

**Testimony of Angela Licata, Deputy Commissioner of Sustainability
NYC Department of Environmental Protection**

**New York City Council Committee on Environmental Protection
Committee Room, City Hall
April 23, 2018**

Oversight - Threats to Jamaica Bay: A Case Study of Flooding and Sea Level Rise in New York City; and Introductions relating to mapping of areas with increased precipitation and sea level rise; a Jamaica Bay Task Force; and a geothermal pilot

Good afternoon, Chairman Constantinides and Members of the Committee. I am Angela Licata, Deputy Commissioner of Sustainability in the New York City Department of Environmental Protection (DEP) and I am joined by my colleagues John McLaughlin, Managing Director of the Office of Ecosystem Services, Green Infrastructure and Research at DEP and John Lee, Deputy Director for Green Buildings and Energy Efficiency at the Mayor's Office of Sustainability. Thank you for the opportunity to testify in relation to flooding and sea level rise in New York City, specifically Jamaica Bay and Southeast Queens.

In April 2015, Mayor de Blasio released the groundbreaking *One New York: The Plan for a Strong and Just City* (OneNYC), a strategic plan for inclusive growth and climate action. OneNYC addressed the challenges that we face as a city with growing population: an inequality crisis, aging infrastructure, as well as the risks of climate change. Among the climate risks we face today is how we adapt our stewardship of our land, resources, and waterways, which are central to DEP's mission. Last Friday, the City released the *OneNYC 2018 Progress Report*, which shows that since 2015, the City has made significant progress toward OneNYC's goals.

Today, water quality in New York Harbor is better than it has been in over 100 years. Habitats are being restored, and New Yorkers are able to use our waterways for commerce and recreation. These improvements to New York Harbor water quality are in direct response to the over \$12 billion in investment over the last several years to upgrade wastewater treatment plants, sewer systems, combined sewer overflow abatement, green infrastructure, marshland restoration, and nutrient removal from wastewater, among other initiatives.

Jamaica Bay is one of the largest coastal wetland ecosystems in New York State. Encompassing 12,000 acres, Jamaica Bay is a beloved network of marsh islands, fringe marshes, maritime shrub and dune communities, shorelines and open water. Under Local Law 71 of 2005, DEP was tasked with developing the Jamaica Bay Watershed Protection Plan – a living, adaptive management document that evaluates current and future threats to the bay, as well as the benefits of coordinated research, restoration, and water quality projects in the Bay. To date, DEP has committed \$32 million on 26 individual projects and efforts such as a 20,000 square foot oyster bed project at Head of Bay in Jamaica Bay, a ribbed mussel water filtration project, eelgrass restoration, algae and sea lettuce harvesting, and marsh island and habitat restorations. In addition to ecological improvements, DEP completed \$534 million in upgrades mostly related to nitrogen reduction at the Jamaica and 26th Ward Wastewater Treatment Plants. Due to these recent upgrades, nitrogen discharges into Jamaica Bay have declined 43% since the year 2000, from 45,300 pounds per day to approximately 26,000 pounds per day. In addition, upgrades at

the Rockaway and Coney Island Waste Water Treatment Plants are projected to be completed by 2020 and 2022.

DEP also has an aggressive water-quality sampling program in Jamaica Bay that is serving as a model for the rest of the City. These studies, as well as the water-quality sampling and analysis conducted for our Long-Term Control Plan, show that water quality in Jamaica Bay has and will continue to improve dramatically as a result of critical green and gray infrastructure investments.

Since 2010, DEP has committed a little over \$1 billion in gray infrastructure projects to mitigate combined sewer overflows (CSOs), which have helped reduce CSOs by 38% in Jamaica Bay since 2007. These projects include sewer cleaning in the 26th Ward Wastewater Treatment Plant drainage area, dredging of the Hendrix Creek Canal, upgrades at the Spring Creek Auxiliary Wastewater Treatment Plant, construction of the Paerdegat CSO facility, and construction of high-level storm sewers in Fresh Creek. We have also committed \$300 million for green infrastructure projects in neighborhoods that are tributary to Jamaica Bay, such as Brownsville, East New York, and Ozone Park. These green infrastructure projects include rain gardens in City streets and sidewalks, and retrofits of parks, schools, and New York City Housing Authority developments.

This June, DEP will submit its Jamaica Bay CSO Long-Term Control Plan (LTCP) to the New York State Department of Environmental Conservation (DEC) for review and approval. The purpose of the LTCP is to identify further appropriate CSO controls or projects necessary to achieve waterbody-specific water quality standards consistent with federal CSO policy and the water quality goals of the Clean Water Act. DEP kicked off the Jamaica Bay LTCP in 2016 and has held multiple stakeholder meetings throughout its development. Just last week we met with stakeholders to share our proposal, which builds on earlier ecological projects to expand green infrastructure, add an additional 50 acres of wetland and other coastal habitat around the Bay perimeter, install ribbed mussels for biological water quality treatment, and evaluate the potential for environmental dredging.

We strongly believe that an integrated approach to water quality improvements has a wide variety of benefits, such as additional stormwater management; increased protection against flooding; greater co-benefits for Brooklyn and Queens residents, such as urban heat-island mitigation and neighborhood greening; increased adaptation measures for climate resiliency; increased protection from coastal flooding through wetland creation and restoration; improved overall water quality; and increased habitat for wildlife through wetland protection. We are currently scheduling additional stakeholder meetings and we will work with environmental advocates and DEC to refine the scope before we formally submit the plan this June.

Clearly, we have many good things happening around Jamaica Bay and we work closely with local stakeholders. Introduction 750 looks to formalize that engagement by legislating the Jamaica Bay Task Force. As you know, there is a community-led task force that already meets quarterly, and DEP regularly attends these meetings with our colleagues at DEC and the National Park Service. Over the years, we have partnered with many of these advocates and funded projects such as shoreline cleanups and marshland restoration, and we will be working with them

on a State of the Bay Symposium this fall. We are more than happy to work with the Council and all local stakeholders to find the best way to formalize the task force.

Introduction 749 would require a study and pilot program related to open-loop geothermal applications in Southeast Queens. We appreciated the opportunity to speak to committee staff last week to better understand the intent of this bill.

The City shares with the Council a collective enthusiasm for geothermal energy systems. The geology beneath our feet can be accessed as a clean energy resource: ground-sourced energy is an essential part of the City's strategy to reach our clean power targets and greenhouse gas reduction goals. The City has already deployed seven geothermal projects across the five boroughs in recent years, and we are eager to measure the performance and results to prove that these systems work as designed. As with any new equipment, there is a need for commissioning at startup and calibration of the system in its early days.

It is important to note that not every site is favorable for a geothermal project. Feasibility is a function of geological conditions and waters beneath the project site, the specific energy demands of the building itself, based on how the building is to be used, and an understanding of the impacts to the environment from the exchange of heat with the subsurface geology.

We share the Council's concerns regarding flooding specific to Southeast Queens. Southeast Queens experienced rapid residential and commercial growth from the 1920s through the 1960s, and many of the natural watercourses that previously drained the area were paved over by developers, exacerbating flooding. The low-lying topography of the area and the enlargement of Kennedy Airport significantly complicated the installation of large storm sewers, making planned work extremely costly. Major projects had been deferred until Mayor de Blasio authorized \$1.5 billion over ten years for the Southeast Queens Flood Mitigation Plan. This has since increased to \$1.9 billion.

Together with our partners at the Department of Design and Construction and the Department of Transportation, DEP has developed a four-pronged approach to improve conditions in the area:

- Construct quick fixes, such as storm sewer extensions, targeted full-size sewers, and green infrastructure to bring near-term flooding relief;
- Build neighborhood sewer projects where there is existing available capacity in the sewer system;
- Create future capacity for further neighborhood sewer projects by investing in large trunk sewers; and
- Evaluate opportunities to reduce groundwater flooding.

Together, these four approaches are starting to deliver both immediate and long-lasting relief for many residents of Southeast Queens. As required by the Council, our latest update on project delivery and an easy-to-use map were made available online last month.

We do understand, however, that groundwater flooding is still a very real challenge for some property owners in this community.

