

Item	Quantity	Cost	Unit	Total
Demolition and Site Prep				
General site clearing, non-contaminated material removal	16	$50,000	ACRES	$800,000
Deconstruction of existing bulkhead	3,100	$1,500	LF	$4,650,000
Treatment and removal of contaminated material	30,000	$200	CY	$6,000,000
General site prep, water, power, offices, staging	16	$100,000	ACRES	$1,600,000
Levee Structure				
Clean Fill to Elevate Sites	13,000	$100	CY	$1,300,000
Contaminated Fill and Barriers	39,000	$300	LF	$11,700,000
Sheet Pile Bulkhead Structure	4,000	$5,000	CY	$20,000,000
Earthen Levee Structure	6,500	$8,000	LF	$52,000,000
Concrete Bulkhead Structure	3,400	$8,000	LF	$27,200,000
Deployable Structures	0	$14,000	LF	$-
Park Landscape				
Softscape plantings budget	16	$200,000	ACRES	$3,200,000
Hardscape and site furniture budget	16	$100,000	ACRES	$1,600,000
Amenity Site Improvements budget	16	$100,000	ACRES	$1,600,000
Site Utilities, local drainage, lighting, power, communications	16	$500,000	ACRES	$8,000,000
Signage and other educational materials budget	16	$10,000	ACRES	$160,000
In-Water Ecological Restoration				
Rip Rap Boulder edge condition	7,000	$1,500	LF	$10,500,000
Shoreline Habitat Upgrades	3.0	$250,000	ACRES	$750,000
Breakwater	2,500	$6,000	LF	$15,000,000
Total Direct Costs				$166,060,000
Total Indirect Costs				$121,607,066
Total Component Cost Estimate				**$287,667,066**

PHASE ONE SOFT COSTS AND PROGRAM COSTS

		Levee Park	Energy	Cleanways	Maritime	Community
Direct Costs		[1]$305,035,000	$83,506,000	$17,316,984	$14,000,000	$9,870,000
Soft Costs						
Landscape, Engineering and Design	10%	$30,503,500	$6,680,480	$1,731,698	$1,120,000	$265,000
Project Management, Legal, Permitting	5%	$15,251,750	$3,340,240	$865,849	$560,000	$132,500
Mark-Ups						
General Requirements	5%	$15,251,750	$4,175,300	$865,849	$700,000	$132,500
Design Estimating Contingency	20%	$64,057,350	$8,768,130	$3,636,567	$1,470,000	$556,500
Construction Contingency	5%	$94,741,605	$4,822,472	$1,090,970	$16,978,500	$3,505,950
Escalation to Midpoint (60 Months)	15%	$80,359,351	$23,747,682	$4,742,173	$2,546,775	$525,893
CCIP	4%	$19,356,826	$5,000,783	$1,106,102	$781,011	$161,274
Total InDirect Costs		**$243,997,732**	**$56,535,087**	**$14,039,208**	**$7,986,286**	**$1,940,616**
Total Phase I Component Costs		**[1]$607,832,732**	**$140,041,087**	**$31,356,192**	**$21,986,286**	**$14,460,616**

[1]Indirect cost calculations for the Phase I Levee park exclude land acquisition costs of approximately $58.8 million.
Total component costs in this table include land acquisition costs.

AVOIDED DAMAGES: PROPERTY

Current elevations of properties in the Food Distribution Center range from +8' to +20' as some sites have been elevated with fill while others remain low-lying. Properties still at low elevations such as Krasdale, Sultana & Citarella, and the DEP WWTP remain exposed to property damage at even the 1 in 10 year storm event (10% probability of occurrence each year). Other such as the Produce Market at +18' see exposure to damage only in the most extreme storm many years from now with the impact of sea level rise.

Damages, or repair values, summarized below are based on a fraction of the estimated replacement cost of each facility depending on the depth of flooding on the site. The reference scenario for some facilities includes complete redevelopment within 50 years in which the site would be raised or the facility wet-proofed.

Estimated Property Damages To FDC Facilities by Flood Event Probability

Flood Probability/Year	10% 2013	1% 2013	1% 2050	0.2% 2050
Flood Elevation (NAVD88)	**10'**	**13'**	**16'**	**18'**
Terminal Market (Produce)	$0	$0	$0	$66,400,000
Cooperative Market (Meat)	$0	$0	$40,800,000	$54,400,000
Fish Market	$0	$17,200,000	$25,800,000	$34,400,000
Krasdale Foods	$0	$9,000,000	$18,000,000	$24,000,000
Baldor Specialty Foods	$0	$7,400,000	$11,100,000	$14,800,000
Anheuser-Busch	$0	$0	$0	$12,000,000
Sultana / Citarella	$7,600,000	$11,400,000	$19,000,000	$26,600,000
Iroquois Gas Pipeline	$0	$0	$0	$7,500,000
DEP Wastewater Treatment Plant	$25,000,000	$75,000,000	$100,000,000	$125,000,000
Outside Food Distribution Center	$0	$10,953,934	$25,896,872	$45,145,403
Total	**$32,600,000**	**$130,953,934**	**$240,596,872**	**$410,245,403**

Industry and infrastructure within the 2050 100-Year Flood Zone (+16' NAVD88)

AVOIDED DAMAGES: INVENTORY

The PennOlin team analyzed the average inventory values stored in each FDC facility based on interviews with facility managers, publicly available information and previous studies. For each flood level event inventory losses were included if storm flood elevation breaches the ground floor level of the facility and water spoils inventory.

Other inventory risk was assessed such as regional power outage and lack of diesel fuel supply for distribution trucks as power outage and lack of refrigeration for more than one day will spoil perishable food inventories. The energy resilience component of the plan which includes full backup power through a micro-grid and on-site electrical generation provides avoidance of these damages while a project with only a levee wall would not.

Estimated Inventory Damage by Flood Event Probability

Flood Probability/Year	**10% 2013**	**1% 2013**	**1% 2050**	**0.2% 2050**
Flood Elevation (NAVD88)	**10'**	**13'**	**16'**	**18'**
Terminal Market (Produce)	$0	$27,600,000	$27,600,000	$27,600,000
Cooperative Market (Meat)	$0	$0	$40,800,000	$54,400,000
Fish Market	$0	$12,000,000	$12,000,000	$12,000,000
Krasdale Foods	$0	$8,372,093	$8,372,093	$8,372,093
Baldor Specialty Foods	$0	$5,162,791	$5,162,791	$5,162,791
Anheuser-Busch	$0	$0	$0	$10,874,419
Sultana / Citarella	$0	$0	$0	$12,372,093
Iroquois Gas Pipeline	$0	$0	$0	$3,600,000
DEP Wastewater Treatment Plant	$0	$0	$0	$0
Outside Food Distribution Center	$0	$3,821,140	$14,246,445	$20,552,430
Total	**$0**	**$56,956,024**	**$108,181,329**	**$154,933,826**

AVOIDED DAMAGES: LOSS OF BUSINESS ACTIVITY

Not only will businesses in the Food Distribution Center lose perishable inventories stored in the facilities during a major storm event, they will lose revenue for the duration that they are not able to open for business. If the electrical grid is out, the subways are not running, or diesel fuel is not available, businesses in the study area will suffer losses even if their facility is well above the high flood level.

The damages estimated below are based on a service outage analysis for each flood event level suggesting power, transit and fuel outages for 1 to 14 days (see assumptions page for details).

Estimated Loss Of Revenue To FDC Facilities by Flood Event Probability

Flood Probability/Year	**10% 2013**	**1% 2013**	**1% 2050**	**0.2% 2050**
Flood Elevation (NAVD88)	**10'**	**13'**	**16'**	**18'**
Terminal Market (Produce)	$9,200,000	$36,800,000	$64,400,000	$128,800,000
Cooperative Market (Meat)	$12,800,000	$51,200,000	$179,200,000	$384,000,000
Fish Market	$4,000,000	$16,000,000	$56,000,000	$120,000,000
Krasdale Foods	$2,790,698	$11,162,791	$39,069,767	$83,720,930
Baldor Specialty Foods	$1,720,930	$6,883,721	$10,325,581	$17,209,302
Anheuser-Busch	$1,553,488	$6,213,953	$9,320,930	$15,534,884
Sultana / Citarella	$1,767,442	$7,069,767	$24,744,186	$53,023,256
Iroquois Gas Pipeline	$1,200,000	$4,800,000	$7,200,000	$12,000,000
DEP Wastewater Treatment Plant	$0	$0	$0	$0
Outside Food Distribution Center	$2,547,426	$12,391,094	$28,739,535	$59,481,671
Total	**$37,579,984**	**$152,521,326**	**$418,999,999**	**$873,770,043**

AVOIDED DAMAGES: INDIRECT ECONOMIC IMPACTS

The total regional economic impact of a major disruption at the Hunts Point food center would be catastrophic, considering that at least 50% of all produce and meat consumed in the city passes through the major markets, and that the next-nearest markets are not only distant but susceptible to similar flood risk. As a result, thousands of customers (including supermarkets, restaurants, and major institutions) would either be unable to secure food or would need to pay a premium for goods.

Many of these impacts are difficult to quantify due the unpredictability of outcomes, but the PennDesign/ OLIN team was able to estimate a subset of impacts – lost economic activity – using the IMpact Analysis for PLANning (IMPLAN) input-output model. These impacts include the reduction in overall spending that would occur as employees and vendors went unpaid, as well as the multiplier effects of those lost payments.

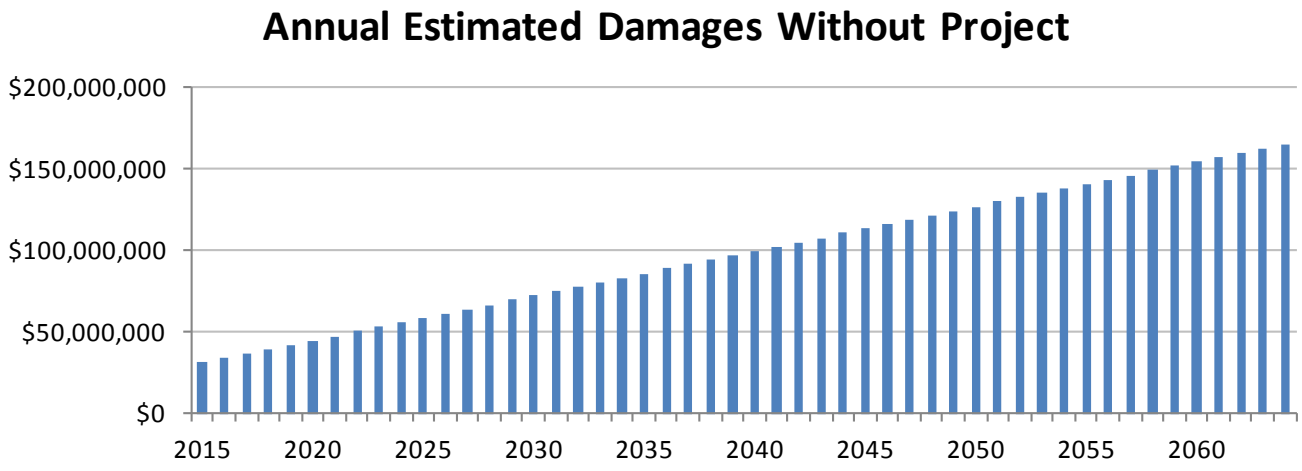
Estimated Indirect Economic Impact by Flood Event Probability

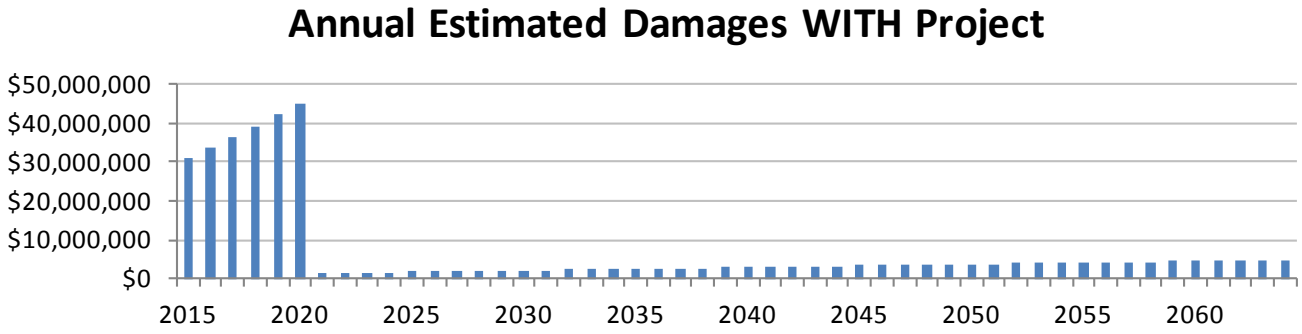
Flood Probability/Year	**10% 2013**	**1% 2013**	**1% 2050**	**0.2% 2050**
Flood Elevation (NAVD88)	**10'**	**13'**	**16'**	**18'**
Terminal Market (Produce)	$4,648,906	$18,595,624	$32,542,342	$65,084,685
Cooperative Market (Meat)	$5,798,204	$23,192,818	$81,174,862	$173,946,132
Fish Market	$2,021,264	$8,085,054	$28,297,689	$60,637,905
Krasdale Foods	$1,410,184	$5,640,735	$19,742,574	$42,305,515
Baldor Specialty Foods	$869,613	$3,478,453	$5,217,680	$8,696,134
Anheuser-Busch	$785,002	$3,140,009	$4,710,014	$7,850,023
Sultana / Citarella	$893,116	$3,572,466	$12,503,630	$26,793,493
Iroquois Gas Pipeline	$0	$0	$0	$0
DEP Wastewater Treatment Plant	$0	$0	$0	$0
Outside Food Distribution Center	$1,287,255	$6,261,417	$14,522,543	$30,057,033
Total	**$17,713,544**	**$71,966,576**	**$198,711,334**	**$415,370,920**

NET PRESENT VALUE OF AVOIDED DAMAGES

The net present value of avoided damages is the difference between estimated damages over the next 50 years without the proposed project and estimated damages over the next 50 years with the proposed project. Graphs of the two scenarios below are shown in constant 2014 dollars. The increase in annual estimated damages represents the increasing probability of flooding events based on sea level rise projections. By 2065 more properties will be in the 100 year flood zone and those already in the 100 year flood zone will have a higher likelihood of a flood event than they do today, thus annual estimated damages increase over time despite using constant year dollars.

