



STACEY PHEFFER AMATO  
Assemblywoman 23<sup>rd</sup> District  
Queens County

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MEMBER  
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June 15th, 2017

Committee on Recovery and Resiliency  
New York City Council  
250 Broadway  
New York, NY 10007

Members of the Committee,

Thank you for the opportunity to submit testimony. I am writing today to **urge the City of New York, in coordination with the State of New York, the Army Corps of Engineers and any other necessary partners, to fund an emergency sand replacement and groin installation in Rockaway Beach, specifically between Beach 90<sup>th</sup> and Beach 95<sup>th</sup> streets and between Beach 126<sup>th</sup> and Beach 149<sup>th</sup> streets, as the lack of sand (and the lack of groins to retain that sand) leaves entire blocks vulnerable to a major storm.**

Hurricane Sandy devastated the Rockaway Peninsula, which is my home, and the communities surrounding Jamaica Bay. Immediately after the storm, the Corps came through with emergency sand replacement to protect Rockaway from future storm surges. They quickly completed that work, placing 3.5 million cubic yards of sand on the Peninsula, and we owe much of our subsequent safety to those efforts. However, it has been two years since that sand placement, and already the Peninsula has experienced substantial erosion.

For many years, both before and after Superstorm Sandy, residents of southern Queens and many experts have been advocating for more permanent measures to protect our homes and communities. The long-term comprehensive coastal storm risk reduction plan for Rockaway and Jamaica Bay requires the completion of hard protective features including a sea wall, jetties and groins. Long Island, Staten Island, the Jersey Shore, and Coney Island have all received protective measures, while the Rockaway Peninsula is left exposed.

Families in southern Queens and Rockaway deserve – and absolutely need – to have **basic safety measures in place for this upcoming hurricane season, which is projected by NOAA to be the worst in several years.** For these reasons, I am requesting **emergency sand replacement and groin installation as soon as possible** – not at the end of the summer (after hurricane season and the risk of catastrophe), not next year, but right away.

Thank you for your immediate attention to this matter. Should you have any questions, please do not hesitate to contact my office at 718-945-9550.

Sincerely,

Stacey Pheffer Amato  
Member of Assembly, 23<sup>rd</sup> District

**Public Testimony**  
**New York City Council, Committee on Parks and**  
**Recreation and Committee on Recovery and Resiliency**  
**Re: Beach Erosion in New York City**

June 15, 2017

**Roland Lewis**  
President and CEO  
Waterfront Alliance

The Waterfront Alliance is a non-profit civic organization and coalition of more than 900 community and recreational groups, educational institutions, businesses, and other stakeholders committed to restoring and revitalizing New York Harbor and the surrounding waterways.

New York City is a city of water, with our waterways serving as a vital resource for commerce, transportation, education, and recreation. Among our most popular waterfront recreation sites are our bathing beaches. With the exception of Manhattan, every borough enjoys a large stretch of beachfront for swimming, sunbathing, and summertime recreation: from Midland Beach in Staten Island, to Orchard Beach in the Bronx, to Coney Island Beach in Brooklyn and Rockaway Beach in Queens.

Hurricane Sandy's storm surge and wave action wrought substantial damages on our city's beaches, which lost as much as 3 million cubic yards of sand citywide, with the Rockaways accounting for roughly half that loss.<sup>1</sup> The US Army Corps of Engineers and its state and local partners have worked to replenish those losses and rebuild berms and dunes to better strengthen our coastal defenses through beach nourishment, or the replacement of sand in eroded shorelines. However, though this is an important tool to restore recreational use and access, as well as wildlife habitats, beach nourishment is not a cure-all for beach erosion. As well, major storm events, while a significant risk to coastal infrastructure, are not the only contributing factor toward beach erosion.

Our beaches are the first line of defense against the accelerating threat of sea level rise, which will continue to claim natural sediment, on our beaches and elsewhere, redrawing our coastal maps and displacing coastal residents, if we are not prepared. Beaches are dynamic, and sea level rise will continue to push beaches and dunes further upland. One solution is a system of groins, or structures built on shore extending into the water to capture longshore sand drift, preventing a portion of beach sediment from moving seaward. They commonly function well when combined with soft shore measures like beach nourishment. A project to stabilize Coney Island's Sea Gate Beach with four large T-groin structures was completed last year.

A plan is in place to build groins on Rockaway Beach, largely the result of significant pressure from community members and other stakeholders, but construction has not yet begun, despite the fact that according to some reports much of the sand that has been replenished has been lost to erosion. Long Beach groins are under construction now, with the Hamptons likely to happen next. While Long Island was likewise devastated by Hurricane Sandy and faces similar risks of future storms and sea level rise, the potential impacts to residents are greater here in New York City.

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<sup>1</sup> "A Stronger, More Resilient New York" [http://s-media.nyc.gov/agencies/sirr/SIRR\\_singles\\_Lo\\_res.pdf](http://s-media.nyc.gov/agencies/sirr/SIRR_singles_Lo_res.pdf) p14

This year the Waterfront Alliance launched a new initiative, the Harbor Scorecard, a district-by-district dashboard for coastal flood risk, water quality, and public access to the waterways. Using data from Climate Central, a research institution studying climate risk, and taking into account moderate to high sea level rise projections, we found that more than 408,000 New Yorkers live in areas with a 50% cumulative chance of experiencing a major storm event by 2060.

That's roughly the population of all of Miami, where a significant beach nourishment project was launched last summer. That total includes roughly 75,000 people in the Rockaways (Queens Community District 14), 81,000 in Coney Island (Brooklyn Community District 13), and 37,000 in Sheepshead Bay (Brooklyn Community District 15).<sup>2</sup> Those three districts together exceed the equivalent risk for Nassau County of 160,000 people, or for Suffolk County, of 65,000 people.<sup>34</sup> We take great pride that New York City has stepped forward to lead efforts to implement the Paris climate accords in the absence of federal leadership. Yet as we have seen in recent years, sea level rise and climate projections continue to worsen, which could exacerbate coastal erosion and reduce protection from storm surge absent further intervention.

Broadly speaking, coastal erosion is a challenge across our city and not necessarily limited to beachfronts. Currents and wake action create shoreline maintenance requirements up and down the Hudson, East, and Harlem Rivers, and beyond, for both private and public waterfront landowners. There are several types of shoreline stabilization strategies, from riprap revetments to living shorelines and wetlands restoration, available to waterfront planners and engineers and encouraged through our Waterfront Edge Design Guidelines rating system, which awards excellent waterfront developments that improve resilience, ecological outcomes, and public access and is currently being revised in partnership with a team of scientists and design experts.

We look forward to working with the Council and other stakeholders to ensure that New York City residents are adequately and expeditiously protected from the increasing threats posed by climate change, with strong and stable coastlines for generations to come.

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<sup>2</sup> Waterfront Alliance Harbor Scorecard [link](#)

<sup>3</sup> Climate Central Risk Finder, Nassau County, NY [link](#)

<sup>4</sup> Climate Central Risk Finder, Suffolk County, NY [link](#)



Testimony Before the New York City Council Committee on Recovery and Resiliency and Committee on Parks and Recreation

On Beach Erosion in New York City

Submitted by:

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Good Afternoon. Thank you Chairperson Levine, Chairperson Treyger and members of the Committees for the opportunity to provide this testimony.