In July 2017, Mayor de Blasio announced that the City would conduct a feasibility study for a groundwater drainage project aimed at addressing basement flooding in Southeast Queens. The groundwater table in Southeast Queens has risen over the last two decades and a number of residential and commercial properties report water rising up through their basement foundations. DEP leadership has seen this first hand at institutions like York College, Allen Senior Housing and Carter Community House, where constant pumping is expensive and inconvenient. The study has been measuring how high the groundwater table has risen, assessing how much it should be lowered in order to mitigate basement flooding, and determining the feasibility of a radial collection plan. Next month we plan to review the findings of that study with all stakeholders, especially with local Council members.

We agree that we must continue to study this issue diligently and determine proper next steps to help resolve this issue once and for all. It is still unclear whether the feasibility and costs associated with either the radial collection study or the open-loop geothermal application included in this bill will deliver the intended results. For example, use of groundwater in Southeast Queens for geothermal would require treatment and technology that could be expensive, so feasibility would have to be the first step before implementation of a pilot or demonstration project. That said, we want to work very closely with the Council and local stakeholders to ensure we get to the preferred solution as quickly and cost effectively as possible.

Introduction 628 would require the Mayor's Office of Recovery and Resiliency (ORR) to develop and post publicly a map of areas in the City most susceptible to increased flooding and a long-term plan for preventing or mitigating such increased flooding and its effects in those areas.

Hurricane Sandy forced the City to consider the risks associated with coastal flooding. However, as the incidence of extreme weather increases, our city faces another type of flood risk that requires attention. Extreme rainfall can cause urban flooding – also called flash or inland flooding – when stormwater surpasses the capacity of our drainage systems and flows over the surface. It can be worsened when it occurs at the same time as coastal flooding. Inland flooding can flood underground infrastructure and basements, and physically damage the built environment.

It is important to understand the differences between coastal flooding with storm surge and urban flooding caused by precipitation. The main differences are that precipitation events can happen with little warning, can happen throughout the year, and at any location in the city. In addition, there is no federal agency such as FEMA that can provide the municipality support, such as that required to map the different types of urban flooding events. In response to these challenges, the City has already begun taking steps to better understand and address urban flooding.

One new program, led by DEP in partnership with ORR, is a Cloudburst Management study and pilots. "Cloudburst" is another name for an intense rainfall event. These cloudburst mitigation efforts offer a new vision for "dual drainage" in New York City, demonstrating how streets and green spaces can increase the capacity of our drainage system. This work has benefited from a close, multi-year partnership with the city of Copenhagen, DEP's investment in thousands of rain gardens, as well as green-roof incentive programs. Going forward, ORR's Climate Resiliency Design Guidelines recommend how new City capital projects retain more stormwater on site.

Building on this work already done, DEP and ORR have just procured a citywide stormwater resiliency study that we expect to complete by the end of 2018. The purpose of the study is to model urban flooding in the City today and in the future, and how interventions can help. The study will develop a citywide model, based on climate projections from the New York City Panel on Climate Change, to test multiple rainfall scenarios and investigate the impact of changing climate conditions on flood conditions and existing stormwater management practices. These impacts include changes in sea level, groundwater, and the intensity, duration, and frequency of precipitation events. Results from these analyses will include flood maps, high-level analysis of stormwater management options and costs, and a prioritized list of proposed interventions. The 2019 OneNYC update will include results from this study and mitigation strategies for addressing urban flooding. We look forward to working with the Council on aligning our work with the goals presented in Intro. 628.

Again, these are very important issues and we look forward to collectively solving them with the Council as our partner. Thank you for the opportunity to testify. We're happy to answer any questions.

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The Gaia Institute

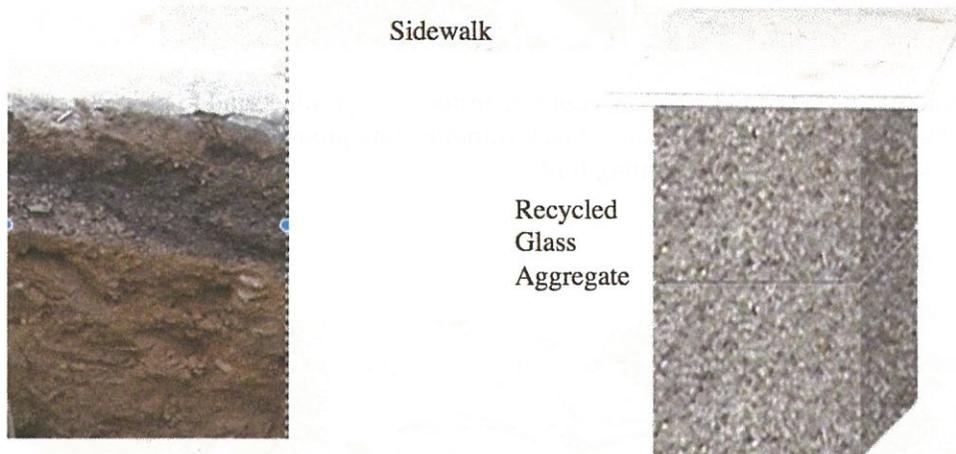
April 23, 2018

Honorable Costa Constantinides, Chair
Committee on Environmental Protection
City Hall
New York, NY 10007

Dear Chair Constantinides and Committee Members;

RE: Oversight - Threats to Jamaica Bay: A Case Study of Flooding and Sea Level Rise in New York City.

Each foot of flooding in communities around Jamaica Bay could be stored by aquifers built under roadway, sidewalk, parking lot, and rain garden.



The two foot depth of glass aggregated on the right allow for the storage a 1' of flood waters per square foot of walkway, roadway, parking lot, or rain garden. This provides a way for Jamaica Bay communities to build their way out of future flooding threats, storing water for the growth of trees and meadow, treating water and cleaning air in the process,

The City produces some 19,500 tons per day of waste concrete, brick, and glass. This is enough material to raise about 4 square miles landscape around Jamaica by one foot each year. Added to this, the Mayors Office of Remediation's Clean Soil Bank provides $\approx 100,000$ tons of soil parent materials a year. In place since before mastodons disappeared from glacial edge habitat in Brooklyn & Queens, toxic-free environments could be constructed from these.

The work of the Gaia Institute couples ecological engineering and restoration with the integration of human communities in natural systems. While much environmental engineering has the worthy aim of minimizing harm, the Gaia Institute explores, through research and development, design and construction, how human activities and waste products can be treated to increase ecological productivity, biodiversity, environmental quality, and economic well being.



One opportunity we designed around 2000 for the Penn and Fountain Avenue landfills Citizens Advisory Committee could incorporate clean rock-like material from the City's waste stream for a wave-break, protecting saltmarsh soils from pristine parent material. With space for 50 – 100 acres of intertidal wetland, this would be equivalent to replacing 1 – 2 years of marsh, at present loss rates.



Dune, dune grasses, bayberry and meadow could be restored on pristine sand to protect coastal communities by rebuilding habitat for terns, black skimmer, and piping plover, and forage for a hundred species and thousands of migrating birds.



If you build it, they will come, protecting property and the quality of life around Jamaica Bay, in the process

Paul S. Mankiewicz, Ph.D.
Director



APRIL 2018 | ISSUE NO. 2

SURGE WATCH



A Note from the Storm Surge Working Group (SSWG) Chair



We are advocates for a “layered defense” system encompassing both an offshore regional barrier system and a network of on-shore perimeter defenses that would be developed together by New York City and all the coastal communities surrounding the 1,000 miles of shoreline of New York Harbor, its tributaries, and the lower Hudson River.

This specifically separates the function of the regional barriers, designed to hold back dangerous storm surges from future megastorms, but not the slow but insidious rise in sea level. Regional storm surge barriers must be held open 99.99% of the time for the purposes of navigation, fish migration, fisheries, tidal currents, river discharges and harbor flushing. There is no way they can hold back sea level rise.

This then shifts the responsibility of protecting the City and other perimeter Harbor and Tributary (HAT) communities in NY and NJ from sea level rise through the construction of modest seawalls, abutments, and barrier beach re-nourishment projects in a grand partnership. We don't oppose the City's proposal to build more than 100 perimeter barriers. We want to partner with them to protect the City and region from both damaging storm surges and sea level rise. We believe this system of layered defense can protect the whole metropolitan region for more than a century into the future.