50 year NPV of Damages without Hunts Point Lifelines Project	$1,331,000,000
50 year NPV of Estimated Damages WITH Hunts Point Lifelines Project	$224,093,780
Avoided Damages (Project Benefit)	$1,107,144,483



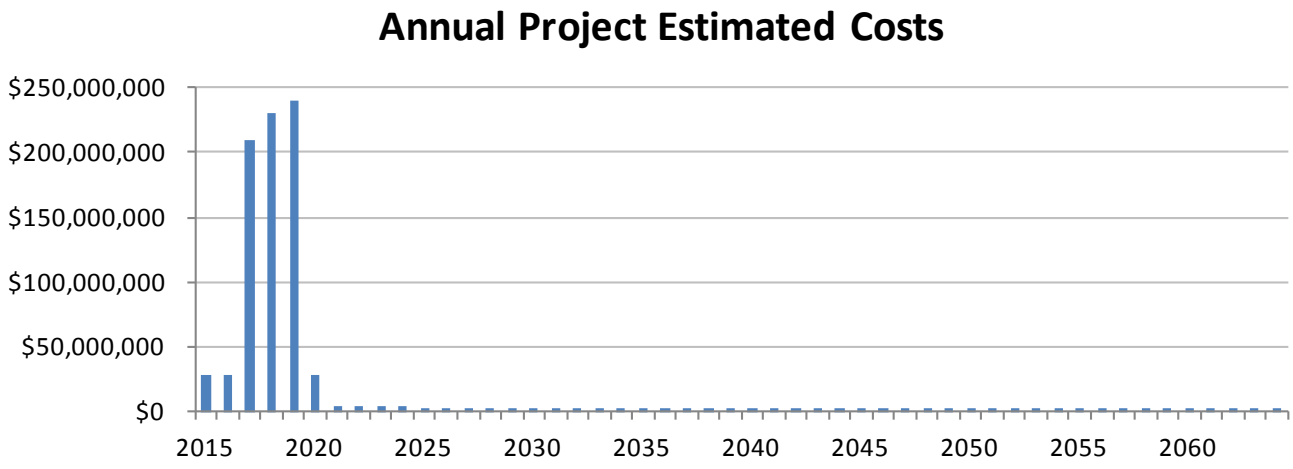


NET PRESENT VALUE OF PROJECT COSTS

A full breakdown of project cost estimating can be found on page at the beginning of this chapter, and a summary is to the right. Considering the majority of Phase 1 project construction costs will be spent over 2 to 3 years after a 2 to 3 year design and permitting phase, the NPV of project costs will be less than the estimated costs.

Also included in cost side of the Benefit Cost Analysis are ongoing maintenance and operation costs required to keep the levee fully functional, the park spaces clean and maintained, and upkeep of deployable flood protection structures. A budget of $2,000,000 per year is currently being carried for annual operations and maintenance costs.

Component	NPV of Estimated Cost
Phase 1 Levee Park	$503,208,955
Phase 1 Cleanways	$25,958,978
Phase 1 Energy Resilience	$77,688,626
Phase 1 Maritime Supply Chain	$18,201,876
Phase 1 Community Programming	$11,166,105
O & M	$35,325,547
TOTAL	**$671,550,087**



BCA ASSUMPTIONS

Economic Analysis Assumptions

Rate	Assumption
Discount Rate	5%
Alternate Discount Rate	7%
Economic Growth Rate	2%

Property Value Assumptions

Property Value	PSF
Fish	$200
A-B	$240
Produce	$334
Area Median	$200

Revenue Assumptions

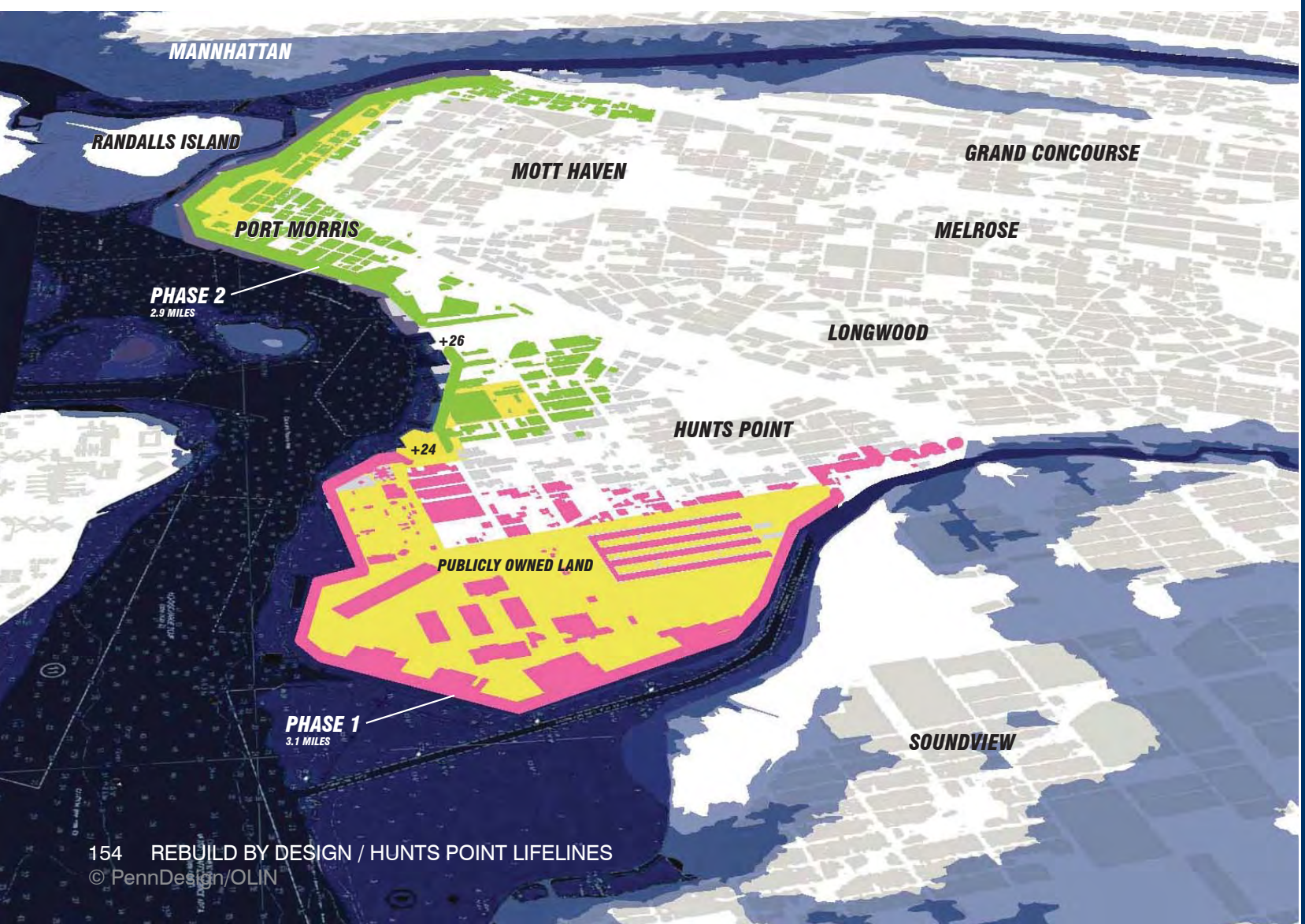
Sales	PSF
Produce	$2,312
Meat	$4,706
Fish	$2,326
Area Median	$2,116

Employment Assumptions

Employees	PSF
Produce	332
Meat	283
Fish	662
Krasdale	1500
Baldor	308
A-B	396
Sultana	1267
Area Median	396

Service Disruption Assumptions

Flood Probability/Year Flood Elevation (NAVD88)	10% 2013 10'	1% 2013 13'	1% 2050 16'	0.2% 2050 18'
Depth of Flood on Property	0’ - 10’	0’ - 7’	0’ - 4’	0’ - 2’
Days Power Outage	0	2	4	7
Days Transit Outage	0	3	5	8
Days to return to business	1-7	4-14	7-30	14-30



Implementation *Strategy*

In order to deliver comprehensive and effective resilience infrastructure to Hunts Point, the implementation of the Lifelines project requires the establishment of cohesive lines of communication between community, industry, and City government. The stakeholder list is broad, the interagency coordination is complex, and the anticipated regulatory approvals for flood-related infrastructure and energy infrastructure improvements will require intensive study and coordination. During Stage Three of Rebuild by Design, the PennDesign/ OLIN team has identified the majority of the stakeholders necessary to accomplish this endeavor. For more detail on that process, see the Coalition chapter of this report.

CONTINUITY OF PUBLIC LAND
and the value of regional assets in the peninsula make Hunts Point an ideal site to develop an integrated flood protection system that protects a critical regional asset and builds on long-standing plans to create a waterfront greenway from Randall's Island to the Bronx River.

Overview

The findings outlined in this report represent a high-level conceptual plan for addressing long-term physical and economic resilience on the Hunts Point Peninsula. While we are confident in our finding that there is a strong need for an integrated flood protection system and energy infrastructure investment in Hunts Point, and that a multi-purpose levee and smart grid system are the optimal methods for achieving the stated goals of the City of New York, additional study is needed to advance our work to an implementation-ready stage.

The Office of the Mayor of New York City and the New York City Economic Development Corporation (NYCEDC) have expressed strong support of the recommendations outlined in this report. They have suggested next steps that would align our findings with NYCEDC's more holistic understanding of certain project components and to expand upon our analysis by securing access to City-owned property.

In line with this input, we recommend the City of New York undertake the following three steps over the next 18 months to prepare for Phase I of the recommended project.

Step One

The first action is to commission a follow-on feasibility study to advance site-specific planning. This study would build upon our report and position the City to prepare a formal application for CDBG-DR funds, identify total project sources and uses, and begin planning for the procurement of design and construction bids. It would conclude with recommended next steps, including a detailed work plan and project timeline by phase.

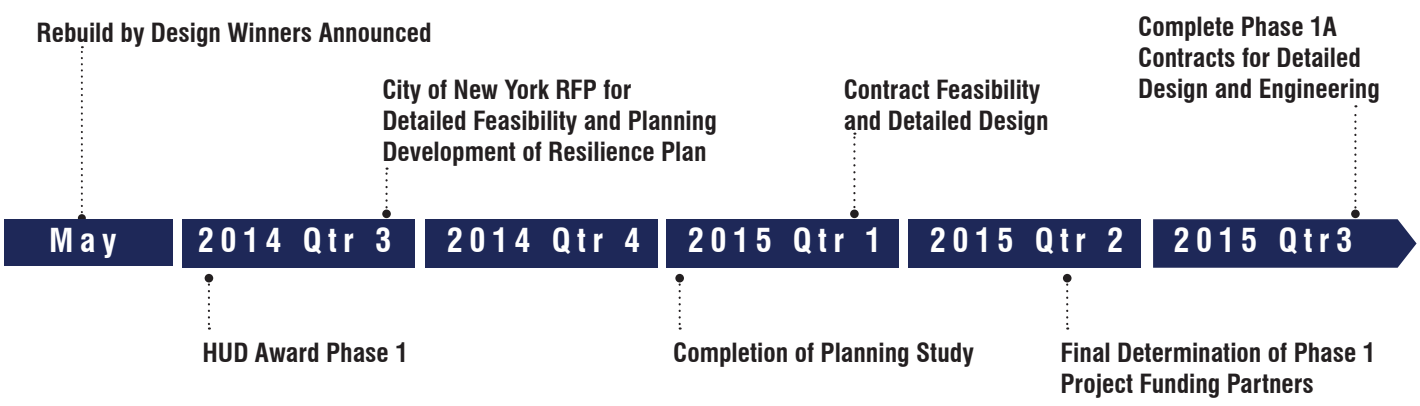
Components of the study that advance this report's scope include:

-Detailed survey of existing site conditions
-Detailed geotechnical analysis
-Phase I and II environmental impact analysis
-Analysis of property acquisition needs and scenarios
-Recommendations for integrating protection with local business uses, the Waste Water Treatment Plant, and transportation infrastructure

Components of the study that would refine and continue this report's scope include:

-Preliminary landscape architecture and engineering design work
-Stakeholder outreach to define programming and components for community space
-Refined construction cost estimating and phasing strategies
-Identification of total funding sources, a preliminary version of which is outlined in the charts Potential Funding Streams: Phase 1 (A+B) and subdivided further into Potential Funding Streams: Phase 1A and Phase 1B
-Evaluation of long-term economic benefits, including

PRELIMINARY TIMELINE



private development opportunities

-Identification of required regulatory approvals and other public processes, which are likely to include New York State Environmental Quality Review Act (SEQRA) and New York City Environmental Quality Review (CEQR), and engagement with the following agencies, several of which have already been consulted through this project:

-U.S. Army Corps of Engineers

-U.S. Environmental Protection Agency

-New York State Department of Environmental Conservation (NYSDEC)

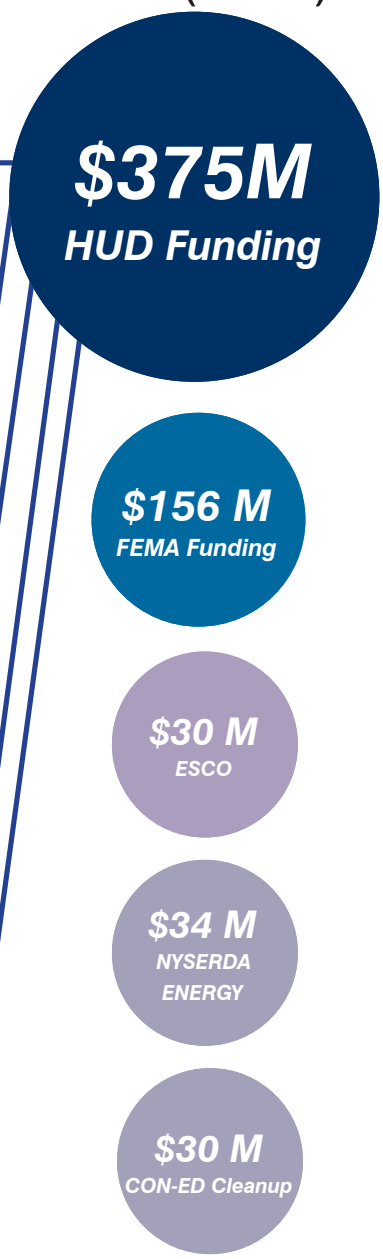
-New York City Department of Environmental Protection (NYCDEP)

Step Two

Perform required regulatory and land use actions, including seeking and securing regulatory approvals and funding, and acquiring necessary property. It is likely that some of these steps may take place concurrently with the feasibility study.