My name is Brett Branco, and I'm speaking on behalf of Brooklyn College and on behalf of the Science and Resilience Institute at Jamaica Bay. The Institute is a partnership between the City of New York, the National Park Service, and eight research institutions<sup>1</sup>. Together, we work with communities, agencies and non-governmental groups in and around Jamaica Bay to support resilient life and livelihoods throughout the Jamaica Bay watershed.

As you consider managing beach erosion, keep in mind that well-intended interventions in one location will have adverse consequences in other locations.

The beaches of New York City are part of a regional sand conveyor belt that encompasses all of the south shore of Long Island, including the Rockaways, Coney Island, and Jamaica Bay. From 1844 – 1907, the Rockaway Peninsula grew to the West at a rate of 253 ft/yr due to a steady supply of sand from southern Long Island. The United States Geological Survey data reveals that 60% of the shoreline along southern Long Island has eroded over the last century. The construction of groins on the Rockaway Peninsula have had a cascading effect on this sand movement, building up sand on one side and eroding it on the the downcurrent side. Moreover, while hard structures have trapped sand coming from Long Island to the Rockaways, shorelines in Jamaica Bay have been isolated from this supply. For example, National Park Service

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<sup>1</sup> Led by the City University of New York – Brooklyn College and including New York Sea Grant, Cornell University, Rutgers University, Columbia University, Wildlife Conservation Society, Stevens Institute of Technology, and Stony Brook University



monitoring data collected by Rutgers University shows that erosion at Plumb Beach is exacerbated by less sand coming from the sand conveyor and the dredging of the Sheepshead Bay channel.

Looking ahead, the options available today to address beach erosion may not be available in 50 years, and we should think about short- and long-term strategies in parallel. Future generations may have less sand, and they will certainly face higher seas.

There is a finite limit on the available sand that can be used for continued beach nourishment. The Army Corps of Engineers' plan to stabilize the erosion on the Rockaway Peninsula assumes that the City will re-nourish the beaches every 3 to 4 years to make up for the inevitable sand losses. While the identified sources of sand are sufficient for the next 50 years, there is the possibility that new sources may be difficult to find or prohibitively expensive to utilize due to the regional trend of erosion.

Over the same period, sea level in New York City will likely rise over 1 foot and possibly close to 3 feet. Beaches will be squeezed between developed land and encroaching seas. From 2015-2016, there were 18 storms that submerged regional beaches, ranging from roughly half a foot to 3 feet of storm surge. Any amount of sea level rise will submerge the beaches more frequently, and with an established pattern of erosion, the impacts will increase in magnitude.

Communities must be engaged in thinking about the long-term strategies that balance land use policy and infrastructure with an evolving sense of place.



Communities have helped restore wetlands and maintain beaches at lower cost, when they are engaged meaningfully in an ongoing, two-way dialogue. The Science and Resilience Institute at Jamaica Bay is a place-based initiative built on partnership and on process. We urge you to provide support to all of our partners for a creative, diverse, and fun series of dialogues on how to help our coastal communities thrive.

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ANTHONY CIORRA, PE  
Chief, Coastal Restoration & Special Projects Branch  
US Army Corps of Engineers, New York District  
Testimony  
NEW YORK CITY COUNCIL  
JUNE 15, 2017

- Good afternoon, I'm Anthony Ciorra, Chief of Coastal Restoration Branch with the US Army Corps of Engineers, New York District (USACE) and I'm very pleased to be here today to testify on behalf of USACE.

- First off I would like to thank Council Member Treyger and the Committee on Recovery and Resiliency and Council Member Levine and the Committee on Parks and Recreation for the invitation to testify and the opportunity to provide an update on the status of the Corps of Engineers' post-Sandy coastal recovery efforts in the City of New York.

- As the Hurricane Sandy recovery program manager, my responsibility is to lead and manage the execution of the New York District's \$3.5 billion coastal restoration program in New York City, coastal Long Island, and northern New Jersey as far south as the Manasquan inlet.

- From 2004-2013, I was the Chief of the Civil Works Branch for the New York District, where I managed one of the largest and most diverse Corps Civil Works programs in the nation, including multi-million dollar flood risk reduction, shore protection, navigation, and ecosystem restoration studies and projects. In the aftermath of Hurricane Sandy in March 2013, I was reassigned as the Chief Coastal Restoration & Special Projects Branch and am now responsible for managing the \$3.5 billion dollar post-Sandy coastal recovery program in the New York District.

- We have the confidence that the Sandy experience and lessons learned will lead us to future success.

- Collaboration between government agencies, stakeholders, the general public and private sector are critical to the continued success of the recovery efforts.

- Strong interagency and intergovernmental teamwork was crucial to meet and challenges and continues to be critical as we move forward with post-Sandy coastal recovery efforts.

- Moving forward with our partners, the Corps developed, maintained and applied optimum expertise in science and engineering to restore and enhance the resilience of our coastlines.

- The primary purpose of coastal restoration projects is to reduce risk to life and property to vulnerable communities.

- Shore protection and flood risk reduction have always been crucial, and projects such as these have taken on greater significance with expected climate and sea level change, especially following Hurricane Sandy.

- Recovery efforts that the New York District has accomplished in NYC since Sandy include placing millions of cubic yards of sand along the coastline to repair and restore completed coastal storm risk reduction projects previously constructed by the Corps and maintained by NYC that were severely impacted by the storm at 100% Federal cost using Flood Control and Coastal Emergencies (FCCE) funding.



- Over 7 million cubic yards of sand was placed in coastal areas within the State of New York, with approximately 4 million cubic yards placed within the City of New York.
- The majority of beachfill placement – approximately 3.4 million cubic yards -- was placed along Rockaway Beach in Queens. Approximately 600,000 cubic yards was placed on Coney Island in Brooklyn. The sand placed at Rockaway and Coney Island was sufficient not only to repair damages to project resulting from Sandy, but restored it to its original design profile. The damaged levee and tide gate at Oakwood Beach on Staten Island was also repaired with Sandy FCCE funds at a cost of approximately \$500,000.
- Sand was beneficially used by dredging material from the East Rockaway Inlet and Jamaica Bay (Rockaway Inlet) Federal Navigation Channels and placing it on the beaches at Rockaway and Coney Island to restore the projects to their authorized design conditions.
- One of our NYC Sandy recovery projects is physically complete.
- In 1994, the Corps of Engineers placed 2.4 million cubic yards of sand the beach at Coney Island from Corbin Place west to West 37th Street and extended the West 37<sup>th</sup> Street terminal groin. Due to the rapid beach erosion that occurred on the Sea Gate beach and the sand accumulation along the Gravesend Bay shoreline around Norton Point, a series of T-shaped stone groins was proposed to retain sand on the ocean beach and reduce the amount of sand that migrated to the bayside.
- Construction of the Coney Island T-Groins project was physically completed in 2016 and is functioning as designed. This was not directly related to the FCCE work but was still accomplished at 100% Federal cost as an Authorized but Unconstructed project that was defined as ongoing construction because it received Federal Construction appropriations prior to Sandy. This \$33 million project included the construction of four T-groins along the beaches of the Sea Gate community that are now providing protection to the overall Coney Island project by retaining sand on the downdrift beaches west of the West 37<sup>th</sup> Street groin.
- The Corps partnered with New York State and New York City on this effort to restore Coney Island and provide a more stable beach to help reduce storm risks and restore this centerpiece of Coney Island's identity.
- I am providing an update on the status of three major coastal storm risk management projects located in NYC: The East Rockaway to Rockaway Inlet and Jamaica Bay Reformulation Study; the South Shore of Staten Island Coastal Storm Risk Management Project; and the New York/New Jersey Harbor and Tributaries Focus Area Study

#### (1) East Rockaway to Rockaway Inlet and Jamaica Bay Reformulation Study

- The East Rockaway to Rockaway Inlet and Jamaica Bay Hurricane Sandy General Reevaluation Report will recommend authorization of a project for coastal storm risk reduction from Gravesend Bay, Brooklyn, to Coney Island, Manhattan Beach, Sheepshead Bay, Gerritsen Beach, and Breezy Point to Far Rockaway.
- The project is expected to cost nearly \$4 billion, and detailed in a Final Report that will be prepared in March 2018.
- The project will include closure gates in Coney Island Creek, Sheepshead Bay, Gerritsen Creek, and across the Rockaway Inlet. Because the cost of this effort far exceeds available funding under the

Sandy recovery program, the U.S. Army Corps of Engineers will seek to implement portions of the project that are incrementally justified.