Only in this way can the essential tasks of protection against both storm surges and sea level rise be accommodated in an advantageous cost/benefit scenario, plus gain the support of Metropolitan residents who will not accept 20' high walls built around their iconic shoreline views of the New York City, Hoboken, Port Elizabeth, Jersey City, and other coastal communities and infrastructure.

Malcolm Bowman,
Senior Editor



Image Credit: Left—Flickr User Robwelds via Inhabitat, Right—NY Harbor Nature

Can NYC Survive the Sea?

NYCH2O hosted a lecture focusing on New York City's response to rising sea levels and coastal flooding. Speakers included Catherine McVay Hughes, who presented the concept of a layered regional protection system (minute 9 of video), and Ted Steinberg, who presented on the City's history of development in the floodplain and the City's approach to management of coastal flood risk (minute 32 of video). [Continue Reading...](#)

In This Issue

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Forum Series Session 1 - Storm Surge Barrier: Traditional and Innovative Finance Options

On February 28, 2018, National Institute for Coastal and Harbor Infrastructure (NICHI) and the NY-NJ SSWG held the first in its series of four Forum Sessions that are designed as “think tanks” to address important issues related to the proposed NY NJ Storm Surge Barrier System which is currently Alternative 2 in the USAOE Harbor and Tributaries Study (HATS).

The First Forum, entitled “Traditional and Innovative Finance Options,” was held on February 28th at 200 West Street in Lower Manhattan. Forum speakers included Moderator Bill Golden, President of NICHI; Professor Malcolm Bowman, Chair NY-NJ SSWG, Marvin Markus, Goldman Sachs Managing Director; Gwen Dawson, Battery Park City Authority (BPCA) VP Real Estate; Paul Josephson, Duane Morris, Senior Partner; Jack Kingston, Squire Patton Boggs Principal; and Martin Nicholson, CH2M Senior Partner. Professor Robert Yaro, Co-Chair of the NY-NJ SSWG and President Emeritus of the Regional Plan Association, led the “think tank” discussion and analysis that followed the panel presentation.

Marvin Marcus (Goldman Sachs) presented the innovative option of an insurance surcharge on property and casualty and auto insurance premiums. Gwen Dawson (BPCA) focused on how the BPCA authority intended to finance its seal level rise and interim storm surge system by reallocating real estate derived revenues. Jack Kingston (Squire Patton Boggs) discussed and analyzed the availability of federal funding through the President’s infrastructure initiative. Paul Josephson Duane Morris) cited his involvement in a Pennsylvania public private partnership to rebuild and maintain 600 bridges. Martin Nicholson (CH2M) discussed a new USACE program that utilizes a federal, state and local finance option.

The NICHI NY-NJ SSWG Forum Series is sponsored by: Battery Park City Authority, Cameron Engineering and Associates, Chelsea Piers, CH2M, Downtown Alliance, Hazen and Sawyer, Howard Hughes Corporation, JP Morgan Chase, Langan, NY General Contractors Association, Squire Patton Boggs, S&P Global Ratings, Skanska and Tetrattech.



Thank you for keeping up with the SSWG. For more information, please visit our [website](#)

Senior Editor: Malcolm Bowman, Distinguished Professor of Oceanography, State University of NY Stony Brook

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See What NYC’s Famous Landmarks Look Like Submerged Under Water

Climate Central, a nonprofit organization that focuses on climate science, has developed a powerful visualization of the impacts of sea level rise on famous landmarks throughout the US. This tool can be used with Google Earth’s 3D maps to zoom in on waterfront communities to show conditions if global seas levels were to rise eight feet. [Continue reading...](#)



Image Credit: Climate Central

The Social Justice Case for a Metropolitan New York-New Jersey Regional Storm Surge Barrier

NICHI and the NY-NY SSWG issued a statement for Water Day setting forth the case as to why a New York-New Jersey Metropolitan Storm Surge Barrier System is the only “Social Justice” solution to protect poor and low-income communities from the devastation of storm surge. The press conference coincided with the release of the April issue of the LexisNexis Environmental Law in New York Review, which includes an article on this Social Justice topic co-authored by members of NICHI and SSWG. [Continue Reading...](#)

Other Flooding and Climate Change News

Hunts Point Lifelines on WNET’s Peril and Promise.

[Continue Reading...](#)

WNET | February 7, 2018

Rockaway flood protection draft report to be released this summer; coastal Protections could include a sea wall, jetties, and groins. [Continue Reading...](#)

AM New York | March 20, 2018

Community Board 3 Parks Committee meets to discuss East Side Coastal Resiliency Project. [Continue Reading...](#)

ESCR Project | March 15, 2018

Testimony of William Sweet
Oceanographer
National Oceanographic and Atmospheric Administration
before the
New York City Council Committee on Environmental Protection
April 23, 2018

Good afternoon, Chairman and Members of the Committee. I am William Sweet, an oceanographer with NOAA's Center for Operational Oceanographic Products and Services (CO-OPS), an office within the National Ocean Service. CO-OPS is the authoritative source for accurate, reliable, and timely water-level and current measurements that support safe and efficient maritime commerce, sound coastal management, and recreation. With this data and online tools and analysis, CO-OPS enables coastal communities to better plan for and mitigate risk from changing ocean conditions.

I have been asked to address several questions pertinent to the bills you are considering today. The two questions that I will address are related to the stated assumption of The New York City Mayor's Director for Recovery and Resiliency, who indicates that by the 2050s, NYC temperatures are projected to rise between 4.1 and 5.7 degrees F: 1) how do you anticipate such an increase in temperatures will affect New York City's coastline, sunny day flooding and sea level rise? and 2) is a rapid increase in sunny-day flooding anticipated in the 2020s?

The stated temperature increase between 4.1 and 5.7 degrees F by the 2050s aligns with a sea level rise response that falls somewhere between the Intermediate (1.0 meter [3.3 feet] global rise by 2100) and Intermediate High (1.5 m [4.9 feet] global rise by 2100) Scenarios for future global sea level recently developed by the U.S. Federal Interagency Sea Level Rise and Coastal Flood Hazard Scenarios and Tools (Sweet et al., 2017). The High (2.0 m [6.6 feet] global rise by 2100) or Extreme (2.5 m [8.2 feet] global rise by 2100) Scenarios are not necessarily precluded, but these outcomes--if they were to occur--would more likely unfold later in the century. The Intermediate Low Scenario (0.5 m [1.6 feet] global rise by 2100) is also included in order to answer the question regarding changes in flood frequencies during the 2020s. Global sea levels are rising and will continue to rise due to thermal expansion of the ocean and melt of land-based ice within Greenland, Antarctica and mountain glaciers.

The sea level rise scenarios of Sweet et al. (2017) provide downscaled projections of local relative rise associated with the global rise amounts. The localized projections account for changes in land elevation, gravitation/rotational effects from melting of land-based ice and ocean circulation such as the Gulf Stream System. Median projections of relative rise since year 2000 on average in the 2050s under the Intermediate Low, Intermediate and Intermediate High global rise scenarios for the NYC region are approximately 0.3 m, 0.5 m and 0.7 m (1.0 foot, 1.6 feet and 2.3 feet), respectively.

Since the year 2000 when the sea level rise scenarios commence, the underlying trend trajectories as well as interannual variability in annual mean sea level measured by the NOAA tide gauges at The Battery, Sandy Hook and Bergen Point, have been largely constrained by the Intermediate Low and Intermediate High Scenarios. In response, flood frequencies of 'sunny day' or 'high tide' flooding have been increasing along the NYC coastlines. High tide flooding is characterized by flooding of about 2-3 feet above the highest average daily tide (MHHW) for the NYC region and is largely driven by the astronomical tide in combination with some degree of a weather-forced water level setup or storm surge. However, as sea levels continue to rise, flooding is occurring more often from less-salient factors

and not necessarily from localized wind storms (hence the 'sunny day' description). For instance, in the last 30 years (1985-2015), the annual frequency of high tide flooding reaching or exceeding 2 feet above MHHW as measured at The Battery tide gauge has increased from about 2 days per year to 6 days per year or a 200% increase. The deeper 3-foot flood occurs less often and on average occurs about one day per every two years or so since 1985 with no observable trend yet established.

