TESTIMONY OF THE MAYOR'S OFFICE OF RECOVERY AND RESILIENCY
BEFORE THE NEW YORK CITY COUNCIL
COMMITTEE ON ENVIRONMENTAL PROTECTION

Monday, October 22, 2018

I. INTRODUCTION

Good morning. I am Jainey Bavishi, the Mayor's Director for Resiliency. I want to thank Chairperson Constantinides and members of the Committee for this opportunity to speak about the de Blasio Administration's work to build a stronger, more resilient city in the face of sea level rise caused by climate change.

Six years ago, Hurricane Sandy devastated New York City with unprecedented force, claiming 44 lives and causing over $19 billion in damages and lost economic activity. It was the costliest natural disaster we have ever faced. As we took stock of the damage, it was clear that we could not just plan to simply recover from the storm. Instead, we needed to use the moment to address the risks of 'another Sandy' while broadening our approach to prepare for the chronic impacts of climate change, including sea level rise.

The necessity of this work has never been clearer. Hurricanes Florence and Michael, which tragically devastated communities in the Southeast and along the Florida Panhandle, combined with the recent Intergovernmental Panel on Climate Change's findings on limiting global warming to 1.5 degrees Celsius, have reaffirmed the need for our climate resiliency work and highlighted its urgency. That's why we are making bold and innovative investments in resiliency.

With 520 miles of coastline, sea level rise is among the most challenging climate risks facing the city. Since 1900, we have already witnessed one foot of sea level rise – a fact that made Hurricane Sandy so devastating for New Yorkers. The New York City Panel on Climate Change, or the NPCC, projects that sea levels will rise up to an additional 30 inches by the 2050s. Preparing our city for sea level rise is at the core of our multi-layered OneNYC resiliency plan – which has become a global model for other cities striving to build resilience in the face of climate change.

To be clear, as we mark the sixth anniversary of Hurricane Sandy and take stock of our progress, our city is safer and more resilient than it was before Hurricane Sandy – and we have much more to do before we'll be satisfied.

II. HOW ARE WE ADDRESSING SEA LEVEL RISE?

I'd like to provide the highlights of the City's progress on addressing sea level rise through our OneNYC resiliency plan – comprised of a multilayered approach to coastal defenses, infrastructure, buildings and land use and neighborhoods. Needless to say, our resiliency work to date is a product of a massive team effort, led out of the Mayor's Office and implemented by nearly every City agency, and which includes State and Federal agencies, as well as a myriad of community organizations and private, philanthropic and academic partners. I also want to thank the City Council for being our partner in these efforts. This high level of interagency, intergovernmental, and cross-sector engagement underscores progress being made

toward mainstreaming consideration of sea level rise into our actions and investments across various levels of government and in partnership with the private sector.

Our coastal protection efforts protect against long-term sea level rise. Every major coastal protection project we undertake incorporates the latest sea level rise projections. For example, the East Side Coastal Resiliency project is more than just a storm barrier – it is being intentionally designed to address long-term sea level rise. This is true of other projects citywide, including coastal barriers that are being implemented by the U.S. Army Corps of Engineers in Staten Island and the Rockaways. Our Raised Shoreline Citywide program is investing $125 million to reduce the impacts of tidal flooding and address sea level rise through strategic localized investments in vulnerable communities. An RFP has been issued for a $47 million project to raise the edge of Coney Island Creek, which proved to be the most vulnerable breach in the neighborhood during Hurricane Sandy.

Our infrastructure investments account for sea level rise, now and into the future. After Sandy, Con Edison agreed to use the NPCC's sea level rise projections to inform their storm hardening efforts, which included spending over $1 billion to harden, protect, and elevate key electric, gas and steam assets. We are working with National Grid on a similar effort to protect customers and key assets from flooding impacts. Other infrastructure systems are being adapted as well. The Department of Environmental Protection undertook a comprehensive climate risk study of its 96 pumping stations and 14 wastewater treatment plans and has begun implementing cost-effective protective measures tailored to each facility to improve resiliency in the face of future flood events. Additionally, in April 2018, we released version 2.0 of our Climate Resiliency Design Guidelines to ensure that future capital investments, both new construction and significant rehabilitation, are designed to withstand the impacts of a changing climate. The Guidelines provide designers and engineers with step-by-step instructions and tools to incorporate sea level rise and other climate projections into the design and construction of capital projects.

Our building and zoning codes and standards are climate-smart. Hurricane Sandy demonstrated that structures built to the latest codes perform well in storms and better protect their inhabitants. We have learned from this and have upgraded the City's building codes, including 16 new local laws – thanks in no small part to the Council's leadership – to account for vulnerabilities related to extreme weather and climate change. Additionally, FEMA, in partnership with the City, is drafting new, more precise flood insurance rate maps that will more accurately communicate risk and keep premiums affordable. The City is working with FEMA to create a second first-of-its-kind flood risk product reflecting future conditions that account for sea level rise. Finally, the City Planning Commission has created a new zoning designation, the Special Coastal Risk District, to limit exposure to damage and disruption in the most vulnerable communities by limiting future development, especially in areas where sea level rise is projected to lead to regular tidal flooding. And, the Department of City Planning is currently working with community members and property owners across the city's floodplain to update the flood resilience zoning rules through a future Citywide Zoning Text Amendment.

Our communities are better prepared. We are working to strengthen social cohesion in our neighborhoods to ensure there is improved coordination between community-based, health services and faith-based organizations and the government during an extreme weather event, which could be made worse by sea level rise. One example of these efforts is securing dedicated staff at NYC Emergency Management to conduct emergency preparedness trainings for community-based organizations. We're also working to strengthen social infrastructure, such as the small businesses that communities rely on during and after emergencies. Through the BusinessPrep program, the Department of Small Business Services sends a team of emergency planning and insurance experts to small businesses in flood-prone areas to review their physical space, operations and insurance coverage and provide assistance with preparedness planning. Businesses are then eligible to receive a small grant to implement measures like flood pumps and portable generators that can reduce their risk in the event of a disaster or disruption. Through RISE: NYC, the

Economic Development Corporation is providing innovative resiliency technologies to Sandy-impacted small businesses to help prepare for future storms and sea level rise. It is also crucial that New Yorkers remain aware of their current and future flood risk. To ensure residents keep their homes and finances safe, the City's consumer education campaign is directing residents to FloodHelpNY.org, a one-stop shop for flood risk information. And we know this outreach is making a difference. Flood insurance enrollment in New York City doubled from 25,000 in 2012 to 55,000 in 2018.

Our environment is cleaner. The City has achieved its OneNYC goal of remediating 119 lots in the coastal floodplain – 19 more than proposed in 2015. These cleanups make the city more resilient to climate change and sea level rise by greatly reducing the risk these properties pose from erosion and pollutant release during future storms. Finally, the Department of Environmental Protection not only requires facilities that store hazardous chemicals to file a risk management plan, but it also now requires special protection for chemicals stored in the floodplain. In the event of a flood, these facilities will be better prepared to avoid environmental contamination that can lead to public health exposures in our coastal communities.

III. LOOKING TO THE FUTURE

We believe that there is no silver bullet solution and that a tailored and multi-layered approach is best. As we look to the future, we will also have to begin to consider where we may not be able to keep the water out and the strategies needed to allow people to safely live with water. Communities will play a vital role in grappling with these hard questions and the de Blasio Administration is committed to working with communities across the city.

It is also important to keep in mind that sea level rise is not the only risk of climate change that New York City faces. We are simultaneously working to address the risks of storm surge, extreme precipitation and extreme heat – all of which impact the city now and into the future.

IV. CONCLUSION

As I conclude my testimony, I would like to thank the Committee for this opportunity. Building resilience in the face of climate change is a long-term and ongoing process; we will always need to innovate and adapt to account for rising sea levels and rising temperatures. I look forward to working with you to adapt our city to the risks of climate change. Your partnership is critical to building a stronger, more resilient New York.

We'd be happy to take your questions.

NEW YORK – NEW JERSEY HARBOR AND TRIBUTARIES COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY

NEW YORK CITY COUNCIL MEETING

H. L. Carey Tunnel between Manhattan and Brooklyn flooded during Hurricane Sandy, October 2012

Joseph Seebode, Deputy District Engineer
Bryce Wisemiller, Project Manager
U.S. Army Corps of Engineers, New York District

October 22, 2018

US Army Corps of Engineers®
New York District

NEW YORK STATE | Department of Environmental Conservation

NYC Mayor's Office of Recovery & Resiliency

New York-New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study

COASTAL FLOODING PROBABILITIES

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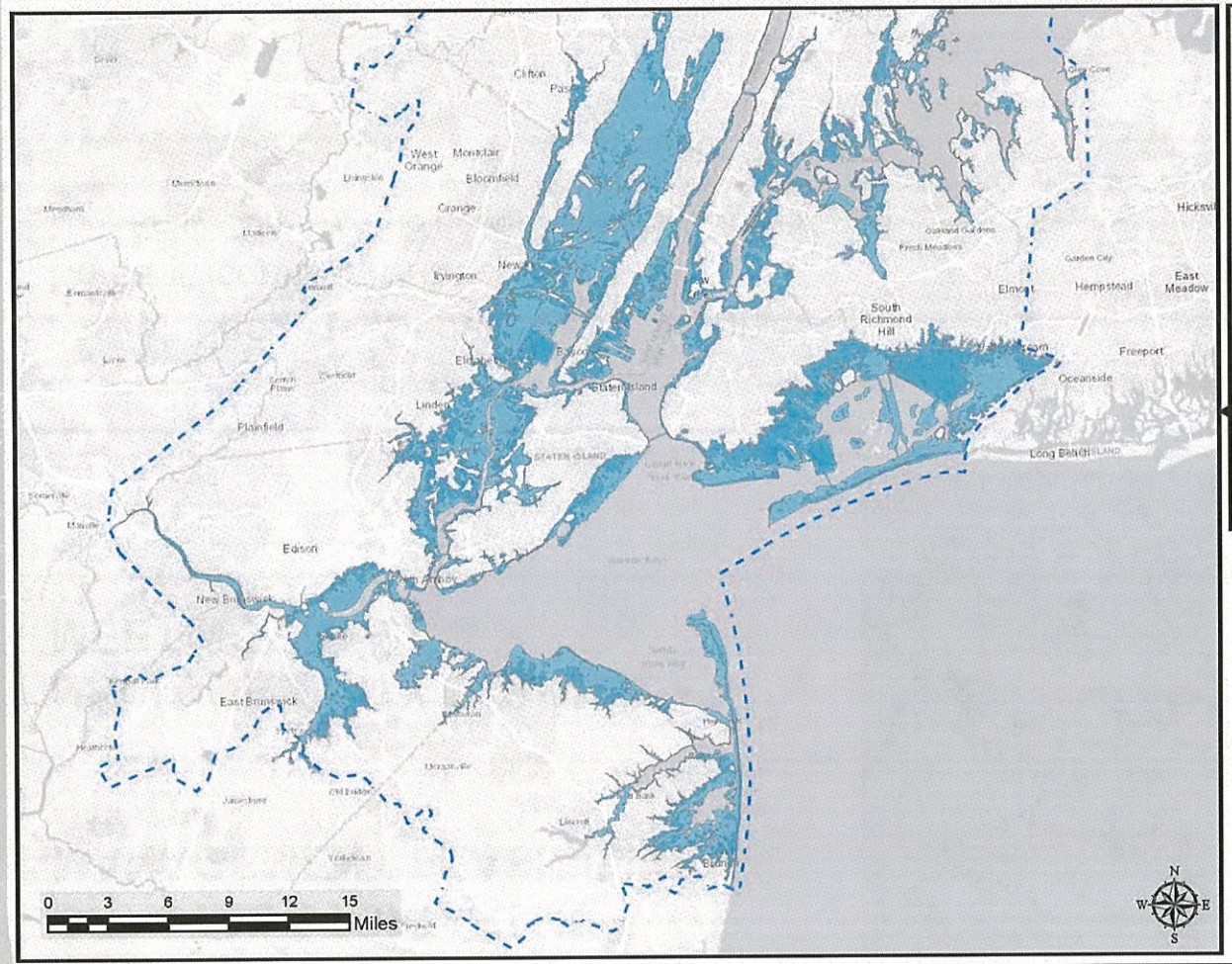

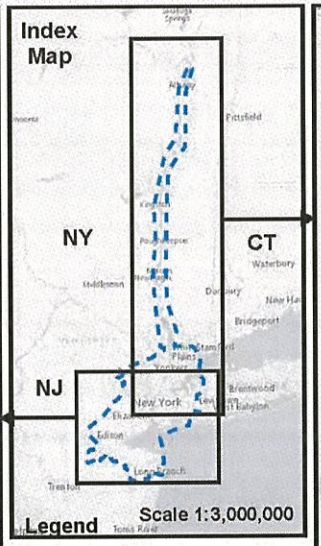

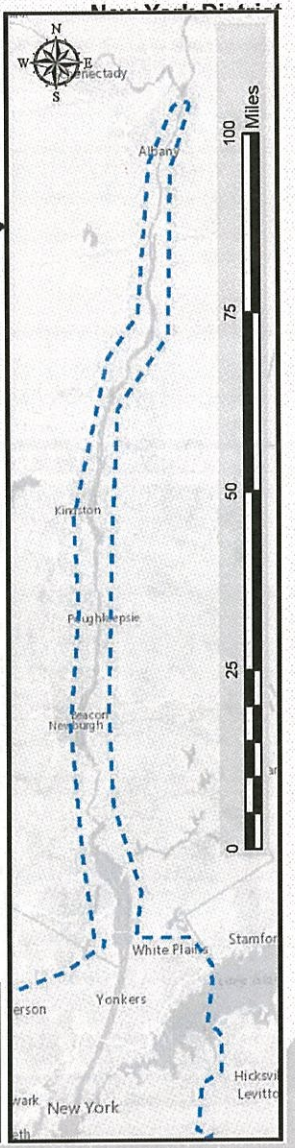

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Flooding Extents of the GIS-Based Risk Analysis
NY/NJ Harbor and Tributaries Study
New York and New Jersey

July 2018

NEW YORK-NEW JERSEY HARBOR AND TRIBUTARIES COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY

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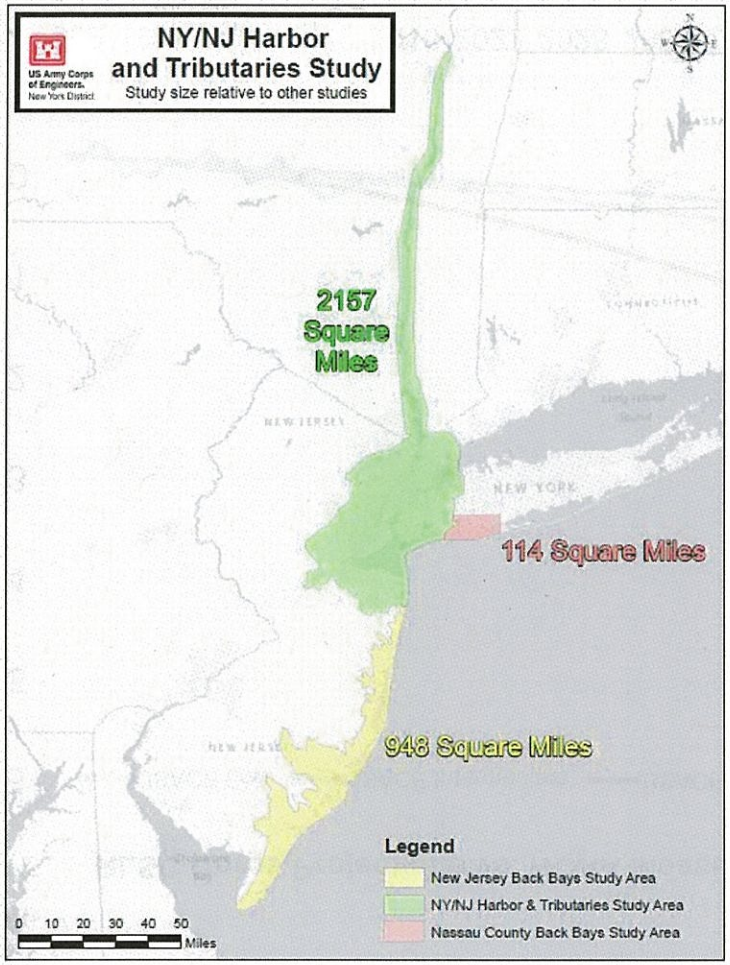

STUDY AREA (in green)

- The largest and most densely populated of the 9 high-risk focus areas identified in the North Atlantic Coast Comprehensive Study (NACCS)
- Area covers 2,150+ square miles and 900+ miles of affected shoreline
- 25 counties in New York & New Jersey
- Affected population of roughly 16 million people, including New York City and the six most populated cities in New Jersey

NEW YORK STATE Department of Environmental Conservation

NYC Mayor's Office of Recovery & Resiliency

ALTERNATIVE 1: NO ACTION (FUTURE WITHOUT PROJECT CONDITIONS) – SEA LEVEL

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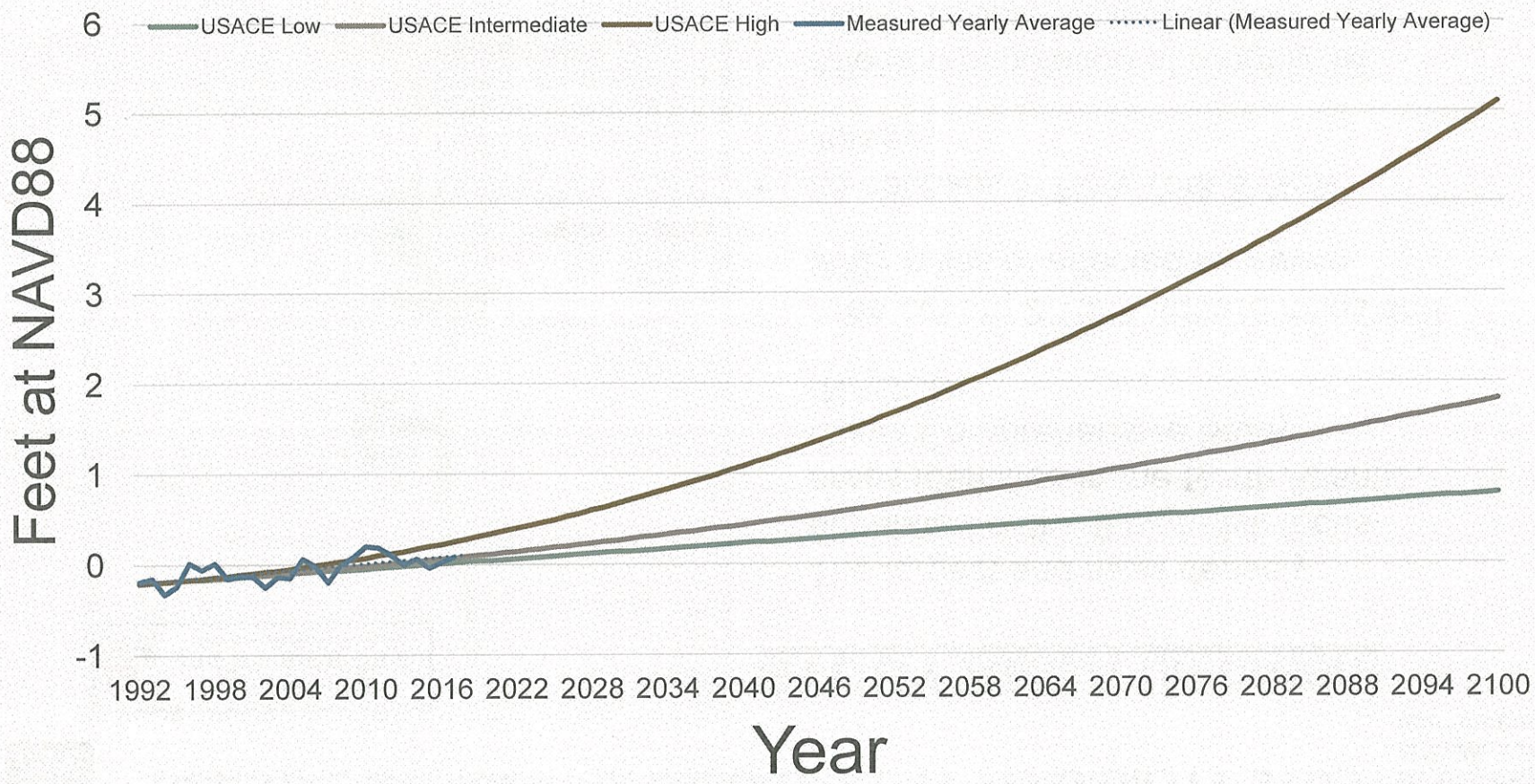
RLSC Corps Projections vs. NOAA Measured Data (Yearly Averaged) at the Battery, NY



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PROPOSED TIMELINE FOR NYNJHATS

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Alternatives Analysis will include affected environment description, understanding of FWOPC, qualitative environmental consequences discussion, conceptual mitigation cost estimates for parametric analysis, concepts for mitigation & ranges of acres impacted, and worst case scenario costs and assumptions

Summary of Alternative Analysis and path forward to get to draft report and EIS

Public/Agency review process will provide input on the most significant resources to *focus and form* impact analysis approach, which is limited by funding/timing.

Draft Tier 1 EIS

Released for Public & Agency Review. Includes prioritized analysis of the refined plan, with enough detail to make a decision.

Incorporate comments and details from the ongoing Engineering optimization

Final Tier 1 EIS

Will address key impacts to the extent necessary to make a decision. Other analysis will be needed during project implementation to develop final mitigation and adaptive management plans.

Chief's Report and Record of Decision 7/22 (Early Finish)

FCSA 7/16 — AMM 9/17 — IPR 10/18 — RIW 5/19 — TSP 1/20 — ADM 7/20 — ½ year Schedule Contingency

Alternatives analysis and qualitative comparison to focus alternatives for further analysis

Formulation Report
Released for Public and Agency Review 1/19

Expect to conduct more detailed engineering, economic and environmental analyses to select a conceptual plan

Draft Feasibility Report
Concurrently released for public and agency review 3/20

Feasibility-Level Design

Final Feasibility Report 3/21

Final ATR Completed

Agency Review of Draft Chief's Report and Record of Decision

Notice of Intent Released

Meetings

Scoping Meetings — **Public Meetings with release of reports** — **SERG & Agency Resource Meetings (Quarterly)**

NEW YORK STATE Department of Environmental Conservation

NYC Mayor's Office of Recovery & Resiliency

New York-New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study

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HOW TO STAY INVOLVED

Scoping Comments

Send any questions and/or comments to NYNJHarbor.TribStudy@usace.army.mil

Scoping Comment Period open through **November 5, 2018**

Project Webpage

http://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/

Stakeholder Mailing List

Email NYNJHarbor.TribStudy@usace.army.mil if you would like to join our mailing list and receive periodic updates.

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CLOSING FACTORS FOR CONSIDERATION

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- Over 900 miles of shoreline; study area of over 2150 square miles, of which approximately 300 square miles of land inundated from 1% annual exceedance probability; most densely populated and highly urbanized area of the country; the largest Port on the eastern seaboard, as well as the largest refined petroleum Port in the U.S.
- The region lacks for a comprehensive framework how to best deal with coastal storm risks, now and into the future when they will be exacerbated by sea level rise and climate change.
- Study outcome may recommend billions of dollars of further actions to further address/reduce coastal storm risks, whether by federal, state or local agencies.
- Multiple active advocacy groups on opposing sides of various study related issues are engaged.
- Extensive public engagement on the study is now underway and planned for numerous times in the future as the study proceeds in the coming years.
- Governmental leaders, at all levels, can assist to inform the public of the study facts and data as well as helping to form consensus on what solutions may be ultimately supportable for implementation.