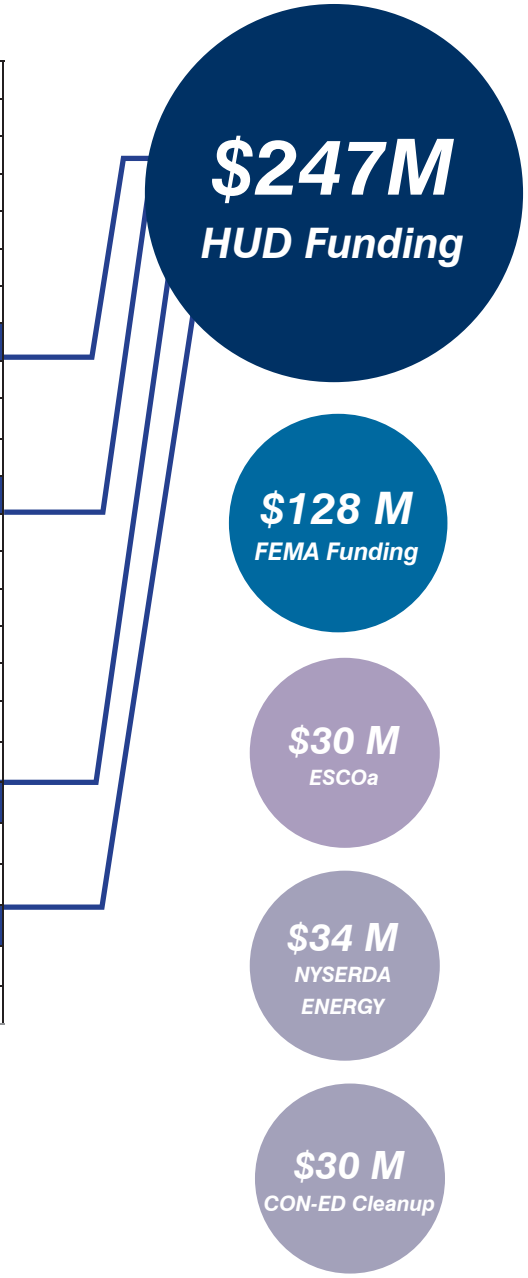
POTENTIAL FUNDING STREAMS: PHASE 1 (A+B)

PHASE 1 LEVEE PARK	
Fema Hazard Mitigation	$156,000,000
NYC (Parks, Edc, Etc)	$10,000,000
Con-Ed Cleanup	$30,000,000
DEP	$16,000,000
Mitigation Banking	$16,000,000
Other Federal Funding	$25,000,000
HUD CDBG	$305,000,000
Property Acquisition	$50,000,000
SUBTOTAL	$608,000,000
CLEANWAYS: STORMWATER, AIR	
HUD CDBG	$15,000,000
DEP	$12,000,000
NOAA Coastal Resilience Funding	$3,000,000
SUBTOTAL	**$30,000,000**
CLEANWAYS: PHASE 1A AND PHASE 1B ENERGY	
Back-Up Energy	$30,000,000
Ny Prize Or Other Grants	$10,000,000
EDC	$15,000,000
HUD CDBG	$21,000,000
NYSERDA	$30,000,000
Private Sector ESCO	$34,000,000
SUBTOTAL	**$140,000,000**
MARITIME SUPPLY	
HUD CDBG	$22,000,000
SUBTOTAL	$22,000,000
COMMUNITY PROGRAMMING	
HUD CDBG	11,460,000
USDA Nutrition Programs	3,000,000
SUBTOTAL	$14,460,000
Phase 1 Project Total	
TOTAL	**$815,650,000**



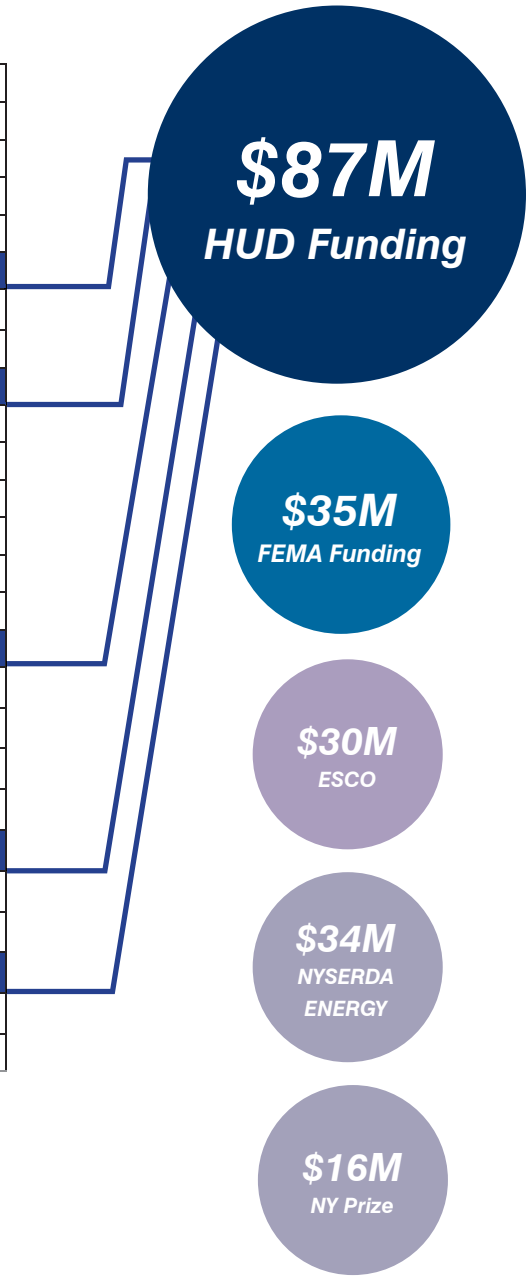
POTENTIAL FUNDING STREAMS: PHASE 1A

PHASE 1A LEVEE PARK	
FEMA HAZARD MITIGATION	$128,000,000
NYC (PARKS, EDC, ETC)	$10,000,000
CON-ED CLEANUP	$30,000,000
DEP	$16,000,000
MITIGATION BANKING	$16,000,000
OTHER FEDERAL FUNDING	$20,000,000
HUD CDBG	$205,000,000
PROPERTY ACQUISITION	$50,000,000
TOTAL	**$475,000,000**
CLEANWAYS: STORMWATER, AIR	
HUD CDBG	$10,000,000
DEP	$5,000,000
NOAA COASTAL RESILIENCE FUNDING	$2,000,000
TOTAL	**$17,000,000**
CLEANWAYS: ENERGY	
DHS EMERGENCY PREPAREDNESS	$15,000,000
CDC EMERGENCY PREPAREDNESS	$14,000,000
MARINE HIGHWAYS	
HUD CDBG	$21,000,000
TOTAL	**$21,000,000**
COMMUNITY PROGRAMMING	
HUD CDBG	$11,460,000
USDA NUTRITION PROGRAMS	$3,000,000
TOTAL PHASE 1	**$556,460,616**



POTENTIAL FUNDING STREAMS: PHASE 1B

PHASE 1B LEVEE PARK	
FEMA HAZARD MITIGATION	$35,000,000
NYC (PARKS, EDC, ETC)	$10,000,000
MITIGATION BANKING	$8,000,000
OTHER FEDERAL FUNDING	$20,000,000
HUD CDBG	$60,000,000
TOTAL	**133,000,000**
CLEANWAYS: STORMWATER, AIR	
HUD CDBG	$6,000,000
DEP	$10,000,000
NOAA COASTAL RESILIENCE FUNDING	$2,000,000
TOTAL	**$13,000,000**
CLEANWAYS: ENERGY	
NY PRIZE OR OTHER GRANTS	$16,000,000
EDC	$15,000,000
HUD	$21,000,000
NYSERDA	$30,000,000
PRIVATE SECTOR ESCO	$30,000,000
TOTAL	**$112,000,000**
MARINE HIGHWAYS	
HUD CDBG	$20,000,000
COMMUNITY PROGRAMMING	
HUD CDBG	$16,000,000
TOTAL PHASE 1	**$258,000,000**



Step Three

Commission and award contracts for project design, construction, and implementation. Once project feasibility is established and approvals are in place, the City should proceed with the following services:

-Detailed landscape architecture and engineering designs
-Construction of integrated flood protection system, energy infrastructure, and community assets
-Administration of community programming associated with flood protection system

Once contracts are awarded for Phase I of the project, the City should repeat steps 1 through 3 for Phase II of the project.

Environmental and Land Use Review

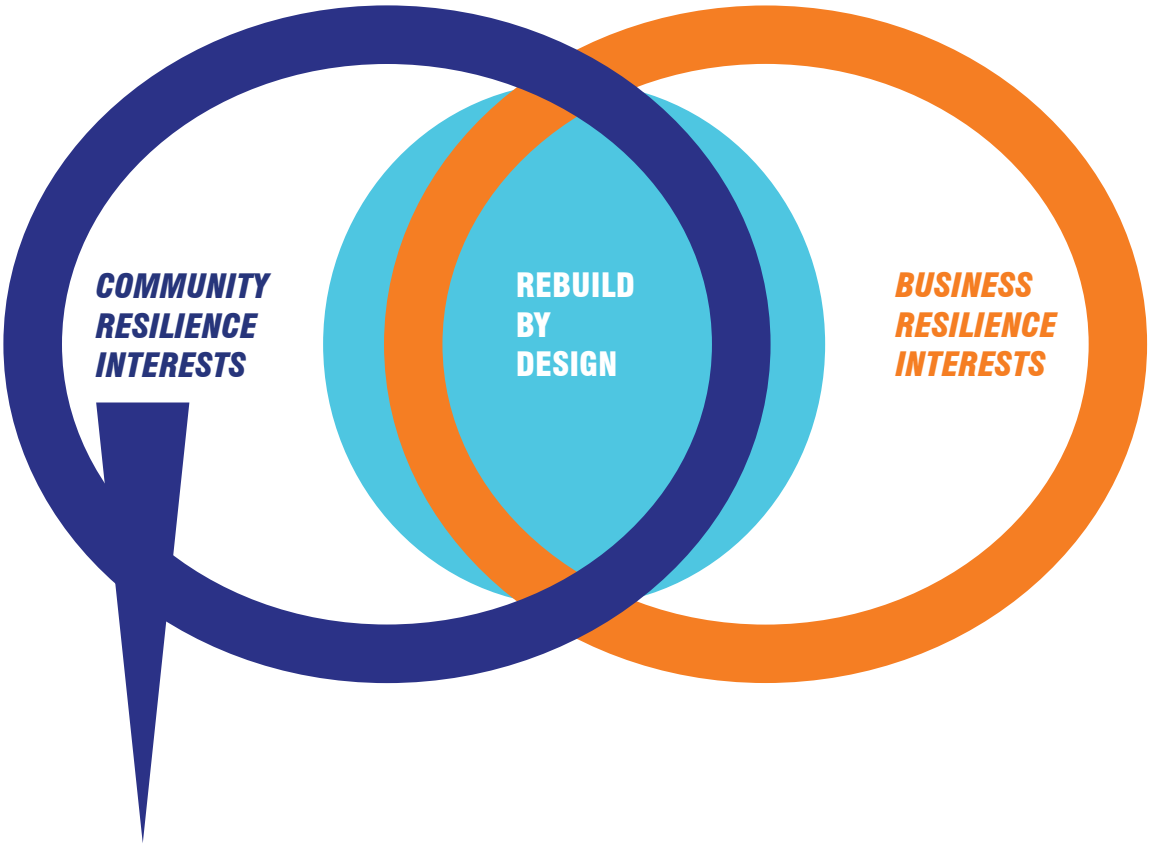
The proposed levee system is expected to be subject to environmental review pursuant to City Environmental Quality Review (CEQR), State Environmental Quality Review Act (SEQRA), and/or the National Environmental Policy Act (NEPA). These processes are generally required for projects that are directly undertaken by or public agencies or require approvals from public agencies.

Projects reviewed pursuant to CEQR/SEQRA/NEPA require preparation of an Environmental Impact Statement (EIS) or Environmental Assessment Statement (EAS). The EIS or EAS includes in-depth studies of a project's effects on the environment. An EAS is appropriate for projects that are not expected to result in significant environmental impacts – in general, for smaller projects. An EIS requires completion of all the tasks required for the EAS, plus a number of additional tasks.

Actions under CEQR are classified as "Type I,", "Type II," or "Unlisted" based on an established list of actions from 6 NYCRR 617, the New York State Environmental Quality Review statute. A Type I Action is an action that is more likely to result in significant adverse environmental impacts, and usually requires preparation of an EIS. Some of the relevant thresholds that are used to define Type I actions include a residential development of more than 2,500 residential units, a non-residential development with more than 240,000 sq. ft., the physical alteration of ten or more acres, or parking for 1,000 vehicles. A Type II action is an action that is included on a specified list of actions that are not expected to result in environmental impacts and do not require preparation of an EIS or EAS. All other actions are classified as "Unlisted" actions, and can usually be addressed in an EAS.