In response to the median projections of local sea level rise under the Intermediate Low, Intermediate and Intermediate High Scenarios, the number of days per year with water levels reaching or exceeding both the 2-foot and 3-foot increments above MHHW are both estimated following methods of Sweet et al. (2018) since 1-foot intervals can be readily mapped (e.g., with the NOAA SLR Viewer). It is important to note that since the metric being assessed is 'days per year' of flooding, the underlying uncertainty in flood probability is minimized (e.g., the spread of 95th confidence interval is < 5 cm [2 inches] for water levels that occur sub-annually), since annual to sub-annual flood magnitudes are very well sampled. If the assessment were different, such as 'when does the 100-year event become the 1-year event', uncertainty in the rare event probability estimates would become a significant factor. During the 2020s (average from 2020-2030), the annual frequency of 2-foot floods is projected to increase to about 15 days, 35 days and 65 days per year, respectively, whereas 3-foot flood frequencies will increase to 1-2 days, 3 days and 7 days per year. During the 2050s (average from 2050-2060), the annual frequency of 2-foot floods is projected to increase to about 75 days, 210 days and 320 days per year, respectively, whereas 3-foot flood frequencies will increase to 8 days, 50 days and 170 days per year. It is noted that by definition, MHHW is approximated by flood frequencies of about 182 days per year.

Again, thank you for this opportunity to testify. I will be glad to answer any questions.



Testimony of Michael Dulong, Senior Attorney, Riverkeeper, Inc.

before the

New York City Council Environmental Protection Committee

**Public Oversight Hearing on Threats to Jamaica Bay:
A Case Study of Flooding and Sea Level Rise in New York City**

August 23, 2018

Good afternoon and thank you, Chairman Constantinides and Council Members, for the opportunity to submit testimony on behalf of Riverkeeper. Riverkeeper is a member-supported watchdog organization dedicated to defending the Hudson River and its tributaries and protecting the drinking water supply of nine million New York City and Hudson Valley Residents. Riverkeeper advocates extensively for water quality throughout New York City, performing water quality testing, pressing for superfund cleanups, suing polluters, and researching needed solutions to stormwater and sewage pollution.

Riverkeeper supports Intro 750. An independent task force could help bring additional Council oversight of pollution impacts and resiliency planning to the vulnerable Jamaica Bay area. We respectfully urge the Council to design its task force to work alongside the community's preexisting "Jamaica Bay Task Force" and not to displace it.

Riverkeeper takes no position on Intro 628. However, we respectfully urge the Council to take additional measures to inform landowners and residents of their scientifically-determined flooding risks.

I. Riverkeeper Supports Intro 750 and the Establishment of a New Jamaica Bay Task Force, but Any Such New Body Should Acknowledge the Preexisting Task Force Established by Jamaica Bay Community Members.

We are thrilled by the Environmental Protection Committee's continuing focus on the water quality and ecological integrity of Jamaica Bay. As experienced during Superstorm Sandy, there is hardly a community in the United States that is as endangered by climate change as those surrounding Jamaica Bay. There are also few areas more impacted by stormwater and sewage discharges.

Resiliency planning and action for Jamaica Bay are now rapidly underway by multiple parties, including the United States Army Corps of Engineers (“Army Corps”), numerous city and state agencies, and local community members. Indeed, there is already a community-driven “Jamaica Bay Task Force” led by local residents and community and environmental groups, such as Jamaica Bay Ecowatchers.¹ This existing Task Force has widespread buy-in from local communities; just last week, it held a meeting attended by roughly 70 people. It has been a platform for various city, state and federal agencies, research outfits, and environmental groups to present their findings, opinions and plans for the communities’ review.

Despite the existing platform, there is still a need for the independent task force—as proposed in Intro 750—that can act as a clearinghouse for information; help guide the many levels of decision-making; and keep the City Council apprised of all pertinent information. In designing its task force, we respectfully urge the Council to recognize the preexisting community body and to work in conjunction with what already exists, instead of displacing it. Coordination between these two groups and information sharing will be essential, or the Council’s task force ultimately will be unsuccessful. To facilitate such coordination, we believe that the Council’s task force should include no less than two members of the preexisting Jamaica Bay Task Force.

II. The Jamaica Bay Task Force Must Independently Review and Help Shape Proposals for the Bay’s Restoration and Resiliency.

As this Committee is no doubt aware, the Army Corps recently proposed to build 28.8 miles of new structures, including a storm surge gate across Rockaway Inlet.² This project is estimated to cost over \$3.7-billion-dollars,³ result in the loss of 154 acres of natural habitat,⁴ and potentially impact the project area’s “[m]ore than 850,000 residents, 48,000 residential and commercial structures, and scores of critical infrastructure features such as hospitals, nursing homes, wastewater treatment facilities, subway, railroad, and schools....”⁵ Our understanding is that the Army Corps will present a modified proposal towards the end of this summer.

Riverkeeper remains concerned that the Army Corps has not yet conducted sufficient modeling and analysis “to identify, quantify and conclusively address any possible impacts to water quality and fish and wildlife species and their habitats in the Bay.”⁶ The Council’s

¹ Jamaica Bay Ecowatchers, <http://jamaicabayecowatchers.org/>.

² U.S. Army Corps of Engineers, N.Y. Dist., Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay: Draft Integrated Hurricane Sandy General Reevaluation Report and Environmental Impact Statement 123 (2016).

³ *Id.* at 106.

⁴ *Id.* at 130.

⁵ *Id.* at ii.

⁶ *Id.* at x.

oversight could help shed light on any shortcomings in the Army Corps' forthcoming analyses and help optimize any resiliency measures implemented.

There are also parallel initiatives to curb stormwater and sewage pollution entering Jamaica Bay from the 52,200-acre watershed. These initiatives include the New York City Department of Environmental Protection's ("DEP") draft Stormwater Management Program ("SWMP") Plan⁷ that will regulate polluted stormwater discharges to the Bay from separate sewers, as well as DEP's draft Long Term Control Plan ("LTCP")⁸ for the combined sewer overflows that pollute the Bay and its tributaries. Public comments are due for each of these plans in short order; LTCP Comments are due May 14, 2018, and SWMP Plan comments are due May 15, 2018. These plans must be strengthened to put the Bay and its tributaries on the path towards suitability for fishing, swimming and boating. A Task Force could help elevate these issues to policy makers with the ability to address community concerns.

III. Riverkeeper Takes No Position on Intro 628, but We Urge the Council to Notify Landowners and Residents within Disputed Floodplain Areas of Their Scientifically-Determined Flood Risks.

Planning and designing for climate change is essential, especially for low income New Yorkers. The National Aeronautics and Space Administration ("NASA") predicts between six inches and six-and-a-half feet of sea level rise by 2100.⁹ The New York City Panel on Climate Change has concluded that "total annual precipitation will likely increase, and brief, intense rainstorms are very likely to increase" and that "New York City's sea level rise is projected to exceed the global average, increasing the risks posed to New York City's coastal populations, infrastructure, and other built and natural assets."¹⁰

During Superstorm Sandy, "a staggering 51 square miles of New York City flooded—17 percent of the city's total land mass."¹¹ Grossly underestimating the risk, the Federal Emergency Management Agency's flood maps had indicated that only "33 square miles of New York City might be inundated during a so-called '100-year' flood."¹² In total, the flooding affected the

⁷ N.Y. City Dep't of Env'tl. Prot., NYC Draft Stormwater Management Program Plan (2018), *available at* <http://www.nyc.gov/html/dep/html/stormwater/ms4.shtml>.

⁸ N.Y. City Dep't of Env'tl. Prot., Jamaica Bay & Tributaries Combined Sewer Overflow Long Term Control Plan, Alternatives and Recommended Plan: Public Meeting Presentation (Apr. 18, 2018), *available at* http://www.nyc.gov/html/dep/pdf/cso_long_term_control_plan/ltcp-jamaica-bay-alternatives-and-recommended-plan-meeting-presentation.pdf.

⁹ Nat'l Aeronautics & Space Agency, Understanding Sea Level; Projections, <https://sealevel.nasa.gov/understanding-sea-level/projections/empirical-projections>.

¹⁰ New York City Panel on Climate Change, 2015 Report Conclusions and Recommendations, *available at* <https://nyaspubs.onlinelibrary.wiley.com/doi/epdf/10.1111/nyas.12592>.

¹¹ N.Y. City, A Stronger, More Resilient New York, at 13 (2013), *available at* http://s-media.nyc.gov/agencies/sirr/SIRR_singles_Lo_res.pdf.