NEW YORK STATE Department of Environmental Conservation

NYC Mayor's Office of Recovery & Resiliency

Oct 22, 2018

Written testimony to:
The New York City Council
Committee On Environmental Protection
Councilmember Costa Constantinides, Chairman

Testimony from:
Andrew R. Juhl, Ph.D
126 Piermont Ave, Nyack, NY

Re: Resolution No 509, related to the the New York – New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study

Chairman Constantinides and members of the Environmental Protection Committee,

My name is Andrew Juhl, I am a resident of Nyack, NY, where I have a view of the Hudson River from my home. I appear here today simply as a concerned citizen of the Hudson Valley, but I should also point out that I am a Research Professor at Columbia University, and have been studying water quality in the Hudson River for the last 12 years. I have co-authored scientific publications related to many aspects of Hudson River water quality, including general plankton ecology, the distribution of sewage-related bacteria, the frequency of antibiotic resistant bacteria in the waters around New York City, aerosolization of bacteria from the water, and the occurance of pharmaceuticals in the Hudson. I was recently the lead author of the Waste and Stormwater Target Ecosystems Characteristics report (http://thehudsonweshare.org/wp-content/uploads/2018/08/Storm-and-WasteWater.pdf), part of the Hudson River Comprehensive Resoration Plan, commisioned by Partners Restoring the Hudson (http://thehudsonweshare.org). Each years, tens of thousands of New York residents view the information and data on microbiological water quality in the Hudson and the interconnected waterways around Manhattan that my research group helps to collect. These data are posted on the Riverkeeper website (https://www.riverkeeper.org/water-quality/hudson-river/). I also want to point out that I was a resident of Piermont NY during Hurricane Sandy. While my own home was not damaged by the storm, many of my neighbors were not so lucky, as parts of Piermont sustained extensive flooding. So, I have a personal appreciation of the goal that the Army Corps is trying to address in their proposals.

With regard to many aspects of water quality, the good news, which probably doesn't get said often enough, is that the situation in the Hudson and NY Harbor is greatly improved compared to 30 or 40 years ago. For example, counts of fecal indicator bacteria around NYC are generally much lower now then in the past, despite substantial growth in population and economic activity during that time. Hand in hand with those improvements in water quality has come a rediscovery of the Hudson River as a recreational and aesthetic resource. Up and down the Hudson River Valley one sees cities and towns recognizing the newly-improved value of waterfront property, in the form of new parks and access points, marinas, waterfront restaurants and cafes, and residental developments of many kinds. These types of public and private investment in waterfront lands are one of the ways that we can see that the citizens of the Hudson River Valley,

which includes the citizens of NYC, have changed their relationship with the Hudson River. They now value being close to the waterfront, which, in my opinion, is directly connected to the decades long improvement in water quality we have experienced. Of course, the more that the waterfront is valued, the greater the incentive to protect that land from flood and storm damage, which is why the Army Corps is undertaking this feasibility study.

However, given a connection between water quality and the value of waterfront lands, it is imperative that any mechanism to protect such lands and property not damage water quality. If a flood protection mechanism was put in place that caused water quality to decline, that protective mechanism would degrade the value of waterfront land and property just as effectively as flooding.

It is currently impossible to predict with any confidence the degree to which water quality would be impacted by any of the proposals described as part of the feasibility study (other than alternative 1), because they all lack sufficent detail. Nevertheless, we can anticipate that any alternative based on barriers will negatively impact water quality within the Hudson River and New York harbor, even when the barriers are open, and even more dramatically when the barriers are closed.

One of the things that often surprises people about the results of our microbial water quality sampling in the Hudson, is our finding that the waters around NYC generally share similar water quality as locations further north, with much lower populations. To some extent that result is because of the public investments NYC has made in sewage and stormwater handling and treatment. In addition, the water quality around NYC is greatly improved by exchange with Long Island Sound and the Atlantic Ocean. Although the volume of waste and stormwater input from NYC is very large, residence time for many contaminants in the water is relatively short because the large volume of cleaner water coming in from offshore dilutes and flushes away many contaminants. Spikes in poor microbial water quality around NYC are commonly triggered by rainfall, which leads to sewer overflows. However, those spikes in sewage contamination are usually short lived, because of the short residence time of water within the system. So there is a very tight connection between water quality and water residence time, or the degree of flushing by cleaner water.

It is inevitable that bulding any kind of barrier will require in-water structures that will impede flow in and out of the system to some degree. We don't know to what degree, because we don't know what type of structures will be built, but they will impede flow even when the barriers are open. Barrier systems built in other locations around the world range greatly in the degree to which they impede flow when they are open, and some structures have a very big impact on flow. In the Hudson, any decrease in the flow in and out of the system will increase residence time and decrease flushing, which will degrade water quality, at least to some extent.

Of course, closing the barriers will even more dramatically degrade water quality. While initially the barriers will be designed to only be closed infrequently, as sea level continues to rise, the frequency of closure will similarly increase, with the resultant impacts on water quality increasing through time.

There is another potential type of water quality problem in the Hudson that would be exacerbated by impeded flushing and increased residence time, algal blooms. Under current conditions, algal blooms in the main channel of the Hudson and waterways around Manhattan are largely inhibited by high turbidity and strong vertical mixing – basically, under current conditions the algae can't grow because they don't get enough light exposure. However, any impediment to the flow in and out of the system would increase water residence time, decrease vertical mixing, and increase stratification, all of which would make the environment more favorable for algal blooms. Given the high levels of nutrients available for algal growth in the Hudson, there are many potentially negative impacts of algal blooms. Algal blooms can be unsightly, they can smell very bad, they can transmit toxins to wildlife, and they can lead to other problems such as hypoxia.

I want to emphasize that my statements about the potential water quality impacts of impeded flow are not idle speculation. In my work we sample a number of embayments around NYC and along the East River. In most of these embayments, the further you go from more open water, the more restricted the flushing becomes. So, many of the embayments we sample present a gradient of flushing by cleaner water. In general, the further we go into such embayments, the less the flushing, and consequently the greater the contaminant concentration. Stratification also tends to increase, turbidity often declines, and we often see massive algal blooms, co-ocurring with temporary or localized hypoxia. These observations highlight the importance of flushing, or the restriction of flushing, to water quality in our waters. So, the consequences of impeded flushing to water quality are easy to predict in general, though we do not currently know to what degree water quality will be impacted by any particular barrier plan. Nevertheless, even if the initial impacts on flow and water quality are predicted to be minimal, as sea level rises, the impacts will increase, effectively driving us further along that gradient towards the problems we now see in restricted waterways.

As sea level rises, at some point any in-water barrier system will eventually be overtopped. At that stage, we will have to resort to some other mechanisms for protecting shorelines. I suggest that we might want to think about what those solutions might be now, as we may be able to come up with solutions that are effective, more resiliant and less expensive, and that do not negatively impact the water quality that is essential to the value of waterfront lands.

I appreciate the opportunity to testify here today,

Thank you very much for considering my perspective,

Andrew Juhl

Testimony before the Committee on Environmental Protection of the New York City Council Regarding Oversight-Resiliency in the Face of Sea Level Rise

Jay Lehr, Ph.D.
Science Director
The Heartland Institute

Dennis Hedke
Partner
Hedke-Sanger Geoscience, Ltd.
Former Chairman
Kansas House of Representatives Energy and Environment Committee

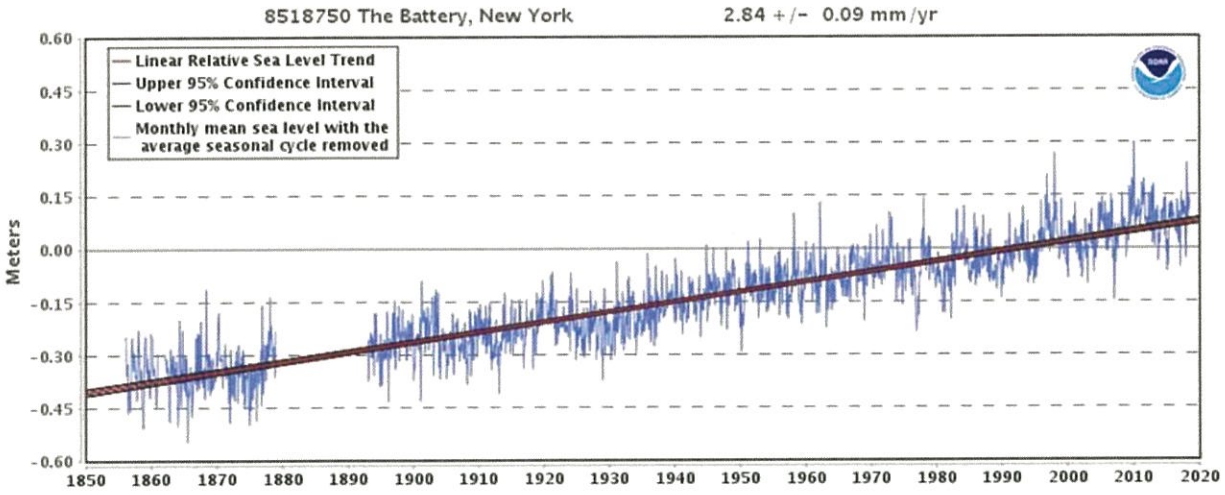
October 22, 2018,

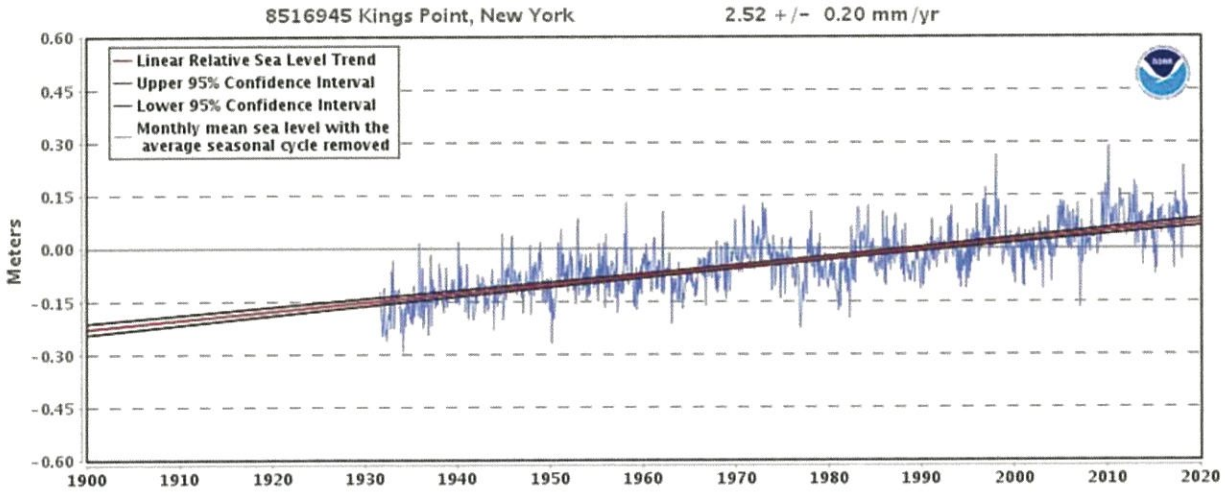
My name is Jay Lehr. I have been studying climate change and potentially associated sea level changes resulting from melting ice and warming oceans for a half century. In the 1970s our primary concern was global cooling and an advancing new ice age. Many believe that increasing quantities of carbon dioxide in our atmosphere could result in rising levels of the sea in general and specifically waters around New York City. There is no question that this great metropolis should always be looking to the future to protect the city from the impacts of weather, storms and storm surges, and all else that could affect its infrastructure and the safety of its citizens. I am here, however, to inform you that you can afford simple solutions to be prepared for all such uncertainties. There is no evidence whatever to support impending sea-level-rise catastrophe or the unnecessary expenditure of state or federal tax monies to solve a problem that does not exist.

The National Oceanographic and Atmospheric Administration (NOAA) has updated its coastal sea level tide gauge data which continue to show no evidence of accelerating sea level rise. These measurements include tide gauge data at coastal locations along the West Coast, East Coast, Gulf Coast, Pacific Ocean, Atlantic Ocean and the Gulf of Mexico, as well as seven Pacific Island groups and six Atlantic Island groups, comprising more than 200 measurement stations.

The longest NOAA tide gauge record on coastal sea level rise measurements is right here in New York at the Battery, with its 160-year record which is shown below with a steady rate of sea level rise of 11 inches per century. A slightly slower rate of sea level rise occurs at nearby Kings Point, New York, whose 80-year record also appears below.

Tidal gauges at the Battery (https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=8518750) and Kings Point (https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=8516945) show sea level rising at a pace of 11 inches per century (https://tidesandcurrents.noaa.gov/sltrends/). Both locations show a steady pace of increase, with the same pace of increase holding steady despite periods of relatively rapid temperatures increase and periods of cooling. The Battery measurements date back to 1855, showing the same pace of sea level rise well before the existence of coal power plants and SUVs.





NOAA data provide assessments with a 95% confidence level at all measured locations which demonstrate the consistent behavior of location-specific sea level rise over time. The 2016 updated NOAA tide gauge data include four long-term periods between 92 and 119 years for California coastal locations at San Diego, La Jolla, Los Angeles and San Francisco. The actual

measured steady rates of sea level rise at these locations vary between four inches and nine inches per century.

In contrast to the steady but modest rise in sea level, revealed in long-term measurements, the United Nations Intergovernmental Panel on Climate Change (IPCC) speculates that sea level will almost immediately begin rising significantly more than in the past and present. NOAA records contradict such claims. This pattern of steady but modest sea level rise extends throughout the world, throughout times of increasing atmospheric carbon dioxide concentrations, and throughout periods of accelerated warming and cooling.

The IPCC and global warming activists have a difficult time scientifically supporting speculation about accelerating sea level rise, as warming temperatures have yet to push sea level rise beyond one foot per century. Current sea level trends are not significantly different from what they were seven to nine decades ago, when atmospheric CO_2 levels were 310 parts per million by volume (ppmv) or less.[1] Dire predictions made decades ago of dramatically accelerating polar ice loss, and an ice-free Arctic Ocean have not come to pass.[2] As Dr. Steven E. Koonin, former Undersecretary for Science for the Obama administration, noted in 2014, "Even though the human influence on climate was much smaller in the past, the models do not account for the fact that the rate of global sea-level rise 70 years ago was as large as what we observe today."[3]

We can test the rising-seas hypothesis with real data collected from ten coastal cities with long and reliable sea-level records.

Fortunately, we don't need to wonder who is right and who is wrong in the debate over future sea-level rise. We can test the rising-seas hypothesis with real data collected from 10 coastal cities with long and reliable sea level records. Those cities are Ceuta, Spain; Honolulu, Hawaii; Atlantic City, New Jersey; Sitka, Alaska; Port Isabel, Texas; St. Petersburg, Florida; Fernandina Beach, Florida; Mumbai/Bombay, India; Sydney, Australia; and Slipshavn, Denmark.

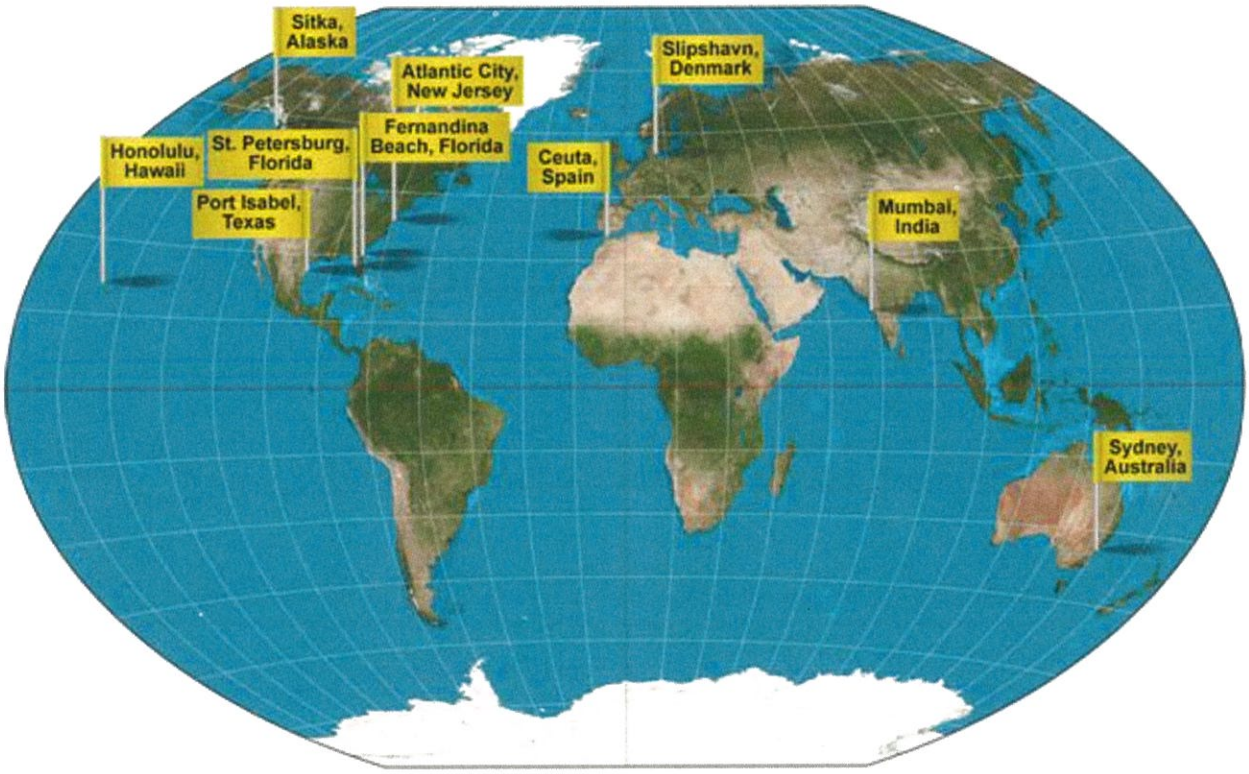
The cities appear on the map on the following page, and data for each city are presented in ten graphs below. The graphs include the following elements:

- CO_2 concentrations measured in the atmosphere over the past century, signified by the green lines in the graphs. (This line is the same in all the graphs.)

- Monthly mean sea-level data for each city, signified by the blue lines, and

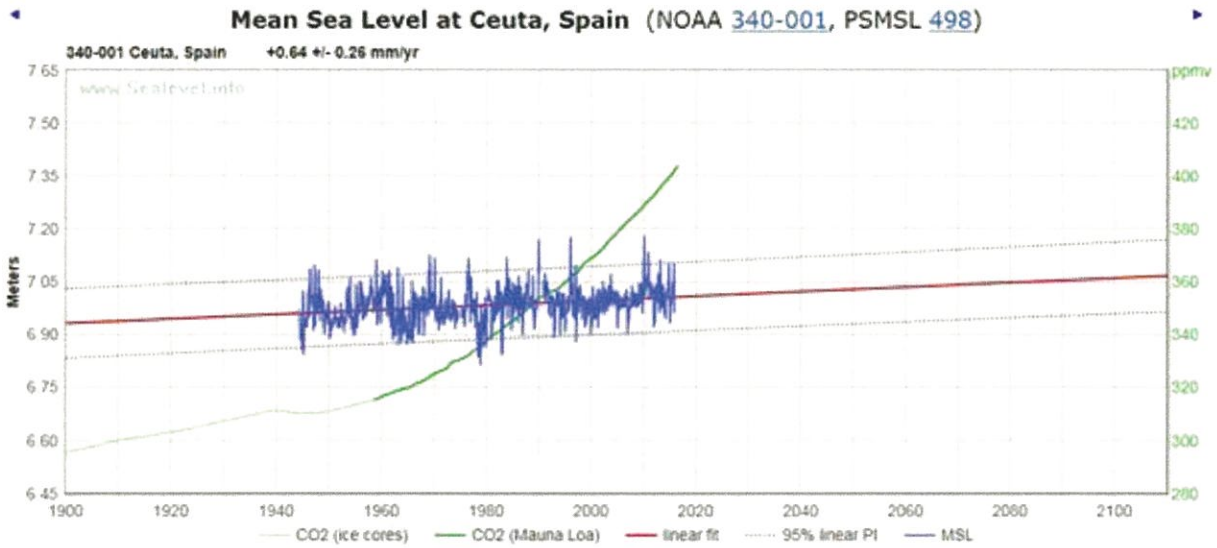
- The "linear fit," signified by the red line, representing the best estimate of past and future average sea levels. We also include the 95% Prediction Intervals.

Sources for these data are reported in Appendix 1, along with the formulas for calculating the linear fit. Based on these data and formulas, we have records of sea level dating back more than a century for some cities, and we can project the sea level rise over the next century for these locations.



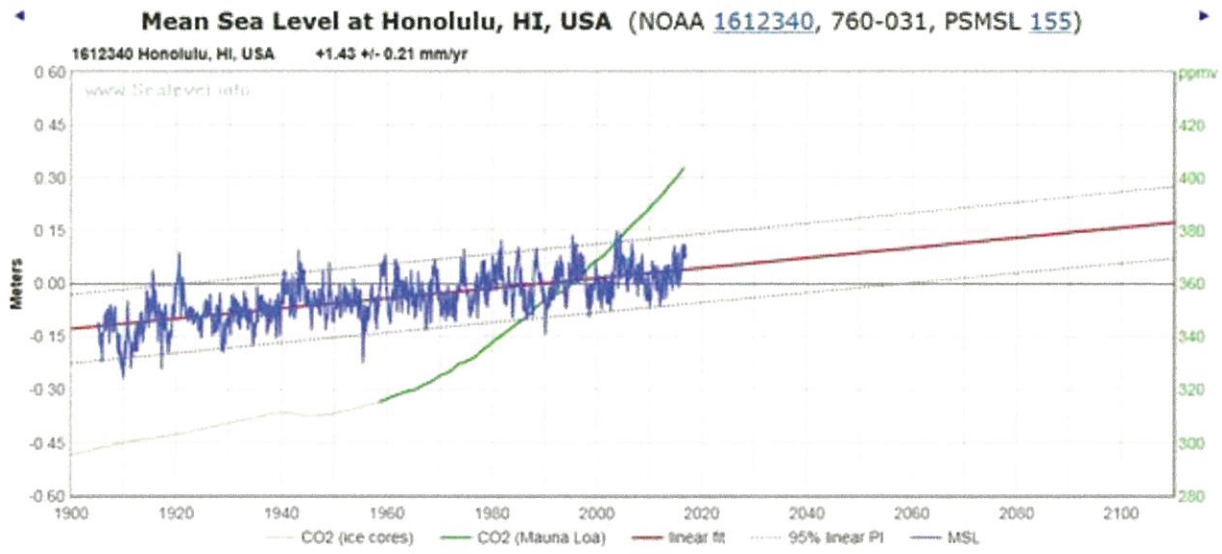
Source: https://en.wikipedia.org/wiki/World_map, modified.