- The Army Corps anticipates, at this time that the Rockaway Atlantic Shoreline alternatives (including new groins, reinforced dunes, and beach construction), that are recommended in the footprint of the existing Federal project, will meet this incremental criteria, and the Corps is seeking other possible portions that might also fit this criteria in areas of Jamaica Bay.
- Elements that are constructed with the P.L. 113-2 funding, will be built with 100 percent federal funding, and the Corps anticipates up to \$400 million to be available for these efforts. The construction of the earliest elements of this project are currently scheduled to begin in late 2019.

## (2) South Shore of Staten Island

- The South Shore of Staten Island Coastal Storm Risk Management project (referred to by Staten Island locals as the 'East Shore') will run along the coastline from the foot of the Verrazano-Narrows Bridge at Fort Wadsworth to Oakwood Beach.
- The design phase is underway in close partnership with the project's non-Federal sponsors, the New York State Department of Environmental Conservation, and the City of New York.
- Additional coordination is underway with various other agencies, including the National Park Service, Natural Resources Conservation Service (NRCS) and Federal Emergency Management Agency (FEMA).
- The Staten Island Final Feasibility Report, Final Environmental Impact Statement and Final Record of Decision were formally approved by a Director's Report on October 27th 2016, and approved by the Assistant Secretary of the Army for Civil Works approval on December 8th 2016.
- The design phase for preparing plans and specifications for the project's construction was initiated in early 2017.
- Major first steps of the design phase during this year in 2017 include gathering data for the overall contract designs, new surveys and utility mapping that is now underway, geotechnical subsurface borings, hazardous material assessments, and cultural resource investigations (tentatively scheduled for this summer).
- Coordination with the City of New York is underway for the required real estate acquisition, design layouts, etc.
- A Project Partnership Agreement between the Corps, NY State and City of New York, that is necessary for construction, is scheduled to be executed by the end of 2017, with project construction scheduled to begin in early 2019 and continuing through 2022.
- The project is currently estimated at a cost of \$615,000,000, to be cost-shared between the Corps, NY State and City of New York at 65 percent Federal (\$400,000,000) and 35 percent non-Federal (\$215,000,000).

### (3) New York/New Jersey Harbor & Tributaries Focus Area Study

- In response to Hurricane Sandy, in January 2015 the Corps completed the North Atlantic Coast Comprehensive Study (NACCS) which identified nine focus areas between Maine and northern Virginia which are at high risk to coastal storm damage but lack for an existing an in-depth coastal storm risk study or project. One of these focus areas is the New York – New Jersey Harbor and Tributaries (NYNJHAT) study, which encompasses all of New York City, the six largest cities in New Jersey and the tidally influenced Hudson River up to the Troy lock and dam.
- The New York District entered into an agreement on July 15, 2016 with the States of New York and New Jersey. New York City is also an equal partner in the execution of this study.
- Building off of the other numerous efforts that are presently underway, the feasibility study will investigate Coastal Storm Risk Management (CSRM) problems and solutions. Three overarching efforts will be performed:
  - Assess the study area's problems, opportunities and future-without project conditions;
  - Assess the feasibility of implementing multi-faceted, system-wide Coastal Storm Risk Management solutions in a watershed context, such as policy/programmatic strategies, and basin-wide hydrologic and hydraulic measures; and
    - If basin-wide solutions are not feasible, assess the feasibility of implementing site-specific solutions, such as a combination of structural, nonstructural, and/or natural and nature-based features (NNBF).
- The Project Management Plan (PMP) for this study, which is now being finalized, describes the scope and corresponding costs, compliant USACE planning policy and procedures. The PMP represents the foundation on which subsequent coordination with and input from stakeholders in the region and the non-Federal study partners would occur during the planning phase.
- The study will initially evaluate broad solutions using refined tools developed in the NACCS to narrow the array of alternatives before then proceeding with detailed feasibility-level investigations for the most feasible coastal storm risk management solutions. Upon identifying a recommended plan, the study will result in a Chief of Engineers' Report which will recommend any further actions needed to address current and future coastal storm risks that face the study area, including those that may be implemented by the Corps, subject to construction authorization and funding. The Chief's Report will be submitted to Congress for authorization for construction.
- This study is currently anticipated to require upwards of 6 years from the agreement execution and potentially \$20 million of federal and non-federal funds (50/50 cost-sharing) to be fully completed.
- In closing, I want to stress that the Corps of Engineers has not lost our sense of urgency for completing these projects as soon as possible to reduce the risk to coastal communities that remain vulnerable from the impact of future storm events. Although we understand the frustration of our stakeholders and the public that our study process requires time due to the extremely complex nature of these projects and environment in which they are located, we are still pushing to move everything forward as quickly as possible because we understand the risk still exists. Our Sandy recovery program continues to be a priority for our agency as we approach the 5 year anniversary of the storm.
- Thank you again for the opportunity to provide testimony this afternoon.
- Our web site: [www.nan.usace.army.mil](http://www.nan.usace.army.mil)

Address: 26 Federal Plaza Rm. 2119A, New York, NY 10278-0090

June 15, 2017 Hearing: Committee on Recovery and Resiliency and  
Committee on Parks and Recreation  
Testimony of Ida Sanoff

I have attended innumerable hearings, meetings and presentations in the five years since Hurricane Sandy hit southern Brooklyn and have heard all sorts of plans and promises. I have read countless reports and submitted written comments. It has been a total waste of time. I am sick and tired of talking. Nothing, absolutely nothing, has been done to provide shoreline protection in southern Brooklyn.

It could be years, even decades, before a flood protection plan is developed, finalized and funded. No flood protection system, no matter how carefully designed, is infallible. But *any* flood protection is better than *no* flood protection at all. The beaches of southern Brooklyn are the only protection against flooding that we currently have and they are being neglected to the point that even a Category 1 hurricane may flood local streets. A small sand replenishment that was done after Hurricane Sandy has long been lost to erosion. Jetties that were buried in a major beach replenishment project in the 1990's are now exposed. High tides on a full or new moon used to end about halfway up the jetties. Now they frequently extend 75 feet or more past them. One of the Nor'Easters we had this past winter brought the ocean more than half way up the beach. With all of the erosion that we have had these past few years it won't take much for a storm surge to go over the Boardwalk and flood our communities.