It is expected that the proposed levee system may require preparation of an EIS, with a particular emphasis on natural resource issues and urban design/visual resources. One of the early steps in the EIS process is preparation of an EAS and draft scoping document which helps to determine which technical areas will be evaluated in detail in the EIS. For some projects, nearly all of these technical areas are evaluated in the EIS, while other EIS documents are targeted to specific environmental issues associated with a proposed project. For projects in New York City, the CEQR Technical Manual is typically used to establish the analysis methodologies and impact thresholds. The following is a list of the CEQR technical areas addressed in the EAS/EIS:

-Land Use, Zoning, & Public Policy
-Socioeconomic Conditions
-Community Facilities
-Open Space
-Shadows
-Historic and Cultural Resources
-Urban Design and Visual Resources
-Water and Sewer Infrastructure
-Solid Waste and Sanitation Services
-Energy
-Neighborhood Character
-Hazardous Materials
-Transportation



2-YEAR COMPREHENSIVE RESILIENCE PLANNING PROCESS WHERE OUR TEAM SUPPORTS COMMUNITY-BASED ORGANIZATIONS LEADING A BROAD PLANNING EFFORT

-Air Quality
-Greenhouse Gases
-Noise
-Public Health
-Construction Impacts

The levee may also be subject to the City's Uniform Land Use Review Procedure (ULURP). ULURP is required for projects that require disposition of City owned property, zoning map changes, City map changes to map or demap public streets and/or utility easements, zoning special permits (for parking facilities, or height and bulk modifications for example), waterfront zoning certification or authorization, site selection for public facilities, etc. ULURP involves a public review process which includes review of a project by the Community Board, Borough President, CPC, and City Council, within an established seven-month time frame.

If ULURP is required, the seven-month statutory ULURP review process begins after completion of the DEIS, and the final EIS (FEIS) is issued at the end of ULURP. If ULURP is not required, the FEIS can be issued approximately 2-3 months after completion of the DEIS, for a total process of 15 months.

Appendix A
Letters of Support

Bronx Community Board #2

Borough President Ruben Diaz, Jr.
1029 East 163rd St.
Bronx, NY 10459
718-328-9125 • 718-991-4974 Fax
E-mail: brxcb2@optonline.net

Dr. Ian Amritt
Chairperson

Rafael Salamanca, Jr.
District Manager

March 31, 2014

Shaun Donovan
Secretary
United States Department of Housing and Urban Development
451 7th Street SW
Washington, DC 20410

Dear Secretary Donovan:

Please be advised that Bronx Community Board #2 voted on Wednesday, March 26, 2014, Full Board meeting to grant a letter of support to Rebuild by Design/Penn Design/Olin for the pre-concept of ecological infrastructure flood protection around the Hunts Point peninsula.

The Hunts Point *Lifelines* proposal protects a vulnerable waterfront community and a critical regional food supply asset through the creation of new flood and energy resilience infrastructure. Ensuring business continuity in the event of extreme weather or other catastrophic occurrences is a critical measure that must be undertaken to protect the food supply for 22 million residents of the tri-state region.

As you may be aware, the Hunt Point Food Distribution Center supports 8,500 living wage jobs and generates $5 billion dollars in annual revenue in what is the poorest Congressional District in the nation. This essential economic engine for the South Bronx and for the wider region is located in a low-lying peninsula on the banks of the Bronx and East Rivers. Through the design and deployment of innovative and integrated flood protection infrastructure, increasingly rare unionized and living wage jobs can be protected, the Food Distribution Center can maintain its advantage over its low-wage competitors, and an essential food distribution asset can be preserved, protected, and enhanced for decades to come.

Lifelines represents the fruit of four months of intensive engagement with all the major stakeholders on the Hunts Point peninsula, which has culminated in a broad coalition of support for the proposed project. The three major wholesale markets in the peninsula—The Hunts Point Terminal Market (produce), the Hunts Point Cooperative Market (meat), and the New Fulton Fish Market-- have all endorsed the project as an essential measure to ensuring the long-term viability of the Food Distribution Center and meeting operational needs in the event of extreme weather and other potential disruptions. Leaders of the major organized labor locals in the FDC—Teamsters Local 202 and United Food and Commercial Workers Locals 342 and 359—have likewise endorsed the proposal and praised it for ensuring the long-term competitiveness of the wholesale markets. Nearly all non-profit organizations in the area—including THE POINT Community Development Corporation, Mothers on the Move, Rocking the Boat, the Hunts Point Economic Development Corporation, the Hunts Point Chamber of Commerce, and Sustainable South Bronx--have endorsed the plan as meeting their objectives for improving the quality of life in the peninsula.

The design of the plan's proposed infrastructure is calculated to yield an outstanding cost benefit ratio of 2 to 1 through job protection, supply chain management improvements, and new economic development opportunities resulting from the proposed resilience implementation plan. These measures will create real community benefit by creating new local construction and maintenance jobs and improving environmental conditions for residents of the South Bronx. Beyond the technical challenges of flood protection, Lifelines seeks to improve the health and quality of life for South Bronx residents who suffer from poor air quality, limited access to healthy food, and poor mobility due to an absence of safe bike and pedestrian routes in an area that has low car ownership. By bundling public amenities and green design with flood protection, these improvements will fulfill essential community aspirations by completing missing links in the South Bronx Greenway, returning long neglected spaces on the Hunts Point waterfront to public access, restoring shoreline ecosystems, deploying green infrastructure for storm-water management, and the development of a clean energy micro-grid in the peninsula. The project will also stimulate retail business in the peninsula and create new retail access points for produce in a neighborhood that has long grappled with limited healthy food options.

The overall modernization strategy embedded in the plan will keep the Food Distribution Center and associated businesses economically viable and operational during disaster events, as well as competitive for decades to come. An essential component of this emergency readiness will include a truck ferry pier to provide staging and distribution of food supply around New York via an emergency maritime food distribution network. The proposed project is innovative in other ways, as well. It demonstrates unprecedented cooperation between private and public resources and protects a regional resource through local build procurement and labor strategies.

Finally, the project also serves as a laboratory for sustainable shoreline design and flood protection in urban environments through the employment of innovative materials and building systems. These design innovations serve to model alternatives for modular flood protection systems, passive flood protection design, and ecologically supportive building systems. In partnership with New York State and City agencies, and local nonprofits these initiatives will create unprecedented and timely triple bottom line benefits to the people of New York.

Should you have any questions please feel free to contact me at 718-328-9125 or email rsalamanca@cb.nyc.gov.

Sincerely,

Rafael Salamanca, Jr.
District Manager

JOSÉ E. SERRANO
15TH DISTRICT, NEW YORK

WASHINGTON OFFICE:
2227 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-3215
(202) 225-4361
FAX: (202) 225-6001

BRONX OFFICE
1231 LAFAYETTE AVE, 4TH FLOOR
BRONX, NY 10474
(718) 620-0084
FAX: (718) 620-0658

http://serrano.house.gov

Congress of the United States
House of Representatives
Washington, DC 20515–3215

COMMITTEE:
APPROPRIATIONS

SUBCOMMITTEES:
RANKING DEMOCRAT, FINANCIAL SERVICES AND GENERAL GOVERNMENT
MEMBER, COMMERCE, JUSTICE, SCIENCE
MEMBER, INTERIOR AND ENVIRONMENT

MEMBER, CONGRESSIONAL HISPANIC CAUCUS

SENIOR WHIP

March 25, 2014

Richard Roark
PennDesign/OLIN team
150 South Independence Mall West
Philadelphia, PA 19106

Dear Mr. Roark:

I am aware that PennDesign/OLIN's team has submitted a Rebuild By Design proposal to the United States Department of Housing and Urban Development on behalf of the Hunts Point community. The Hunts Point *Lifelines* proposal protects a vulnerable waterfront community and a critical regional food supply asset through the creation of new flood and energy resilience infrastructure. Ensuring business continuity in the event of extreme weather or other catastrophic occurrences is a critical measure that must be undertaken to protect the food supply for 22 million residents of both New York City and the tri-state region.

The PennDesign/OLIN team aims to preserve and adapt waterfront culture and economy in the northeast region of the United States by supporting community self-determination and the potential to use innovative design strategies to overcome the boundaries of historical jurisdictional borders. Through the design and deployment of innovative and integrated flood protection infrastructure, people, land, infrastructure, and economies can adapt to rising water and uncertainty.

I understand that the *Lifelines* proposal represents the fruit of four months of intensive engagement with all the major stakeholders on the Hunts Point peninsula, which has culminated in a broad coalition of support for the proposed project. The three major wholesale markets in the peninsula—The Hunts Point Terminal Market (produce), the Hunts Point Cooperative Market (meat), and the New Fulton Fishmarket-- have all endorsed the project as an essential measure to ensuring the long-term viability of the Food Distribution Center and meeting operational needs in the event of extreme weather and other potential disruptions. Leaders of the major organized labor locals in the FDC—Teamsters Local 202 and United Food and Commercial Workers Locals 342 and 359—have likewise endorsed the proposal and praised it for ensuring the long-term competitiveness of the wholesale markets. Nearly all non-profit organizations in the area—including THE POINT Community Development Corporation, Mothers on the Move, Rocking the Boat, the Hunts Point Economic Development Corporation, the Hunts Point Chamber of Commerce, and Sustainable South Bronx--have endorsed the plan as meeting their objectives for improving the quality of life in the peninsula.

The Rebuild By Design project provides a unique opportunity for sustainable shoreline design and flood protection in urban environments through the employment of innovative materials and building systems. It is my sincerest hope that the *Lifelines* proposal is given strong consideration.

Sincerely yours,

Jose E. Serrano
Member of Congress

NEW FULTON FISH MARKET COOPERATIVE AT HUNTS POINT, INC.

800 Food Center Drive
Unit 65B
Bronx, NY 10474
Tel 718-378-2356
Fax 718-378-2355

March 26, 2014

Shaun Donovan
Secretary
United States Department of Housing and Urban Development
451 7th Street SW
Washington, DC 20410

Dear Secretary Donovan:

I am writing to bring to your attention an extraordinary and compelling Rebuild By Design proposal from the PennDesign/OLIN team, submitted on behalf of the Hunts Point community. The Hunts Point *Lifelines* proposal protects a vulnerable waterfront community and a critical regional food supply asset through the creation of new flood and energy resilience infrastructure. Ensuring business continuity in the event of extreme weather or other catastrophic occurrences is a critical measure that must be undertaken to protect the food supply for 22 million residents of the tri-state region.

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Thank you for you kind consideration of the Hunts Point *Lifelines* proposal and please feel free to reach out to my office if you have any questions about our engagement in this process.

Sincerely yours,

Frank Minio

Frank Minio, President
The New Fulton Fish Market Cooperative At Hunts Point, Inc.

Hunts Point Cooperative Market, Inc.
The Largest Food Distribution Center in the World
C101 • 355 FOOD CENTER DRIVE • BRONX, NY 10474
TEL: (718) 842-7466 • FAX: (718) 589-5018
www.huntspointcoopmkt.com

March 19, 2014

Shaun Donovan
Secretary
United States Department of Housing and Urban Development
451 7th Street SW
Washington, DC 20410

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Thank you for you kind consideration of the Hunts Point *Lifelines* proposal and please feel free to reach out to my office if you have any questions about our engagement in this process.

Sincerely yours,

Bruce Reingold
General Manager

HUNTS POINT ECONOMIC DEVELOPMENT CORP.
• 355 Food Center Drive, Suite C 107, Bronx N.Y. 10474 • 718.842.1717

March 19, 2014

Shaun Donovan
Secretary
United States Department of Housing and Urban Development
451 7th Street SW
Washington, DC 20410

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Sincerely yours,

Josephine Infante
President,
Hunts Point Economic Development Corp.

Hunts Point is a Business Opportunity Zone.
www.hpedc.org

HUNTS POINT
PRODUCE MARKET

March 19, 2014

Shaun Donovan
Secretary
United States Department of Housing and Urban Development
451 7th Street SW
Washington, DC 20410

Dear Secretary Donovan:

I am writing to bring to your attention an extraordinary and compelling Rebuild By Design proposal from the PennDesign/OLIN team, submitted on behalf of the Hunts Point community. The Hunts Point *Lifelines* proposal protects a vulnerable waterfront community and a critical regional food supply asset through the creation of new flood and energy resilience infrastructure. Ensuring business continuity in the event of extreme weather or other catastrophic occurrences is a critical measure that must be undertaken to protect the food supply for 22 million residents of the tri-state region.

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Lifelines represents the fruit of four months of intensive engagement with all the major stakeholders on the Hunts Point peninsula, which has culminated in a broad coalition of support for the proposed project. The three major wholesale markets in the peninsula—The Hunts Point Terminal Market (produce), the Hunts Point Cooperative Market (meat), and the New Fulton Fishmarket-- have all endorsed the project as an essential measure to ensuring the long-term viability of the Food Distribution Center and meeting operational needs in the event of extreme weather and other potential disruptions. Leaders of the major organized labor locals in the FDC—Teamsters Local 202 and United Food and Commercial Workers Locals 342 and 359—have likewise endorsed the proposal and praised it for ensuring the long-term competitiveness of the wholesale markets. Nearly all non-profit organizations in the area—including THE POINT Community Development Corporation, Mothers on the Move, Rocking the Boat, the Hunts Point Economic Development Corporation, the Hunts Point Chamber of Commerce, and Sustainable South Bronx--have endorsed the plan as meeting their objectives for improving the quality of life in the peninsula.

The design of the plan's proposed infrastructure is calculated to yield an outstanding cost benefit ratio of 2 to 1 through job protection, supply chain management improvements, and new economic development

opportunities resulting from the proposed resilience implementation plan. These measures will create real community benefit by creating new local construction and maintenance jobs and improving environmental conditions for residents of the South Bronx. Beyond the technical challenges of flood protection, Lifelines seeks to improve the health and quality of life for South Bronx residents who suffer from poor air quality, limited access to healthy food, and poor mobility due to an absence of safe bike and pedestrian routes in an area that has low car ownership.

By bundling public amenities and green design with flood protection, these improvements will fulfill essential community aspirations by completing missing links in the South Bronx Greenway, returning long neglected spaces on the Hunts Point waterfront to public access, restoring shoreline ecosystems, deploying green infrastructure for stormwater management, and by creating new retail access points for produce in a neighborhood that has long grappled with limited healthy food options.