Example 1: Ceuta, Spain - Mediterranean Sea



The Ceuta, Spain data show about as flat a trend as we can observe. Most notably, the data show no correlation between CO_2 concentration and sea-level rise. If the current trend continues for the next century, sea level in Ceuta will rise only three inches. This is in sharp contrast to the 10-foot global rise in sea levels recently projected by former NASA scientist James Hansen.[5]

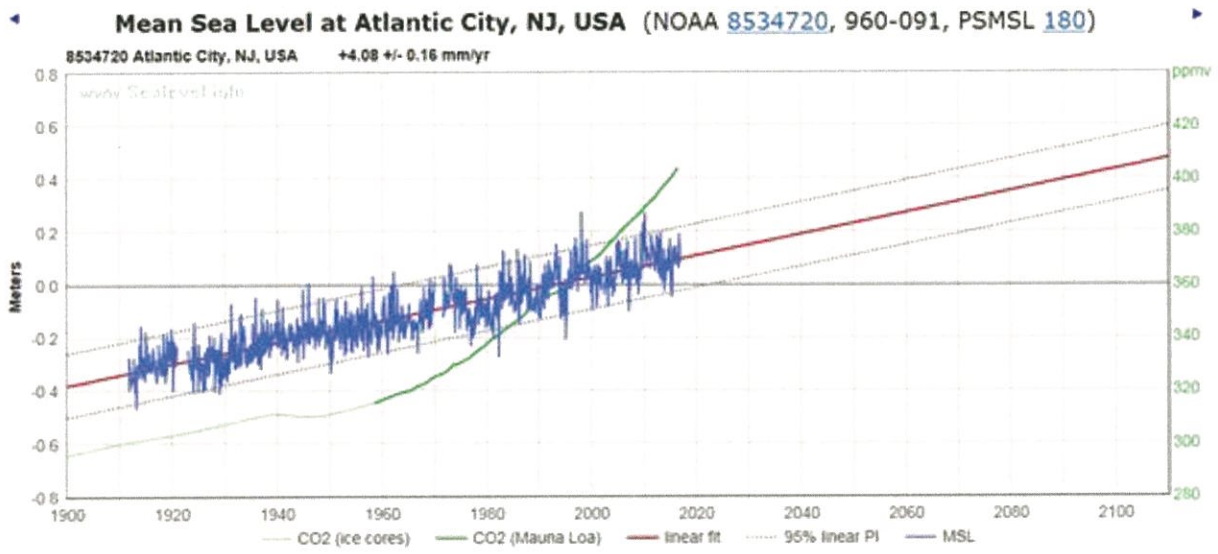
Example 2: Honolulu, Hawaii - Pacific Ocean



Hawaii, like some other regions, can see significant year-to-year fluctuations in sea level because of global oceanic currents or local plate tectonic movements. However, Honolulu has seen an

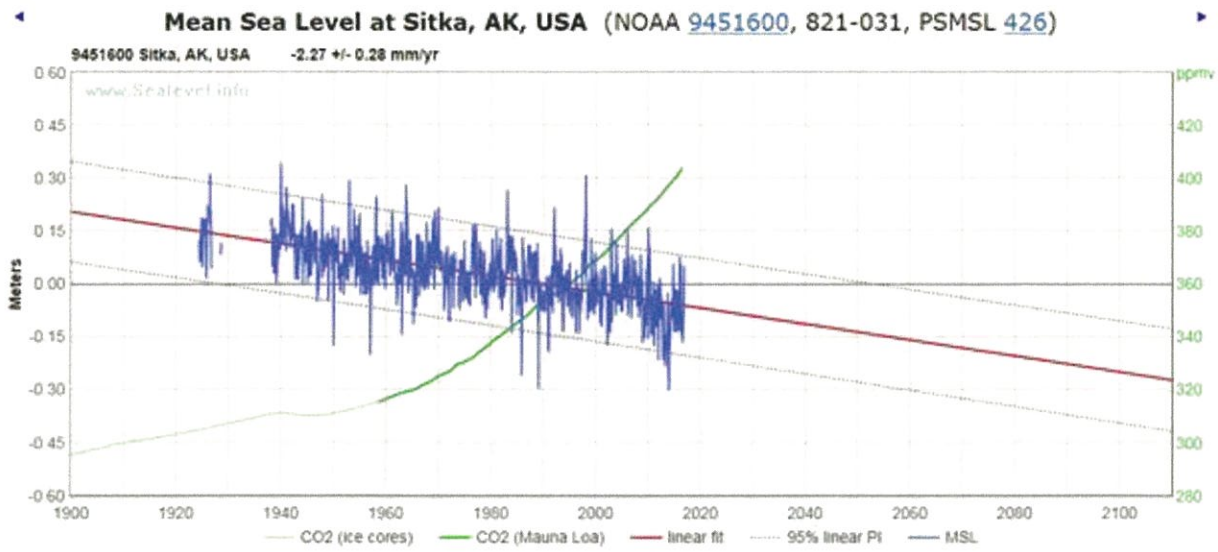
average sea-level rise of only 5.6 inches since 1900. The sea level around Honolulu is projected to rise a mere 5.6 inches in the next 100 years, once again with no correlation to CO_2 levels.

Example 3: Atlantic City, New Jersey - Atlantic Ocean



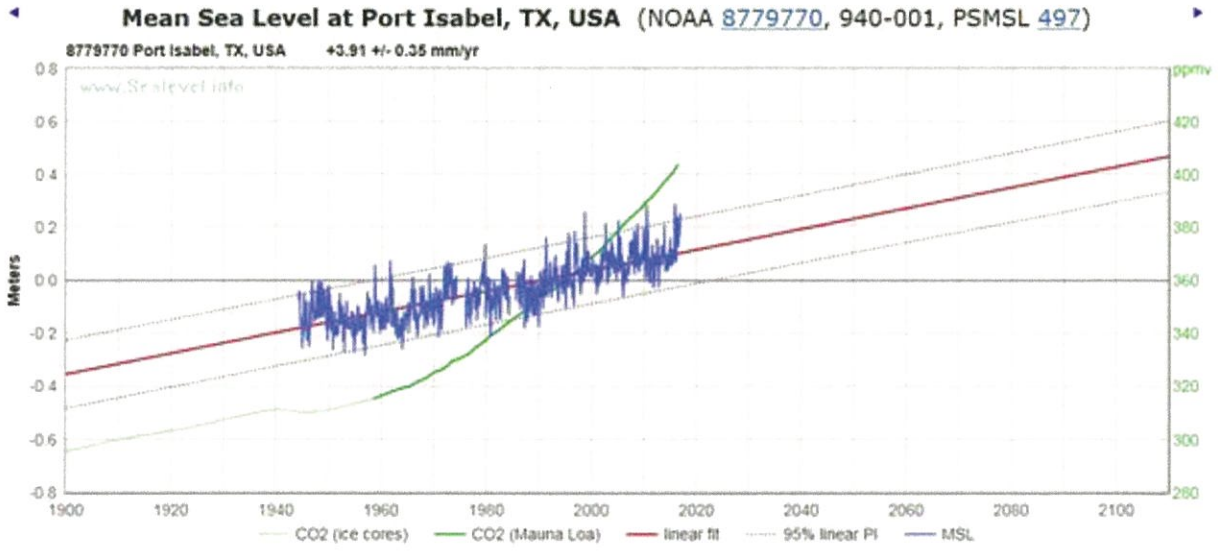
Atlantic City represents one of the more significant upward trends. The average sea level there has risen about 16 inches in the past 100 years. Notice, however, the spike at 1998, when the El Niño event took place in the Pacific Ocean, and then the subsequent drop in sea level that persisted for the next five years. Obviously, factors other than CO_2 levels were responsible for both the spike and the drop.

Example 4: Sitka, Alaska - Northern Pacific Ocean



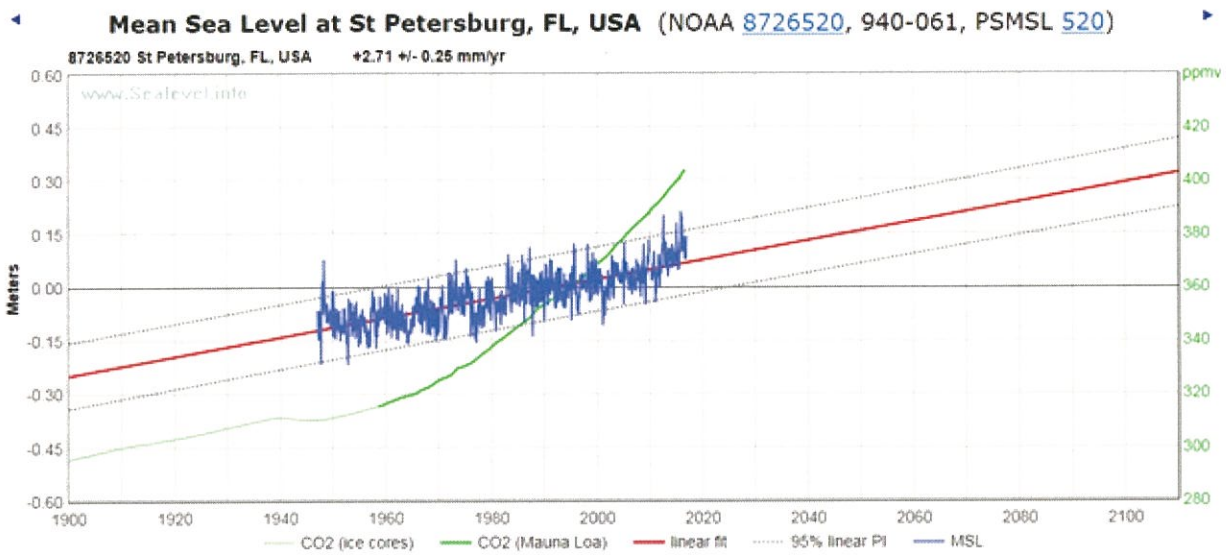
The sea level trend in Sitka, Alaska has been downward, not upward. If the rate of change continues, sea level will fall nine inches over the next 100 years. Note Sitka is only about 100 miles from Glacier Bay and 200 miles from the Hubbard Glacier on Disenchantment Bay. If melting glaciers were causing sea levels to rise, one might expect to see it in Alaska.

Example 5: Port Isabel, Texas - Western Gulf of Mexico



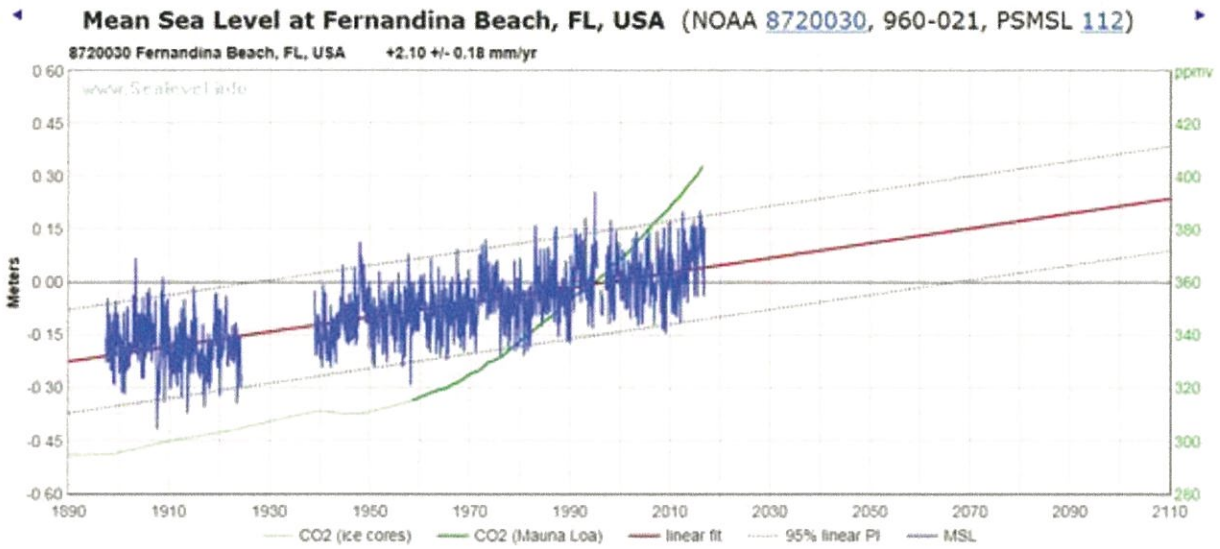
Port Isabel, Texas shows an upwardly inclined sea level trend, although the record reaches only as far back as 1944. If the current trend continues, sea level will rise 15.4 inches over the next 100 years.

Example 6: St. Petersburg, Florida - Eastern Gulf of Mexico



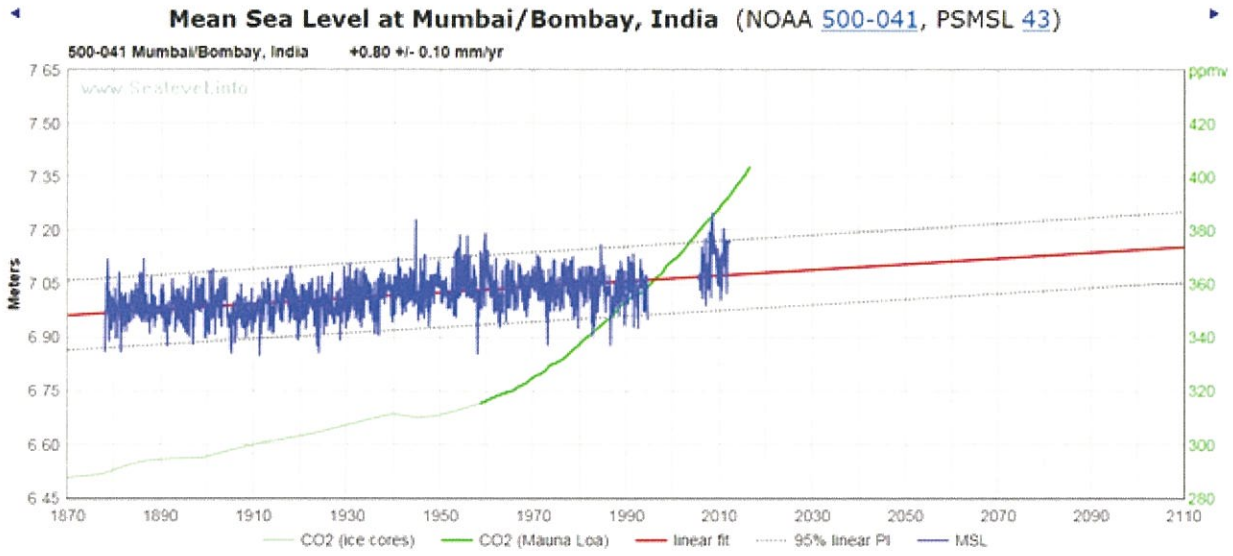
At St. Petersburg, on the other side of the Gulf of Mexico from Port Isabel, Texas, sea level is also rising but more slowly. Once again, the record is shorter than other sites, dating back only to 1947. Here, the projected sea-level rise is only 10.7 inches over the next 100 years.

Example 7: Fernandina Beach, Florida – Atlantic Ocean



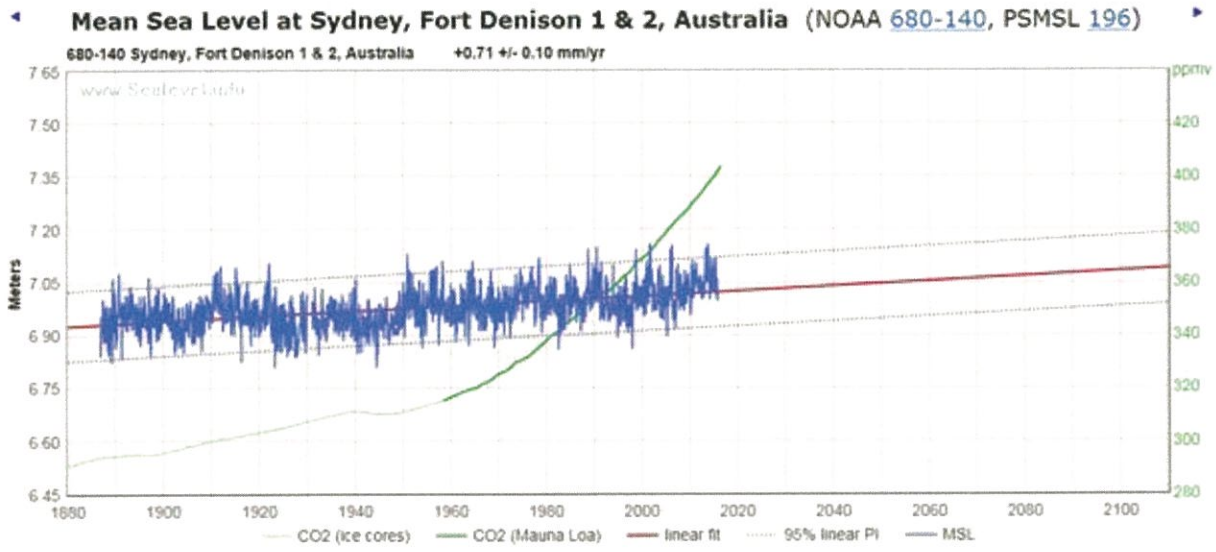
On the opposite side of Florida from St. Petersburg, the Fernandina Beach sea level rise is projected at only 8.3 inches over the next 100 years. Miami Beach officials have been formulating policies to combat a rising ocean, even though the data for that area are spotty and incomplete. The real problem might well be land subsidence, which is unrelated to CO_2 concentrations. Miami officials would do better to consider the possible impact of heavy infrastructure concentrated along the coastline, built upon former swampland.[6]

Example 8: Mumbai/Bombay, India - Indian Ocean



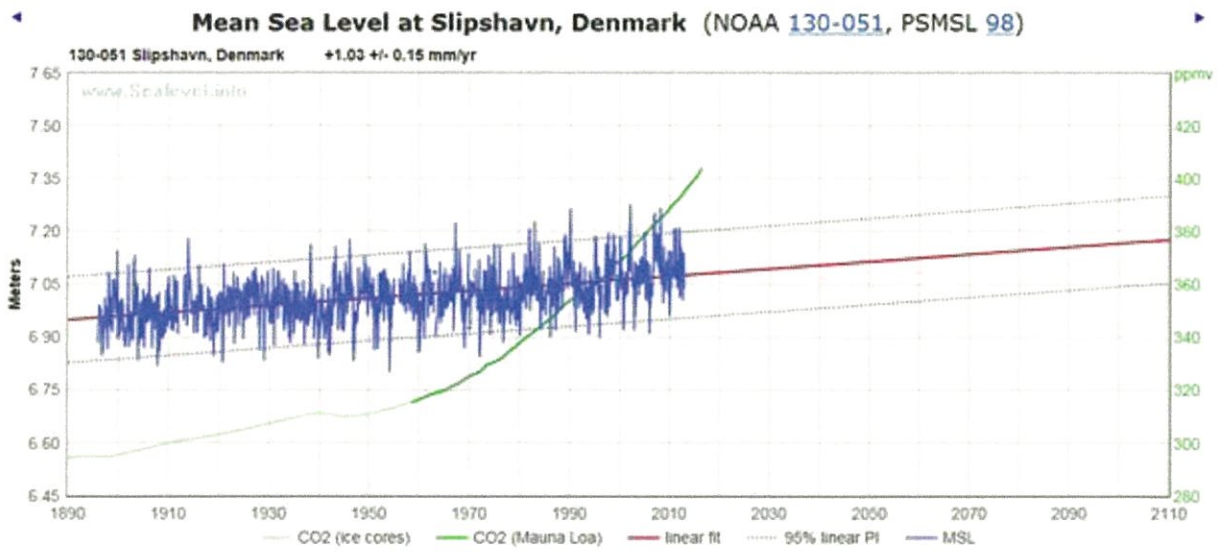
Reliable sea level records at Mumbai/Bombay, India, stretch back to the 1870s. The slight upward trend in Mumbai/Bombay means if current trends continue, sea level there will rise a mere 3.12 inches in the next 100 years. If melting Himalayan glaciers were causing sea level to rise, one might expect to see that reflected in the tidal gauges of Mumbai/Bombay.[7]

Example 9: Sydney, Australia - Pacific Ocean



Australia has taken drastic measures to mitigate perceived CO_2 issues, and the people of that country have suffered significant electricity blackouts in the past year. The shift from reliable coal-fired power plants to unreliable renewable energy has raised electricity rates in Australia to among the highest in the world.[8] Estimated sea-level rise over the next 100 years: 2.76 inches.

Example 10: Slipshavn, Denmark - North Sea



Slipshavn is unique in that it is situated in what is believed to be one of the most geologically/ tectonically inert regions on Earth. Unlike regions such as Alaska, where many land areas are rising, or the Gulf of Mexico, where some areas are subsiding, Slipshavn is tectonically very stable. If sea-level trends over the past 100 years remain constant, and on the basis of the data above, there is no reason to expect anything different in the near future. Sea level at Slipshavn should rise by a mere 3.6 inches over the next 100 years.

Analysis

The data and projected trends for these ten well-documented and widely distributed coastal cities point to three conclusions:

1. There has been no dramatic sea level rise in the past century, and projections show no dramatic rise is likely to occur in the coming century.
2. There is no evidence to indicate the rate of sea level rise or fall in any of the areas of this study will be substantially different than has been the case over the past many decades.
3. There is no correlation between CO_2 concentrations in the atmosphere and sea level rise. The steady but modest rise in sea level predated coal power plants and SUVs, and has continued at its same pace even as atmospheric CO_2 concentrations rose from 280 parts per million to 400 parts per million.[9]

It is wise to address the direct consequences of steady but modest sea level rise, including its impact in the context of extreme weather events such as Hurricane Sandy. Army Corps plans to

prepare New York for such events are certainly justified. These realities, however, do not support catastrophic predictions of rapid and unprecedented sea level rise.

###

About the Authors

Jay Lehr holds a geological engineering degree from Princeton University and a Ph.D. in Water Resources and Environmental Science from the University of Arizona. He is the author, co-author or editor of 30 books from McGraw-Hill and John Wiley & Sons. He is the Science Director of The Heartland Institute, a free-market public policy organization in Arlington Heights, Illinois.

Dennis E. Hedke is a partner in the firm Hedke-Saenger Geoscience, Ltd., where he is a consulting geophysicist. His responsibilities include conducting research related to the Earth's climate, as well as policies that relate to energy and environmental interactions. He also served six years in the Kansas House of Representatives, from 2011-16. From 2013-2016 served as chairman of the House Energy & Environment Committee.

Appendix

The CO_2 concentration data in this survey come from three sources:

- 1958–present data are from measurements at the Mauna Loa Observatory in Hawaii, at 3,400 meters altitude in the Northern subtropics.[10]
- 1850–1958 data are from ice core data.[11]
- 1800–1850 CO_2 data are from a different ice core data set.[12]

Sea-level measurements for the ten coastal city graphs represent monthly data points compiled from the National Oceanic and Atmospheric Administration (NOAA) and the Permanent Service for Mean Sea Level (PSMSL), based in Britain. The database from which the graphs are drawn consists of data from 375 long-record tide-gauges around the globe, selected by NOAA for trend analysis.[13]

Sea levels vary widely across the globe. Values for the initial levels in the eight-city graphs refer to Mean Sea Level (MSL) data, established by the NOAA Center for Operational Oceanographic Products and Services (NOAA-CO-OPS).

As an example, the following equations provide the basis for the linear trends appearing on the Sydney, Australia sea-level graphics:

Linear:

$$y = M \cdot x + B$$
$$y = 0.0711 \cdot x \text{ mm} + 6976.570\text{mm}$$

Quadratic:

$$y = A \cdot x^2 + M \cdot x + B$$

$$y = 0.000806 \cdot x^2 \text{ mm} + 0.0711 \cdot x\text{mm} + 6965.302\text{mm}$$

Where:

Date range = 1886/12 to 2015/12
x = (*date* - 1951.37) (i.e., 1951/5)
slope = M = 0.0711 ±0.0100 mm/yr
acceleration = $2 \cdot A = 2 \times 0.000806 = 0.001612 \pm 0.000587$ mm/yr²

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[1] Patrick J. Michaels, "2016 Record Warm Surface Temperatures: The Party's Over!" *Cato at Liberty*, August 10, 2017.

[2] Douglas Stanglin, "Gore: Polar Ice Cap May Disappear By Summer 2014," *USA Today*, December 14, 2009.

[3] Steven E. Koonin, "Climate Science Is Not Settled," *The Wall Street Journal*, September 19, 2014.

[5] Brian Clark Howard, "Prediction of Rapid Sea Level Rise Won't Change Global Climate Talks," *National Geographic*, July 21, 2015.

[6] Simone Fiaschi and Shimon Wdowinski, "The Contribution of Land Subsidence to the Increasing Coastal Flooding Hazard in Miami Beach," Miami, FL: Rosenstiel School of Marine and Atmospheric Science, no date.