It is difficult to stop shoreline erosion. But in Brooklyn's Brighton Beach and Coney Island, beaches are also eroding on their street facing borders. It is unbelievable that this is allowed to continue. Every year, the wind blows tons of sand off the beach and onto the Boardwalk. The Boardwalk sand piles can become several inches high before the wind scatters the sand onto local streets or the rain washes the sand into storm drains. As a result, the beach profile becomes lower every year and the likelihood that a storm surge will come over the beach and flood local streets increases. Again, the only thing that gives us any flood protection at all is the beach. And we are just watching it vanish into the wind.

The most infuriating thing is that it won't take rocket science to keep the sand from eroding over the Boardwalk. Vegetation – beach grass - would not only minimize sand migration onto the Boardwalk but it would also provide attenuation of storm surge waves, especially if there were dunes. Vegetated sand dunes are a proven, easily constructed, cost effective way to provide shoreline protection. New Jersey towns that had high sand dunes survived Sandy relatively unscathed. Communities without dunes were obliterated. But there are no sand dunes on Brooklyn's public beaches. Every year, some beach grass begins to grow, but instead of allowing it to grow and hold the sand in place, the Parks Dept. digs it right up. No distinction is made between beach grass and weeds. If it's green, it goes. Why is this practice allowed to continue?

Brooklyn's shorefront communities began asking for vegetated sand dunes several years before Sandy hit. The reasons for not providing them were outrageous. We were told that "Tourists who visit the Boardwalk in Coney Island want to see the ocean; they don't want to see a sand dune." The New York City Parks Department told us that dunes weren't feasible because they could not remove trash with mechanical rakes and it would have to be removed by hand. And they just did not have the manpower to rake trash by hand. Yet there are newly planted sand dunes on the beach in Rockaway and it doesn't appear to be a problem. When the Army Corps of Engineers recently replenished beaches in the private

gated community of Sea Gate, at the far western end of Coney Island, beach grass was planted to keep the sand in place. Why are there no dunes and no grass on Brighton Beach and Coney Island?

Instead of constructing vegetated sand dunes, which would slow down sand loss, attenuate wave energy and protect lives and property, we have had studies - lots and lots of studies. The U.S. Army Corps of Engineers has approximately one hundred and fifty years of documentation about the storms that have hit the Brighton Beach/Coney Island peninsula in southern Brooklyn, including the height of the storm surge, how far inland the flood waters traveled and the dollar amount of the damage. In 1972, after a four year study, the Army Corps of Engineers proposed a \$27.5 million, fifteen foot high seawall for the Coney Island/Brighton Beach peninsula. It was fraught with problems and never constructed. Additional flood control studies were done after the Nor'Easter of 1992 sent flood waters almost a mile inland. The New York Rising program proposed all sorts of things which have yet to see the light of day, including vegetated sand dunes. More studies were done after Sandy and most have yet to be completed. The only people who have benefitted from these studies are the consultants who have reaped millions of dollars in fees. And some of these consultants were so inept that they insisted that "hurricanes are not major rain events".

Instead of spending money on providing vegetated dunes as a protective measure, New York City is funding "Know Your Zone". How many tens of millions of dollars have been spent over the last five years on these full color booklets, available in thirteen languages, which instead could have been spent on beach protection? Nothing appears to be grounded in reality. The Know Your Zone booklets even tell you to bring your sleeping bag to the shelter with you. Of course, every New Yorker has a sleeping bag that we keep in our minuscule apartments and tiny closets! All that Know Your Zone has provided is a message to grab as much as you can fit into a backpack and run for your life. The City is just ignoring the devastation that occurred after Sandy. What do you come back to after you spend your night in the shelter to escape the storm?

Here's the bottom line: All you need to create dunes are a couple of bulldozers and some grass. We are now in the fifth hurricane season since Sandy. The National Weather Service is predicting several severe storms. Despite all the talk about resiliency, nothing has been done to provide flood protection for southern Brooklyn. Again, ANY beach protection is better than NO beach protection. What are we waiting for?