¹² *Id.*

homes of 443,000 New Yorkers,¹³ not to mention the catastrophic impact it had on businesses and critical infrastructure, all totaling \$19 billion in damages.¹⁴ Only about 80% of people affected by Sandy flooding had flood insurance.¹⁵

FEMA has proposed to update those woefully underestimated maps, but its proposal would still cover an area much smaller than the agency's projected 100-year floodplain. To boot, the new maps would delineate only a fraction of the widely expanded flood plain area that we can expect in 2100 due to the impacts of climate change.

The City has successfully challenged FEMA's proposed updates, not because they underestimate the potential harm, but because they indicate that over 200,000 additional residents would be responsible for paying costly flood insurance. In doing so, the City averted what would have been a housing foreclosure crisis.¹⁶

Regardless of the dispute between the City and FEMA, there is no doubt these areas will be flooded at some point. If the maps are drawn and published in such a way as to allay the communities' flooding concerns, community members will be more likely to shelter in place during major storms, putting their lives at risk. Additionally, developers will be more likely to build in these areas, unnecessarily increasing risk.

We urge the City Council not to leave these communities in the dark about these risks. Forty-three New Yorkers died during Sandy. We should do everything we can to prevent that from happening again. Alongside whatever lines are drawn for insurance purposes, we respectfully request that the City Council, as part of this bill, provide property owners and residents with ample warning about their *scientifically-based risk of harm* from flooding and the inevitable future increase in that risk due to rising sea levels and more intense storms. Maps and plain language should be used to inform all of those New Yorkers in the 100- and 500-year floodplains projected for 2100. Additionally, mailers should also go out to all residents and landowners within areas disputed by the City and FEMA, encouraging them to buy insurance.

* * *

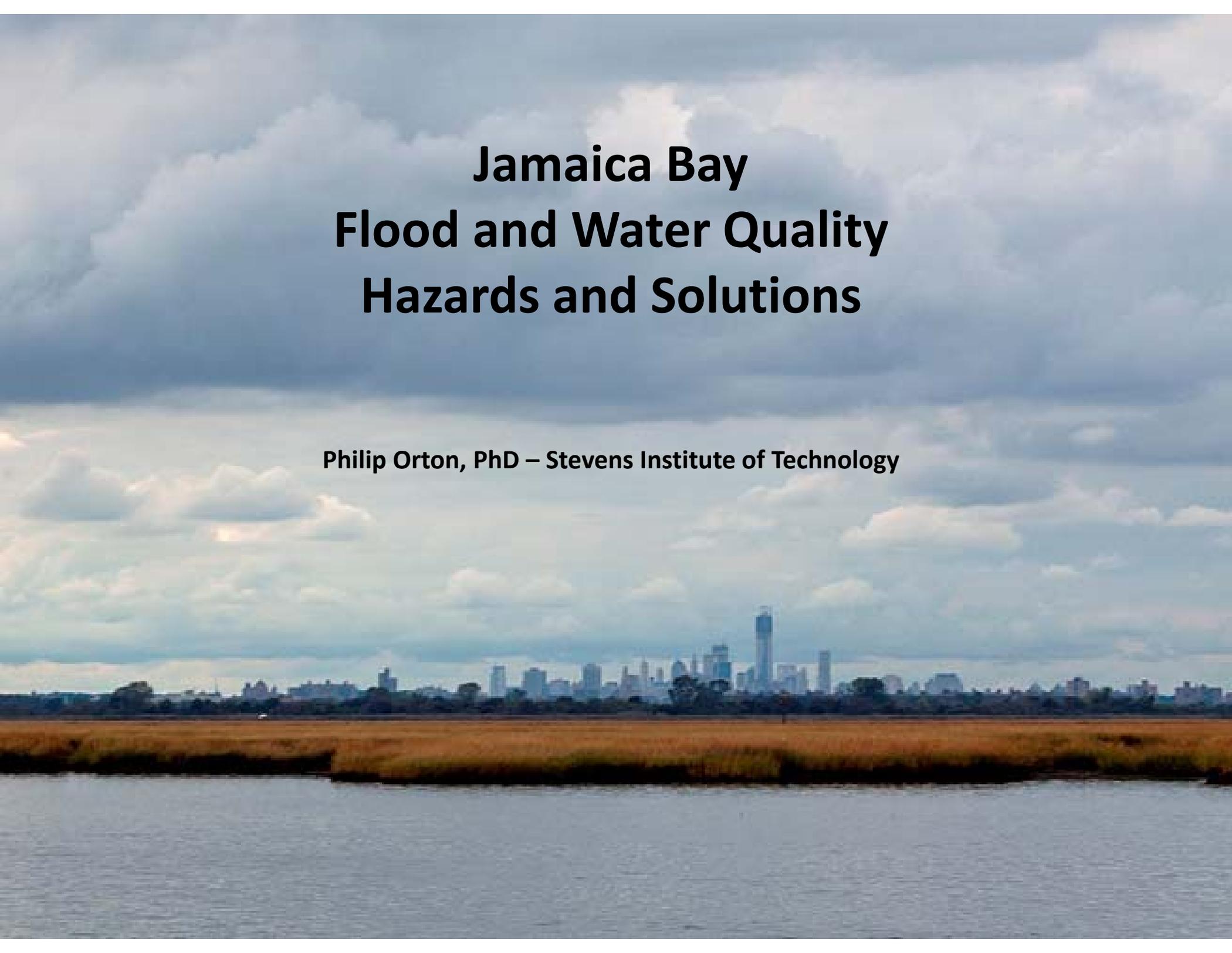
Thank you for your consideration of this testimony, and thank you for all you do to empower our communities and protect clean water. Riverkeeper looks forward to continuing to work with the Council and other stakeholders to protect and restore our waters and prepare our communities for climate change.

¹³ *Id.*

¹⁴ David W. Chen, In New York, Drawing Flood Maps Is a 'Game of Inches,' N.Y. Times (Jan 7, 2018), available at <https://www.nytimes.com/2018/01/07/nyregion/new-york-city-flood-maps-fema.html>.

¹⁵ *Id.*

¹⁶ *Id.* "The RAND Corporation found that the FEMA-proposed maps could 'reduce property values, increase loan defaults, lower tax revenue, and create hardship for current residents.'"

The background of the slide is a landscape photograph. In the foreground, there is a body of water, likely Jamaica Bay, with a wide expanse of brownish-yellow marshland or reeds extending across the middle ground. In the distance, a city skyline is visible, featuring several tall buildings, including a prominent one with a blue facade. The sky is filled with large, white and grey clouds, suggesting an overcast or stormy day.