[7] James Lamont, "Himalayan Glaciers Melting Fast, Says Nepal," *Financial Times*, September 1, 2009.

[8] Ian Plimer, *The Climate Change Delusion and the Great Electricity Ripoff* (Redland Bay, Queensland: Connor Court Publishing, 2017).

[9] Nils-Axel Mörner, "Sea Level Manipulation," *International Journal of Engineering Science Invention* **6** (August 2017): 48–51. ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726; Albert Parker and Clifford D. Ollier, "California Sea Level Rise: Evidence Based Forecasts vs. Model Predictions," *Ocean & Coastal Management*, July 2017.

[10] National Oceanic and Atmospheric Administration, **Earth System Research Laboratory Global Monitoring Division**, data set from **ftp://aftp.cmdl.noaa.gov/products/trends/co2/co2_annmean_mlo.txt** and **ftp://aftp.cmdl.noaa.gov/products/trends/co2/co2_mm_mlo.txt** .

[11] Data compiled by the NASA Goddard Institute for Space Studies.

[12] Law Dome Atmospheric CO2 Data, World Data Center for Paleoclimatology, and NOAA Paleoclimatology Program.

[13] Sources: National Oceanic and Atmospheric Administration, and the Permanent Service for Mean Sea Level, compiled at www.Sealevel.info.

WATERFRONT ALLIANCE

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Public Testimony
October 22, 2018
New York City Council, Committee on Environmental Protection
Re: Oversight - Resiliency in the Face of Sea Level Rise

Submitted by Roland Lewis, CEO and President
Waterfront Alliance

Waterfront Alliance is a non-profit civic organization and coalition of more than 1,000 community and recreational groups, educational institutions, businesses, and other stakeholders. Our mission is to inspire and enable resilient, revitalized and accessible coastlines for all communities.

The Challenge

Over the next century, rising sea levels and more intense storm activity associated with climate change will affect our coastal city and the region. Many neighborhoods bordering the waterfront already experience flooding and storm surges, and these events are expected to increase. The Intergovernmental Panel on Climate Change report released by the UN earlier this month has only reinforced the need to prepare our region for increased flood hazards.

The accelerating pace of sea level rise increases certainty that the 100-year floodplain is not a fixed boundary. 100,000 buildings are expected to be within the 100 year floodplain in NYC by 2050 (the length of a mortgage), and over 7,500 acres (or 13,400 residential units) are projected to be under water daily due to tidal flooding, according to DCP. Low-lying neighborhoods with historically disenfranchised populations face higher risks of hazards during and following storms.

The current political environment in Washington, DC only exacerbates the major collective challenge to invest in resilience against more intense storms and sea level rise.

US Army Corps Report and Waterfront Alliance's Position

With respect to the US Army Corps of Engineers Coastal Storm Risk Management Feasibility Study, we support the resolution introduced here today. A large scale study is needed to assess the potential solutions to adapt the New York-New Jersey harbor and waterfront to sea level rise and an increased frequency of coastal storms. It is important that this study is consistent with that need and the New York City context.

We want to underscore that there is no silver bullet to prepare for the impact of climate change on New York's waterfront. Decisions are being made every day by both public and private stakeholders about how our shorelines are developed. From policy to program to built project, there are multiple solutions, the diversity of which should match the diversity of contexts, uses, and needs exhibited by New York City's waterfront.

Future sea level rise is unequivocal. And, the degree of certainty for the range we will see in the next 50 years is high. It is recommended that the Army Corps of Engineers use moderate and high scenarios in keeping with those developed by the New York Panel on Climate Change to determine the approach taken and target design level for each strategy. We face serious impacts from regular future tidal flooding as well as storms, and this consideration, and the fact that strategies may be different for each, must be thoroughly considered.

What is possible in terms of mitigations and adaptations today?

A number of the projects being considered in the study are long term and costly. Near term strategies and tools are needed. The full range of strategies includes investments prioritizing green infrastructure when feasible, financing strategies, just transition/managed retreat, education, incentives, and improved design standards for best practices, such as the Waterfont Edge Design Guidelines developed at Waterfront Alliance.

It is a complicated multi jurisdictional landscape. That is why the Waterfront Alliance is convening a high level task force over the next several months comprised of experts from various sector to recommend climate change adaptations for our region, as well as undertake a public advocacy and education campaign.

From encouraging collaboration among adjacent landowners to develop integrated flood protection strategies to restoring wetlands and public access in the industrial south Bronx, WEDG is a powerful grassroots and professional tool for shaping a resilient coast above and beyond our existing regulatory policy.

Waterfront Governance is Complex

In our view, there is a significant need for a single manager that oversees the City's varied waterfronts. The waterfront is dynamic, requiring constant maintenance, repair, and oversight, especially in this age of

climate change. What passes for harbor governance is a complex web of city, state, and federal jurisdictions with often confusing and sometimes contradictory regulations, creating obstacles to efficient management, public use, and project planning.

There is a bill introduced in the Council, Intro 982, which would establish an Office of the Waterfront that would be responsible for coordinating among the various city agencies that handle matters related to waterfront use and would harmonize the many pieces that make up its whole. The responsibility of the Office of the Waterfront would be to simplify and raise the platform of waterfront issues, working with the City's Waterfront Management Advisory Board, a forum of expert waterfront stakeholders to advise city agencies on harbor-related policies.

Conclusion

New York City can continue be a world leader with strong and vibrant coastlines for generations to come. We look forward to working with the Council and other stakeholders to ensure that New Yorkers are able to realize that goal, despite the increasing threats posed by climate change. We thank you for the opportunity to present this testimony, and welcome any questions you may have.

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STATEMENT OF THE NATURAL RESOURCES DEFENSE COUNCIL BEFORE THE NEW YORK CITY COUNCIL COMMITTEE ON ENVIRONMENTAL PROTECTION IN SUPPORT OF RESOLUTION NO. 509

October 22, 2018

Good morning, Chairman Constantinides, and members of the Committee. My name is Robert Friedman and I'm an Environmental Justice Policy Advocate at the Natural Resources Defense Council ("NRDC"), which as you know is a national, legal and scientific non-profit organization that has been active in a wide range of environmental health, natural resource protection and quality-of-life issues around the world, and right here in New York City, since NRDC's founding in 1970. We have been engaged in the issue of climate change resilience for several decades.

In short, we support Resolution 509 to reconsider the proposals made in the Army Corps' New York-New Jersey Harbor and Tributaries Coastal Storm Management Feasibility Study to consider sea level rise in addition to storm surge.

Hurricane Michael is the latest monster storm to rip into the coastal United States; one of a string of extreme weather events that have brought destruction to countless communities—from here in New York City to Puerto Rico and beyond. And as the latest IPCC report has warned, these events will continue to wreak havoc on our communities unless we change course, quickly. The time for action is now. And yet, despite the scale of this crisis, the Army Corps' proposed alternatives to mitigate storm surges, and specifically those that include offshore barriers, miss the mark, and could cause irreparable harm to the City and the surrounding region.

To date, very little information has been provided about the five alternatives proposed in the Army Corps' Study—the publicly available information about the five proposed alternative projects is extremely general, failing to state what type of offshore barriers could be used, the height of the proposed barriers, and what types of natural features and non-structural measures will be included in each alternative. Furthermore, the Army Corps' public engagement process around their proposals has been rushed, and troubling. This paucity of detail related to the proposed alternatives makes it difficult to fully evaluate.

What we do know right now is that increased storm surge is not the only impact that will result from climate change—the New York City metropolitan area can also expect to experience sea level rise and tidal or "sunny day flooding," the direct inundation of low-lying areas, and the expansion of floodplains due to rising sea levels and higher levels of precipitation. As proposed,

the Army Corps' Alternatives, specifically, 2, 3A, 3B, and 4 address only a single dimension of the Study Area's present and future vulnerabilities.

To date, average sea levels today are 3 inches higher than levels in 1993,[1] with no sign of plateauing. According to the National Oceanic and Atmospheric Administration (NOAA), the worst-case-scenario sea level rise could be as high as 9.8 feet in the Northeastern United States by 2100.[2] In comparison, the Corps alternatives assume a worst-case-scenario of just under seven feet of sea level rise,[3] below NOAA's worst-case-scenario by almost three feet. What happens when the proposed offshore storm surge barriers overtop due to sea level rise?

Offshore storm surge barriers are not a long-term solution to the myriad coastline effects resulting from climate change—they are expensive, inflexible, harmful to the environment, and injurious to communities located close to, but outside of, the barriers.

Offshore storm surge barriers could damage our waterways, changing the natural flow of water between the Hudson and East Rivers, Long Island Sound, Jamaica Bay and the Atlantic Ocean, and cause sewage, contaminants and other pollution to accumulate along our waterfronts. They could wreak havoc on communities located outside of, and immediately adjacent to the barriers, including New York City's numerous low-income, environmental justice communities like Sunset Park, Hunts Point and East Elmhurst, which are already experiencing environmental burdens. The proposed barriers also risk restricting the habitats and migratory runs of native fish, potentially harming native species of all types, from the barnacle to the bottlenose dolphin to the endangered Atlantic Sturgeon.

There are more affordable, more localized, more dynamic, and more effective solutions to the problem, such as the construction of onshore dunes, floodwalls, levees, offshore breakwaters, wetlands, living shorelines, and reefs. These proposed solutions also address other climate change vulnerabilities, including sea level rise.

On top of all this, we cannot just treat the symptoms of climate change—we also need to treat the root problem by radically reducing climate pollution. We must do this by improving energy efficiency, transitioning to renewable energy, and ending our deadly addiction to dirty fossil fuels.

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[1] Somini Sengupta, *The Message of a Scorching 2018: We're Not Prepared for Global Warming*, N.Y. TIMES, Aug. 9, 2018, *available at* https://www.nytimes.com/2018/08/09/climate/summer-heat-global-warming.html.

[2] National Oceanic and Atmospheric Administration, *Global and Regional Sea Level Rise Scenarios for the United* States, NOAA Technical Report NOS CO-OPS 083, January 2017. This projection of so-called "extreme" sea level rise includes global mean sea level rise of 2.5 m (8.2 feet) by 2100, *id.* at 21 – 22, with an additional 0.3 – 0.5 m (1.0 – 1.6 feet) in the Northeastern United States due to ocean currents and other regional differences, *id.* at vii.

[3] U.S. Army Corps of Engineers, *New York/New Jersey Harbor & Tributaries Coastal Storm Risk Feasibility Study*, http://www.nan.usace.army.mil/Portals/37/docs/civilworks/projects/nj/coast/NYNJHATS/NJHatPres.pdf?ver=2017-10-16-141621-747

Building huge barriers to keep out the ocean sounds appealing in its simplicity. Unfortunately, solutions to complex problems like climate change are rarely so simple. And as the levee failures in New Orleans during Hurricane Katrina demonstrated, the perils of relying too heavily on a single solution can be catastrophic.

In closing, we urge the City Council to move forward with the proposed resolution. We thank you for your continued leadership to address the impacts of climate change, and look forward to continuing to work with you as we strive for climate justice in New York City.

Save the Sound®

TESTIMONY OF TRACY BROWN, DIRECTOR, SAVE THE SOUND

BEFORE THE NEW YORK CITY COUNCIL COMMITTEE ON ENVIRONMENTAL PROTECTION

HEARING: "OVERSIGHT - RESILIENCY IN THE FACE OF SEA LEVEL RISE."

OCTOBER 22, 2018

Good morning Chairman Constantinides, members of the Committee on Environmental Protection, and City Council members. I'm Tracy Brown, director of Save the Sound. Save the Sound's mission is to protect and improve Long Island Sound and its environs. I appreciate the opportunity to testify today on behalf of Save the Sound and our 30,000 supporters.

Recognizing the inextricable link between our warming planet, climate change, and water quality, Save the Sound has a Climate and Energy program. Our team provides technical expertise and leadership on issues of climate and energy policy as well as coastal resiliency. In this capacity we have been carefully tracking the US Army Corps of Engineers ("the Corps") "New York – New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study" ("the Study").[1] Save the Sound is very concerned about both the alternatives proposed by the study, and the fast-tracked process that the Army Corps is using to complete the review and approval of those alternatives (the "3x3x3 Rule").[2]

Save the Sound recognizes the urgent need for robust measures to protect coastal communities and critical infrastructure from strengthening storm surges and sea level rise. We support the stated purpose of the Study, to "manage the risk of coastal storm damage in the New York and New Jersey Harbor and tributaries study area, while contributing to the resilience of communities, critical infrastructure, and the environment."[3] However, the fast-tracking of massive projects before all the impacts – intended and unintended – have been thoroughly

[1] U.S. Army Corps of Engineers, New York/New Jersey Harbor & Tributaries Focus Area Feasibility Study, http://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/ (last visited Aug. 21, 2018) [hereinafter Project Webpage].

[2] Since February 2012, Army Corps feasibility studies have been guided by the "3x3x3 rule," which states that feasibility reports will be produced in no more than three years; with a cost not greater than $3 million; and involve all three levels of Corps review – district, division and headquarters – throughout the study process.

[3] New York – New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study, PowerPoint Presentation 3 (Oct. 2017), *available at* http://www.nan.usace.army.mil/Portals/37/docs/civilworks/projects/nj/coast/NYNJHATS/NJHatPres.pdf?ver=2017-10-16-141621-747

researched and assessed is the wrong approach. And we can't afford to get it wrong when the stakes are this high.

I have included as an addendum to my testimony, Save the Sound's public comment letter to the Corps, which currently has signatures from fifteen entities including private business interests, not-for-profits, and educational institutions. Most of the signatories will find themselves just outside the proposed barriers, where impacts of storm surges will be worsened – not improved – by the proposed structures. I urge you to read the comment letter as it provides far more detail than I can cover with my verbal testimony.

The comment letter echoes the substance of City Council Resolution 509 – calling for only the alternatives that address sea level rise *and* storm surge to move forward in the process. Based on that criteria, and in consideration of the myriad potential negative impacts of in-water surge barriers, we are only supporting one of the proposed alternatives – Alternative 5, the "Perimeter Only Solutions."

We urge the City Council, and the Army Corps, to research and support natural and nature-based features along with the shoreline measures in Alternative 5. Other approaches such as flood-proofing, raising structures, and planned retreat should also be assessed and pursued. A multipronged approach that combines these strategies, will result in a more flexible and affordable resiliency plan, one which does not externalize the costs and impact of protecting the NY/NJ Harbor and Tributaries on the outer boroughs and neighboring communities, or on to the waterbodies which are the lifeblood of New York City.

Thank you for your work on this important and urgent issue and for the opportunity to submit testimony today.

Respectfully,

Tracy Brown
Director
Save the Sound
tbrown@savethesound.org
914-574-7407

October 21, 2018

Via U.S. Mail and Electronic Mail

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RE: Scoping Comments on the New York New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study

Dear Mr. Wisemiller and Ms. Brighton,

We are submitting these comments on behalf of our respective organizations and members, institutions, and businesses located, residing, or operating on Long Island Sound. We urge the United States Army Corps of Engineers ("Army Corps") to undertake a more thorough economic and environmental analysis of the proposed alternatives, and to consider likely impacts throughout the entire affected area, including Long Island Sound. We recognize the urgent need for robust measures to protect coastal communities from strengthening storm surges and sea level rise under the reality of our changing climate. We support the stated project need and purpose of the New York – New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study ("the Study"),[1] to "manage the risk of coastal storm damage in the New York and New Jersey Harbor and tributaries study area, while contributing to the resilience of communities, critical infrastructure, and the environment."[2] However, the level of analysis and

[1] U.S. Army Corps of Engineers, New York/New Jersey Harbor & Tributaries Focus Area Feasibility Study, http://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/ (last visited Aug. 21, 2018) [hereinafter Project Webpage].
[2] New York – New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study, PowerPoint Presentation 3 (Oct. 2017), *available at* http://www.nan.usace.army.mil/Portals/37/docs/civilworks/projects/nj/coast/NYNJHATS/NJHatPres.pdf?ver=2017-10-16-141621-747 [hereinafter Study Summary PowerPoint].

assessment of the proposed alternatives completed to date is insufficient to arrive at tentatively selected plan(s).

We recognize that the Army Corps is bound by the "3x3x3 rule" for all feasibility studies, requiring their completion within 3 years, for a budget not to exceed $3 million. However, for projects with the scale and complexity of this study, an exemption from that requirement can be granted. As per this established protocol, we formally ask the Army Corps to submit and endorse an exemption request to the 3x3x3 rule for the Study and extend the alternatives analysis and assessment process to include an Environmental Impact Assessment (EIS) and complete cost-benefit analysis for each alternative. We also request that all the communities that will be impacted by the proposed alternatives, including the communities on the coast of Long Island Sound, be included in the public comment process for the upcoming Interim Report and Draft EIS, with analyses conducted throughout the entire affected area.

The issues, described further below, that must be assessed in detail in the Environmental Impact Statement and prior to the elimination of any alternatives include, but are not limited to:

- Potential deflection and induced flooding into Long Island Sound coastal communities, potential resulting harm, and necessary mitigation measures to protect these communities from even further flooding.
- Impacts on tidal flushing, as related to pollutants and sedimentation, both inside and outside of barriers.
- Impacts to fish migration, and threatened and endangered species.
- Impacts on boat and ship traffic due to increased congestion and increased velocity.
- Impacts to other coastal resiliency measures, due to location of construction and changes to waterbody channelization and flow.
- Impacts to and conflicts with existing ocean and coastal infrastructure.
- Potential disturbance of polluted sediments.
- The potential for natural and nature-based measures at the core of these alternatives, rather than merely supplementary.
- Criteria relied upon to determine location of storm barriers, including demographics of surrounding communities.

All environmental, human, and economic impacts throughout the entire affected area, including Long Island Sound and its coastal communities, must be considered. The EIS must not be limited to the artificial study area boundaries.

I. The National Environmental Policy Act Requires Meaningful Participation from the Affected Public and Robust Environmental Analysis.

The National Environmental Policy Act (NEPA) recognizes the importance of involving members of the public in decision making processes for projects that will impact the environment: "The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment."[3] Scoping is a critical stage in the NEPA process. It sets the stage for comprehensive analyses throughout the rest of the project development, as it is the "early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action."[4] "[P]ublic scrutiny [is] essential" to this process."[5] As the Army Corps materials for the Study state: "Local communities and stakeholders have valuable local knowledge and expertise and the scoping process is intended to help gather that for inclusion in the analysis."[6]

Under NEPA, the agency must consider all potential environmental impacts, not limited to those within the study area or determined by the Study's funding. The study area spans over 2,150 square miles, extending: northward up the Hudson River from New York Harbor, throughout the river's tidal and estuarine environments, to Troy, New York; westward up the Passaic River to the Dundee Dam and up the Hackensack River to the Oradell Reservoir; and eastward into the Western Long Island Sound. However, the study area stops at the Connecticut border and the City of Glen Cove on Long Island (located directly south of the New York - Connecticut border).

The impacts of this proposed project will not stop at this artificial study area boundary, rather with proposed barriers at the western end of Long Island Sound (the "Throgs Neck barrier") and the mouth of the Hutchinson River (the "Pelham Barrier"), impacts will extend into Long Island Sound and along the Westchester County, Connecticut, and Long Island coastlines.[7] Impacts must be considered throughout the entire geographic range within which they may occur. However, materials provided for the scoping process indicate that any environmental analyses will be limited to the study area, as were all the public meetings.[8]

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[3] 40 C.F.R. § 1500.1(c).
[4] 40 C.F.R. § 1501.7.
[5] 40 C.F.R.§ 1500.1(b).
[6] U.S. Army Corps of Engineers, New York – New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study, National Environmental Policy Act (NEPA) Scoping Meeting, http://www.nan.usace.army.mil/Portals/37/docs/civilworks/projects/ny/coast/NYNJHAT/NYNJHAT%20NEPA%20Scoping%20PresentationNEW.pdf?ver=2018-08-08-150005-403 [hereinafter Scoping Meeting Presentation].
[7] "Moreover, since the hydrological changes due to East River tide gates would extend as far as New Jersey and Connecticut, those states as well as villages on Long Island Sound and the Hudson River would have an opportunity to review these consequences . . . ." Douglas Hill, Robert E. Wilson & Malcolm J. Bowman, East River Tide Gates Operational Feasibility and Trade-offs 4 (Apr. 2004).
[8] *See, e.g.*, Public Information Meeting: New York and New Jersey Harbor and Tributaries Focus Area Feasibility Study Coastal Storm Risk Management, Scoping Meeting Posters 7 (July 9-11, 2018), *available at* http://www.nan.usace.army.mil/Portals/37/docs/civilworks/projects/ny/coast/NYNJHAT/NYNJHATS_All_NEPA_Scoping_Posters.pdf?ver=2018-07-06-104831-627 [hereinafter Scoping Meeting Posters] ("The Corps of Engineers is currently assessing the existing conditions in the *study area.*") (emphasis added).

The conclusions drawn for the New York-New Jersey Harbor cannot be applied to Long Island Sound. Long Island Sound will experience unique impacts due to its geography, orientation, tidal patterns, and strength of storm surge. Therefore, specific analyses must be conducted for Long Island Sound and all other affected areas, even those that extend beyond the boundaries of the study area.

The Council on Environmental Quality's implementing regulations for NEPA require that agencies "insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken."[9] The Army Corps has not provided sufficient information on the project alternatives to meet this standard. To date it has only provided an online Fact Sheet,[10] a PowerPoint presentation given at the scoping meetings available online,[11] a PowerPoint presentation of posters from the scoping meetings available online,[12] and a PowerPoint presentation summarizing the Study, which is largely repeated in the scoping presentations.[13] The PowerPoint slides include only low-quality, "zoomed out" maps of the entire project area, such that specific details cannot be discerned. The maps are also missing critical information, such as other post-Hurricane Sandy resilience projects planned and underway. These omissions render the maps misleading, as the cumulative impacts of those plans with the proposed project alternatives are not represented. It is unclear if the cost-benefit analysis currently underway will include the other ongoing and planned resiliency projects.

We acknowledge the recent efforts by the Army Corps to improve the public involvement process, by adding scoping meetings in Brooklyn, Westchester County, and Long Island. These additional meetings are critical for ensuring that these communities throughout the impacted area are informed about the project and can voice their concerns. However, these new meetings were announced with limited notice, likely limiting the attendance by the public. The meetings were also not tailored to the specific communities where they took place, therefore they were not ideal for eliciting local knowledge or focusing on local impacts. The Army Corps still has not held or scheduled any meetings in Connecticut. We request that the Army Corps hold public meetings throughout the entire affected area and provided sufficient notice to members of the public after the Interim Report and Draft EIS are released in 2019 and 2020, respectively. These meetings should be scheduled well in advance of their occurrence, and not in a piecemeal fashion as they were throughout this scoping process.

The Army Corps stated that they expected to narrow down the alternatives to one or two by this fall (potentially within a month of the conclusion of the scoping comment period) with the

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[9] 40 C.F.R. § 1500.1(b).
[10] U.S. Army Corps of Engineers, FACT SHEET - New York/New Jersey Harbor & Tributaries Focus Area Feasibility Study, http://www.nan.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/644997/fact-sheet-new-yorknew-jersey-harbor-tributaries-focus-area-feasibility-study/ (last visited Sept. 13, 2018) [hereinafter Fact Sheet].
[11] Scoping Meeting Presentation, *supra* note 6.
[12] Scoping Meeting Posters, *supra* note 8.
[13] Study Summary PowerPoint, *supra* note 2.

issuance of the Draft Feasibility Report and Environmental Impact Statement. We acknowledge and appreciate the critical extension of this timeline. The Army Corps has stated that they will only issue an Interim Report in January 2019, with all alternatives still under consideration. Only after the issuance of the Draft EIS and Feasibility Study in winter of 2020 will the alternatives be narrowed down. This allows for the public to meaningfully participate in the NEPA process before the majority of the alternatives will be eliminated from consideration, ideally avoiding the elimination of the alternative that best meets the project needs and also minimizes environmental impacts. This new timeline better supports the purpose of NEPA – to conduct fully-informed decision making, including considerations of the environment and concerns of the public. We request that the Army Corps clearly articulate the purpose of the Interim Report to the public so that it can be understood in the context of the overall timeline. We further request that the Army Corps determine the format and timeline for public involvement that will occur after the Interim Report is issued, given that this will not be dictated by statutory requirements. Clear notice will allow the public to best plan and participate in this process.