John Cori, President  
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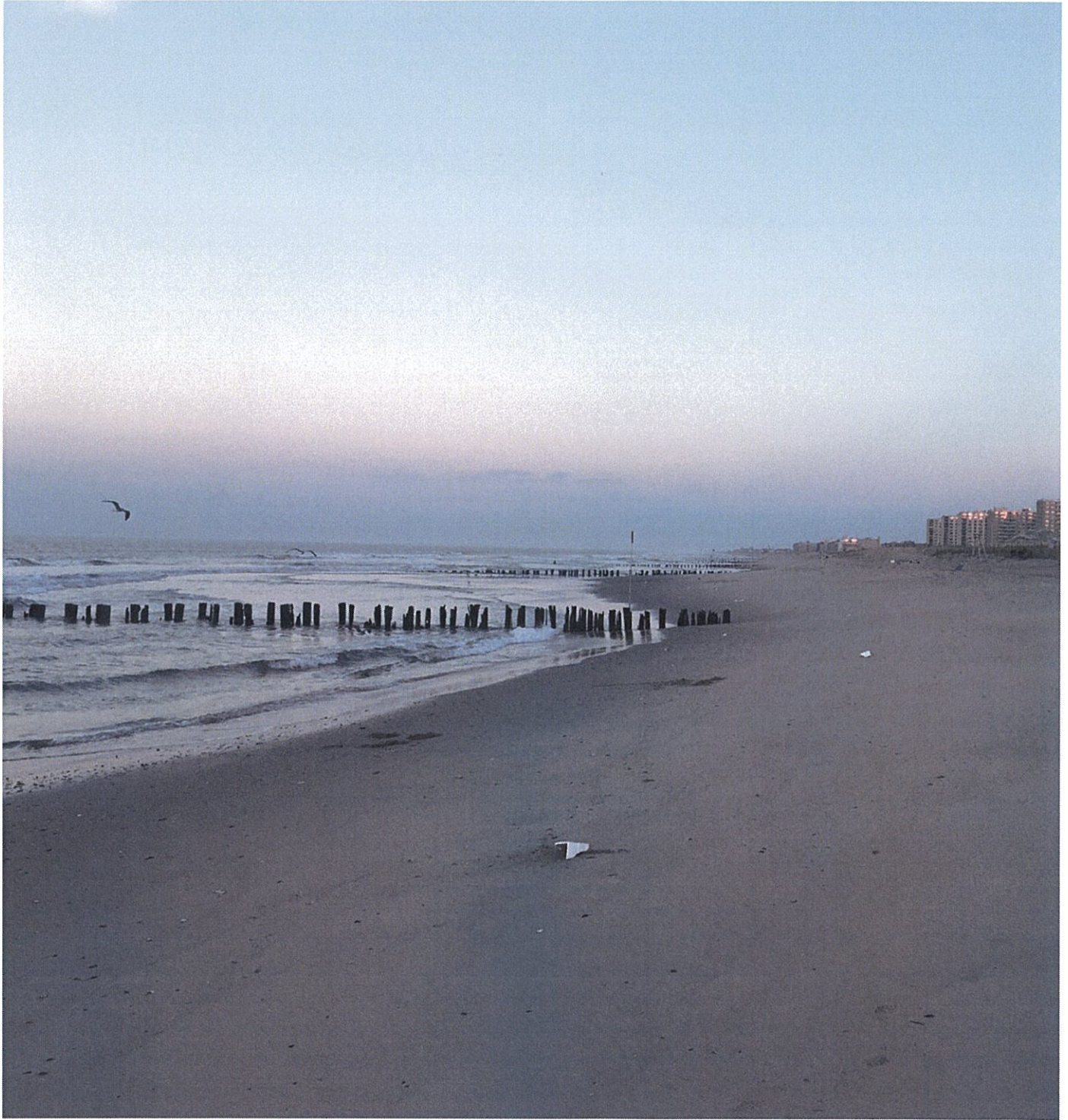
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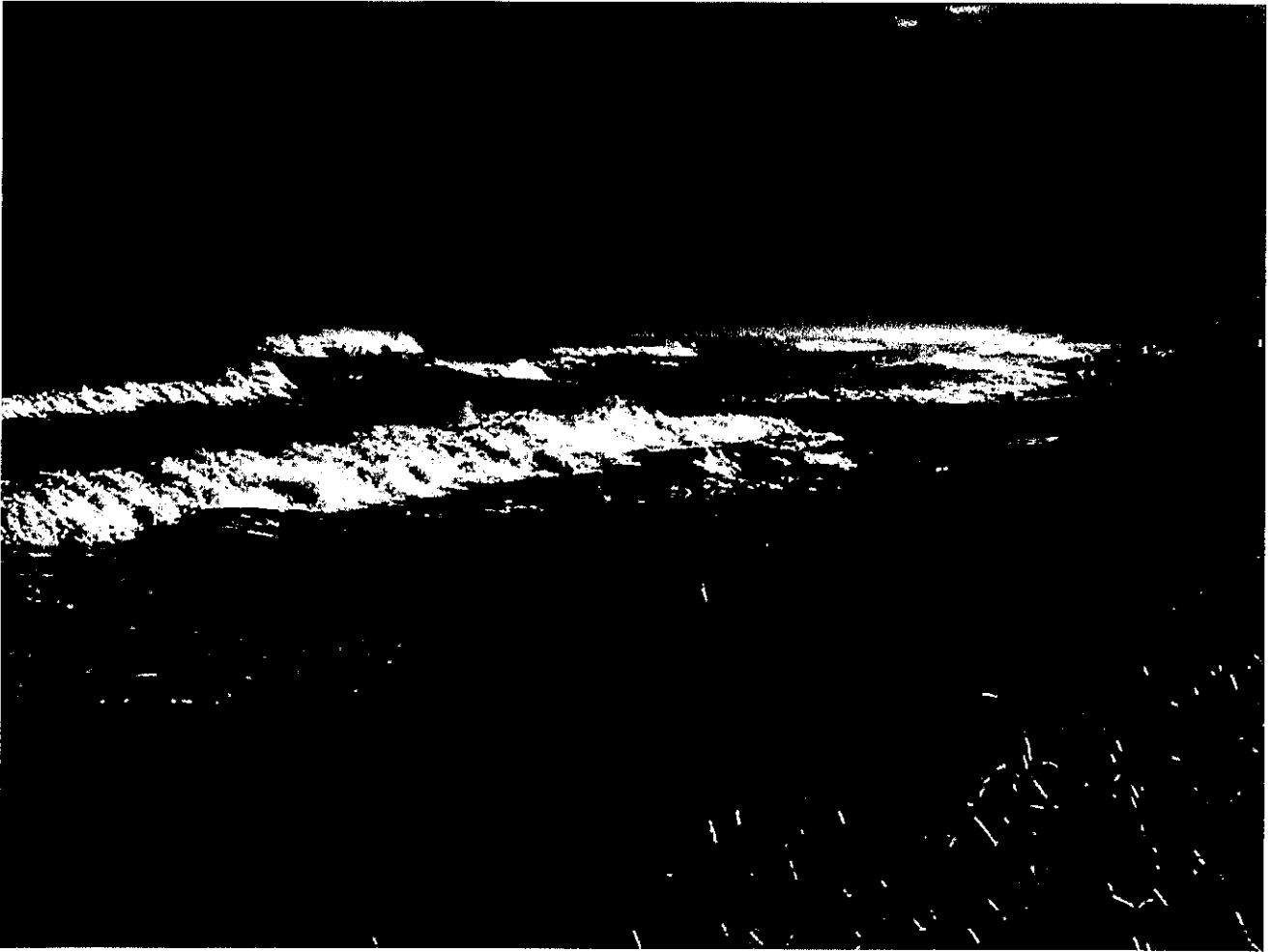


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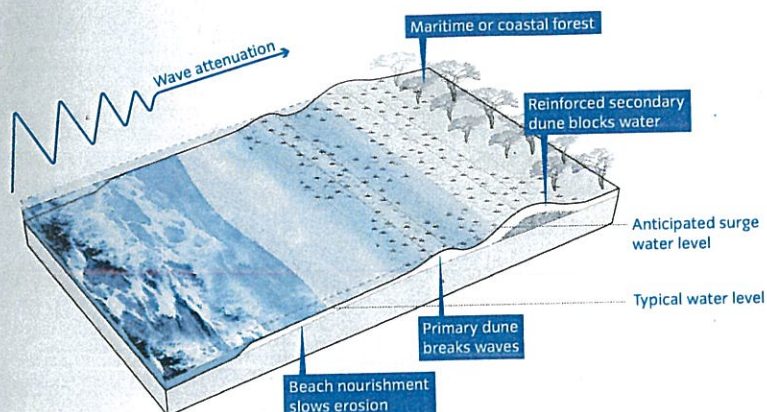


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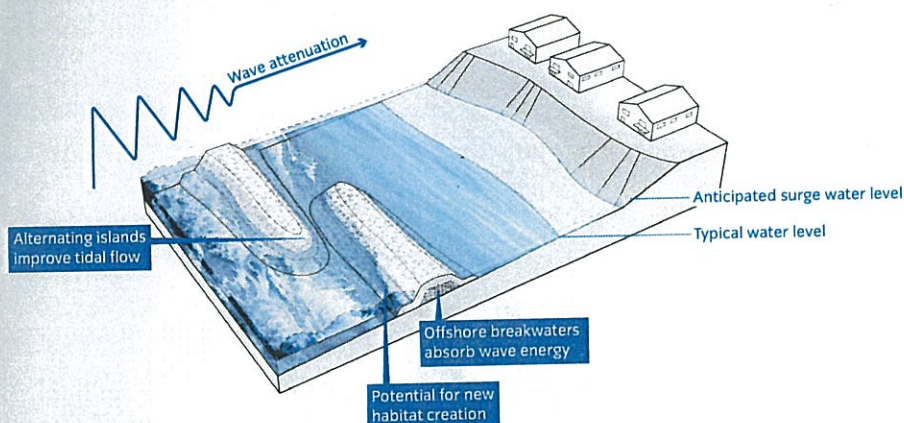
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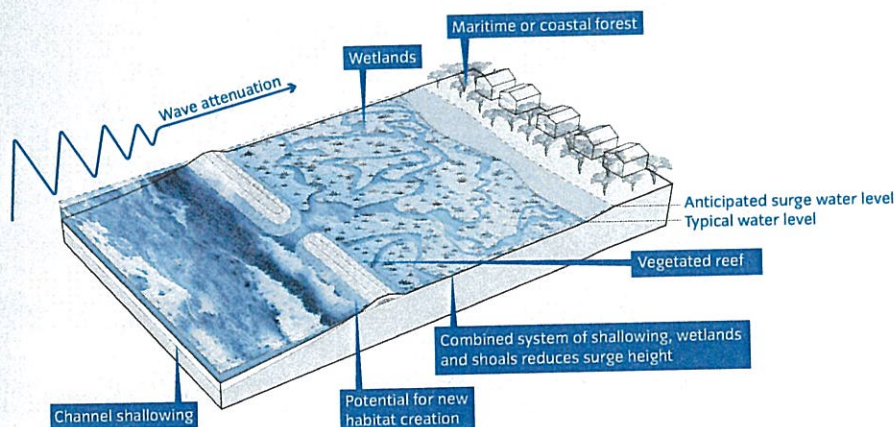
## Primary and Secondary Dune System



## Offshore Breakwaters



## Wetlands with Wave Attenuation



groins must be carefully evaluated because they have the potential to disrupt natural sediment transport processes, with careful planning, they can serve a vital function in protecting oceanfront communities.