Lastly and crucially, the plan proposes a clean energy micro-grid in the peninsula. This last element—clean energy generation and distribution—is pivotal for both the stakeholders in the FDC and for the regional supply chain. Disruptions in power generation and grid connectivity will quickly result in degradation and spoilage of the perishable products in the FDC that feed the region. With the capacity to store and refrigerate a 2 ½ day supply of food for the City of New York, a disruption in the Produce Market's ability to maintain refrigeration and cold chain compliance would likely result in the closure of small businesses that depend on wholesalers in the FDC. Moreover, such a grid disruption could quickly result in a scarcity of fresh food in the City and beyond.

The overall modernization strategy embedded in the plan will keep the Food Distribution Center and associated businesses economically viable and operational during disaster events, as well as competitive for decades to come. An essential component of this emergency readiness will include a truck ferry pier to provide staging and distribution of food supply around New York via an emergency maritime food distribution network. The proposed project is innovative in other ways, as well. It demonstrates unprecedented cooperation between private and public resources and protects a regional resource through local build procurement and labor strategies.

Finally, the project also serves as a laboratory for sustainable shoreline design and flood protection in urban environments through the employment of innovative materials and building systems. These design innovations serve to model alternatives for modular flood protection systems, passive flood protection design, and ecologically supportive building systems. In partnership with New York State and City agencies, and local nonprofits these initiatives will create unprecedented and timely triple bottom line benefits to the people of New York.

Thank you for you kind consideration of the Hunts Point *Lifelines* proposal and please feel free to reach out to my office if you have any questions about our engagement in this process.

Sincerely yours,

Myra Gordon
Executive Director
Hunts Point Terminal Produce
Cooperative Association, Inc.

Mothers on the Move/Madres en Movimiento

928 Intervale Avenue Bronx, NY 10459

Phone (718) 842-2224 Fax (718) 842-2665 www.mothersonthemove.org

March 19, 2014

Shaun Donovan
Secretary
United States Department of Housing and Urban Development
451 7th Street SW
Washington, DC 20410

Dear Secretary Donovan:

I am writing to bring to your attention an extraordinary and compelling Rebuild By Design proposal from the PennDesign/OLIN team, submitted on behalf of the Hunts Point community. The Hunts Point *Lifelines* proposal protects a vulnerable waterfront community and a critical regional food supply asset through the creation of new flood and energy resilience infrastructure. Ensuring the safety of Hunts Point and business continuity in the event of extreme weather or other catastrophic occurrences is a critical measure that must be undertaken to protect the food supply for 22 million residents of the tri-state region.

As I am sure you are aware, the Hunt Point Food Distribution Center supports 8,500 living wage jobs and generates $5 billion dollars in annual revenue in what is the poorest Congressional District in the nation. This essential economic engine for the South Bronx and for the wider region is located in a low-lying peninsula on the banks of the Bronx and East Rivers. Through the design and deployment of innovative and integrated flood protection infrastructure, increasingly rare unionized and living wage jobs can be protected, the Food Distribution Center can maintain its advantage over its low-wage competitors, and an essential food distribution asset can be preserved, protected, and enhanced for decades to come.

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The design of the plan's proposed infrastructure is calculated to yield an outstanding cost benefit ratio of 2 to 1 through job protection, supply chain management improvements, and new economic development opportunities resulting from the proposed resilience implementation plan. These measures will create real community benefit by creating new local construction and maintenance jobs and improving environmental conditions for residents of the South Bronx. Beyond the technical challenges of flood protection, Lifelines seeks to improve the health and quality of life for South Bronx residents who suffer from poor air quality, limited access to healthy food, and poor mobility due to an absence of safe bike and pedestrian routes in an area that has low car ownership.

Real People Making Real Change... Gente Real Haciendo Cambios Reales

By bundling public amenities and green design with flood protection, these improvements will fulfill essential community aspirations by completing missing links in the South Bronx Greenway, returning long neglected spaces on the Hunts Point waterfront to public access, restoring shoreline ecosystems, deploying green infrastructure for stormwater management, and by creating new retail access points for produce in a neighborhood that has long grappled with limited healthy food options.

Lastly and crucially, the plan proposes a clean energy micro-grid in the peninsula. This last element—clean energy generation and distribution—is pivotal for both the stakeholders in the FDC and for the regional supply chain. Disruptions in power generation and grid connectivity will quickly result in degradation and spoilage of the perishable products in the FDC that feed the region. With the capacity to store and refrigerate a 2 ½ day supply of food for the City of New York, a disruption in Hunts Point's ability to maintain refrigeration and cold chain compliance would likely result in the closure of small businesses that depend on wholesalers in the FDC. Moreover, such a grid disruption could quickly result in a scarcity of fresh food in the City and beyond.

The overall modernization strategy embedded in the plan will keep the Food Distribution Center and associated businesses economically viable and operational during disaster events, as well as competitive for decades to come. An essential component of this emergency readiness will include a truck ferry pier to provide staging and distribution of food supply around New York via an emergency maritime food distribution network. The proposed project is innovative in other ways, as well. It demonstrates unprecedented cooperation between private and public resources and protects a regional resource through local build procurement and labor strategies.

Finally, the project also serves as a laboratory for sustainable shoreline design and flood protection in urban environments through the employment of innovative materials and building systems. These design innovations serve to model alternatives for modular flood protection systems, passive flood protection design, and ecologically supportive building systems. In partnership with New York State and City agencies, and local nonprofits these initiatives will create unprecedented and timely triple bottom line benefits to the people of New York.

Thank you for you kind consideration of the Hunts Point *Lifelines* proposal and please feel free to reach out to my office if you have any questions about our engagement in this process.

Sincerely yours,

Wanda Salaman
Executive Director

New York City Environmental Justice Alliance

166A 22nd Street
Brooklyn, NY 11232
347-841-4410
eddie@nyc-eja.com
www.NYC-EJA.org

March 25th, 2014

Shaun Donovan
Secretary
United States Department of Housing and Urban Development
451 7th Street SW
Washington, DC 20410

Dear Secretary Donovan:

The NYC Environmental Justice Alliance (NYC-EJA) is a 501(c)3 non-profit citywide network linking grassroots organizations from low-income communities of color in their struggle for environmental justice. Founded in 1991, NYC-EJA coalesces its member organizations around common issues to advocate for improved environmental conditions and against inequitable burdens by coordinating campaigns designed to affect City and State policies.

I am writing to bring to your attention an extraordinary and compelling Rebuild By Design proposal from the PennDesign/OLIN team, submitted on behalf of the Hunts Point community in the South Bronx. The Hunts Point Lifelines proposal seeks to protect a vulnerable waterfront community and a critical regional food supply asset through the creation of new flood and energy resilience infrastructure.

Hunts Point Lifelines represents the fruit of four months of intensive engagement with all the major stakeholders on the Hunts Point peninsula, which has culminated in a broad coalition of support for the proposed project. NYC-EJA and our member organizations in the area (including THE POINT Community Development Corporation and Sustainable South Bronx) have endorsed the plan as meeting our objectives for a climate resilient industrial waterfront community in the peninsula.

For decades, the Hunts Point community has been subject to disproportionate environmental burdens, and a lack of equitable access to the resources required to address them. Low-income communities and communities of color living and working in/around the South Bronx Significant Maritime and Industrial Area (SMIA) are particularly vulnerable to climate change impacts. Through Hunts Point Lifelines, the PennDesign/OLIN team seeks to address issues of equity in its approach to reduce neighborhood vulnerability by integrating community priorities in recovery and resiliency-building efforts -- as well as local community-based organizations and leaders in the planning and potential implementation process.

As you are aware, while the Hunt Point Food Distribution Center is an essential economic engine for the South Bronx and for the wider region, it is located in the poorest Congressional District in the nation. In addition, it is located in a low-lying peninsula on the banks of the Bronx and East Rivers. Through the design and deployment of

innovative and integrated flood protection infrastructure, increasingly rare unionized and living wage jobs can be protected, the Food Distribution Center can maintain its advantage over its low-wage competitors, and an essential food distribution asset can be preserved, protected, and enhanced for decades to come.

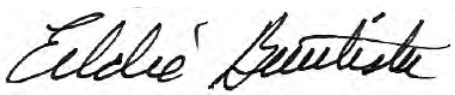
The design of the plan's proposed infrastructure is calculated to yield an outstanding cost benefit ratio of 2 to 1 through job protection, supply chain management improvements, and new economic development opportunities resulting from the proposed resilience implementation plan. These measures will create real community benefit by creating new local construction and maintenance jobs and improving environmental conditions for residents of the South Bronx. Beyond the technical challenges of flood protection, *Lifelines* seeks to improve the health and quality of life for South Bronx residents who suffer from poor air quality, limited access to healthy food, and poor mobility due to an absence of safe bike and pedestrian routes in an area that has low car ownership. By bundling public amenities and green design with flood protection, these improvements will fulfill essential community aspirations by completing missing links in the South Bronx Greenway, returning long neglected spaces on the Hunts Point waterfront to public access, restoring shoreline ecosystems, deploying green infrastructure for stormwater management, and the development of a clean energy micro-grid in the peninsula. The project will also stimulate retail business in the peninsula and create new retail access points for produce in a neighborhood that has long grappled with limited healthy food options.

The overall modernization strategy embedded in the plan will keep the Food Distribution Center and associated businesses economically viable and operational during disaster events, as well as competitive for decades to come. An essential component of this emergency readiness will include a truck ferry pier to provide staging and distribution of food supply around New York via an emergency maritime food distribution network. The proposed project is innovative in other ways, as well. It demonstrates unprecedented cooperation between private and public resources and protects a regional resource through local build procurement and labor strategies.

Finally, the project also serves as a laboratory for sustainable shoreline design and flood protection in urban environments through the employment of innovative materials and building systems. These design innovations serve to model alternatives for modular flood protection systems, passive flood protection design, and ecologically supportive building systems. In partnership with New York State and City agencies, and local nonprofits these initiatives will create unprecedented and timely triple bottom line benefits to the people of New York.

Thank you for you kind consideration of the Hunts Point *Lifelines* proposal and please feel free to reach out to my office if you have any questions about our engagement in this process.

Sincerely yours,



Eddie Bautista
Executive Director
NYC Environmental Justice Alliance (NYC-EJA)

THE POINT
WHERE COMMUNITY AND CREATIVITY CONNECT

March 19, 2014

Shaun Donovan
Secretary
United States Department of Housing and Urban Development
451 7th Street SW
Washington, DC 20410

Dear Secretary Donovan:

On behalf of THE POINT Community Development Corporation, we are writing to bring to your attention an extraordinary and compelling Rebuild By Design proposal from the PennDesign/OLIN team, submitted with the strong support of the Hunts Point community. The Hunts Point *Lifelines* proposal protects a vulnerable waterfront community and a critical regional food supply asset through the creation of new flood and energy resilience infrastructure. Ensuring business continuity in the event of extreme weather or other catastrophic occurrences is a critical measure that must be undertaken to protect the food supply for 22 million residents of the tri-state region.

We are sure that you are well aware of the regional significance our community as being home to the Hunt Point Food Distribution Center, one of the worlds largest food distribution center, which supports 8,500 living wage jobs and generates $5 billion dollars in annual revenue in what is the poorest Congressional District in the nation. This essential regional economic engine is located in a low-lying peninsula on the banks of the Bronx and East Rivers. Through the design and deployment of innovative and integrated flood protection infrastructure, increasingly rare unionized and living wage jobs can be protected, the Food Distribution Center can maintain its advantage over its low-wage competitors, and an essential food distribution asset can be preserved, protected, and enhanced for decades to come.

Lifelines represents the fruit of four months of intensive engagement with all the major stakeholders on the Hunts Point peninsula, which has culminated in a broad coalition of support for the proposed project. The three major wholesale markets in the peninsula—The Hunts Point Terminal Market (produce), the Hunts Point Cooperative Market (meat), and the New Fulton Fishmarket-- have all endorsed the project as an essential measure to ensuring the long-term viability of the Food Distribution Center and meeting operational needs in the event of extreme weather and other potential disruptions. Leaders of the major organized labor locals in the FDC—Teamsters Local 202 and United Food and Commercial Workers Locals 342 and 359—have likewise endorsed the proposal and praised it for ensuring the long-term competitiveness of the wholesale markets. THE POINT has worked extensively with this team on helping to craft this vision and feel very strongly that they have done an outstanding job of incorporating and leveraging many of the development principals and priorities that have come from the extensive community based planning initiatives already afoot in the neighborhood. As a result, nearly all non-profit organizations in the area, —including Mothers on the Move, Rocking the Boat, the Hunts Point Economic Development Corporation, the Hunts Point Chamber of Commerce, and Sustainable South Bronx--have endorsed the plan as meeting their objectives for improving the quality of life in the peninsula.

The design of the plan's proposed infrastructure is calculated to yield an outstanding cost benefit ratio of 2 to 1 through job protection, supply chain management improvements, and new economic development opportunities resulting from the proposed resilience implementation plan. These measures will create real community benefit by creating new local construction and maintenance jobs and improving environmental conditions for residents of the South Bronx. Beyond the technical challenges of flood protection, Lifelines seeks to improve the health and quality of life for South Bronx residents who suffer from poor air quality, limited access to healthy food, and poor mobility due to an absence of safe bike and pedestrian routes in an area that has low car ownership. By bundling public amenities and green design with flood protection, these improvements will fulfill essential community aspirations by completing missing links in the South Bronx Greenway, returning long neglected spaces on the Hunts Point waterfront

THE POINT Community Development Corporation / 940 Garrison Avenue / Bronx, NY 10474 / ph 718.542.4139 / fax 718.542.4988 / www.thepoint.org

to public access, restoring shoreline ecosystems, deploying green infrastructure for storm water management, and the development of a clean energy micro-grid in the peninsula. The project will also stimulate retail business in the peninsula and create new retail access points for produce in a neighborhood that has long grappled with limited healthy food options.