II. Long Island Sound and Its Coastal Communities Will Likely Experience Unique Harmful Impacts Which Must Be Identified and Addressed.

The construction of in-water storm barriers across Western Long Island Sound near Throgs Neck (Alternatives 2 and 3A) and at the mouth of the Hutchinson River (Alternatives 3A, 3B, and 4) poses serious threats to the health of Long Island Sound and the safety of multiple coastal communities. Some of these impacts will also occur elsewhere as a result of the other proposed in-water storm barriers, but we are focusing our comments on Long Island Sound communities in this section.

a. Sea barriers will likely result in induced flooding in "outside the barrier communities" from the deflection of storm surge and other adverse impacts on quality of life.

The very purpose of storm surge barriers is to deflect the force of the storm surge to prevent it from reaching areas within its protections. Logically, that deflected storm surge will then move into areas outside the barrier, resulting in increased flooding for neighboring "outside" coastal communities. As Catherine Seavitt Nordenson, Associate Professor of landscape architecture at CCNY's Spitzer School of Architecture, explained in reference to storm barriers: "If you mitigate to protect Lower Manhattan, you increase the impact in other areas. Everyone outside of the surge protection zone would be in jeopardy because the water doesn't get reduced, it just goes somewhere else."[14] These communities will, therefore, not only be faced with the sea level rise and increased storm surge that the Study aims to protect against because they are not inside the barriers, but they will also face additional flooding that results from these structures.

[14] "Storm Surge Barriers for Manhattan Could Worsen Effects on Nearby Areas: Other Options Proposed," Science Daily, Nov. 19, 2012, https://www.sciencedaily.com/releases/2012/11/121119163504.htm. *See also* PlaNYC, A Stronger, More Resilient New York 49 (2013), *available at* https://www.nycedc.com/resource/stronger-more-resilient-new-york

A 2004 report titled "Hydrologic Feasibility of Storm Surge Barriers to Protect the Metropolitan New York – New Jersey Region," authored by Malcolm J. Bowman, et al., considered the "additional rise in water level outside [a] barrier" located at Throgs Neck.[15] The study used simulations that relied on data from Hurricane Floyd, which was only the strength of a tropical storm when it struck this region, and the December 2002 nor'easter.[16] The report found that if a barrier at this location is closed during storms of the aforementioned scale, "peak water levels on the outside [of] the barrier [will be raised] an additional 0.28 meters," or one foot.[17] Resulting additional sea level rise reaches as far east as Stamford, Connecticut, and Oyster Bay, New York, with the effect decreasing eastward throughout Long Island Sound.[18] A 2013 analysis, published by the American Society of Civil Engineers, expands upon this 2004 Bowman et al. report.[19] This analysis concluded that a barrier located at Throgs Neck, when faced with a Category 4 hurricane, would result in a sea level rise of an additional two feet outside of the barrier.[20] An additional foot or two of sea level rise during a storm event could result in an exponential increase in flooding and resulting damage and risk to human safety and well-being.

The deflection of storm surge will not only flood nearby communities, but it will also increase the erosion and scour of coastlines – potentially undermining other shoreline natural measures put in place to protect against sea level rise and storm surge. The entire hydrology of Long Island Sound, and the study area, will be altered, with changing velocity and circulation – even with the barriers open.[21]

The potential deflection and its impacts on "outside" communities must be studied in careful detail. Consideration should be given to the demographics of communities that will be subjected to deflection, especially those immediately adjacent to the barriers that will likely also suffer a reduction in quality of life brought about by a potential decline in property values, and disruptions from the construction and operation of the barriers. If in-water storm barriers are constructed, there must be corresponding measures taken to protect against, or compensate for, the negative side effects in "outside" communities. These measures should be included as part of each alternative that has in-water storm barriers and factored into the cost-benefit analysis.

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[15] Malcom J. Bowman et al., Hydrologic Feasibility of Storm Surge Barriers to Protect the Metropolitan New York – New Jersey Region, Summary Report 12-15 (Nov. 2004). *See also* Hill et al., East River Tide Gates Operational Feasibility and Trade-offs, *supra* note 7, at 6.
[16] Bowman et al., *supra* note 16, at 6.
[17] *Id.* at 15.
[18] *Id.* at 14.
[19] Michael J. Abrahams, *East River Storm Surge Barrier*, in Storm Surge Barriers to Protect New York City 182 (Douglas Hill, Malcolm J. Bowman & Jagtar S. Khinda eds., 2013).
[20] *Id.* at 184.
[21] *See, e.g.*, Feasibility of Harbor-wide Barrier Systems: Preliminary Analysis for Boston Harbor 48-71 (May 2018), *available at* https://www.greenribboncommission.org/wp-content/uploads/2018/05/Feasibility-of-Harbor-wide-Barriers-Report.pdf [hereinafter Boston Harbor Barrier Analysis].

b. *Sea barriers in Western Long Island Sound will restrict tidal flushing and alter patterns of exchange between fresh and salt water, and sedimentation.*

Barriers in Western Long Island Sound will alter the hydrology of the Sound both when open and closed, impacting the tidal flushing of pollutants and sediment, and altering the exchange of fresh and salt water. These impacts are not unique to the proposed Throgs Neck barrier in the Western Sound, and will also occur as a result of the other proposed barriers. However, the impacts must be considered at each specific structure, as well as the compounded impacts from multiple barriers throughout the region choking the network of water bodies. In-water barriers will change the tidal circulation and velocity as water is channeled through the openings. The study conducted to examine the feasibility of storm barriers in Boston harbor ("the Boston barrier analysis") concluded that the water levels inside and outside of the proposed barriers would remain the same – "[t]he volume of water entering or exiting the harbor over a tidal cycle is the same with or without the barrier (with gates open) in place."[22] Therefore, the same volume of water that moves with each tidal cycle would consequently be traveling through narrower channels and at a greater velocity when the barrier is in place.[23] "[F]low fields will be modified. Tidal velocities at the storm surge barriers will increase while the barriers are opened and the same volume of water that now makes up the tidal prism is forced through a smaller cross-sectional area."[24]

Tidal exchange and circulation is critical for the flushing of pollutants and sediment distribution. Yet, alterations to tidal currents and velocity will impact how pollutants and sediment are distributed both inside and outside of the barriers.[25] While the velocity may increase where water is moving through the gates, there may also be areas where water becomes stagnant, such as the areas immediately adjacent to the barriers. In these areas of stagnation, sediment and pollution may aggregate. The Boston barrier analysis conducted particle tracking simulations and found large areas of stagnation along the barriers.[26] Similar analyses must be conducted for the proposed barriers in Western Long Island Sound, and throughout the study area to determine possible impacts of stagnation and localized aggregation of pollution and sediment, and subsequent harm to humans and the environment. The analysis must include consideration of the communities that are adjacent to the expected areas of stagnation. Subjecting communities to highly concentrated pollution poses environmental justice concerns. Further, the aggregation of sediment may impact the necessary maintenance required for the operation of the barriers.

Researchers reviewing the New Bedford, Massachusetts storm barrier found that sediment buildup behind the barrier was increasing and water exchange was reduced.[27] They referenced a

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[22] *Id.* at 55-57.
[23] *See, e.g., id.* at 59 figs.5.9, 5.10, 5.11.
[24] Abrahams, *supra* note 20, at 126.
[25] *See e.g.*, Boston Harbor Barrier Analysis, *supra* note 22, at 63-64 figs. 5.13, 5.14, 5.15.
[26] *Id.* at 65.
[27] John Winkelman, New England District, Army Corps of Engineers, Pers. Comm. (Dec. 15, 2006).

barriers when they are open.[32] The stated purpose of the Study includes mitigating both the impacts of storm surge and sea level rise, and the alternatives include both storm barriers and "conceptual shoreline based measures." Very little detail has been disseminated with regard to the conceptual measures, yet in reality they will be critical as the only defense proposed in the Study to protect against sea level rise. Shoreline measures and natural/nature-based measures must be at the heart of any project, not an afterthought.

Not only will the expensive and massive storm barriers do nothing to protect against sea level rise, but they will also lose effectiveness as the sea level continues to rise over time. With higher sea levels, the storm barriers will have to be closed for smaller and smaller storms. In time, they would have to be closed so frequently that they could no longer be effective. The Boston barrier analysis concluded that "[i]n the early years of operation the frequency of closure of a barrier would be no more than a few times per year. Because of rising sea levels, and assuming the system was designed to be closed each time the water level is above the level of protection provided by shore-based measures, after 50-60 years the frequency of closure would have increased so much that the barrier could no longer function as designed."[33] The Boston Harbor barriers functionality ranged between only 20 years to 60 years after construction, depending on date of construction and other shoreline projects installed.[34] Certain projections showed that by 2070, the gates would be closed 50 to 100 times per year.[35] The more often the gates are closed, the more intense the associated environmental, social, and economic impacts of closed barriers, described above, will be. This enormous investment, targeting only one coastal impact, has a shockingly short lifespan.

Finally, the Army Corps has stated that the states would be liable for the cost of maintenance of these storm barriers. Maintenance costs would include the removal of built-up sediments that would prevent the functioning of the gates, as well as other mechanical maintenance and upkeep. This cost to the states could be considerable, and would reduce resources available to continue to invest in other climate change adaptation measures that will be necessary to assist where the storm barriers fail to protect coastlines.

V. Recommendation: Focus on Shoreline-Based Measures That Address Both Sea Level Rise and Storm Surge

The environmental and human harm that the proposed in-water storm barriers would cause cannot be justified by their limited effectiveness, short life span, and massive price tag. While urgent and aggressive action is needed to cope with the effects of climate change on our coastal region, Alternatives 2, 3A, 3B, and 4 are not the best course of action. Further, this urgency does

[32] Boston Harbor Barrier Analysis, *supra* note 22, at 55-57.
[33] *Id.* at 71.
[34] *Id.* at 68.
[35] *Id.*

not override the need to properly conducted meaningful public participation and environmental analyses.

Of the alternatives presented, Alternative 5, which consists of shoreline ("Perimeter Only") solutions, is the only alternative we support exploring. We urge the Army Corps to include natural and nature-based features with the shoreline measures in Alternative 5. Nonstructural approaches such as flood-proofing, raising structures, and planned retreat should also be pursued and reflected in the Army Corps plans, along with all other post-Hurricane Sandy resilience projects planned and underway. This multilayered approach, combined with a public engagement process that includes all the impacted communities, will result in a more flexible and affordable resiliency plan that does not externalize the serious costs and impact of protecting the NY/NJ Harbor and Tributaries on its neighbors or on the waterbodies which are its lifeblood.

Thank you for your consideration of these comments.

Respectfully Submitted,

Tracy Brown, Director, Save the Sound
Adrienne Esposito, Executive Director, Citizens Campaign for the Environment
Dr. Sarah C. Crosby, Marine Ecologist, Resident of Greenwich, CT
Mystic Aquarium
Carol DiPaolo, Programs Director and Water-Monitoring Coordinator, Coalition to Save Hempstead Harbor
David Spader, Secretary, Board of Directors, Kuder Island Colony, Inc.
Jack Brewer, Founder of Brewer Yacht Yards, Co-Founder of Safe Harbor Marinas
Douglas Manor Environmental Association
Ana Paula Tavares, Executive Director, Audubon New York
Kathryn Heintz, Executive Director, NYC Audubon
Anne Swaim, Executive Director, Saw Mill River Audubon
Sandra Morrissey, President, Bronx River – Sound Shore Audubon Society
Peggy Maslow, President, North Shore Audubon Society
Hutchinson River Restoration Project
[Additional sign-ons]

CC: U.S. Senator NY, Charles Schumer
U.S. Senator NY, Kirsten Gillibrand
U.S. Senator CT, Richard Blumenthal
U.S. Senator CT, Christopher Murphy
U.S. Representative NY District 1, Lee Zeldin
U.S. Representative NY District 3, Thomas Suozzi

U.S. Representative NY District 4, Kathleen Rice
U.S. Representative NY District 5, Gregory Meeks
U.S. Representative NY District 6, Grace Meng
U.S. Representative NY District 7, Nydia Velázquez
U.S. Representative NY District 8, Hakeem Jeffries
U.S. Representative NY District 9, Yvette Clarke
U.S. Representative NY District 10, Jerrold Nadler
U.S. Representative NY District 11, Daniel Donovan, Jr.
U.S. Representative NY District 12, Carolyn Maloney
U.S. Representative NY District 13, Adriano Espaillat
U.S. Representative NY District 14, Joseph Crowley
U.S. Representative NY District 15, José Serrano
U.S. Representative NY District 16, Eliot Engel
U.S. Representative NY District 17, Nita Lowey
U.S. Representative NY District 18, Sean Maloney
U.S. Representative NY District 19, John Faso
U.S. Representative NY District 20, Paul Tonko
U.S. Representative NY District 21, Elise Stefanik
U.S. Representative CT District 4, James Himes
U.S. Environmental Protection Agency, Long Island Sound, Director, Mark Tedesco
NY Department of Environmental Conservation, Commissioner, Basil Seggos
CT Department of Energy & Environmental Protection, Commissioner, Rob Klee
NJ Department of Environmental Protection, Commissioner, Catherine McCabe
New York City, NY, Mayor, Bill de Blasio

Testimony of Jonathan Goldstick, PE
on behalf of
The Metro NY-NJ Storm Surge Working Group

Before the
New York City Council
Committee on Environmental Protection

on
City Council Resolution 0509-2018
Monday, October 22, 2018

Good morning Chairman Constantinides and committee members. I am Jonathan Goldstick, a Registered Professional Engineer who specializes in waterfront issues, and I am here to address the proposed resolution on behalf of the Metro NY-NJ Storm Surge Working Group. We are an affiliation of professionals dedicated to exploring regional approaches to reduce the risks to the greater Metropolitan Region from flooding due to ocean storm surges, climate change and rising sea levels.

We have reviewed the resolution and agree with the assumption contained within it that the limited information provided to the public by the Army Corps of Engineers is not sufficient to allow the public to comment on a number of issues.

However, we're troubled by a number of other premises that are either not factual or can be misleading, and I'll summarize those in a moment. But, more important, even if were to accept all of the statements as correct, we can't understand the logic behind the resolution. In short, the resolution states that Sandy was a devastating event and some of the options the Corps is studying to reduce the risk of future events include surge barriers. Because these storm surge barriers could have negative environmental impacts, the City Council calls upon the Corps to reconsider its proposals by including consideration of sea level rise in its study. But the Corps already intends to study environmental impacts and the Corps already considers sea level rise when formulating proposals. While this lack of clarity alone should be enough to amend or withdraw this resolution, I'd like to address our issues with some of the premises contained in the resolution.

First is the statement that surge barriers, flood walls and levee systems do not address sea level rise. A preliminary conclusion of a Hudson River Foundation study released by researchers at the Stevens Institute of Technology and the Woods Hole Oceanographic Institution was that a large storm surge barrier would decrease the tidal range in the Hudson River. While this absolutely will have many impacts, one is that it reduces the high tide elevation in areas behind the barriers, even when they are open, counteracting some of the impact of sea level rise.

Next are two statements that no coastal risk management project can eliminate the risk of flooding and that in-water barriers could have adverse impacts. Both of these statements are true, but they imply that the other risk reduction strategies being considered by the Corps have lower impacts. Because all of the options have different impacts and provide different benefits, the Corps has a rigorous process for comparing the costs – from construction costs to environmental impacts – to the benefits, which could include the infrastructure that is not damaged, the lives that are not lost, and the costs related to business interruptions. The Storm Surge Working Group believes that it is extremely important to ensure that accurate cost and benefit data is used for all of the options to allow comparisons to be made among them.

The final statement I'd like to address is that storm surge barriers would "restrict natural flushing, …causing contamination to once again be concentrated in New York Harbor." While this is certainly a possibility, scientists have also proposed timing the opening of barriers to increase flushing and improve water quality.

In at least two recent public presentations with their partners – The Mayor's Office of Recovery & Resiliency and New York State DEC – the Corps has stated that the study will incorporate sea level rise in their analyses and design. While the Corps' Feasibility Study does not include an evaluation of sea level rise generally on the study area, the City already conducted such an evaluation in 2013 and is now studying, designing, and building flood walls and other measures to protect communities from sea level rise.

The City needs to+ be protected from both sea level rise and storm surge. Therefore, we believe that it is appropriate for the Corps and the City to cooperate in a two-tiered approach in which the Corps focuses on measures to address storm surge while the City acts to protect neighborhoods from sea level rise.

In closing, there are flaws in the resolution and it is calling upon the Corps of Engineers to do something that it is already doing, namely incorporating sea level rise in their analyses and design. The Storm Surge Working Group would recommend that the resolution be modified to call upon the Corps to provide the level of detail that an informed public requires, including environmental analyses, and to call upon the City Administration to prioritize shoreline projects designed to protect communities from the effects of sea level rise.

Thank you very much for the opportunity to testify.

The Municipal Art Society of New York
MASNYC

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September 26, 2018

MAS Comments to the U.S. Army Corps of Engineers on the New York and New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study

The Municipal Art Society of New York (MAS) finds the alternatives proposed by the U.S. Army Corps of Engineers (USACE) for the New York and New Jersey Harbor Regional Storm and Tributaries Coastal Storm Risk Management Feasibility Study ("Feasibility Study") to be patently inadequate as long-term protection to coastal storm risks for a number of reasons.

In general, we find the USACE's structural approach to storm resiliency identified in the Feasibility Study to be self-defeating in the battle against the effects of climate change.

In the event that the massive in-water barriers are constructed, tens of thousands of properties would still face risks on a daily basis due to future tidal flooding. Despite the enormous financial investment in infrastructure, the barriers would fail to protect residents and property in the long-term and would have long-lasting, wide-spread adverse ecological consequences.

We also find the alternatives as proposed directly contradict the recommendations in the USACE's own *Hudson-Raritan Estuary Comprehensive Restoration Plan (Restoration Plan).* In stark contrast to the massive structural approaches offered in the Feasibility Study, the *Restoration Plan* supports natural ecosystem restoration programs, increasing awareness of resiliency within coastal communities, and protecting valuable infrastructure and property against the impacts of future storms.

Furthermore, for a project of this magnitude, we find the public outreach efforts and level of detail in the information provided by the USACE to be woefully insufficient. At a minimum, we expect the USACE to hold additional informational meetings with effected communities before moving forward with this project. The fact that the deadline for submitting scoping comments for the Feasibility Study has been moved twice reflects the inadequacy of the outreach effort thus far.

Background

In the aftermath of Superstorm Sandy in 2012, MAS brought together leaders, government officials, grassroots community organizers, academics, and a host of other community stakeholders and planning practitioners in a series of forums, meetings, and programs to find ways to improve resiliency in light of the impacts of climate change in the New York City area. Between 2012 and 2015, MAS organized over 25 events, which provided a robust forum for the sharing of information concerning resilience planning throughout New York.

These efforts helped identify four guiding principles: transparency, collaboration, inclusivity, and scalability. MAS maintains that adherence to these principles is critical to ensuring that New York City's resiliency efforts meet the needs of all New Yorkers. These principles and recommendations are further explained in the 2013 MAS report, *All Hands on Deck: Mobilizing New Yorkers for a Livable and Resilient City*.

Comments on Feasibility Study

Hudson-Raritan Estuary Comprehensive Restoration Plan
The *Hudson-Raritan Estuary Comprehensive Restoration Plan* (*Restoration Plan*) was a collaborative effort between the USACE, the Port Authority of New York and New Jersey, and the New York – New Jersey Harbor & Estuary Program that supported restoration programs designed to improve ecological conditions in Hudson-Raritan Estuary. The *Restoration Plan* includes non-structural methods such as wetland creation and restoration, habitat enhancements, coastal and maritime forest restoration, oyster reef habitat creation and other methods identified in the CRP.

In contrast, the structural alternatives presented in the *Feasibility Study* directly conflict with the methods outlined in the *Restoration Plan*. We question why the *Feasibility Study* focuses predominantly on massive structures within the region's waterways and largely ignores the ecologically sound solutions supported in the *Restoration Plan*.

Flood Risk: Sea Level Rise and Heavy Rainfall Events
MAS firmly believes that the proposed alternatives in the *Feasibility Study*, particularly those that include large-scale, in-water barriers (Alternatives Nos. 2, 3A, 3B, and 4) would fail to meet the aforementioned recommendations. Although large-scale, in-water barriers would provide temporary protection against storm surges, they will not be sufficiently flexible or adaptive to address long-term sea level rise.

Our position is supported by the New York City Economic Development Corporation (NYCEDC) in its 2013 report *A Stronger, More Resilient New York*, which states "*since the barriers would be open most of the time (to allow navigation), it would represent a major public investment that would end up doing nothing to address the growing problem of rising sea levels*."

Research conducted by the New York Panel on Climate Change (NPCC) also supports NYCEDC's concerns. Based on the NPCC projections, as many as 43,882 properties in New York City could be affected by daily tidal inundation due to sea level increasing by year 2100 (See Figures 1 and 2).[1] Moreover, according to NYC Department of Finance, the assessed total value of these properties for fiscal year 2018 is over $52 billion, almost as much as all the real estate in Staten Island ($63 billion) or the Bronx ($61 billion). Therefore, MAS believes that the USACE should factor the value of properties affected by sea level rise into the economic assessment, a critical component of the *Feasibility Study*.

According to the NPCC, by year 2100 sea level could increase as much as 75 inches and storms of the magnitude of Sandy could eventually overtop the in-water barriers proposed by the USACE. Once constructed, the system of gates and walls could not be easily modified or heightened. Accordingly, we find it irresponsible to invest in infrastructure that would fail to maintain protection over a long period of time. Instead, MAS believes that onshore, adaptive levees, dunes, floodwalls, and coastal green infrastructure built and modified as needed over time, are a more rational and cost-effective alternative to purely structural resiliency approaches.

Storm surge barriers, as proposed in alternatives 2, 3A, 3B, and 4, would not reduce flood risk resulting from heavy rainfall and may actually increase risk resulting from "back flooding" by limiting water flow

[1] New York City Panel on Climate Change 90th percentile projections for future tidal flooding due to sea level rise in year 2100 – based on a Sea Level Increase of 75 inches.

back to waterways. As seen during Hurricane Irene in August 2011, much of the damage in New York occurred due to extreme precipitation in inland areas.

According to the National Climate Assessment, the amount of precipitation falling during very heavy events has increased 71 percent in the northeast region of the U.S.[2] Moreover, climate change will likely have a potentially dangerous effect on the water cycle. Warmer atmospheric temperatures hold more moisture, leading to even more intense precipitation events, a trend already observed in the New York region. As such, storm surge barriers could increase flooding in inland areas caused by extreme precipitation.

Renowned geophysicist Dr. Klaus H. Jacob, provides further explanation as to why massive in-water barriers are a bad idea for mitigating flood risk: "*Barriers create short-term benefits and delayed long-term liabilities, if not a disastrous, delayed, long-term coastal havoc. They would create intergenerational inequity by protecting us in the short term, reaping benefits for waterfront development for a few decades, while making our children and grandchildren pay the price for our reckless selfish behavior.*"

Water Quality and Waterbody Impairment
Even though there has been significant progress in improving the water quality of New York harbor and its tributaries, the issue remains a very significant problem for New York City and for many of its surrounding municipalities.