## Groins



**Selected Locations:** Sea Gate in Brooklyn and the Rockaway Peninsula (See photo: Groins)

## Strategy: Protect against storm surge

### Integrated Flood Protection Systems

Flexible and adaptable, integrated flood protection systems are composed of a variety of elements that can be combined and customized in areas where critical infrastructure or vulnerable neighborhoods require a high level of flood protection. Such systems have evolved from traditional floodwalls and can include landscaping features, such as terraced berms at the back end of a waterfront park; benches, park walls, flood-proofed buildings or bridge abutments; drainage improvements, including valves and gates; and temporary features such as deployable floodwalls, which can be erected in advance of an extreme weather event. Passive elements that float into position during flood conditions by reacting to floodwaters can also be a part of an integrated flood protection system in discrete areas such as the entrances to underground parking garages.

In the case of areas that are subject to the risks posed by infrequent, but damaging, extreme weather events—but where permanent features are undesirable or infeasible—one solution is to rely more heavily on deployable floodwalls. These systems, which consist of moveable posts and panels which are, at times of vulnerability, affixed to permanent, in-ground foundations, can be removed immediately after a threat recedes. The advantage of deployable systems is, of course, the fact that they allow the waterfront to remain open and accessible at all times, except during weather events. However, the systems do pose maintenance and operating challenges (e.g., the deployable elements need to be stored, deployment often requires heavy equipment and a sizeable workforce, and regular drills are required to ensure readiness during storms). (See photos: Deployable Floodwalls)

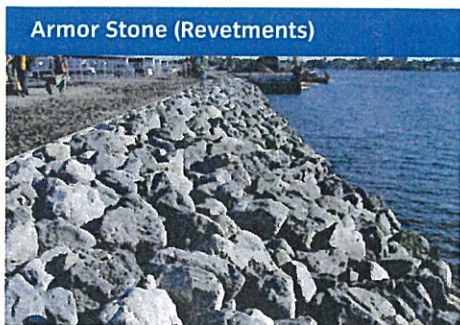


ensuring that city beaches continue their vital coastal protection role.

**Selected Locations:** Rockaway Peninsula; Coney Island peninsula; East Shore and South Shore of Staten Island; and Orchard Beach in the Bronx. (See photo: *Beach Nourishment*)

### Armor Stone (Revetments)

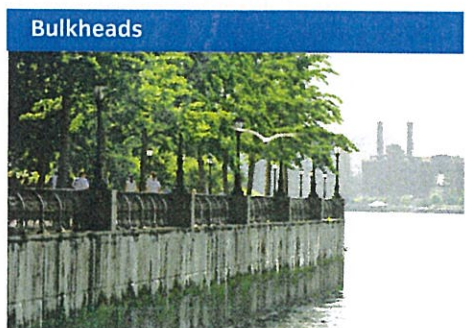
Hardening exposed shorelines with armor stone (various kinds of massive rocks, including granite), or revetments can protect against erosion caused by storms and rising sea levels. Revetments, also known as rip-rap, are a proven coastal protection technique in New York City and can also be used to raise edge elevations. Experience has demonstrated that revetments require minimal maintenance. In addition, the shallow slopes of revetments can provide near-shore habitat for marine organisms and vegetation.



**Selected Locations:** South Shore of Staten Island and Coney Island Creek. (See photo: *Armor Stone (Revetments)*)

### Bulkheads

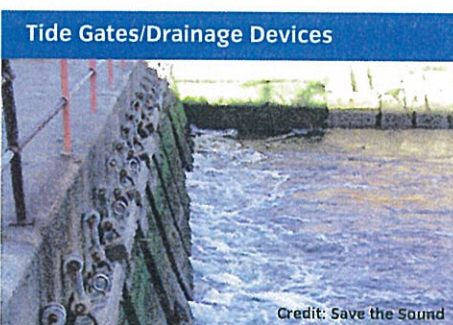
Historically, bulkheads (or structures, usually made of stone or concrete, at the water's edge) have been installed to hold shorelines in place and provide land for commerce adjacent to the city's rivers. They are also used to protect exposed shorelines from erosion. Over time, these bulkheads have taken on an expanded role—supporting parks, esplanades, and highways. Raising bulkheads in targeted locations citywide would mitigate the effects of rising sea levels in low-lying areas shown to be prone to future tidal flooding.



**Selected Locations:** Bay side of the Rockaway Peninsula, Broad Channel, and Howard Beach in Queens; West Midtown and Sherman Creek in Manhattan; Locust Point in the Bronx; Greenpoint in Brooklyn; and in the North Shore of Staten Island; as well as other locations that will be evaluated. (See photo: *Bulkheads*)

### Tide Gates/Drainage Devices

Tide gates, "duckbill" valves, which seal a pipe end but still allow water to drain, and other backflow-prevention devices are used to ensure that water does not flow backwards through drainage infrastructure. These commonly used devices, although not universally applicable, can be used to improve the performance of the city's drainage network and reduce flood risk, though they must be evaluated on a site-specific basis so as not to impede the ability of upland areas to drain stormwater.



**Selected Locations:** Oakwood Beach and Mill Creek in Staten Island; Coney Island Creek; Flushing Meadows Corona Park in Queens; and Beach Channel Drive on the Rockaway Peninsula. (See photo: *Tide Gates*)

## Strategy: Minimize upland wave zones

### Dunes

Dunes—reinforced sand mounds typically located along the back edge of a beach—help break waves and keep floodwaters from inundating neighborhoods. Dunes can be "sacrificial," designed to allow sand to wash away as storm waters recede. Generally, they require maintenance and sand replenishment from time to time, especially after storms. Dunes work well when planted (because plant roots help hold the sand in place) and reinforced (with a structural inner core of rock or geotextiles, on which the sand sits). In some locations, they work even better when there is enough land to allow for both primary and secondary dunes (a double-dune system), which also provide redundant coastal protection.

**Selected Locations:** Rockaway Peninsula and the Coney Island peninsula. (See rendering: *Primary and Secondary Dune System*)

### Offshore Breakwaters

Offshore breakwaters—features typically composed of rock or other robust materials located in an ocean or bay—attenuate wave energy offshore, thereby absorbing the force of destructive waves before they reach the coast and adjacent neighborhoods. By calming nearby waters, these structures also can provide new habitat for in-water organisms such as oysters. Although expensive, offshore breakwaters can reduce risks significantly for areas exposed to significant wave action and erosion.