Jamaica Bay Flood and Water Quality Hazards and Solutions

Philip Orton, PhD – Stevens Institute of Technology



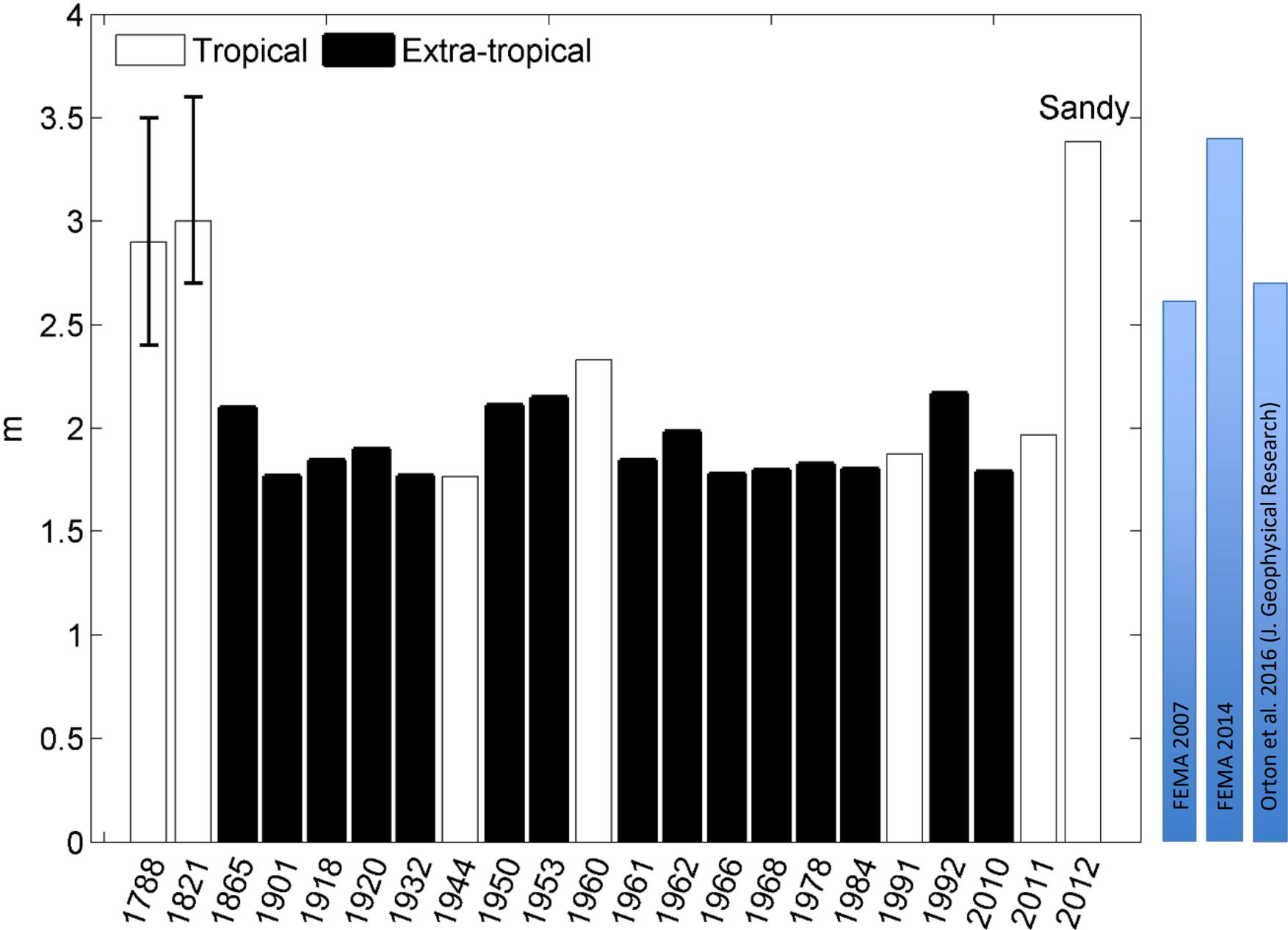
Outline of Comments

- Core consensus science
 - Hazards: Flooding, sea level rise, hypoxia
(Consensus based on NPCC reports; Science and Resilience Institute /RAND studies; published research)
 - Mitigation: Grey and green (nature-based) options
- My mitigation research
- Final recommendations