The overall modernization strategy embedded in the plan will keep the Food Distribution Center and associated businesses economically viable and operational during disaster events, as well as competitive for decades to come. An essential component of this emergency readiness will include a truck ferry pier to provide staging and distribution of food supply around New York via an emergency maritime food distribution network. The proposed project is innovative in other ways, as well. It demonstrates unprecedented cooperation between private and public resources and protects a regional resource through local build procurement and labor strategies.

Finally, the project also serves as a laboratory for sustainable shoreline design and flood protection in urban environments through the employment of innovative materials and building systems. These design innovations serve to model alternatives for modular flood protection systems, passive flood protection design, and ecologically supportive building systems. In partnership with New York State and City agencies, and local nonprofits these initiatives will create unprecedented and timely triple bottom line benefits to the people of New York.

Thank you for you kind consideration of the Hunts Point *Lifelines* proposal and please feel free to reach out to my office if you have any questions about our engagement in this process.

Sincerely yours,

Maria Torres
President & COO

Kellie Terry-Sepulveda
Executive Director

THE POINT Community Development Corporation / 940 Garrison Avenue / Bronx, NY 10474 / ph 718.542.4139 / fax 718.542.4988 / www.thepoint.org

rocking the boat
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www.rockingtheboat.org

March 25, 2014

Shaun Donovan
Secretary
United States Department of Housing and Urban Development
451 7th Street SW
Washington, D.C. 20410

Dear Secretary Donovan:

Having spent much time advising members of the PennDesign/OLIN team on our needs and even taken them on a tour of the Hunts Point waterfront aboard one of Rocking the Boat's boats, I am writing to bring to your attention to their extraordinary and compelling Rebuild By Design proposal, submitted on behalf of the Hunts Point community. The Hunts Point *Lifelines* proposal protects a vulnerable waterfront community and a critical regional food supply asset through the creation of new flood and energy resilience infrastructure. Ensuring business continuity in the event of extreme weather or other catastrophic occurrences is a critical measure that must be undertaken to protect the food supply for 22 million residents of the tri-state region.

As I am sure you are aware, the Hunt Point Food Distribution Center supports 8,500 living wage jobs and generates $5 billion in annual revenue in what is the poorest Congressional District in the nation. This essential economic engine for the South Bronx and for the wider region is located in a low-lying peninsula on the banks of the Bronx and East Rivers. Through the design and deployment of innovative and integrated flood protection infrastructure, increasingly rare unionized and living wage jobs can be protected, the Food Distribution Center can maintain its advantage over its low-wage competitors, and an essential food distribution asset can be preserved, protected, and enhanced for decades to come.

Lifelines represents the fruit of four months of intensive engagement with all the major stakeholders on the Hunts Point peninsula, which has culminated in a broad coalition of support for the proposed project. The three major wholesale markets in the peninsula—The Hunts Point Terminal Market (produce), the Hunts Point Cooperative Market (meat), and the New Fulton Fishmarket—have all endorsed the project as an essential measure to ensuring the long-term viability of the Food Distribution Center and meeting operational needs in the event of extreme weather and other potential disruptions. Leaders of the major organized labor locals in the FDC—Teamsters Local 202 and United Food and Commercial Workers Locals 342 and 359—have likewise endorsed the proposal and praised it for ensuring the long-term competitiveness of the wholesale markets. Rocking the Boat is proud to be among the non-profit organizations in the area—including THE POINT Community Development Corporation, Mothers on the Move, the Hunts Point Economic Development Corporation, the Hunts Point Chamber of Commerce, and Sustainable South Bronx—to endorse the plan as meeting our objectives for improving the quality of life in the peninsula.

The design of the plan's infrastructure is calculated to yield an outstanding cost benefit ratio of 2 to 1 through job protection, supply chain management improvements, and new economic development opportunities resulting from the proposed resilience implementation plan. These measures will produce real community benefit by creating new local construction and maintenance jobs and improving environmental conditions for residents of the South Bronx. Beyond the technical challenges of flood protection, *Lifelines* seeks to improve the health and quality of life for South Bronx residents who suffer from poor air quality, limited access to healthy food, and poor mobility due to an absence of safe bike and pedestrian routes in an area that has low car ownership. By bundling public amenities and green design with flood protection, these improvements will fulfill essential community aspirations by completing missing links in the South Bronx Greenway, returning long neglected spaces on the Hunts Point waterfront to public access, restoring shoreline ecosystems, deploying green infrastructure for storm water management, and the development of a clean energy micro-grid in the peninsula. The project will also stimulate retail business in the peninsula and create new retail access points for produce in a neighborhood that has long grappled with limited healthy food options.

The overall modernization strategy embedded in the plan will keep the Food Distribution Center and associated businesses economically viable and operational during disaster events, as well as competitive for decades to come. An essential component of this emergency readiness will include a truck ferry pier to provide staging and distribution of food supply around New York via an emergency maritime food distribution network. The proposed project is innovative in other ways, as well. It demonstrates unprecedented cooperation between private and public resources and protects a regional resource through local build procurement and labor strategies.

Finally, the project also serves as a laboratory for sustainable shoreline design and flood protection in urban environments through the employment of innovative materials and building systems. These design innovations serve to model alternatives for modular flood protection systems, passive flood protection design, and ecologically supportive building systems. In partnership with New York State and City agencies, and local nonprofits these initiatives will create unprecedented and timely triple bottom line benefits to the people of New York.

Thank you for your consideration of the Hunts Point *Lifelines* proposal and please feel free to reach me at (718) 466-5799 x1213 or adam@rockingtheboat.org if you have any questions about Rocking the Boat's involvement in this process.

Sincerely,

Adam Green
Executive Director

SUSTAINABLE SOUTH BRONX

March 27, 2014

Shaun Donovan
Secretary
United States Department of Housing and Urban Development
451 7th Street, S.W.
Washington, DC 20410

Dear Secretary Donovan:

I am writing to express Sustainable South Bronx's support of the Rebuild By Design proposal from the PennDesign/OLIN team, submitted on behalf of the Hunts Point community. The mission of Sustainable South Bronx is to address economic and environmental issues in the South Bronx – and throughout New York City – through a combination of green job training, community greening programs, and social enterprise. Over the last ten years, has linked environmental restoration to the economic needs of low-income New Yorkers who are seeking a fresh start. Our largest program is our job training program that prepares South Bronx residents for careers in the environmental field ranging from building maintenance to environmental remediation to green infrastructure. Our other programs include a social enterprise that employs our job training program's graduates to perform environmental projects, a borough-wide program to promote energy efficiency in buildings, and a number of other community greening projects.

Given our interest in the environment and economy of Hunts Point, we could not be more excited about the proposal submitted by the PennDesign/OLIN team. In addition to presenting a plan for protecting the Hunts Point Food Distribution Center from the next natural disaster, the proposal envisions that nonprofit organizations such as Sustainable South Bronx will play a key role in implementing the projects envisioned in the plan. One of the unique features of Hunts Point is the interconnectedness of the many nonprofits who call the community home. In what is the highest-poverty urban community in the nation, the nonprofit organizations that work in Hunts Point are fully dedicated to improving the lives of local residents in a variety of innovative ways. We therefore appreciate how the PennDesign/OLIN team's proposal posits a future for Hunts Point that builds on the strengths of the organizations that are already doing work that is pertinent to the issues that Rebuild by Design hopes to address.

If you would like any additional information about Sustainable South Bronx or why we think that the work proposed by the PennDesign/OLIN team can have a transformative impact on the Hunts Point peninsula, please do not hesitate to contact me. Thank you.

Sincerely,

Michael Brotchner
Executive Director

1231 Lafayette Ave., 4th Floor • Bronx, NY 10474
Tel: 646.400.5430 • Fax: 347.892.3442 • e: info@ssbx.org • Web: www.ssbx.org

CHARLES E. SCHUMER
NEW YORK

United States Senate
WASHINGTON, DC 20510

COMMITTEES:
BANKING
FINANCE
JUDICIARY
RULES

The Honorable Shaun Donovan
Secretary
U.S. Department of Housing and Urban Development
451 Seventh Street, S.W.
Washington, D.C. 20410

Dear Secretary Donovan,

I write in support of Rebuild By Design proposal from the PennDesign/OLIN team, submitted on behalf of the Hunts Point community. The Hunts Point *Lifelines* proposal protects a vulnerable waterfront community and a critical regional food supply asset through the creation of new flood and energy resilience infrastructure. Ensuring business continuity in the event of extreme weather or other catastrophic occurrences is a critical measure that must be undertaken to protect the food supply for 22 million residents of the tri-state region.

The Hunt Point Food Distribution Center supports 8,500 living wage jobs and generates $5 billion dollars in annual revenue in what is the poorest Congressional District in the nation. This essential economic engine for the South Bronx and for the wider region is located in a low-lying peninsula on the banks of the Bronx and East Rivers. Through the design and deployment of innovative and integrated flood protection infrastructure, increasingly rare unionized and living wage jobs can be protected, the Food Distribution Center can maintain its advantage over its low-wage competitors, and an essential food distribution asset can be preserved, protected, and enhanced for decades to come.

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The design of the plan's proposed infrastructure is calculated to yield an outstanding cost benefit ratio of 2 to 1 through job protection, supply chain management improvements, and new economic development opportunities resulting from the proposed resilience implementation plan. These measures will create real community benefit by creating new local construction and maintenance jobs and improving environmental conditions for residents of the South Bronx. Beyond the technical challenges of flood protection, Lifelines seeks to improve the health and quality of life for South Bronx residents who suffer from poor air quality, limited access to healthy food, and poor mobility due to an absence of safe bike and pedestrian routes in an area that has low car ownership. By bundling public amenities and green design with flood protection, these improvements will fulfill essential community aspirations by completing missing links in the South Bronx Greenway, returning long neglected spaces on the Hunts Point waterfront to public access, restoring shoreline ecosystems, deploying green infrastructure for stormwater management, and the development of a clean energy micro-grid in the peninsula. The project will also stimulate retail business in the peninsula and create new retail access points for produce in a neighborhood that has long grappled with limited healthy food options.

The overall modernization strategy embedded in the plan will keep the Food Distribution Center and associated businesses economically viable and operational during disaster events, as well as competitive for decades to come. An essential component of this emergency readiness will include a truck ferry pier to provide staging and distribution of food supply around New York via an emergency maritime food distribution network

Thank you for you consideration of the Hunts Point *Lifelines* proposal and please feel free to reach out to my office if you have any questions about our engagement in this process.

Sincerely,

Charles E. Schumer
United States Senate

Teamsters Local Union No. 202

Affiliated with the
International Brotherhood of Teamsters

Main Office
101 Food Center Drive • Room 12-A • Bronx, NY 10474
PHONE: (718) 328-7000 • FAX: (718) 991-3175
EMAIL: Local202@aol.com

March 19, 2014

Shaun Donovan
Secretary
United States Department of Housing and Urban Development
451 7th Street SW
Washington, DC 20410

Dear Secretary Donovan:

I am writing to bring to your attention an extraordinary and compelling Rebuild By Design proposal from the PennDesign/OLIN team, submitted on behalf of the Hunts Point community. The Hunts Point *Lifelines* proposal protects a vulnerable waterfront community and a critical regional food supply asset through the creation of new flood and energy resilience infrastructure. Ensuring business continuity in the event of extreme weather or other catastrophic occurrences is a critical measure that must be undertaken to protect the food supply for 22 million residents of the tri-state region.

As I am sure you are aware, the Hunts Point Food Distribution Center supports 8,500 living wage jobs and generates $5 billion dollars in annual revenue in what is the poorest Congressional District in the nation. This essential economic engine for the South Bronx and for the wider region is located in a low-lying peninsula on the banks of the Bronx and East Rivers. Through the design and deployment of innovative and integrated flood protection infrastructure, increasingly rare unionized and living wage jobs can be protected, the Food Distribution Center can maintain its advantage over its low-wage competitors, and an essential food distribution asset can be preserved, protected, and enhanced for decades to come.

Lifelines represents the fruit of four months of intensive engagement with all the major stakeholders on the Hunts Point peninsula, which has culminated in a broad coalition of support for the proposed project. The three major wholesale markets in the peninsula—The Hunts Point Terminal Market (produce), the Hunts Point Cooperative Market (meat), and the New Fulton Fish Market-- have all endorsed the project as an essential measure to ensuring the long-term viability of the Food Distribution Center and meeting operational needs in the event of extreme weather and other potential disruptions. Leaders of the major organized labor locals in the FDC—Teamsters Local 202 and United Food and Commercial Workers Locals 342 and 359—have likewise endorsed the proposal and praised it for ensuring the long-term competitiveness of the wholesale markets. Nearly all non-profit organizations in the area—including THE POINT Community Development Corporation, Mothers on the Move, Rocking the Boat, the Hunts Point Economic Development Corporation, the Hunts Point Chamber of Commerce, and Sustainable South Bronx--have endorsed the plan as meeting their objectives for improving the quality of life in the peninsula.

The design of the plan's proposed infrastructure is calculated to yield an outstanding cost benefit ratio of 2 to 1 through job protection, supply chain management improvements, and new economic development opportunities

Administration Office
1308 Pierce Street • Rahway, NJ 07065
PHONE: (732) 388-6336 • FAX: (732) 388-1565

resulting from the proposed resilience implementation plan. These measures will create real community benefit by creating new local construction and maintenance jobs and improving environmental conditions for residents of the South Bronx. Beyond the technical challenges of flood protection, Lifelines seeks to improve the health and quality of life for South Bronx residents who suffer from poor air quality, limited access to healthy food, and poor mobility due to an absence of safe bike and pedestrian routes in an area that has low car ownership. By bundling public amenities and green design with flood protection, these improvements will fulfill essential community aspirations by completing missing links in the South Bronx Greenway, returning long neglected spaces on the Hunts Point waterfront to public access, restoring shoreline ecosystems, deploying green infrastructure for storm water management, and the development of a clean energy micro-grid in the peninsula. The project will also stimulate retail business in the peninsula and create new retail access points for produce in a neighborhood that has long grappled with limited healthy food options.