**Selected Locations:** Rockaway Extension; City Island in the Bronx; South Shore of Staten Island; and Upper Bay. (See rendering: *Offshore Breakwaters*)

### Wetlands, Reefs, and Living Shorelines

Wetlands—swamps, marshes, and bogs—are areas that are inundated or saturated by surface or groundwater sufficiently frequently to support vegetation that thrives in wet soil conditions. Reefs are an offshore feature typically below sea level. Living shorelines are coastal edges that incorporate a combination of reefs, breakwaters, maritime or coastal forests, and tidal wetlands to reduce wave action and erosion. These natural features are known to offer significant ecosystem and water quality benefits, and also to aid in the retention of stormwater, sediment, nitrogen, and other nutrients.

What is less well-understood is their ability to reduce waves during storms, although anecdotal evidence indicates that they can perform this function. More analytical research, including the City's storm surge modeling completed for this report, has shown that, when placed appropriately, wetlands, oyster reefs, and living shorelines, including coastal forests, possess effective wave-attenuation properties. Those properties may be improved even further by altering the depth at which these features are placed or modestly increasing the inclusion of hardened elements such as rock.

**Selected Locations:** Jamaica Bay; Tottenville in Staten Island; Bay Ridge Flats; along the Arthur Kill and Kill van Kull; and along Long Island Sound. (See rendering: *Wetlands with Wave Attenuation*)

### Groins

These installations of rocks or timber, perpendicular to the shoreline, are often referred to as jetties. They can help retain sand from beach nourishment projects on-site and also serve to break waves and absorb wave energy. Though



destructive impact on the coastline of New York City, though different sections of the coastline experienced the storm differently and with different consequences. (See map: *Sandy Inundation*)

Generally, Sandy's coastal inundation took one of three forms. First, floodwaters came directly from the ocean, as water surged over beaches and bulkheads, flooding neighborhoods and critical infrastructure such as tunnels. Extreme water levels were seen citywide as the storm peaked in the evening of October 29, 2012. (See chart: *Peak Storm Surge Elevations During Sandy*)

In many cases, in ocean-facing areas such as Southern Brooklyn, South Queens, and the East and South Shores of Staten Island, from South Beach to Tottenville, the surge brought with it not just large volumes of water but also powerful waves that wreaked havoc on buildings and infrastructure alike. Record ocean waves of over 30 feet were measured in the ocean southeast of the Rockaway Peninsula.

Another impact of the wave action along the city's ocean-facing coastline was massive beach erosion. In fact, estimates indicate that

up to 3 million cubic yards of sand, and maybe more, were lost citywide, with the Rockaway Peninsula alone losing about 1.5 million cubic yards of sand (a volume larger than the Empire State Building) and additional losses occurring in Coney Island, Orchard Beach, and the East and South Shores of Staten Island.

The second way Sandy's surge impacted the city was via less direct routes. In these cases, the city's many bays, inlets, and creeks functioned as "backdoor" channels, funneling ocean waters inland. For example, much of the flooding in Southern Brooklyn came not only over the area's beaches, but also via Coney Island Creek and Sheepshead Bay. Likewise, floodwaters from Jamaica Bay contributed to the inundation of the Rockaway Peninsula, where, as area residents explained, "the ocean met the bay." Newtown Creek, meanwhile, overflowed its banks, flooding Maspeth, Greenpoint, East Williamsburg, and Bushwick. Similarly, the Gowanus Canal overflowed its banks, flooding Red Hook and other adjacent neighborhoods.

The third way Sandy's surge impacted New York City was by overtopping the city's extensive shoreline drainage infrastructure, and in some cases infiltrating the roadway drainage

and sewer system through catch basins, manholes, and storm drains in the streets, especially in low-lying areas such as in Midland Beach, Staten Island. This network of pipes and other features is designed to drain rainwater away from land and into the area's waterways and is not designed to protect against storm surge. Additionally, several tide gates and floodgates (devices that prevent water from flowing backwards through the drainage system)—including at Oakwood Beach, Staten Island—were damaged during the storm, while others, including at Flushing Meadows Corona Park, lost power and had to be operated manually during Sandy, amid the overwhelming volume of water that they were being asked to handle.

### Performance of Existing Coastal Defenses

Though Sandy's surge generally devastated areas that it touched, some coastal features and strategies—such as beaches nourished with sand, dunes, wetlands, new and elevated drainage systems, site elevation, and bulkheads—did offer some protection. For example, many nourished beaches and dunes absorbed the destructive energy of waves and floodwaters, in many cases buffering adjacent neighborhoods. This was the case on the Coney Island peninsula, where the neighborhoods behind the nourished beaches of Coney Island and Brighton Beach suffered far less-destructive wave impact than did Sea Gate, where the beaches had not been nourished. In addition, areas of the Rockaway Peninsula with established dunes, such as Beach 56th Street, suffered substantially less damage and less sand migration into neighborhoods than areas without them, such as Beach 94th Street. (See photos: *Dune Protection on the Rockaway Peninsula*)

Site elevation, too, often proved effective in protecting buildings from destructive waves and flooding. Much of the city's development along the waterfront has occurred on land created by filling in historic wetlands and marshes *at-grade*, leaving them at risk of flooding. However, *elevated* developments—such as Battery Park City in Lower Manhattan and Arverne By The Sea on the Rockaway Peninsula—survived Sandy with minimal damage, particularly compared to other nearby locations that were not elevated.

Drainage systems that took advantage of local landscape and site characteristics also worked well. Though the volume of water that came with Sandy's surge was so massive that, in many cases, these systems were overwhelmed by peak water levels, areas with newer, elevated systems such as Arverne By The Sea were able to drain more quickly as floodwaters receded—sometimes immediately—allowing quicker recovery.

### Dune Protection on the Rockaway Peninsula

With Dune (Beach 56th Street)



Before Sandy

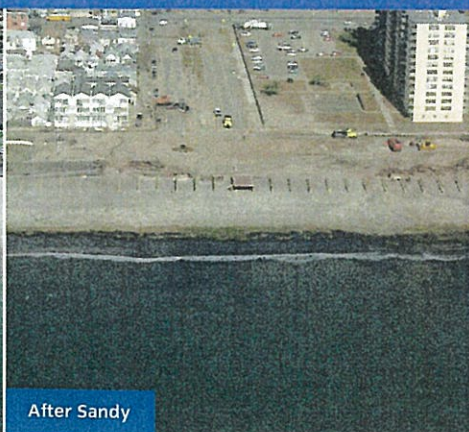


After Sandy

Without Dune (Beach 94th Street)



Before Sandy



After Sandy

Credit: NOAA





John Cori, President  
**Rockaway Beach Civic Association**  
PO Box 930134, Rockaway Beach, NY 11693  
[www.RockawayBeachCivicAssociation.org](http://www.RockawayBeachCivicAssociation.org)

**Mail body: The Army corps of engineers(ACE) did an valiant Job**

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The Army corps of engineers(ACE) did an valiant Job after Hurricane Sandy on the Rockaway shoreline, just as it has done for over 50 years.

After Hurricane Sandy, ACE placed roughly 600,000 cubic yards of sand dredged from East Rockaway Inlet onto severely eroded areas from Beach 89th Street to Beach 149th Street. A second contract to place an additional 3 million cubic yards of sand on entire Rockaway peninsula was awarded on August 14, 2013 and began after the first contract was completed. When both contracts were completed, the Corps restored Rockaway Beach to its originally constructed size from when the project was initially constructed in the 1970s.

The project provided coastal storm risk reduction to the densely populated communities and infrastructure located along the shoreline on the Rockaway Peninsula.