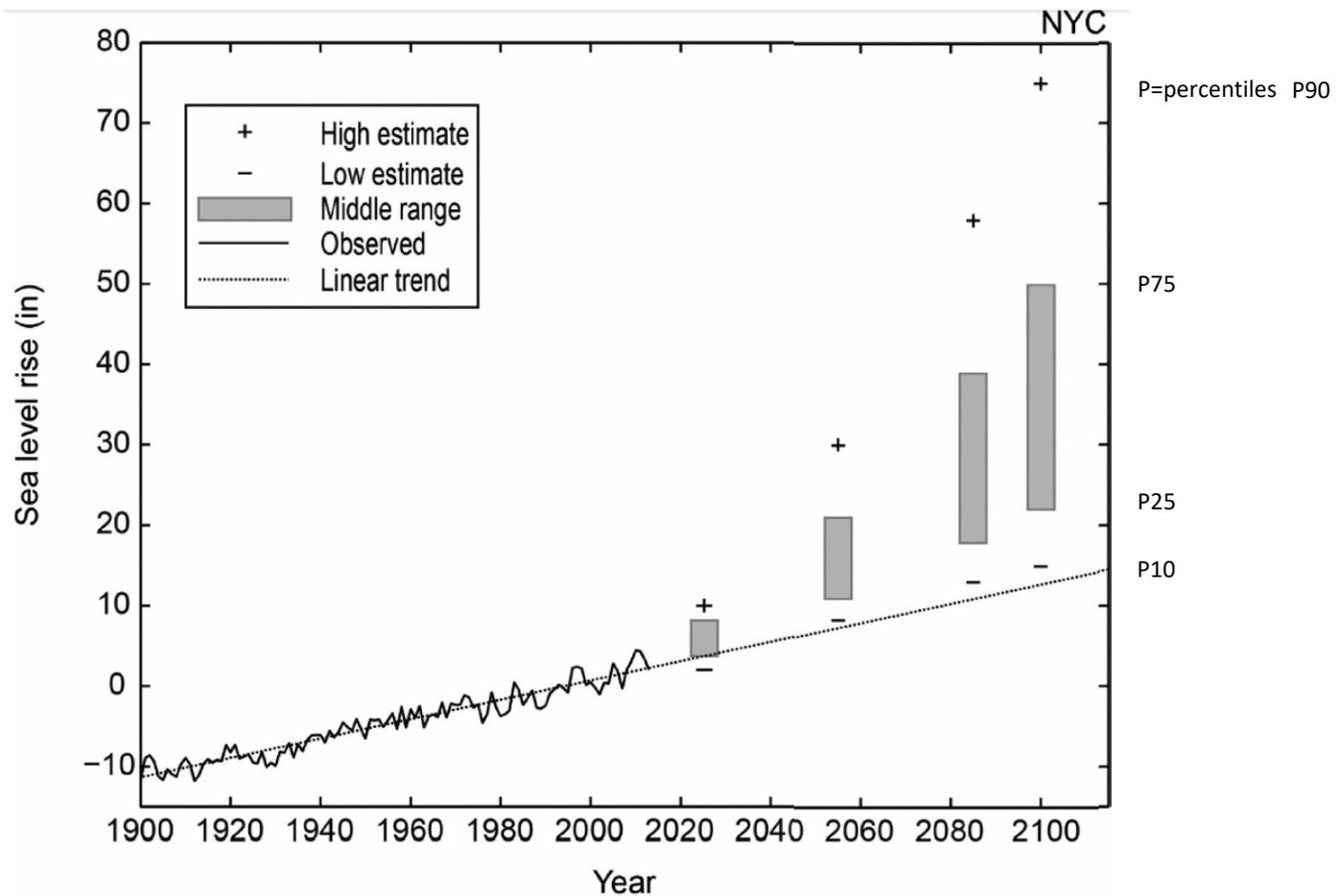


CORE, CONSENSUS SCIENCE

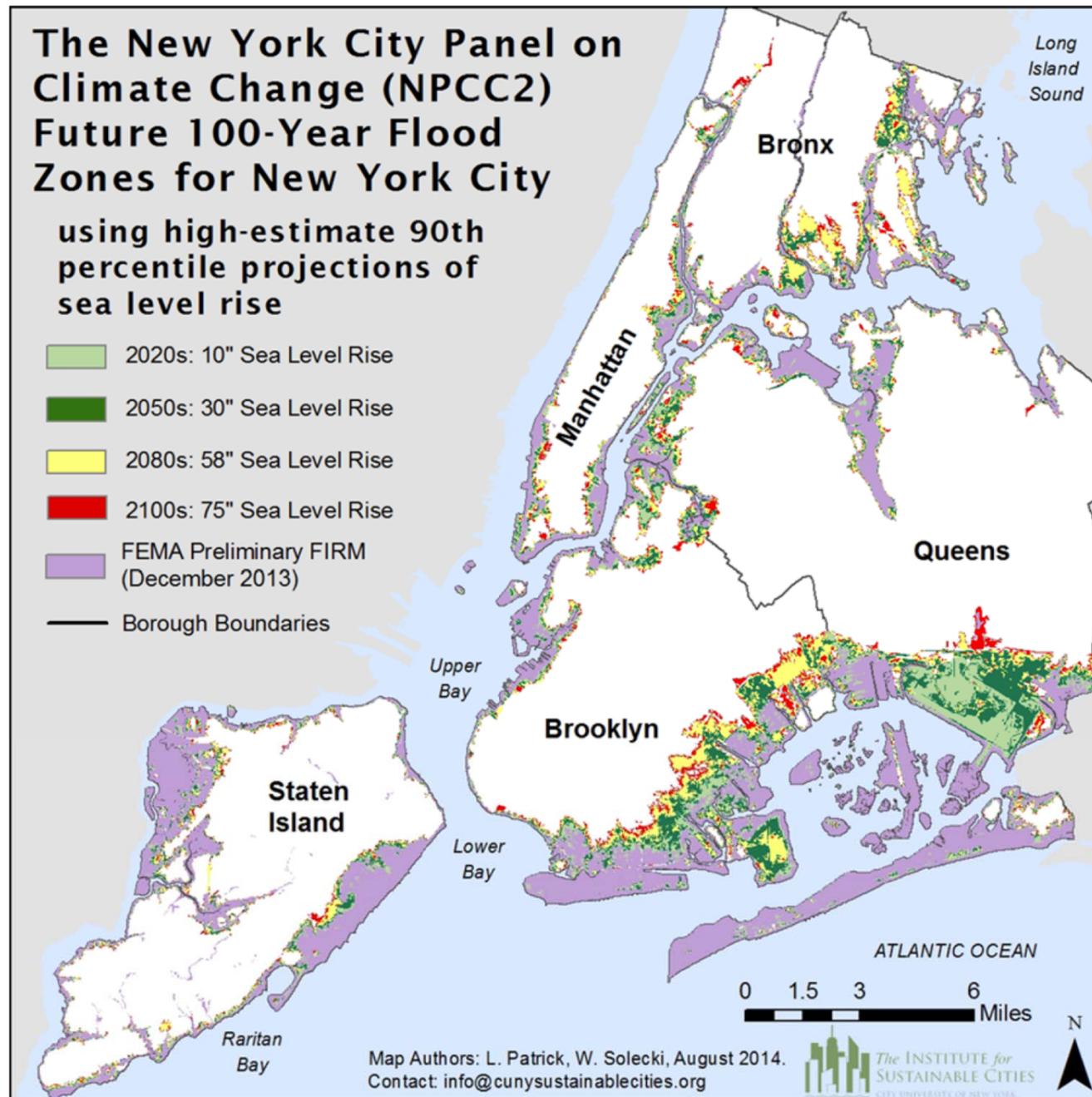
Historical Extreme Water Levels at NY Harbor



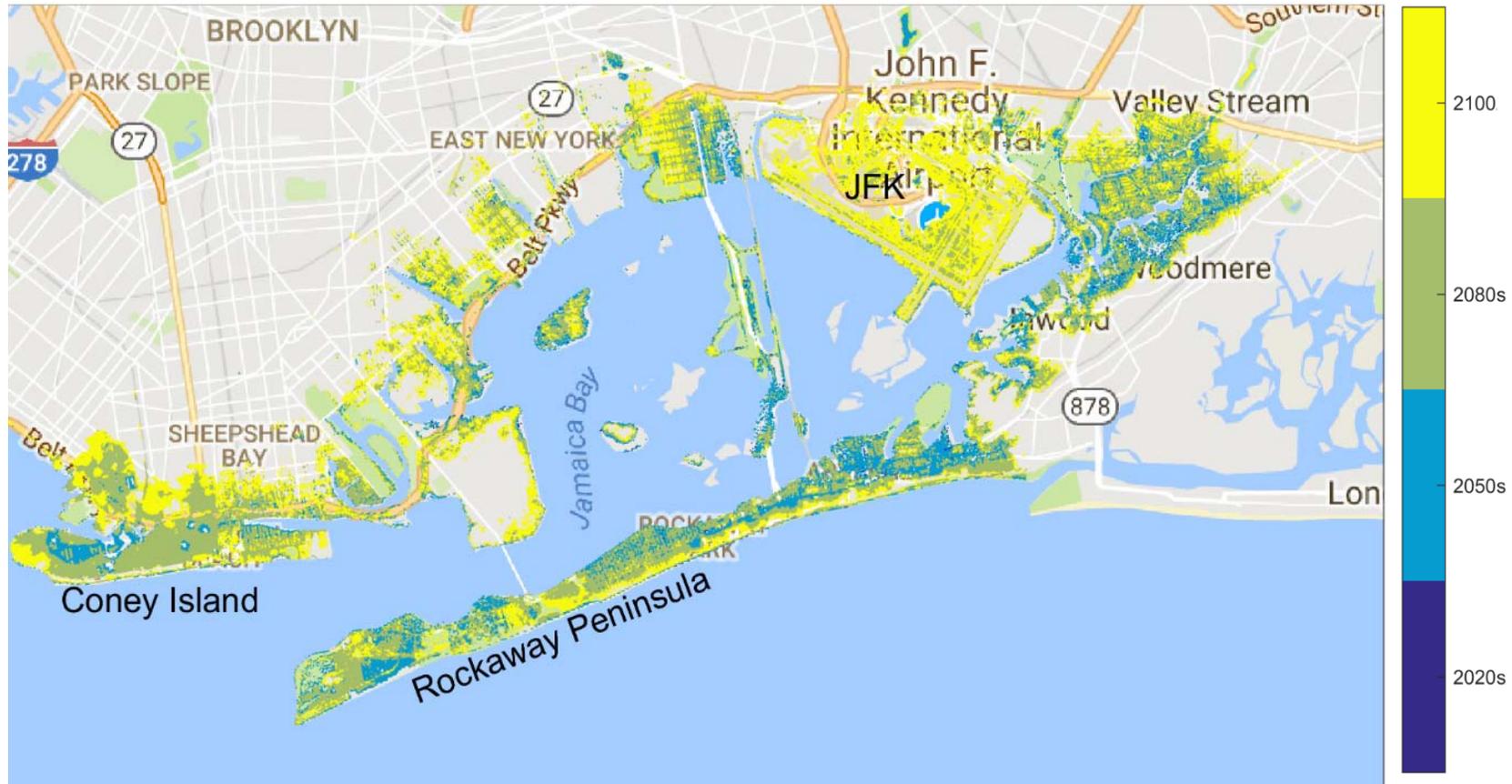
NYC Panel on Climate Change Sea Level Rise Projections 2015



Future Evolution of 100-year Flood



Future of Monthly Tidal Floods (with high-end sea level rise scenario)



- Draft results from my latest work with the New York City Panel on Climate Change
- Shows the extent of monthly tidal flooding – e.g. spring tides
- Uses “high-end” (90th percentile) sea level rise estimates from NPCC (2015)



Future of Dissolved Oxygen

2015 to 2065 Changes

- Consensus still emerging ...
- Sea level rise leads to deeper water, better flushing of Grassy Bay
- Warming leads to lower dissolved oxygen concentrations
- A preliminary finding is that the area of the bay that is hypoxic will double by 2065, under a mid-range climate change scenario (RAND study; Fischbach et al.)

MITIGATION OPTIONS



Corps of Engineers Rockaway Reformulation Study

- Plans include a cross-inlet surge barrier to stop flooding around the bay
- Also include protections of Rockaway Peninsula - dunes, groins, and beach fill, some high seawalls
- Overall, the Corps concluded (and scientists generally support) that this is the most comprehensive approach to flood risk reduction
- Construction can begin as early as next year
- NYC /DeBlasio and citizen groups are onboard
- An important factor is that the surge barrier itself would not be closed frequently
 - This could be positive for ecosystems, allowing normal flushing and circulation of the bay
 - But this means the barrier will not be a solution for regular tidal flooding



Concerns about a Surge Barrier

- There are some voices that do not support the barrier plan, but I am not aware of them all and certainly can't speak for that community
- One issue: The long-term outlook for a surge barrier concerns some people:
 - With accelerating sea level rise, it may eventually require closure more and more frequently for protection, and the bay could become a lake or non-tidal lagoon.
 - What assurances are there that this will not occur?