The overall modernization strategy embedded in the plan will keep the Food Distribution Center and associated businesses economically viable and operational during disaster events, as well as competitive for decades to come. An essential component of this emergency readiness will include a truck ferry pier to provide staging and distribution of food supply around New York via an emergency maritime food distribution network. The proposed project is innovative in other ways, as well. It demonstrates unprecedented cooperation between private and public resources and protects a regional resource through local build procurement and labor strategies.

Finally, the project also serves as a laboratory for sustainable shoreline design and flood protection in urban environments through the employment of innovative materials and building systems. These design innovations serve to model alternatives for modular flood protection systems, passive flood protection design, and ecologically supportive building systems. In partnership with New York State and City agencies, and local nonprofits these initiatives will create unprecedented and timely triple bottom line benefits to the people of New York.

Thank you for you kind consideration of the Hunts Point *Lifelines* proposal and please feel free to reach out to my office if you have any questions about our engagement in this process.

Sincerely yours,

Daniel J. Kane, Jr.
President

a VOICE for working America

REGION 1 — NORTHEASTERN

Christina E. Hajagos-Clausen
Director

March 25, 2014

Shaun Donovan
Secretary
United States Department of Housing and Urban Development
451 7th Street SW
Washington, DC 20410

Dear Secretary Donovan:

I am writing to bring to your attention an extraordinary and compelling Rebuild By Design proposal from the PennDesign/OLIN team, submitted on behalf of the Hunts Point community. The Hunts Point *Lifelines* proposal protects a vulnerable waterfront community and a critical regional food supply asset through the creation of new flood and energy resilience infrastructure. Ensuring business continuity in the event of extreme weather or other catastrophic occurrences is a critical measure that must be undertaken to protect the food supply for 22 million residents of the tri-state region.

As I am sure you are aware, the Hunt Point Food Distribution Center supports 8,500 living wage jobs and generates $5 billion dollars in annual revenue in what is the poorest Congressional District in the nation. This essential economic engine for the South Bronx and for the wider region is located in a low-lying peninsula on the banks of the Bronx and East Rivers. Through the design and deployment of innovative and integrated flood protection infrastructure, increasingly rare unionized and living wage jobs can be protected, the Food Distribution Center can maintain its advantage over its low-wage competitors, and an essential food distribution asset can be preserved, protected, and enhanced for decades to come.

Lifelines represents the fruit of four months of intensive engagement with all the major stakeholders on the Hunts Point peninsula, which has culminated in a broad coalition of support for the proposed project. The three major wholesale markets in the peninsula—The Hunts Point Terminal Market (produce), the Hunts Point Cooperative Market (meat), and the New Fulton Fishmarket-- have all endorsed the project as an essential measure to ensuring the long-term viability of the Food Distribution Center and meeting operational needs in the event of extreme weather and other potential disruptions. Leaders of the major organized labor locals in the FDC—Teamsters Local 202 and United Food and Commercial Workers Locals 342 and 359—have likewise endorsed the proposal and praised it for ensuring the long-term competitiveness of the wholesale markets. Nearly all non-profit organizations in the area—including THE POINT Community Development Corporation, Mothers on the Move, Rocking the Boat, the Hunts Point Economic Development Corporation, the Hunts Point Chamber of Commerce, and Sustainable South Bronx--have endorsed the plan as meeting their objectives for improving the quality of life in the peninsula.

The design of the plan's proposed infrastructure is calculated to yield an outstanding cost benefit ratio of 2 to 1 through job protection, supply chain management improvements, and new economic development opportunities resulting from the proposed resilience implementation plan. These measures will create real community benefit by creating new local construction and maintenance jobs and improving environmental conditions for residents of the South Bronx. Beyond the technical challenges of flood protection, Lifelines seeks to improve the health and quality of life for South Bronx residents who suffer from poor air quality, limited access to healthy food, and poor mobility due to an absence of safe bike and pedestrian routes in an area that has low car ownership. By bundling public amenities and green design with flood protection, these improvements will fulfill essential community aspirations by

Joseph T. Hansen, *International President*
Anthony M. Perrone, *International Secretary-Treasurer*

United Food & Commercial Workers International Union, AFL-CIO, CLC
219 Paterson Avenue • Little Falls NJ 07424
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completing missing links in the South Bronx Greenway, returning long neglected spaces on the Hunts Point waterfront to public access, restoring shoreline ecosystems, deploying green infrastructure for stormwater management, and the development of a clean energy micro-grid in the peninsula. The project will also stimulate retail business in the peninsula and create new retail access points for produce in a neighborhood that has long grappled with limited healthy food options.

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Thank you for you kind consideration of the Hunts Point *Lifelines* proposal and please feel free to reach out to my office if you have any questions about our engagement in this process.

In Solidarity,

Christina Hajagos Clausen

Christina Hajagos-Clausen
Director

cc: Steve Powell, UFCWIU

Appendix B
Detailed Shoreline Investigation

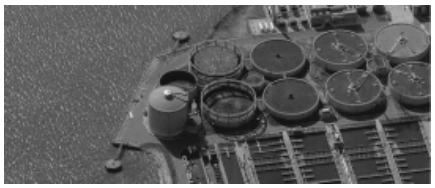
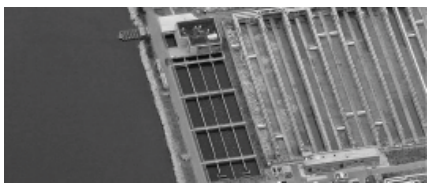
The Hunts Point peninsula is a complex site with significant constraints of width and length, and the need to create grade separation of uses for quality of experience and safety. The land side of the Food Distribution Center, Waste Water Treatment Plant, and jail is an unglamorous logistics field. Due to the threat of terrorism, US food safety laws, and concern for pedestrian safety, among others, the operations are not likely to become open to the public.

This complexity is typical of the working waterfront and the “special case” of designing compact, smart blueways and greenways for community access to active industrial waterfronts—locations where greenways and water access are often most needed.

To demonstrate our willingness to contend with the realities of the varied edge conditions, uses and leases, and the mandate for reliable flood protection, we have studied a representative sample of the edge conditions, including the most constrained locations. We have drawn existing sections for each location and multiple technical sections to examine options for fitting a generous greenway, ecology, and operations.

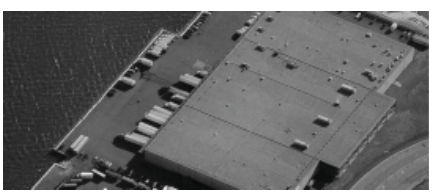
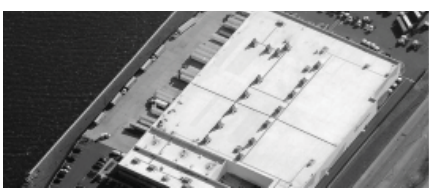
We used these technical studies to initiate conversations about the constraints and challenges of moving forward with NYS DEC, the New York Economic Development Corporation, which manages City land at the Food Distribution Center, the Department of Environmental Protection, which operates the sewage plant, and with other agencies. We used the sections as the basis for realistic visualizations of the thin interface between operations, public use, rising seas and the benefit / cost pragmatics of the site. The pages that follow are representative of the edge studies.

The height of the flood protection is provisionally shown at 16 feet based on the cost benefit analysis. With survey information, further marine analysis, and conversation with agencies, we will determine the appropriate mix of elements for the high level of protection appropriate to this site.

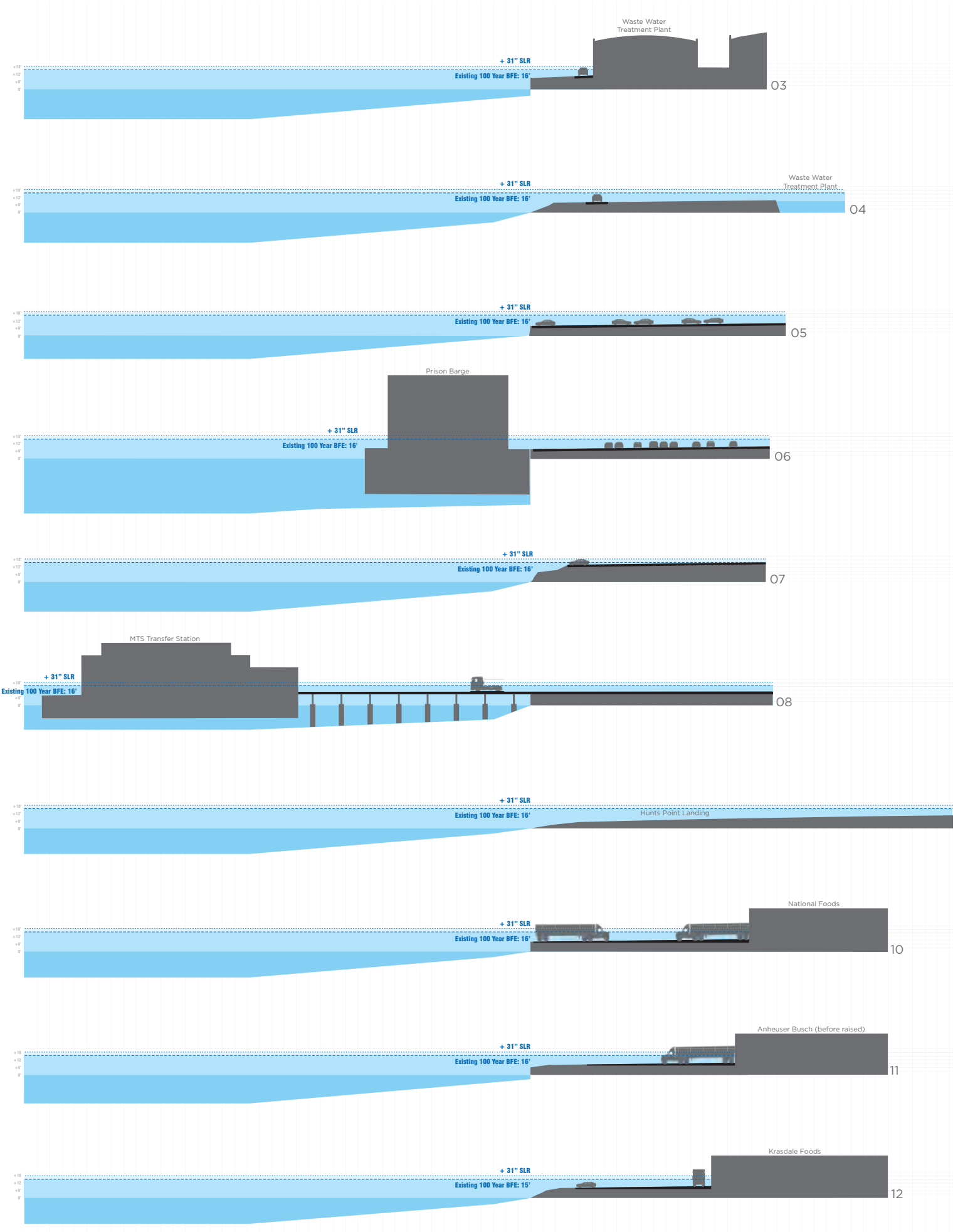







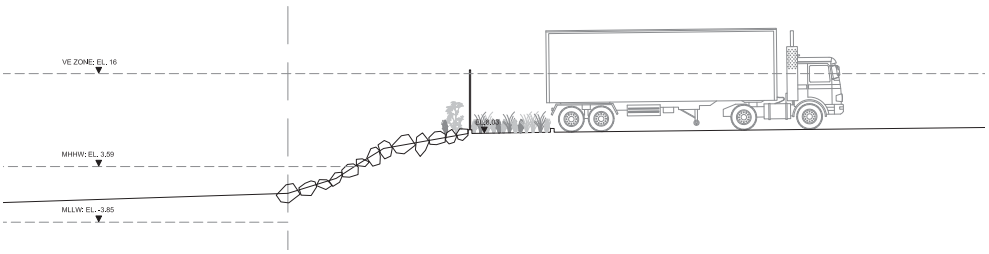




Initial studies of edge topography and conditions, in birdseye aerial and in section.