Sadly, The sand which was placed just a few short years ago is already eroding, at an alarming rate, West of beach 87th and on the beaches east of the Beach 20s and Beach 30s

While "dunes" were also placed at the back of the berm width, the dunes are eroding as well, west of Beach 86th!

If the current rate of sand loss is any indication, the dunes will be totally washed away by 2019 leaving the peninsula west of beach 86th street and east of beach 32nd, 100% vulnerable to Wave inundation from just a simple high tide.

ACE tells the Residents and business owners of the Peninsula that dunes are "sacrificial" and their erosion is part of the design.

If this is true, What is next then? The sacrificing of our homes and businesses AGAIN?

Dunes do work on the peninsula, But only when coupled with LARGE STONE GROINS!!

At last night's Build it back town hall by NY1 at the collage of Staten Island, Senior Director of Climate Policy, Dan Zarilli talked about Resilient Neighborhoods.

Mr Zarilli specifically commented about a neighborhood, Called Arverne By The Sea, on the Rockaway Peninsula and how it sustained significantly less damages from flooding than the rest of the Peninsula.

While Mr Zarilli's Comments about Arverne by the Sea are accurate, he failed to mention that portion of the Rockaway peninsula east beach 86th on the Rockaway Peninsula sustained significantly less damage from the Oceans wave inundation than that was sustained west of Beach 86th street.

What Mr Zarilli neglected to point out was the fact that Arverne by the sea is east of Beach 86th street. Where LARGE STONE GROINS keep sand in place.

Part of the design for Arverne by sea's success in preventing flooding during hurricanes Irene and Sandy was NYC's requirement for Arverne by the Sea to plant a line of dunes between the development and the beach. Thus creating the most successful protection anywhere in NYC from Wave inundation during Hurricane Sandy.

What is SIGNIFICANT, is how much GROINS DO WORK ! They kept over 200 feet of Berm width in place for over 2 miles on the Rockaway shoreline for over 36 years prior to hurricane Sandy, with minimal replenishment.

With the "consensus" of Sea rise acknowledged and adopted by the City of New York, I implore the Mayor and the City council to adopt legislation which leads to the expeditious preparation for the impending doom which will be brought on by sea level rise.

Wind farms and solar panels great to lower carbon emissions, but they are the equivalent to crossing our fingers if we truly believe they will stop the oceans from rising.

If we do not use sand and beach grass to seal our tunnels, then we should not use it as exclusive protection for our neighborhoods.

Hard structures should be protection of choice to protect us from higher tides.

The time to get ready is yesterday.

John Cori, President

**Rockaway Beach Civic Association**

PO Box 930134, Rockaway Beach, NY 11693

[www.RockawayBeachCivicAssociation.org](http://www.RockawayBeachCivicAssociation.org)

Email secured by Check Point



**THE COUNCIL  
THE CITY OF NEW YORK**

*Appearance Card*

I intend to appear and speak on Int. No. \_\_\_\_\_ Res. No. \_\_\_\_\_

☐ in favor ☐ in opposition

Date: \_\_\_\_\_

(PLEASE PRINT)

Name: Sam Marsh

Address: 253 Broadway

I represent: ORR

Address: \_\_\_\_\_

**THE COUNCIL  
THE CITY OF NEW YORK**

*Appearance Card*

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☐ in favor ☐ in opposition

Date: \_\_\_\_\_

(PLEASE PRINT)

Name: Curtis Cravens

Address: 253 Broadway

I represent: ORR

Address: \_\_\_\_\_

**THE COUNCIL  
THE CITY OF NEW YORK**

*Appearance Card*

I intend to appear and speak on Int. No. \_\_\_\_\_ Res. No. \_\_\_\_\_

☐ in favor ☐ in opposition

Date: 6/15/17

(PLEASE PRINT)

Name: Liam Kavanagh, First Deputy Commissioner

Address: \_\_\_\_\_

I represent: NYC Parks

Address: 830 Fifth Ave.

Please complete this card and return to the Sergeant-at-Arms

**THE COUNCIL**  
**THE CITY OF NEW YORK**

Appearance Card

I intend to appear and speak on Int. No. \_\_\_\_\_ Res. No. \_\_\_\_\_

☐ in favor ☐ in opposition

Date: JUNE 15

(PLEASE PRINT)

Name: JOHN CORI

Address: 142 B92 ROCKAWAY NY

I represent: ROCKAWAY BEACH CLINIC.

Address: \_\_\_\_\_

**THE COUNCIL**  
**THE CITY OF NEW YORK**

Appearance Card

I intend to appear and speak on Int. No. \_\_\_\_\_ Res. No. \_\_\_\_\_

☐ in favor ☐ in opposition

Date: \_\_\_\_\_

(PLEASE PRINT)

Name: Nicholas DeBLASI

Address: 130 Beach 133rd St

I represent: Belle Harbor

Address: 11694

**THE COUNCIL**  
**THE CITY OF NEW YORK**

Appearance Card

I intend to appear and speak on Int. No. \_\_\_\_\_ Res. No. \_\_\_\_\_

☒ in favor ☐ in opposition

Date: 6/15

(PLEASE PRINT)

Name: HANK IGRI

Address: 177 Beach 131 St

I represent: Belle Harbor Property Owners Assn.

Address: \_\_\_\_\_

Please complete this card and return to the Sergeant-at-Arms



✓

# THE COUNCIL THE CITY OF NEW YORK

Appearance Card

I intend to appear and speak on Int. No. \_\_\_\_\_ Res. No. \_\_\_\_\_

☐ in favor ☐ in opposition

Date: 6/15/17

(PLEASE PRINT)

Name: JOHN SIGNORELLI

Address: 135-14 CROSTON AVE, Belle Harbor 11694

I represent: Belle Harbor Prop. Assoc.

Address: 11694 Belle Harbor

▶ Please complete this card and return to the Sergeant-at-Arms ◀

# THE COUNCIL THE CITY OF NEW YORK

Appearance Card

I intend to appear and speak on Int. No. \_\_\_\_\_ Res. No. \_\_\_\_\_

☐ in favor ☐ in opposition

Date: 6/15/2017

(PLEASE PRINT)

Name: Bretti Branco

Address: \_\_\_\_\_

I represent: Science and Resilience Institute at Jamaica Bay

Address: Brooklyn College, 2900 Bedford Ave Brooklyn NY 11210

▶ Please complete this card and return to the Sergeant-at-Arms ◀

**THE COUNCIL  
THE CITY OF NEW YORK**

*Appearance Card*

I intend to appear and speak on Int. No. \_\_\_\_\_ Res. No. \_\_\_\_\_

☐ in favor ☐ in opposition

Date: 6/15/17

(PLEASE PRINT)

Name: Jose' Soegaard

Address: \_\_\_\_\_

I represent: Waterfront Alliance

Address: 217 Water Street

▶ Please complete this card and return to the Sergeant-at-Arms ◀

**THE COUNCIL  
THE CITY OF NEW YORK**

*Appearance Card*

I intend to appear and speak on Int. No. \_\_\_\_\_ Res. No. \_\_\_\_\_

☐ in favor ☐ in opposition

Date: 6-13-17

(PLEASE PRINT)

Name: L. A. Wong / George Chen

Address: 126 Bedford Street, (with unit 841022)

I represent: Board of (Company of) (Sewer) and District

Address: 517A

▶ Please complete this card and return to the Sergeant-at-Arms ◀