New York City has over 20 waterbodies that do not meet federal water quality standards and are currently classified as impaired by the New York State Department of Environmental Conservation (NYSDEC). Large-scale in-water barriers, as proposed in alternatives 2, 3A, 3B, and 4, will restrict tidal flow, sediment transport, and migration of fish, which will further worsen the water quality conditions.

Unrestricted tidal exchange is essential for transporting sediments and flushing out contaminants. If tidal exchange is restricted, sewage and other contaminants would flush to the ocean at a slower pace, resulting in more pollution in already impaired waterbodies. Higher nutrient levels would lead to more frequent algae blooms and lower dissolved oxygen essential for aquatic life. Moreover, with more accumulated sedimentation, the harbor would require much more dredging to maintain shipping channels. MAS believes that onshore solutions such as adaptive levees, dunes, and floodwalls will not have indirect negative impacts on water quality.

On this issue, the 2013 NYCEDC report noted "*the possible hydrodynamic and environmental impacts (on fish migration, siltation, river flow, and water quality) of harborwide barriers are likely to be substantial, are not yet known, and would require extensive study, potentially derailing or requiring substantial redesign of the project.*"

Funding and Maintenance
According to information provided by USACE, the barrier projects would cost an estimated $10 billion to $36 billion to build, and $100 million to $2.5 billion to maintain every year. The USACE has stated that maintenance and operation costs would NOT be covered by the federal government. Instead these costs will fall on local municipalities.

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[2] U.S. Global Change Research Program, 2014. Heavy rain events defined as the top 1% of daily events between 1958 and 2012.

MAS finds it unacceptable to saddle local communities with the burden of astronomical infrastructure expenditures that ultimately would still leave thousands of properties and people at risk and lead to potentially harmful impacts on water quality and marine habitat.

Conclusion

The fact that the alternatives proposed by the USACE directly contradict the approaches outlined in the USACE's *Restoration Plan* cannot be ignored. They also fail to recognize the basic principles and recommendations that a wide range of experts and citizens alike have agreed upon regarding storm surge and climate change resiliency. In many ways, the USACE is doing directly the opposite.

In consideration of the magnitude of the proposed structures, the astronomical cost that communities would face, and the potential ecological destruction that could occur, MAS finds the USACE's community outreach efforts and information provided to be woefully inadequate.

We urge the USACE to move the deadline for comments until substantial additional public input is gleaned through a rigorous public outreach program and additional meetings in affected communities.

Without effective community engagement, the project will fail to respond to the needs of the people most likely to be affected by the impacts of these structures, storm surge and climate change. Therefore, we urge the USACE to reconsider the proposed alternatives and engagement strategy.

Thank you for the opportunity to comment on this vitally important proposal.

Testimony of the Bronx River Alliance before the New York City Council
Environmental Protection Committee Hearing
October 22, 2018

Re: Resolution for the US Army Corps of Engineers to reconsider the proposals made in the NY - NJ Harbor and Tributaries Coastal Storm Risk Management Feasibility Study

Thank you for allowing the Bronx River Alliance to testify today regarding the U.S. Army Corps of Engineers' (USACE) proposed storm surge barriers in the New York – New Jersey Harbor and Tributaries (NYNJHAT) Coastal Storm Risk Management Feasibility Study.

The Bronx River Alliance serves as a coordinated voice for the river and works in harmonious partnership with more than 100 organizations and agencies to protect, restore, and improve the Bronx River as an ecological, recreational, educational, and economic resource for the communities through which the river flows. Each year through our diverse programming, we engage over 1500 paddlers, 2000 students and educators, and thousands of volunteers who come in contact with the river, some for the first time. Through our Ecology program, we restore habitat for local diadromous fish, including river herring and American eel, and have spent considerable time and resources on reestablishing their populations in the Bronx River.

We are deeply concerned about the significant environmental impacts and other consequences that could result from the storm surge barrier alternatives, particularly the four that include in-water barriers throughout New York Harbor and the Throgs Neck. These four plans (Alternatives 2, 3A, 3B and 4) threaten to permanently damage our local waterways and their wildlife by significantly restricting the migrations of species essential to our ecosystem – namely striped bass, Atlantic sturgeon, river herring, shad, and American eel. In-water barriers would significantly restrict tidal exchange essential to moving sediment and flushing contaminants from the New York Harbor and Long Island Sound, resulting in higher concentrations of contamination and sewage, and more pollution in our already contaminated harbor and waterways. Studies must evaluate the potential effects on all the affected water bodies, including the Bronx River, New York Harbor, and Long Island Sound, and must examine how the impacts would vary over the life of any structures, particularly projecting centuries into the future.

The Corps must provide more detail about the alternative plans, including the size and number of all ship and tidal exchange gates in all barrier alternatives, and the sea level threshold for closure of the gates. The maps shared with the public offer too little information to make effective scoping comments, particularly because the potential impacts of these plans are enormous. The public has not been provided an extensive enough opportunity to become informed and provide feedback on these plans, and the only alternatives are expensive and create significant hydrologic manipulation of the NY-NJ Harbor Estuary area. The Corps should take into consideration the effects on our ecosystems in its evaluation of the current array of alternatives and propose more "green" alternatives that also serve as adaptation measures and shoreline protection essential to protecting our area against flooding from sea level rise. We request that no plan be advanced unless it addresses flooding from both storm surge and sea level rise.

Specifically we request that you study effects on the following:

- Tidal range / regime and flow velocity
- Endangered, threatened, and special-concern fish and wildlife species (both federally and state designated) in the New York Bight and in the Bronx, Hackensack, River, and Raritan rivers; Meadowlands; Jamaica Bay; and Long Island Sound
- Abundance of all native and currently existing fish and bird species, including migratory patterns
- Abundance and distribution of all mollusk species throughout the study area
- Current and potential commercial and recreational fisheries, commercial shipping, and recreational boating
- Vegetation (subaquatic and intertidal)
- Habitat for fish, birds, and other wildlife
- Sedimentation rates, scour, and elevation in the rivers, bays, and harbor
- Changes in contamination levels both in the water and in river and harbor sediments
- Rate at which PCBs and other contaminants will be transported from the rivers and harbor to the sea
- Water quality in the harbor, rivers, and bays, particularly dissolved oxygen, salinity, temperature, and nutrient levels throughout the study area
- Frequency of algae blooms throughout the study area, especially those which are toxic to humans and/or fish and wildlife
- The degree and cost of wastewater treatment required to comply with the Clean Water Act, in light of reduced tidal exchange / flushing
- Induced coastal flooding or deflection of storm surge to areas adjacent to any barrier alternatives
- Back-flooding inland of any barriers due to heavy rain events
- Cost to state taxpayers for future operation and maintenance of ship and tide gates in any barriers

Given the enormous and perpetual consequences that would result from the project alternatives listed in the NYNJHAT Feasibility Study, any initial selection or prioritization of alternatives is unconscionable without knowledge of the full range of impacts. Thank you for your consideration and your service.

Hello, my name is Rebecca De La Cruz, the Environmental Program Associate for Scenic Hudson. On behalf of our organization, we would like to thank you for the opportunity to provide comments regarding the City Council of New York Resolution Number 509.

We commend the City Council of New York for considering Resolution 509, calling on the United States Army Corps of Engineers (USACE) to reconsider the proposals made in the New York - New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study to address sea-level rise in addition to storm surge. Scenic Hudson is a 501(c)(3) organization based in Poughkeepsie, NY and owns over 1,000 acres of land along the river's edge. Our organization has studied the potential impacts of flooding, storm surge and sea-level rise on Hudson waterfront communities since 2006. Notably, Scenic Hudson's online sea-level rise mapping tool offers cutting-edge models to project how sea-level rise will affect the Hudson's tidal wetland habitats.[1] This tool has been used by conservation groups and local governments across the state to inform decisions that reduce risks to people, property and nature and make Hudson River shorelines resilient for future generations. Our Conservation Science staff has worked directly with officials and citizens in several communities to convene waterfront resilience task forces. With our support, upriver communities of Kingston, Piermont and Catskill have been able to accurately assess their risks, understand their options and begin planning for safe, secure and vibrant waterfronts in the future. Finally, staff co-authored a report detailing the effects of sea-level rise on the resilience and migration of tidal wetlands along the Hudson River.[2]

While we are generally supportive of the USACE effort to manage the risk of coastal storm damage, we are concerned that some of the proposed Coastal Storm Risk Management (CSRM) alternatives the USACE is considering could dramatically— and permanently— harm the Hudson River ecosystem while doing nothing to address the ongoing and long-term damages caused by sea-level rise.

It is our understanding that the CSRM alternatives include sea-level rise projections as they relate to storm surge risk reduction; however, the alternatives would not address sea-level rise independent of severe storm events. Specifically, open barriers would do nothing to alleviate daily coastal inundation and tributary flooding. In their closed state, barriers could exacerbate flooding for upstream communities when storms bring both coastal surge and heavy rain and run-off. Water flow, including fresh water discharge and tidal regimes, will affect sediment transport/deposition, salinity, and potentially, contaminant levels and dynamics. Altered sediment deposition and tidal regimes may compromise the natural ability of the Hudson River Estuary's tidal wetlands to adapt to sea-level rise by migrating vertically or horizontally.

This year the Hudson River Foundation and the New York – New Jersey Harbor and Estuary Program commissioned a preliminary evaluation of the potential physical influences that large barriers could have on the estuary.[3] The report found that storm surge barriers could potentially alter the Hudson River estuary ecosystem during non-storm conditions. Modeling scenarios were conducted to evaluate potential impacts resulting from fixed infrastructure across the estuary-ocean entrance. Findings from the report indicate more restrictive barriers would lead to stronger tidal currents and mixing near barrier openings, a reduction in tidal range, currents, and mixing throughout the estuary, an increase in stratification, and greater salinity intrusion. Although findings from this report are preliminary, they provide a credible baseline for further study to evaluate the physical changes resulting from surge barriers in the Hudson River estuary.

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[1] http://www.scenichudson.org/slr/mapper

[2] https://www.scenichudson.org/sites/default/files/tabak-et-al-2016.pdf

[3] http://www.hudsonriver.org/download/surge_barrier_report_V9.pdf

In summary, Scenic Hudson fully supports Resolution Number 509 calling on the USACE to reconsider the proposals made in the New York - New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study pursuant to the National Environmental Policy Act (NEPA) to consider sea rise in addition to storm surge. Scenic Hudson also requests that the New York City Council call on the USACE to prioritize the study of shoreline-based measures that have the potential to help address sea-level rise, and exclude in-water barrier alternatives that do not offer protection from daily inundation resulting from sea-level rise. In addition, given the unique ecology and hydrology of the Hudson River and that the New York New Jersey Harbor and Tributary was identified as the "largest and most densely populated high risk area" out of nine identified in North Atlantic Comprehensive Coastal Study, Scenic Hudson urges the New York City Council to request that the USACE exempt the New York New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study from the "3x3x3 rule." As per the established protocol, the District Commander must submit this request and it should be endorsed to the Senior Leaders Panel by the Major Subordinate Command (MSC) Commander. Finally, we urge the New York City Council to call on the USACE to take into consideration the perspective of the Hudson's waterfront communities, a dozen or more of whom have expressed their concerns with in-water barriers through the adoption of resolutions.

Thank you for this opportunity to provide comment. Scenic Hudson welcomes the opportunity to provide additional information and answer any questions you may have. I can be reached at:

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SURFRIDER FOUNDATION

October 22, 2018

FOR THE RECORD

New York City Council
Committee on Environmental Protection
Oversight - Resiliency in the Face of Sea Level Rise

RE: Res 509 - Calling on the United States Army Corps of Engineers to reconsider the proposals made in the New York - New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study pursuant to the National Environmental Policy Act (NEPA) to consider sea rise in addition to storm surge.

Chair Constantinides and Council Members,

Thank you for inviting me here, and thank you to Council Member Constantinides for bringing this important issue to the attention of this Council and the public. My name is Nikita Scott and I am the volunteer Chair of the New York City Chapter of the Surfrider Foundation.

Surfrider is dedicated to the protection and enjoyment of the ocean, waves, and beaches through a powerful activist network. We submit these comments on behalf of our 81 chapters, 86 youth clubs, and more than 500,000 supporters, activists, and members in the United States, including our two chapters most affected by the proposed project in question, our New York City and Jersey Shore chapters.

We are appreciative and supportive of the language in Resolution 509. The various alternatives proposed under the US Army Corps of Engineer's New York/New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study, if implemented, would have profound impacts to the environment, human uses, and coastal communities in this region. We have many concerns about the proposed alternatives.

We are concerned that a full analysis under the National Environmental Policy Act will not occur because of the Corp's plan to only fully analyze one or two of the proposed alternatives.

We are concerned about the level of public involvement in the Study, as most affected stakeholders do not currently know the project exists. We thank the Corps for extending the detrimentally short public comment period, but even more time for the public to provide comments and improved outreach processes with fair timelines is warranted.

Surfrider is concerned about the potentially large environmental impacts associated with the proposed alternatives. Most of them, if constructed, would act as physical barriers to tidal flow, trapping wildlife, hurting water quality, and damaging habitat.

The proposed alternatives could have serious impacts on recreational uses. As described already, the proposed in-water seagates could have serious negative environmental consequences, in turn reducing the ability and enjoyability for such recreational uses as wildlife viewing, diving, fishing, and pleasure boating.

Physically blocking huge amounts of water, sediment, and tidal action could have profound effects on adjacent coastlines around the NY/NJ Bight. Heavily used beaches in the region could be destroyed by increased erosion or from the addition of sea walls as part of the proposed alternatives, which would ultimately destroy beaches. These impacts would be detrimental to recreational uses such as beach going, swimming, wildlife viewing, and surfing.

All of these negative impacts to human activity correlate with reduced economic activity in the recreational use sector. New York and New Jersey gain around $25 billion in GDP from the recreation and tourism industry every year, and this project would reduce some portion of that contribution to coastal economies that rely heavily on this income.

The concept of managed retreat or reimagined land use is not mentioned in the Corps' reports. We are concerned that in the long term, armoring every shoreline and plugging every waterway will not keep people safe and some communities may need to move out of low lying areas eventually. Funding for these massive Army Corp projects might be better spent developing options for the community regarding offering to buy out property owners who are in harm's way and empowering and supporting the community to make such decisions that will enable them to remain safe and adapt in a just way. A portion of the funds for the project should be set aside for property buyouts for those who want and need them.

The Corps must better address sea level rise projections in relation to the Study area and the proposed alternatives. We urge the Corps to use the best available data when analyzing the proposed alternatives. The issue of sea level rise also brings up political questions if the proposed seagates are constructed. They are described as being for storm use only, but as flooding becomes more and more routine, there will be strong public outcry to keep them closed with increased frequency.

In addition, we urge the Corps to analyze how increased precipitation levels, coupled with the proposed alternatives, could impact the Study area. Surfrider is concerned that during rain events, the offshore floodgates could lead to increased flooding. During a coastal storm, combined storm surge and rainfall could render seagates unusable.

Again, thank you for inviting me here and for highlighting this important issue.

Sincerely,

Nikita Scott, Chair
New York City Chapter of the Surfrider Foundation
chair@nyc.surfrider.org

Testimony of Daniel Gutman

Before the
New York City Council
Committee on Environmental Protection
regarding
City Council Resolution 509-2018
Monday, October 22, 2018

My name is Daniel Gutman. I live on the West Side of Manhattan and over the years have been involved with several planning and design projects on the West Side waterfront starting with Westway in the late 1970s, and including Riverside South in the late 1980 and 1990s and the Hudson Yards Project more recently. I have worked with several environmental groups including the Natural Resources Defense Council and the Environmental Defense Fund. I am currently a member of the Storm Surge Working Group.

The US Army Corps of Engineers has made several proposals in their Harbor and Tributaries Study to protect the New York/New Jersey region from the kind of storm surge that occurred during Hurricane Sandy.

The Army Corps' study is currently in an early scoping and public comment phase. No study of environmental impacts of the Corps' initial proposals has yet been conducted. Consequently, some "whereas" clauses in Resolution 509 regarding environmental impacts are either premature or inaccurate. For example, the resolution states that the Corps should conduct a more thorough review of the environmental impacts of each alternative measure, but then even in the absence of that thorough review, the resolution concludes that "barriers are likely to restrict the migration of . . . [fish] species important to the Hudson estuary." We simply don't know yet whether fishery impacts are likely or not. A lot depends on barrier design, which the Corps has not even begun.

The resolution also concludes that storm surge barriers would "restrict natural flushing from the ocean . . . causing contamination to once again be concentrated in New York Harbor." Yet engineers studying barriers for New York City have long believed that barriers can be operated to improve flushing and water quality in New York Harbor. How and whether such a system could work would be part of the Corps' forthcoming environmental study.

The resolution calls on the Corps to include consideration of sea level rise in addition to storm surge. But the Corps is already doing that by adjusting its proposals to account for future sea level. What it cannot do is sponsor projects whose ~~only~~ main purpose is addressing sea level rise. That's the job of the City, which the Mayor long has embraced. A 2013 report by the Mayor's Special Initiative for Rebuilding and Resiliency identified 43 miles of coastline vulnerable to sea level rise. In its latest progress report, the Administration claims to have already addressed 25 miles of coastline. If you are interested in protecting neighborhoods from sea level rise, the Mayors's resiliency program might be a worthy subject for an oversight hearing.

Resolution 509 refers to 60 fatalities and billions of dollars of damage due to Hurricane Sandy and acknowledges that, six years after Sandy, storm surge remains a significant risk. The Army Corps' study is the only effort underway with a sufficiently broad mandate to evaluate a full range of alternatives. Inclusion of regional storm surge barriers in the project scope is essential to informed decision-making, and an opportunity that we cannot afford to miss.

I would suggest a modification of Resolution 509 that corrects misstatements of fact, calls on the Corps to complete environmental studies before it chooses a preferred alternative, and asks the Corps to share more information with the public on an expedited schedule. The modified resolution could also call on the Mayor to prioritize City projects that protect against sea level rise.

Testimony of Catherine McVay Hughes before the
The New York City Council Committee on Environmental Protection
Oversight Hearing on Resiliency in the Face of Sea Level Rise
Monday, October 22, 2018 10:00AM--250 Broadway, Committee Rm, 16th Floor

Good afternoon, Chair Constantinides and Council Members Espinal, Levin, Menchaca, Richards, Ulrich and Yeger. Thank you for the opportunity to testify. My name is Catherine McVay Hughes. I served 20 years on Manhattan Community Board One, half that time as Chair or Vice-Chair. After Superstorm Sandy, I was appointed Co-chair of the NY Rising Community Reconstruction Program for Southern Manhattan. Today I am representing the Financial District Neighborhood Association which is home to roughly 50,000 residents.

First, I would like to thank Constantinides for speeding up the phase-out of dirty heating oil in power plants and more recently for working on the Urban Green framework to reduce carbon emissions in large buildings by 20% between 2020 and 2030 which is waiting to be translated into legislation.

With the approaching sixth anniversary of Superstorm Sandy, we remember its devastating impact on NYC which has over 500 miles of shoreline. Sandy caused 48 deaths in New York mostly due to drowning. Sandy also did an estimated $71 billion in economic damage in the NY-NJ region, with $19 billion in losses to NYC. While the storm's immediate impact lasted only weeks, major infrastructure systems, including mass transit and electrical and telecommunications systems, sustained lasting damage, some of which is still not repaired. Resiliency in the face of sea level rise can be resolved by a multi-layered strategy.

1) **Decrease greenhouse gases emissions (GHGs) immediately by increasing energy efficiency and transitioning rapidly to renewable fuels from carbon-based.** "What's in a Half a Degree? 2 Very Different Future Climates: A new IPCC report shows the impacts in the near future that can be avoided by limiting warming to 1.5 degrees Celsius instead of 2 degrees C," according to Scientific American (10/17/18)[i]. "These alternate futures were laid out last week in a new report from the Intergovernmental Panel on Climate Change (IPCC) that explores the possibility of limiting global temperature rise to 1.5 degrees Celsius above preindustrial times by 2100, instead of the 2-degree C upper limit agreed to in the landmark Paris agreement three years ago. The report exposes the closing window humanity has to choose which future it wants."

   In September 2014, New York City committed to reduce greenhouse gas (GHG) emissions by at least 80 percent by 2050 (80 x 50, Local Law 66 of 2014), with an interim target to reduce emissions 40 percent by 2030 (40 x 30). The graph attached shows that since 2005, NYC has reduced Citywide Annual Greenhouse Gas Emissions (GHGs) by 15% in 11 years. However, GHG emissions dropped the most by 2012 and rebounded after that, instead of following the downward trend. NYC committed itself to reduce GHG emissions by at least another 25% within the next 12 years. Can the City keep this promise? And how? Most of NYC's GHGs come from two sources: buildings (67%) and transportation (30%). Therefore, the introduction of your upcoming energy efficient building legislation is more important than ever to meeting that target.

   With the EPA and the National Highway Traffic Safety Administration proposing to freeze the Federal Corporate Average Fuel Economy (CAFE) Standards it would freeze emission standards and fuel economy targets at 2020 levels (around 38.5 mpg for all cars and light trucks overall) instead of rising to about 49.5 mpg by 2025. Transportation is a critical contributor to climate change and accounts for 27 percent of global emissions and roughly one-third of NYC's GHGs. Loosening emission and fuel economy standards will hurt NYC twice — making us suffer from more pollution

and making us pay more for gasoline in less fuel-efficient vehicles. This needs to be included in the Congestion Pricing discussions.

2) **Incorporate proposed clarifications and updates by Storm Surge Working Group into Res 0509-2018**[ii] which would resolve that the Council of the City of New York urges the Mayor's Office of Recovery and Resiliency (ORR) to prioritize and advance shoreline projects designed to protect communities from the effects of sea level rise in addition to storm surge. The USACE's presentation[iii] now includes a slide (11) called ADDRESSING SEA LEVEL RISE
   • Adapting to sea level rise is NOT optional and it is a shared responsibility.
   • This study incorporates the most recent, sound science analyses of how to adapt coastal storm risk measures to increased future sea level in their design and analyses.
   • This includes assessing risk and uncertainty based on an uncertain future.

   It is inappropriate to hold the Corps responsible for addressing NYC's resiliency needs. The HATS study clearly identifies its objective as managing the risk of coastal *storm* damage. The legislation authorizing the Corps work (Public Law 71, Chapter 140, cited at beginning of each scoping session presentation) clearly references hurricane winds and tides. The primary responsibility for addressing NYC's resiliency appears to belong to NYC's Office of Resiliency and Recovery, over which the Environmental Protection Committee already has oversight responsibility, per City Council Rules.

   Recently a Vox+ProPublica collaboration dives into how a structure that's designed to protect us from floods may be making them worse[iv]. High Levees come at a high cost, often pushing water into communities that can't afford the same protection – or in the situation of FiDi, where there still are no plans for resiliency, while just north the East Side Coastal Resiliency project completion date is 2023.