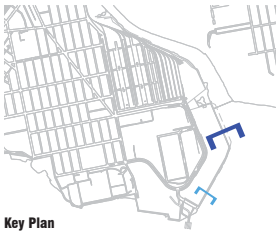


EXAMPLES OF SECTIONAL STUDIES REVIEWED WITH NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION

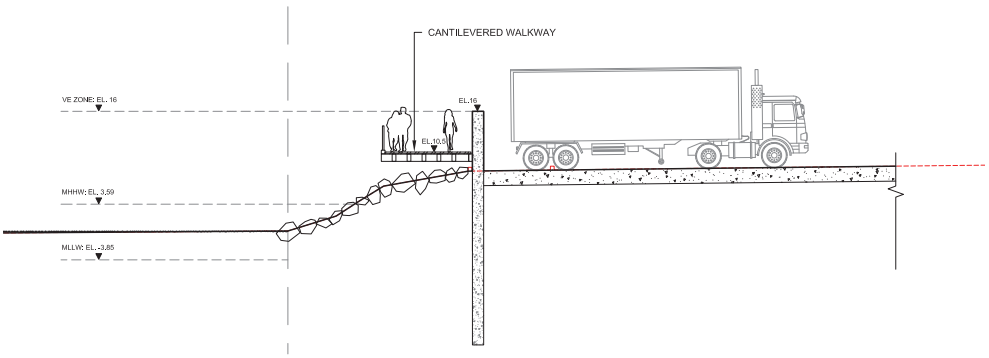
Tight Fit for Greenway



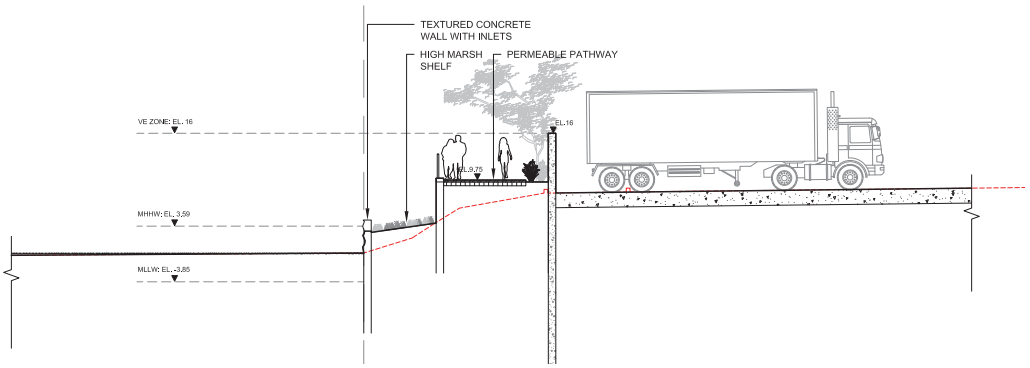
existing section



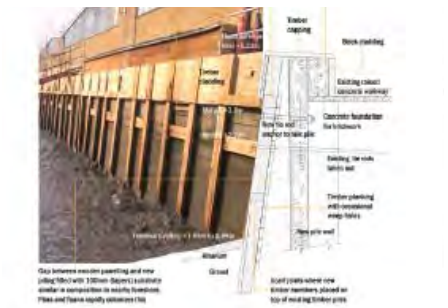
NYS DEC preferred section



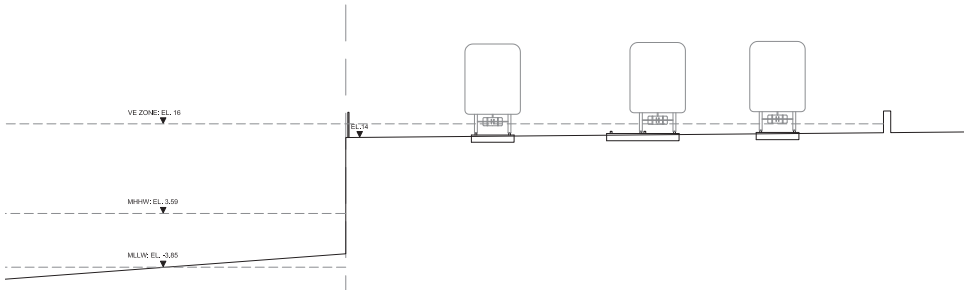
Cantilevered Walkway



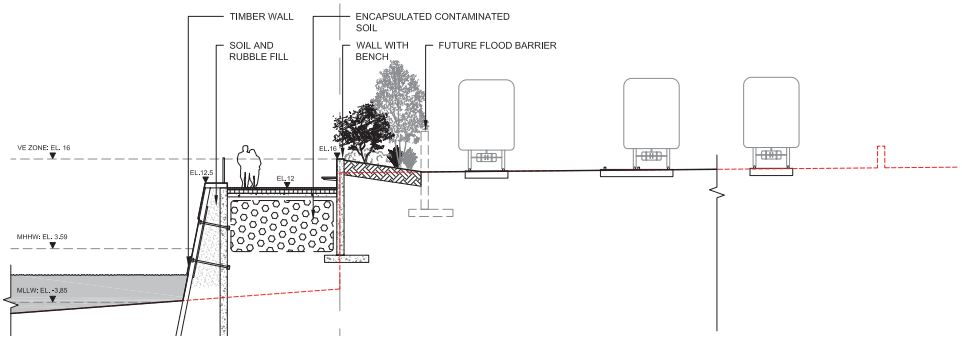
Tidal Marsh Terrace



Freight Rail and Tight Fit

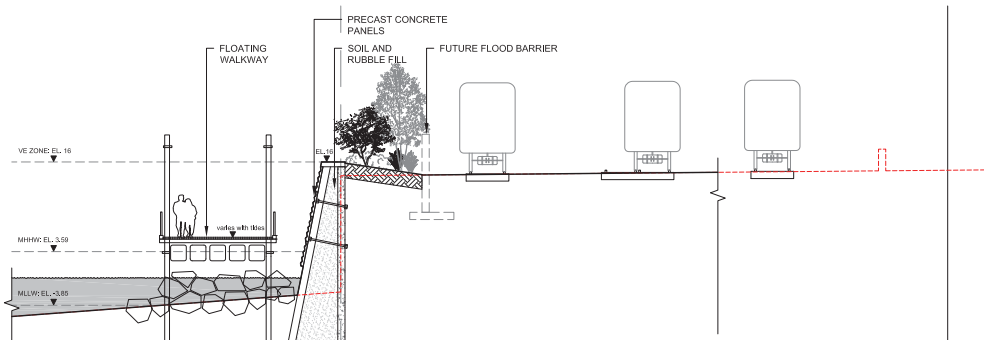


existing section



Timber Wall + Pathway on Terra Firma

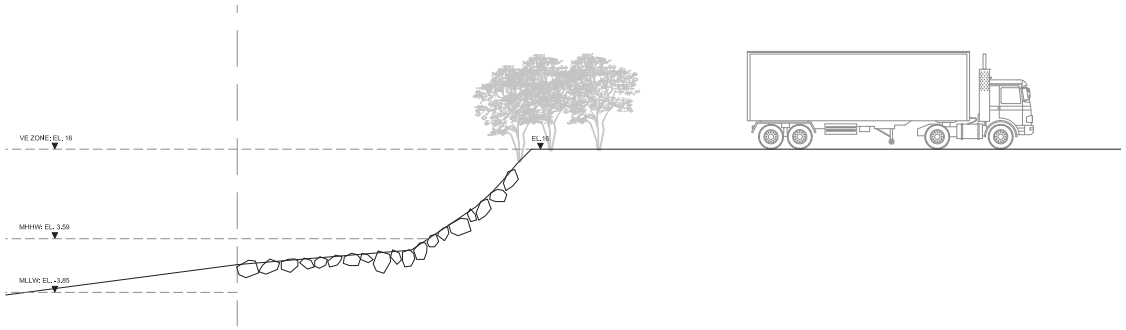
NYS DEC preferred section



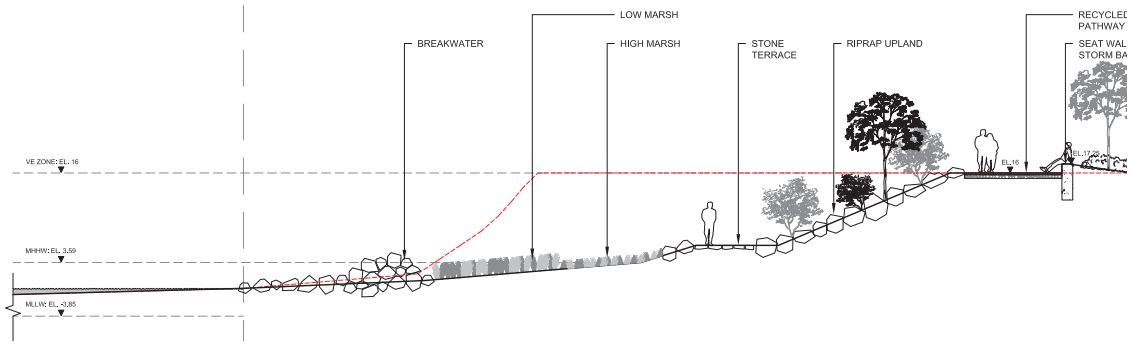
Timber Wall and Floating Pathway

EXAMPLES OF SECTIONAL STUDIES REVIEWED WITH NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION

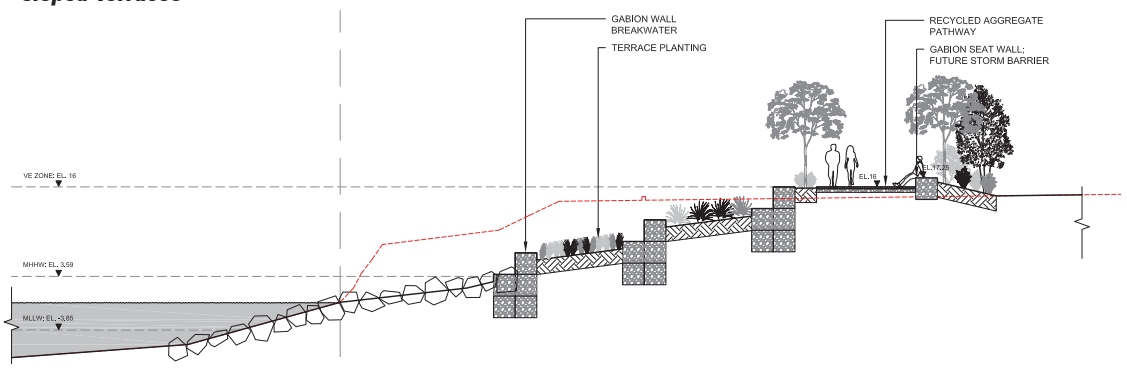
Inlets and Freshwater treatment sites = Cut sites that balance Fill within the project



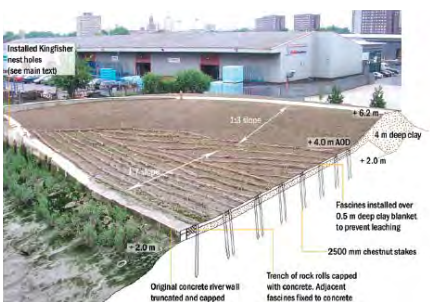
existing section



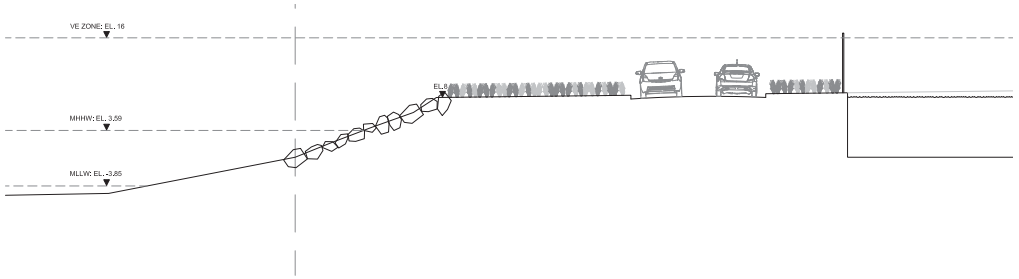
Sloped Terraces



Gabion Tidal Terraces



Waste Water Treatment Plant



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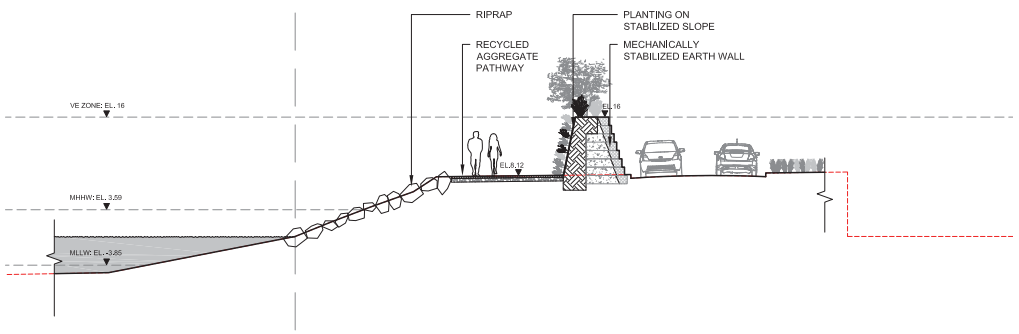
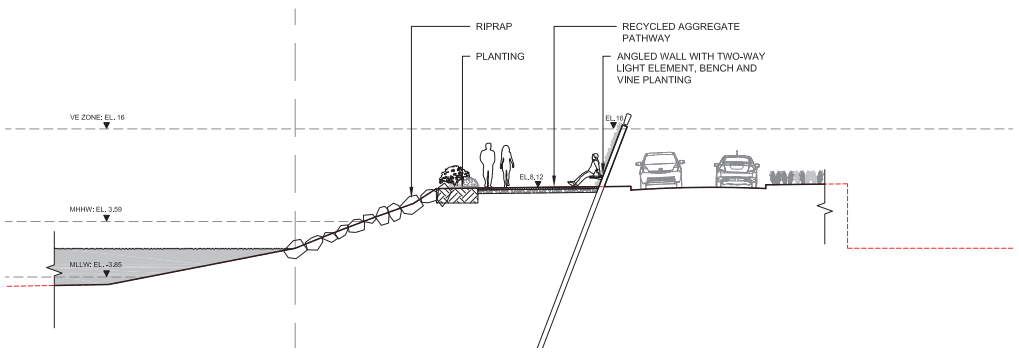
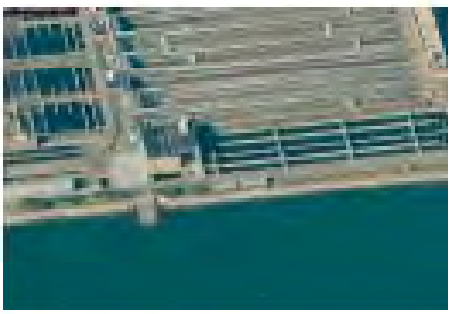
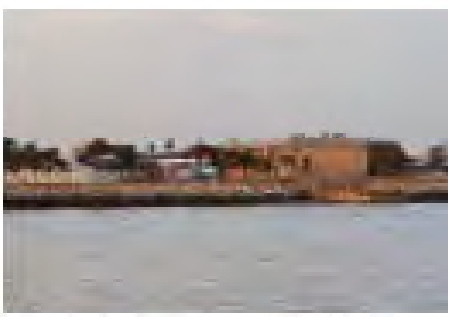


Stabilized Earth Berm



Steel Wall with integrated Bench





HUNTS POINT LIFELINES
sees jobs and the City's food supply as critical resilience infrastructure, and the community and businesses of Hunts Point as powerful integrators of economic, social and ecological potential to strengthen the whole.

Hunts Point Artist: A. Delfin

Source: eDesign Dynamics

Source: Time Out NY

Source: The New York Times and PlaNYC

Source: Time Out NY

HUNTS POINT LIFELINES

PennDesign / OLIN

HR&A Advisors
eDesign Dynamics
Level Infrastructure
McLaren Engineering Group
Barretto Bay Strategies
Philip Habib & Associates
Buro Happold

6 APRIL 2014 Rev1