Nature-Based Solutions to Flooding and Hypoxia



Photo by Don Riepe



Nature-Based Solutions Research

Reducing hazards during storms

- Wetlands in Jamaica Bay
 - cannot significantly reduce flooding (Orton et al. 2015; Corps; SIRR)
 - can reduce wave heights during storms (Marsooli et al. 2017; McKee-Smith et al. 2016)
 - can reduce erosion and enhance deposition (Wang et al. 2017 - USGS study)



MY ADAPTATION RESEARCH AND RECOMMENDATIONS



Nature-Based Solutions Research

Reducing flooding and hypoxia

- Shallowing and narrowing shipping channels
 - Can reduce flooding substantially but not completely
 - Relative to a future without action, the upland flood area for a 100-year storm at 2055 is reduced by 49% (<http://AdaptMap.info>)
 - Can also sharply reduce hypoxia
 - Annually at 2065 there is a 81% reduction in hypoxic water volume (Orton et al - report in preparation)
 - However, such topics like filling borrow pits or shallowing the bay's channels are not palatable to some stakeholders
 - Also, the realism and environmental impacts require a great deal more study



My Recommendations

1. High priority should be SLR adaptation
 - This is underway with projects like “Raising Shorelines”, and the Department of City Planning’s efforts on changing zoning, allowing for elevation of buildings
2. The strong focus on protecting against “the next Sandy” may be misguided – it could be important, but should not come at the expense of point #1
3. With respect to the cross-inlet surge barrier, the City and Corps should consider giving more time for:
 - (a) research on nature-based solutions – can mitigate both floods and hypoxia
 - (b) more research and modeling of on sediment transport
 - (c) more outside analysis of the barrier solution



SWIM Coalition

Stormwater Infrastructure Matters

Testimony of Stormwater Infrastructure Matters (SWIM) Coalition

Before the New York City Council Environmental Protection Committee Public Oversight Hearing

On Threats to Jamaica Bay: A Case Study of Flooding of Sea Level Rise in New York City

Intro. No. 750 to create a Jamaica Bay Task Force

April 23, 2018

Thank you for the opportunity to submit this comment letter on Intro. No. 750, a local law to amend the administrative code of the city of New York, in relation to creation of a Jamaica Bay task force which would oversee the clean - up of Jamaica Bay, the process by which combined sewer overflows are managed, and the effects of climate change on the Bay.

Stormwater Infrastructure Matters Coalition (SWIM) is a diverse group of more than 70 community-based, citywide, regional and national organizations, water recreation user groups, institutions of higher education, scientists, citizens and businesses who advocate for the health of New York City's vital waterways. SWIM is dedicated to ensuring swimmable and fishable waters around New York City through natural, sustainable stormwater management practices – or green infrastructure – in our neighborhoods. This approach is environmentally and fiscally responsible because it utilizes stormwater, currently viewed as waste, as a resource. Since our founding in 2007, SWIM has advocated for green infrastructure as a way to abate combined sewer overflows and to manage stormwater and ensured robust and meaningful public engagement and participation in the planning processes, and empowered local communities in becoming clean water stewards.

SWIM supports Intro. No. 750 to create a Jamaica Bay Task Force charged with evaluating both water quality and ecological integrity and making recommendations on not only combined sewer overflows but also the effects of climate change on the Bay. We believe accounting for sea level rise and climate change in water quality planning is not only important but necessary for success of any plan.

While we are supportive of Intro. No. 750, SWIM shares the following concerns with the members of the City Council Environmental Protection Committee.

Timing of the JBTF and the Jamaica Bay Long Term Control Plan

NYC Department of Environmental Protection (DEP) will be submitting the Jamaica Bay Long Term Control Plan on June 30, 2018. The comments on the alternatives proposed at the April 18th meeting are due on May 14th, 2018. We are unsure how the newly constituted JBTF will have an adequate opportunity to make recommendations on the Jamaica Bay LTCP before the public comment deadline.

As you know the Jamaica Bay LTCP submission date has been delayed by one year already. While we want to ensure a good plan is submitted, we do not want further delay. We would like to know how you envision the JBTF to provide recommendations for the LTCP.

Coordination with the City's MS4 Stormwater Management Plan

DEP has just recently released the Stormwater Management Plan (SWMP) for the Municipal Separate Storm Sewer System (MS4) area. The comments on the draft plan is due on May 15th, 2018. A large portion of the Jamaica Bay watershed falls within the MS4 area and managing stormwater will be critical in improving the water quality and the ecological integrity of the bay. We are not

certain how the timing of the establishment of the JBTF will allow it to weigh in on the SWMP, but believe it is important for the JBTF to consider stormwater in the MS4 areas in conjunction with CSO.

A holistic approach to restoring the Bay

We have expressed our concerns to the DEP regarding how water quality improvement planning often proceeds in silos: CSO under LTCPs and stormwater under MS4 with little coordination between them. Furthermore, wetland restoration is not seen by the State Department of Environmental Conservation, the oversight agency, as water quality improvement and is put under natural resources management. As such the NYS DEC does not consider wetland restoration as an acceptable green infrastructure practice.

From the perspective of the organisms that make the bay their home, the source of pollution is irrelevant: they need clean water and high quality habitat. Just as we cannot treat a sick person with addressing one symptom out of many, restoring the bay should be framed in a system-wide approach. Whatever we plan for improving Jamaica Bay should be holistic and integrated across various planning silos that currently lead us to operate in parallel.

If the Jamaica Bay Task Force can be the means by which we can move toward this holistic planning process, we believe it would be a highly worthy endeavor and it should be clearly stated in the mission of the task force.

Partnership with the existing Jamaica Bay Task Force

Finally, we would like to ensure that the work of the existing Jamaica Bay Task Force, which was reconvened after a hiatus in 2000 and has been meeting regularly since, is respected and integrated into the City Council's JBTF. We recommend at a minimum two members of the Jamaica Bay Task Force to serve on the City Council's JBTF. The existing Jamaica Bay Task Force includes members with deeply intimate and historical knowledge of the bay. These are people who interact with the bay on a daily basis and have seen the changes over decades. They may not be "scientific experts" but their knowledge of the bay is unmatched.

Thank you again for the opportunity to share our thoughts.

Sincerely,

Julie A. Welch | Program Manager | SWIM Coalition
On behalf of the SWIM Coalition Steering Committee:

Mike Dulong, Riverkeeper

Larry Levine, Natural Resources Defense Council

Michelle Luebke, Bronx River Alliance

Paul Mankiewicz, The Gaia Institute

Jaime Stein, Pratt Institute

Korin Tangtrakul, New York City Soil & Water Conservation District

Shino Tanikawa, New York City Soil & Water Conservation District

**THE COUNCIL
THE CITY OF NEW YORK**

Appearance Card

I intend to appear and speak on Int. No. 128, 749, 750 Res. No. _____

in favor in opposition

Date: April 23, 2018

(PLEASE PRINT)

Name: William Sweet

Address: _____

I represent: National Oceanographic and Atmospheric Administration

Address: _____

**THE COUNCIL
THE CITY OF NEW YORK**

Appearance Card

I intend to appear and speak on Int. No. 0749 Res. No. _____

in favor in opposition

Date: 4/23/18

(PLEASE PRINT)

Name: John Rhyner

Address: 630 Johnson Ave, Bohemia, NY

I represent: P.W. Grosser Consulting, Inc.

Address: Same as above

**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: 4-23-18

(PLEASE PRINT)

Name: JOHN LEE

Address: 253 BAY 14th St.

I represent: MAYOR'S OFFICE

Address: CITY HALL

**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: Paul Mankiewicz

Address: 99 Bay St Bx

I represent: Urban Sports Institute, NYC Soc & Wk

Address: 121 6 Ave NY NY

**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: Catherine McVay Hughes

Address: _____

I represent: Storm Surge Barrier Working Group

Address: (regional)

**THE COUNCIL
THE CITY OF NEW YORK**

Appearance Card

I intend to appear and speak on Int. No. 628 Res. No. _____

in favor in opposition

Date: 4/23/18

(PLEASE PRINT)

Name: Philip Orton

Address: 340 E. 93rd St. #21M, NY 10128

I represent: myself, scientist at Stevens Institute

Address: Hoboken, NJ

**THE COUNCIL
THE CITY OF NEW YORK**

Appearance Card

I intend to appear and speak on Int. No. 750 Res. No. _____

in favor in opposition

Date: 4-23-2018

(PLEASE PRINT)

Name: Mike DuLong

Address: _____

I represent: Riverkeeper

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: Angela Licata Misiakiewicz

Address: NYC DEP

I represent: _____

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: 4/23/18

(PLEASE PRINT)

Name: John McLaughlin

Address: DEP Ht voters table

I represent: _____

Address: not testifying

**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: 4/23/18

Name: Angela Licata (PLEASE PRINT)

Address: DEP

I represent: _____

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: _____

Name: Michael Shaikh (PLEASE PRINT)

Address: _____

I represent: Mayor's office

Address: 253 Broadway

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