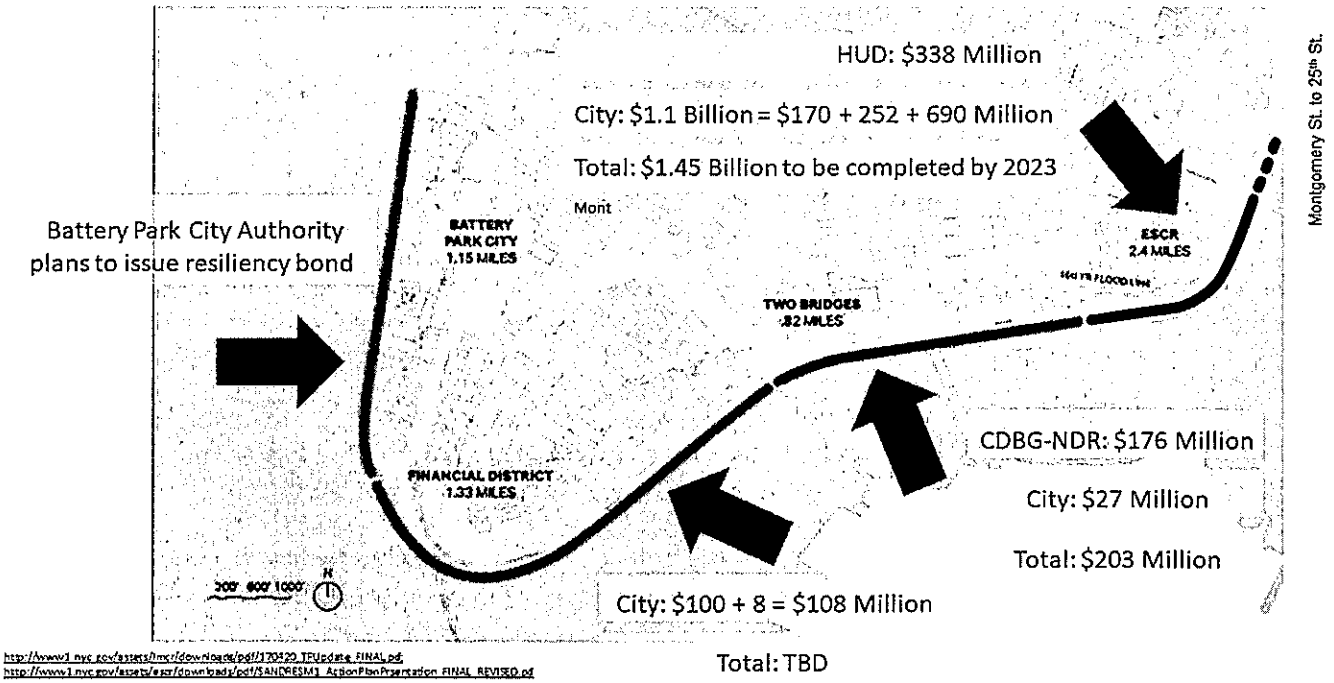
3) **Construct a layered defense of local sea walls and a Regional NY Harbor Storm Gate System to address future storm surges.** A local perimeter land-based seawalls will be necessary to provide protection from rising sea levels over the decades and centuries ahead, huge storm surges are best addressed by a layered defense system built around a regional storm surge barrier system that vastly shortens the coast line (in this situation roughly 1,000 miles down to less than 10 miles) and provides comprehensive protection against the devastation caused by occasional but massive storm surges. The New York-New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study includes Natural and Nature-Based Feature Examples such as Tidal Marsh, Vegetated Dune, Oyster Reef, and Freshwater Wetland. It is imperative to save the Metropolitan Region while maintaining a healthy Hudson and East River.

In conclusion, Sandy taught us the importance of preparation and the necessity of investing to prevail in the worst potential impacts of climate change. One, the **future of the National Flood Insurance Program is uncertain and is due to expire shortly on November 30, 2018**. We do not know if or how much the federal government will assist in rebuilding our communities after the next Superstorm Sandy. Two, **Moody's, a major credit rating agency, recently added climate to credit risks and warns cities to address their climate exposure or face rating downgrades.** Lower ratings would shut cities off from the investments they need to adapt to climate change and to recover from future storms.

Affiliations (for purposes of disclosure): Catherine McVay Hughes is a member of the Board of the Battery Park City Authority, Earth Institute at Columbia University Advisory Board, CERES Presidents Council, Lower Manhattan Development Corporation, The Trust for Governors Island, South Street Seaport Museum, WTC Scientific Technical Advisory Committee and Storm Surge Working Group. She holds an MBA from the Wharton School of Business and a Bachelor of Science degree in Civil Engineering from Princeton University.

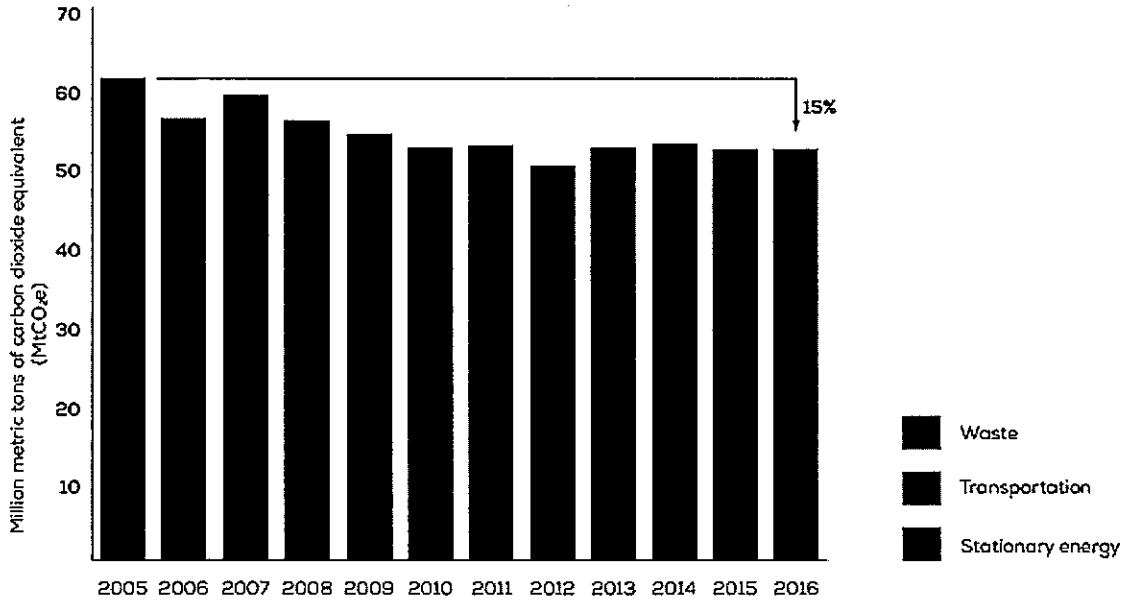
Supporting Data for Testimony of Catherine McVay Hughes

Coastal Resiliency Projects and Funding – Lower Manhattan



http://www1.nyc.gov/assets/myr/downloads/pdf/170420_TFUpdate_FINAL.pdf
http://www1.nyc.gov/assets/esr/downloads/pdf/SANDRESM1_ActionPlanPresentation_FINAL_REVISED.pdf

CITYWIDE ANNUAL GHG EMISSIONS BY SECTOR



Source: 1.5°C: Aligning New York City with the Paris Climate Agreement, September 2017, p. 43

Following up on two items from my April 12, 2018 testimony:

Hurricane Sandy Recovery Task Force[v] – status update. The members of this task force were to be appointed by the Mayor and the City Council Speaker within 120 days of the enactment of this local law. This deadline has already passed. In addition, the task force was to submit to the Mayor and the Speaker a report no later than 12 months. It should include an update on the Lower Manhattan Coastal Resiliency (LMCR) Project which includes Community Board 1's segment south of Brooklyn Bridge including the historic South Street Seaport and Financial District. FiDi is the fourth largest business district in the country and where one out of every 18 jobs citywide jobs are located. LMCR is in the planning phase with a Budget Total = TBD and a Completion Date = TBD.

Mayor's Management Report (MMR)[vi] – the City must track the financial cost of climate change and add indicators to capture sea level rise, energy use and greenhouse gas emissions. The now 450-page September 2018 MMR which increased from its 372-page Preliminary 2018 MMR annual report released in Februar y 2018 continues to fail to report on the City's targets and goals to meet its C40 Commitment by 2020 and its "80 by 2050" target. Since the MMR also reflects the City's values and priorities, this document needs to be updated to include indexes that are annually measured and publicly shared, so that progress can be monitored and evaluated going forward. Also, Local Law 22 of 2008 requires a 30 percent reduction in citywide greenhouse gas emissions by 2030 and requires annual inventory and analysis of greenhouse gas emissions no later than every September 7th and to post on the City's website a report regarding actions taken. Where is that 2017 data?

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[i] https://www.scientificamerican.com/article/whats-in-a-half-a-degree-2-very-different-future-climates/?utm_source=newsletter&utm_medium=email&utm_campaign=sustainability&utm_content=link&utm_term=2018-10-18_featured-this-week&spMailingID=57591300&spUserID=MzA4MTE1ODExOTU5S0&spJobID=1502660355&spReportId=MTUwMjY2MDM1NQS2

[ii] calling on the United States Army Corps of Engineers to reconsider the proposals made in the New York - New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study pursuant to the National Environmental Policy Act (NEPA) to consider sea rise in addition to storm surge

[iii]New York-New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study, http://www.nan.usace.army.mil/Portals/37/docs/civilworks/projects/ny/coast/NYNJHAT/NYNJHAT%20NEPA%20Scoping%20Presentation%203%20Oct%2018.pdf?ver=2018-10-12-151150-907

[iv] VOX + PROPUBLICA S1 • E11, How "levee wars" are making floods worse, https://www.youtube.com/watch?V=ltv6rkfnelm

[v] Int. 1720-2017, passed unanimously by City Council in October 2017 and enacted on November 17, 2017, http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3163963&GUID=E67E93F0-B9A4-477C-A18A-E4D86891D4

[vi] MMR is mandated by the City Charter, serves as a public account of the performance of City agencies, measuring whether they are delivering services efficiently, effectively and expeditiously, https://www1.nyc.gov/assets/operations/downloads/pdf/mmr2018/2018_mmr.pdf

Testimony of Joseph J. Seebode, Deputy District Engineer, US Army Corps of Engineers

Slide 1 Good Morning members of the NY City Council, and good morning to everyone here today to learn about this important topic. My name is Joseph Seebode and I am the Deputy District Engineer and Chief of Programs for the NY District of the US Army Corps of Engineers. With me today is Mr. Bryce Wisemiller who is a senior Project Manager with the NY District.

I want to begin today by thanking the Council for the opportunity to present information on the important topic of sea level rise and efforts underway by the USACE to identify comprehensive options to reduce risk to lives and property from coastal storm impacts in the future. I have a few slides that I will use to illustrate the path forward on the study.

Slide 2 When Hurricane Sandy hit the NY/NJ Metropolitan Area in late October 2012 it caused major damages from storm surge and wave action, which was exacerbated by sea level rise. The slide depicts the coastal storm flooding probability from intense storms such as Hurricane Sandy. Forty-three individuals lost their lives from the storm impacts in NYS, including 24 on Staten Island, and there was tens of billions of dollars of economic damage to the region.

Three months after Hurricane Sandy, Public Law 113 – 2 was signed into law. That Emergency Supplemental bill made available federal appropriations to improve and streamline disaster assistance for Hurricane Sandy. The US Army Corps of Engineers received approximately $5 billion to repair and restore damaged coastal storm risk and navigation infrastructure and build new projects to provide

resiliency and risk reduction. Repairs to over 30 projects within the NY District's region have been completed and we are actively working on the remaining portfolio of authorized projects, which will include among others, major projects in Staten Island and the Rockaways.

A unique feature of PL 113-2 was language that provided $20 million dollars to perform a study to establish vulnerabilities and resiliency options for the North Atlantic coast from Maine to Virginia. Completed in January of 2015, the North Atlantic Coast Comprehensive Study concluded with a finding that there exists 9 vulnerable locations (known as Focus areas) along the coast that warrant greater study and evaluation to look at resiliency options for the future.

Slide 3 One of the 9 Focus areas identified is the New York/New Jersey Harbor and Tributaries (NYNJHATS). A Feasibility Study has been initiated. The States of NY and NJ have signed on to be the cost-share partners for the study, and NYC is a full partner in the steering group for the study. The study will look at a series of comprehensive options to reduce the long-term risks to the coastal system from storms, including the effects of sea level rise. While early in the study process, it the study will be done using the latest sound science, and with multiple levels of review, not only within the Corps, but with other involved federal, state and local agencies, independent peer review, and subject to review by interested stakeholders and the public.

Slide 4 is a graphic which depicts the Corps projections for relative sea level change at the Battery in lower Manhattan with the yearly averaged actual measured levels for the past 25 years. It shows a trend data line that is being used in developing alternatives for comprehensive resiliency. These projections are comparable to those developed by the two states as well as New York City. As so much uncertainty is associated with sea level rise, we will be performing

sensitivity tests in the study to ensure that resiliency plans being considered are adaptable should sea level trends change. We are currently in the scoping phase for the study with an expectation to identify a Tentatively Selected Plan in early 2020.

Slide 5 shows the current timeline for the study – please note particularly the yellow dots at the bottom of this graphic, which depicts the numerous time where agencies, stakeholders and the public will have opportunities to review information and attend public meetings on the study. I would like to emphasize that we are early in the study, which we expect to take several years to perform. We are evaluating a wide array of significant sized and cost measures, all of which have been successfully implemented in other areas of the country or world. Our initial array of alternatives, which are various combinations of measures, span the spectrum of conceptualized solutions for this unique geographic area. There is no decision pending in the near term to recommend, much less implement, any alternative as we continue to collect and synthesize information received from contractors, partners and the public.

Slide 6 provides links to information and Points of Contact for anyone interested in the study or wishing to provide comment during, or after, the scoping period.

Finally, **Slide 7** summarizes the key factors related to this study we would encourage the council to consider as you discuss the serious risk that New York City faces from coastal storms, now and into the future.

Oversight – Resiliency in the Face of Sea Level Rise and Resolution 509
Committee on Environmental Protection

Statement by: Danielle Manley,
Columbia University
Program Manager, New York City Panel on Climate Change

October 22, 2018

1

Good morning. My name is Danielle Manley. I work at the Center for Climate Systems Research at Columbia University's Earth Institute as a climate change researcher. I serve as Program Manager for the New York City Panel on Climate Change. I want to thank you for having me here today.

2

The New York City Panel on Climate Change, or NPCC for short, is a panel of scientific experts from around the New York metropolitan region who advise the New York City Mayor's office on the latest climate science that is relevant for New York City. It was formed in 2008 under then Mayor Michael Bloomberg, who saw climate change as a critical issue that needed to be addressed and managed by New York City, and that science-based decision-making was key to this response. Since 2008, the Panel has provided regular climate science updates to the City of New York.

In 2010, the Panel released its first report detailing risks to the region. This report was called Climate Change Adaptation in New York City: Building a Risk Management Response. In 2012, under Local Law 42, the New York City Panel on Climate Change was established as an ongoing body that is mandated to provide regular climate science updates to the City of New York. After Hurricane Sandy, the NPCC provided an update to its findings from the 2010 report in "Climate Risk Information 2013". The most recent full report of the panel was released in 2015, titled "Building the Knowledge Base for Climate Resiliency", which detailed the most up to date analysis on climate trends, future projections, and future coastal flood risk maps. The next report of the NPCC is due to come out in March 2019.

3

The Panel takes a metropolitan region approach to its analysis, because changes in climate do not stop at the municipal boundaries of the city, and much of the cities infrastructure and community network extends across the region.

By looking at historical trends, we see that sea levels are already rising across the globe. According to the Intergovernmental Panel on Climate Change, **globally**, sea level rise has trended **1.7 mm/year** or about **7.8 inches** since 1900. **Across the New York metropolitan region**, we have observed that sea levels have risen **over one foot**, at a rate of about **2.8 mm/year** in both Bridgeport, Connecticut and in Lower Manhattan, and about **4 mm/year** in Sandy Hook, New Jersey. This means that the New York City region is experiencing sea level rise at **nearly double the rate** as the rest of the globe.

Many groups around the region understand and are working towards improving resilience to the risks that sea level rise is already posing to our coasts.

4

Nearly 6 years ago on October 29, 2012, Hurricane Sandy hit New York City, bringing unprecedented sea water into lower Manhattan, Brooklyn, Queens, Staten Island, and across the New Jersey coastline. The floodwaters reached a height of 14.1 feet in Manhattan, **setting the record at The Battery tide gauge**. The storm left the region:

- **11 days** without telecommunications ability at critical facilities,
- **2 million people** losing power,
- all of New York City's tunnels into and out of Manhattan shut down displacing **nearly 5 and a half million** weekday riders,
- closing **6 hospitals** evacuating **2,000 patients**,
- and at least **60 fatalities** across New York and New Jersey.

The events of Hurricane Sandy were a renewed strengthening of action on climate change in a City that was already looking to understand the risks. The storm was evidence that the City is already vulnerable today to sea level rise and coastal storm surge.

5

Here are some photographs of the floodwaters that came into the region during Hurricane Sandy.

a. The top left shows waves crashing against and over the top of a seawall and into an adjacent park Brooklyn during Sandy – you can see the Verrazano Bridge there in the background. The park itself acts as a buffer zone absorbing the floodwater, which protects the private homes beyond.
b. The top right shows coastal flooding in Seaside Heights, New Jersey during Sandy. Seaside Heights is a small residential community situated on a narrow barrier island, roughly mid-way between Atlantic City, to the south, and Sandy Hook to the north. In general, the barrier islands of New Jersey are eroding, in part due to historic sea level rise and in part to the presence of hard structures. Storms like Sandy produce extensive beach erosion.
c. The bottom left shows water cascading into the former World Trade Center site in lower Manhattan during Sandy.
d. The bottom right is an image of water flooding the entrance to the PATH train in Hoboken, New Jersey during the storm.

These images show the impacts that coastal storm surge flooding can have on our region. Severe storms also generate high waves and water levels that lead to beach erosion and shoreline retreat. Sea level rise will generally increase these erosion rates.

As sea levels continue to rise across the globe and in our region, surges from storms of similar magnitude to Hurricane Sandy will be able to

reach further inland due to a higher baseline sea level. Coastal flood risks will be higher in the New York metropolitan region – and all regions around the globe – because of sea level rise, regardless of how the intensity of storms is affected by climate change. The magnifying effects that sea level rise are having and will continue to have on coastal flooding cannot and should not be ignored.

6

These are the latest sea level rise projections provided by the New York City Panel on Climate Change in our 2015 report. These projections are based upon the same global climate models that are used by the Intergovernmental Panel on Climate Change. The NPCC provides range of possible future sea levels here in New York City resulting from the analysis of 24 global climate models across two greenhouse gas emissions scenarios – RCP 4.5 (a middle-emissions scenario), and RCP 8.5 (a high-emissions scenario) – as well as based on literature reviews and expert analyses.

The 6 components that go into this sea level rise analysis include:

1. Thermal expansion of ocean water (global)
2. Changes in dynamic ocean height (local)
3. Ice mass loss from ice sheets, glaciers, and ice caps (global)
4. Gravitational, rotational, and isostatic "fingerprinting" (local)
5. Vertical land movements (GIA) (local), and
6. Changes in land water storage (global)

All projections shown here are in reference to sea levels in the baseline years spanning 2000-2004, and are shown as a low, middle-range, and high estimate for future sea levels across the 21st century.

All of these possible future scenarios demonstrate that sea levels will continue to rise. **Middle range projections** estimate that the New York metropolitan region could experience **11-21 inches of sea level rise by the middle of the century** and 18-39 inches by the 2080s. The **high end** of projections estimate that sea level rise could be as high as **6 feet by the year 2100**.

7

These rising seas will exacerbate the effects of future coastal flooding, enabling storms of similar frequency and magnitude today to produce higher floodwaters in the future.

Historically, the 100-year flood, or a flood that has a 1% chance of occurring in any given year, is **11.3 feet** in New York City. The data shows us that this level of flooding will likely become more frequent in the coming decades because of rising sea levels. **Today's 100-year flood could become a 50-year flood by mid-century**, and by the 2080s could become a **20-year flood** or even **an 8-year flood**.

Future 1% flood heights are likely to increase, where today's 100-year flood of 11.3 feet could become **12-13 feet mid-century**, and **up to 16 feet** in the 2080s.

8

The key message here in all of this analysis is that **coastal flooding is very likely** to increase in frequency, extent, and height **due to increasing sea level rise**.

This flood map developed by the NPCC in our 2015 report illustrates the changing extent of the 100-year flood zone in New York City as a result of heightened sea level rise. The purple areas indicate coastal flood risk today based upon the 2013 Preliminary Flood Insurance Rate Maps, the light and dark green areas show how far those storm surge waters could reach in the next few decades in the 2020s and 2050s, and the yellow to red areas show those floodwaters moving even further inland by the 2080s and 2100.

By the end of this century, we see that the **100-year flood zone nearly doubles in its extent** compared to today's levels, and coastal neighborhoods and infrastructure across the city will be at increasing risk. Some of the neighborhoods in New York City that are at the highest risk due to the effects that sea level rise will have on coastal flooding include southern and western Queens, parts of Brooklyn, Staten Island, Lower Manhattan, and parts of the Bronx.

9

Policies and responses to coastal flooding cannot ignore the exacerbating effects that sea level rise will impose on our regions coasts. New York City is already taking future sea level rise into account in planning for the future, like with its Climate Resiliency Design Guidelines. These Guidelines are a science-based policy that

incorporates forward-looking climate data into the design of New York City's capital projects, including sea level rise. Tools like NYC's Flood Hazard Mapper help to illustrate to planners where facilities will be at heightened risk over time.

While nations around the world are still reaching agreements about how we can limit greenhouse gas emissions, governments and their actions need to be responsive to the realities that we are facing. Given that we **know** that sea levels have been rising, and that they will continue to rise, this type of practice in preparing for current and future sea level rise should be the norm. The coasts of New York and New Jersey will continue to be at heightened flood risk as a result of sea level rise for decades to come.

10

Here is the bottom line. Based on our research using the best-available climate science, **we know** that sea levels have already been rising across the New York City metropolitan region, and that **these rates have been nearly twice as much as the global average sea level rise.**

We are **confident** that **sea level rise will enable storm surge waters to reach further inland** across the New York metropolitan region today and into the future.

We **understand** that coastal neighborhoods and infrastructure will **continue to be at increasing risk** from coastal flooding and storm surge as a **result of continued sea level rise** over the 21st century.

We believe that the United States Army Corps of Engineers **should consider sea level rise in addition to storm surge** in the New York-New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study pursuant to the National Environmental Policy Act.

And finally, we believe that in order for **adequate preparation** for the effects of storm surge and sea level rise throughout our region, that **cross-jurisdiction coordination** across city, state, and federal responses will be necessary.

11

Thank you.

SEPTEMBER 2018 | ISSUE NO. 4

SURGE WATCH

A Note From the Chairman

The US Army Corps of Engineers has called for public comments on its Harbor and Tributaries Scoping Study (HATS). The Metro SSWG is preparing a deposition outlining a regional approach arguing that it is the only feasible way to protect the 1,000-mile coastlines of New York Harbor, the Hudson River valley, northern New Jersey and southern Long Island for the next 100 years.

As the Dutch are fond of saying: we must shorten the coastline if we're going to have any hope at all of protecting our mighty Metropolis. But how do we do that?

We propose a porous system of sea gates that under normal weather conditions will allow the free flow of tides and river discharge to the sea with little impediment. Plus, we have some creative ideas that will greatly improve the water quality in New York Harbor and the lower Hudson River by harnessing the moon's energy to pump clean Long Island Sound water throughout the harbor complex. This will revolutionize pollution abatement in the City's affected waterways.

Our friends at Save the Sound list the following issues to be addressed by the Corps:

- *How would the barriers affect migrating fish, oyster beds, boating, and shipping?*
- *How much will reduced tidal flow worsen sewage, nitrogen, and PCB pollution in our waterways?*
- *If storm surge is diverted from NYC, how will that affect the surrounding area? Will "outside" communities suffer increased flooding? How will the government decide which communities to protect and which to expose?*
- *Are there solutions that can address sea level rise as well?*

We agree. We have a team of committed scientists, ecologists, engineers, social scientists and economists working on this. We understand. Stay tuned.

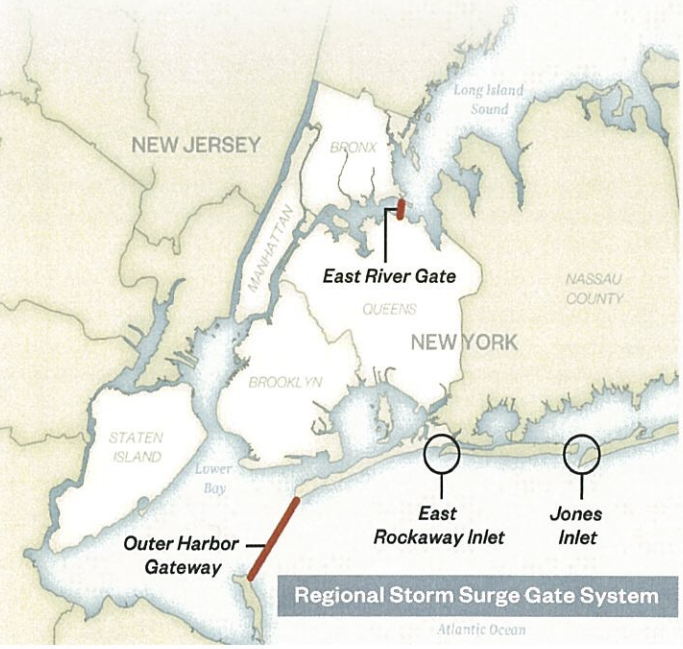
Malcolm Bowman,
Chair, Metropolitan NY-NJ Storm Surge Working Group.

"We need to determine whether harbor-wide protection – such as a storm surge barrier – is feasible. The Army Corps of Engineers should be encouraged to complete this complex study as quickly as possible."

– NYS Senator Brian Kavanagh
Chair of New York State Caucus of Environmental Legislators

USACE Comment Period Extended for the Harbor and Tributaries Scoping Study (HATS)

Due to the interest shown by the public and to allow for meaningful comment on the NEPA scoping phase, the Corps is extending the comment period to **November 5, 2018**. An additional scoping meeting will also take place on Thursday, September 20, 2018 at 6 PM at the New York Aquarium, Surf Avenue and West 8th Street, Brooklyn, NY.
Continue Reading...



Levee Wars: How Barriers May Exacerbate Flooding for Neighbors

A Vox+ProPublica collaboration dives into how a structure that's designed to protect us from floods may be making them worse. High levees come at a high cost, often pushing water into communities that can't afford the same protection. To learn more, *Continue Reading...*

Extreme-weather Events as Part of the BPCA's Ongoing Efforts

The Battery Park City Authority (BPCA) has hired a consultant team to design resiliency measures intended to protect the ball fields and the Asphalt Green community center against future extreme-weather events. For more on the June 19 meeting of the BPCA board, *Continue Reading...*

New Buildings Rising in Flood Zones

One in eight new residential units in New York is being built along the riskiest waterfront. The buildings may be resilient, but what about the neighborhoods? *Continue Reading...*

Buried Internet Infrastructure at Risk as Sea Levels Rise

According to a new study, thousands of miles of buried fiber optic cable may be inundated by rising seas. Internet infrastructure in densely populated coastal regions, such as the Meadowlands, may need to be replaced with salt resistant cables. *Continue Reading...*

Seawater inundation projected for New York City by 2033

Image Credit: *Paul Bartford*

Thank you for keeping up with the SSWG. For more information, please visit our website or www.nichiusa.org
Senior Editor: Malcolm Bowman, Distinguished Professor of Oceanography, State University of NY Stony Brook
Co-Editors: Robert Yaro, Professor of Planning, University of Pennsylvania and William Golden, President National Institute for Coastal & Harbor Infrastructure
Investigative Reporters: Catherine McVay Hughes and Suzanne DiGeronimo FAIA, President DiGeronimo Architects
Graphics and Layout: Hazen and Sawyer

Flooding preparation for a residential community

Image Credit: *Shutterstock.com, Marc Bruxelle*

High water mark from Hurricane Sandy in lower Manhattan

Image Credit: *Robert Simko, The Broadsheet©*

Other Flooding and Climate Change News

Flood insurance premiums are going up again and that's just the beginning. *Continue Reading...*
Miami Herald | July 24, 2018

Sea level rise is eroding home value and owners might not even know it. *Continue Reading...*
Washington Post | August 20, 2018

Flood insurance saved hours before it was to expire, but future unclear. *Continue Reading...*
NorthJersey.com | July 31, 2018

Conference

Weathering the Storm: The Intersection of Finance and Resilience on October 18 at NYU
Registration is officially open! This year's conference explores how architectural and engineering solutions to environmental resilience translate to financial resilience. Experts will prompt attendees to think differently, and with a sharper pencil, about the costs and benefits of resiliency on a large scale.
For more information...

JULY 2018 | ISSUE NO. 3

SURGE WATCH

A Note From the Chairman

So what are the key issues surrounding human life & safety, infrastructure protection, oceanography, meteorology, climate change, environmental health, marine ecology and fisheries, social justice issues, engineering, permitting, design, construction, funding and economics of a regional storm surge barrier system? A system designed to not just reduce the risk, but to actually protect the Metropolitan New York and New Jersey for at least the next 100 years?

That is the task the Metropolitan NY-NJ Storm Surge Working Group has set itself. We build on the experiences of the great European cities, the communities of Stamford CT, Providence RI, New Bedford MA and New Orleans LA. The SSWG brings together the expertise of estuarine and coastal marine scientists, engineers, marine ecologists, former and current elected officials and commissioners, government professionals, academics, media experts, research students, attorneys and community advocates.

We promote a responsible path forward investigating all possibilities, the pros and cons of effective and affordable regional solutions in order to save the region and nation from another catastrophic Sandy-scale flooding disaster.

We believe that only a thoroughly studied and designed regional approach will be effective. A patchwork quilt of attempting to increase resilience in those most vulnerable areas of the 1,000 miles coastline of the Lower and Upper Bays of New York Harbor, its tributaries, the East River and the lower Hudson River will never suffice to protect against the twin threats of extreme storm surges and rising sea levels in the decades and even centuries ahead.

Public information/scoping meetings for the U.S. Army Corps of Engineers NY-NJ Harbor & Tributaries Focus Area Feasibility Study (NYNJ HATS Study) are scheduled for Monday, July 9 through Wednesday, July 11.

We urge you all to attend the upcoming public meetings being held by the US Army Corps of Engineers to address these issues, to speak up and to listen to our various community hopes, aspirations and concerns.

Malcolm Bowman,
Chair, Metropolitan NY-NJ Storm Surge Working Group.

CLICK HERE for Study Summary & Initial Alternatives (Oct 2017)

CLICK HERE for July 2018 Meeting Information.

These meetings will also have webinar capability for remote participation at https://usace.webex.com/join/ArmyCorpsNYDistrict

Contrasting Voices!

Gale A. Brewer, Manhattan Borough President
Borough President of New York

Storm surge barriers are sorely needed along the city's coastline to protect against major storms but they should be done right. Input from experts and the public is key to making this necessary project a success. Attend an upcoming hearing:

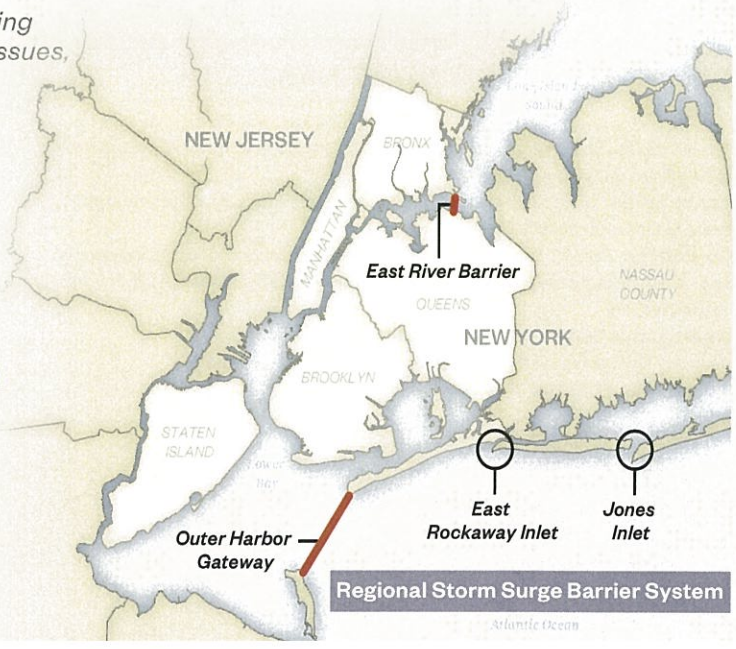
Hudson Riverkeeper: URGENT: Please attend a meeting July 9, 10 or 11 on NY storm surge barriers – Riverkeeper. Fast-tracked Army Corps proposals threaten the future life of the Hudson.

U.S. Army Corps NYNJ HATS Study - Public Information Meetings

NYC Sessions. (duplicate sessions)
Mon, July 9, 3-5 pm and 6-8 pm
Boro of Manhattan Community College. 199 Chambers St, between Greenwich St and West Side Hwy. Conference Room-Richard Harris Terrace, Main Flr.

Newark Sessions. (duplicate sessions)
Tue, July 10, 3-5 pm and 6-8 pm
Rutgers-Newark Campus, Paul Robeson Campus Center. 350 Martin Luther King Jr. Blvd. Essex Room, 2nd Flr.

Poughkeepsie Session. Wed, July 11, 6-8 pm
Hudson Valley Community Center, 110 Grand Ave, Poughkeepsie, NY. Auditorium.



NYNJ HATS Feasibility Study

An official scoping comment period is currently scheduled to run for 30 days following the public meetings scheduled for July 9, 10 and 11.

CLICK HERE for Project Fact Sheet

CLICK HERE for July 2018 Meeting Posters

Comments may be submitted to:

Nancy J. Brighton, Chief, Watershed Section, Environmental Analysis Branch, Planning Division, U.S. Army Corps of Engineers, New York District, 26 Federal Plaza, New York, Room 2151, NY 10279-0090, or via email to: NYNJHarbor.TribStudy@usace.army.mil.

Manhattan Waterfront

Image Credit: *Manhattan Cityscape New York, USA*

WaterWire: NYC Takes First Step to Establish Office of the Waterfront

On June 7, 2018, New York City Council Member Rose (Staten Island) introduced a bill to establish a Mayor's Office of the Waterfront "which would be responsible for coordinating among the various city agencies that handle matters related to waterfront use, supporting the Waterfront Management Advisory Board [a forum of expert waterfront stakeholders to advise city agencies on harbor-related policies being reconstituted as per a bill passed by the Council and signed by Mayor de Blasio in 2016], and implementing the New York City Comprehensive Waterfront Plan, issue permits, and disseminate information about the waterfront to the public. *Continue Reading...*

Thank you for keeping up with the SSWG. For more information, please visit our website or www.nichiusa.org
Senior Editor: Malcolm Bowman, Distinguished Professor of Oceanography, State University of NY Stony Brook
Co-Editors: Robert Yaro, Professor of Planning, University of Pennsylvania and William Golden, President National Institute for Coastal & Harbor Infrastructure
Investigative Reporters: Catherine McVay Hughes and Suzanne DiGeronimo FAIA, President DiGeronimo Architects
Graphics and Layout: Hazen and Sawyer

The Hurricanes Are Coming

June is the start of hurricane season in the Atlantic, and the only certainty for East Coast residents is the uncertainty 2018 will bring. In NYC alone, more than 726,000 homes are at risk of flooding damage from a storm surge, making it the second most at-risk city in the nation behind Miami, Florida. Forecasters are predicting 10 to 16 named storms this hurricane season, according to the National Oceanic and Atmospheric Administration (NOAA), of which five to nine could become hurricanes with winds of 74 miles per hour or higher. *Continue Reading...*

Satellite Image of Hurricane Matthew Approaching Florida

Image Credit: *Elements of this image furnished by NASA*

Sea Level Rise: Jersey Shore Town Flooding Predictions; $10B at Risk

Some 25,000 New Jersey homes will be endangered within 20 years by regular tidal flooding powered by rising sea levels, according to a new analysis by the Union of Concerned Scientists. About 5,300 of those homes are in Ocean County, NJ as both the county's barrier islands are among the most imperiled locations in the US. The threat is global in scope: more than $1 trillion in American real estate, including parts of Miami, Long Island, and the San Francisco Bay area will be in jeopardy by 2100. New Jersey is among the most vulnerable, data from the UCS "US Coastal Property at Risk from Rising Seas" report shows. *Continue Reading...*

Other Flooding and Climate Change News

FEMA National Flood Conference – Federally Supported, State Managed, Locally Executed. *Continue Reading...*
FEMA | June 2018

Zurich Insurance Group found that every $1 spent on 'disaster resilience' saves $5. *Continue Reading...*
Zurich Insurance Group | June 2018

Flood insurance program could lapse July 31, 2018 in midst of hurricane season. *Continue Reading...*
CNBC | June 11, 2018

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

In This Issue

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...

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 USACE 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 Tetratech.

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

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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Co-Editor: William Golden, President National Institute for Coastal & Harbor Infrastructure
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RIVERKEEPER.
NY's clean water advocate

Testimony of Jessica Roff and Paul Gallay, Riverkeeper
"Oversight - Resiliency in the Face of Sea Level Rise" and Resolution 509

October 22, 2018

Good morning Chairperson Constantinides and Councilmembers. We thank you for holding this hearing on the Army Corps of Engineers' New York/New Jersey Harbor and Tributaries (NYNJHAT) Coastal Storm Risk Management Feasibility Study and the alternatives outlined within it. And thank you to Samara Swanston, Legislative Council, and all the work you put into this hearing and assuring a wide range of voices would be heard today.

My name is Jessica Roff; I am the Director of Advocacy and Engagement at Riverkeeper and I am here today with Paul Gallay, the President and Hudson Riverkeeper. Riverkeeper is a membership organization with nearly 55,000 members and constituents, which protects the environmental, recreational, and commercial integrity of the Hudson River, its watershed and tributaries, working with, and advocating for, communities throughout the region, and safeguards the drinking water of millions of New Yorkers.

Riverkeeper is here today, and has been active every day since the Army Corps of Engineers announced their study because this study and the process by which it is being rolled out are fatally flawed by their failure to properly address sea level rise and unreasonably restricted by the procedural straight-jacket imposed by the Corps' so-called "3x3x3" rule. If the Army Corps, New York, and New Jersey are going to spend billions of dollars – the latest figures are in the $140 billion range - on coastal storm protection, they need to be asking the right questions; doing the proper and comprehensive studies; proposing and implementing solutions that protect people, ecosystems, and our waterways, including the Hudson River; while being transparent and engaging communities throughout the affected geographical region. We strongly believe in a process that builds community-driven, resilient, and protective shorelines that also defend against smaller scale, more regularly occurring flooding events, and does not sacrifice the Hudson River, New York Harbor, the smaller waterways, and marine life at risk in most of the Corps' potential plans.

The NY/NJ Harbor was selected as an area of high vulnerability to coastal storm risk in response to the devastation of Super Storm Sandy. Sandy marked the beginning of a new type of hurricane – one that is exacerbated by climate change and the rising sea levels and increased ocean temperatures that come with it. But the Corps was only

tasked with addressing coastal zone flooding and storm surge, not sea level rise, and certainly not climate change – so they are not tackling two of the most significant challenges we face.

The Corps is currently evaluating six alternative storm surge-related plans – to be winnowed down to two or three within the next year and a half. One is the no action alternative, and four of the remaining five involve massive, in-water barriers, of various sizes shutting off the mouths of different waterways along the shores of New York and New Jersey. The proposed in-water barriers pose numerous threats to each of those waterways and the marine life within them. But the most egregious is the five-mile barrier from Sandy Hook, New Jersey to Breezy Point on the Rockaway Peninsula, which would close off the mouth of the Hudson River, actually a tidal estuary, stopping the ebb and flow of the water and permanently damaging the Hudson and the marine life within it. And, even at that scale, the in-water barrier would not protect our communities against sea-level rise or deflection flooding.

In-water barriers that the Corps is considering would need to remain open most of the time to accommodate ships in one of the busiest shipping channels in the world. The Corps is saying that these barriers would only be closed to address major storms, so for most of the time, when the gates are open, shorelines are not protected against sea-level rise, or flooding from other non-catastrophic events. But, as sea level steadily rises, the ship gates will need to close more and more frequently because, with progressively higher average sea level, smaller and smaller events will lead to major flooding and we will reach Sandy-level flooding at regular high tides. As the closures increase, so will the negative impacts to the Hudson, the severity of flood events behind the barriers, and the levels of contamination from combined sewage overflow and storm water runoff as the Hudson's ability to flush them out to sea and to dilute pollution is impeded.

The Corps is also being unreasonably constrained by the 3x3x3 Rule, which is, in fact, a policy, not a rule and must be waived for this study. Under 3x3x3, the Corps must finish feasibility studies in 3 years, cannot spend more than $3 million on the study, and must involve all three levels of Corps review – district, division, and headquarters. The Corps has stated that 3x3x3 was never intended for studies of this size, and it would be impossible to accurately study all the necessary information to determine the feasibility of a project with impacts to three states, that spans more than 2,100 miles, and could forever alter numerous ecosystems, The 3x3x3 "Rule" does have a waiver process that we understand that the Corps has begun to implement, but which it has not yet finalized.

Within the 3x3x3 framework, the Corps will only do a very superficial cost benefit analysis, weighing the cost of the potential structures against the value of real estate and infrastructure that they are expected to protect in a storm. This analysis, however, does not value ecosystem services -- the environment and the river and harbor ecosystem -- before making major decisions like winnowing down to two or three alternatives, nor will the Corps perform any original environmental or other studies. And,

although the Corps just recently announced that it will hold off until Spring 2020 to winnow down, without a 3x3x3 waiver, the entire process is still confined to three years and any changes to the timeline do not affect the overall process. It is urgent that before more time, energy, and resources are put into this broken process, the Corps must grant itself a waiver of this rule.

The rest of Corps' process is also broken. From the very beginning the Corps has been providing the bare minimum notice for its public scoping meetings: the first meeting was announced during a summer holiday week 12 days before the meeting. The Corps posted the notice to their website and emailed roughly 700 people, which did not include anyone at the multiple organizations with which they meet regularly. For other meetings they've posted to their website with three or four day's notice and emailed random groups of people – again, not including organizations with which they had been meeting, or many people who had attended prior meetings and signed in for updates. The Corps has provided substantively different information at every public meeting they hold, has failed to inform the public about which studies they will be evaluating, randomly updates information on their website without notifying the public – though it is often inaccurate as well, and extended the comment period just a few days before it ended and without broadly notifying the public. Since the Corps first publicly announced the NY/NJ HAT study in July, they have actually gotten worse at informing the public of their actions as opposed to improving. Each time we somehow find out about an extension or a meeting we pull together all the available information and get it out to all of our members and supporters and our allies to help drive attendance and inform people about the comment periods – and people continue to come out is large numbers because they are very concerned about this issue and the process.

The Corps needs to develop a comprehensive plan to inform the public and to engage communities around their process. Here are just a few ways that the Corps can make this process productive and increase the chance to meet the actual needs of affected communities.

- They must share which studies they are planning to evaluate and which they will undertake and when;

- they need to have, and communicate with, a comprehensive mailing list of everyone who has attended a meeting, commented, or communicated with the Corps in the area of potential impact;

- they need to be publicizing their meetings, deadlines, updates, and information in places other than their website.

- The Corps must undertake outreach to community groups, local elected officials, and environmental groups; they especially need to do authentic outreach and engagement with environmental justice communities and groups – who as the most impacted by storm surge and sea-level rise often have many solutions, but may not have the resources to implement them. The Corps and New York state

must also consult with Federal and State recognized tribes who will be affected by this study – to date there has been no mention of tribal nations. These must be real conversations with intentional information exchange.

Substantively, the Corps must begin to properly frame the questions it is addressing. Acknowledging sea-level rise and building barriers or sea walls or levees with extra-large foundations to support later expansion is not a comprehensive plan to address sea-level rise. As we are all aware, just last week the Intergovernmental Panel on Climate Change (IPCC) warned that climate change and its impacts are worse and happening far quicker than many scientists had warned and for which world leaders were preparing.

According to the IPCC, humans have about 12 years to completely change the systems that put carbon dioxide into the atmosphere, which means our economic, transportation, and energy systems among the biggest. The report predicts dire consequences by as soon as 2040. And there are many scientists who say even this latest report is downplaying the gravity of our current situation and the impending impacts. Statements about adapting to sea-level rise and assessing risk and uncertainty does not make massive in-water barriers responsive to sea-level rise. Comprehensive onshore levees, dunes, and floodwalls, on the other hand, can be built first in the communities and areas at greatest risk, can be modified as needed over time, are a fraction of the cost of the large in-water barriers, will not require massive amounts of money to maintain and operate, will work in conjunction with ongoing measures to make our shorelines more adaptive, and developing them provides meaningful points of engagement with shoreline and other affected communities.

The latest IPCC report has certainly instilled a heightened sense of urgency in all of us working to address climate change, and likely in everyone affected by it. But, another key take-away from the report is the need to respond in ways that are effective and efficient, not just quick. You cannot address a problem of this magnitude – the storm and sea-level rise flooding New York City and other coastal communities face – without thorough, science and community-based solutions that incorporate the new data from the IPCC report and evaluate the totality of the circumstances. ***In order to do so the Army Corps must waive the 3x3x3 rule, reformulate their NY/NJ HAT study to squarely address sea-level rise, undertake comprehensive studies, and meaningfully and transparently engage the communities throughout the affected region.***

October 22, 2018

Testimony to City Council, Committee on Environmental Protection

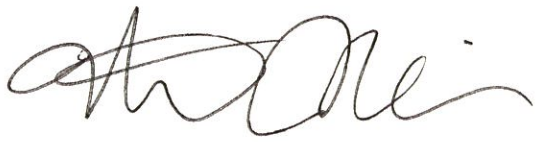
I'm the editor of the project newyork.thecityatlas.org, about the future of New York City; we're based at the Institute for Sustainable Cities at Hunter College, and William Solecki, co-chair of the City's climate panel, is one of our advisors. Today I speak on my own behalf and do not speak for the Institute or for the City Atlas project.

What the city needs, most urgently, is a plan to educate the public at large about the implications of the IPCC 1.5C report, which calls for sweeping changes in our lifestyles and in our economy, including deep changes to many ordinary functions of the city and to the cultural framework in which we live our lives.

The 1.5C target calls for emissions to peak by 2020, and rapidly decline thereafter; we each need to cut our emissions by half in the next ten years, and half again in the following ten years. The only way to make these cuts is through behavior change, followed by enormous investment and transformation of our energy system. The good news is that most New Yorkers are already energy efficient, and high income New Yorkers are well-educated and generally not resistant to the findings of science. New York can lead.

Without the global achievement of the 1.5C target, a harbor barrier for NYC is pointless; it may already be pointless – as Richard Alley, the nation's expert on sea level rise, pointed out in September, there's already a real chance for ten feet or more of sea level rise before 2100. This would make a barrier moot.

Excellent examples of honest and practical public education about the future exist. Model projects are running in Paris and to Finland, and we're in contact with teams from both those nations. We'd love to discuss this further with members of New York's City Council.



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FOR THE RECORD

Douglas Manor Environmental Association

FOR THE RECORD

October 18, 2018

Hon. Costa G. Constantantinides
Committee on Environmental Protection

Re: Res 0509-2018 Resolution calling on the United States Army Corps of Engineers to reconsider the proposals made in the New York - New Jersey Harbor and Tributaries Costal Storm Risk Management Feasibility Study pursuant to the National Environmental Policy Act (NEPA) to consider sea rise in addition to storm surge.

Chairman Constantantinides:

The Douglas Manor Environmental Association supports Res 0509-2018. We are an association in Douglas Manor on a peninsular jutting into Little Neck Bay at the juncture of Long Island Sound and the East River. The recent unprecedented increase of storms and their heightened severity continue to damage our bay, shore, and wetlands. The ACOE proposal, without any review and support for the impacted communities, must not be allowed to proceed.

Sincerely,

Catherine Bealin,
DMEA Board Director

234-21B 41st Avenue, Douglaston, NY 11363 ▪ P: 718-225-3111 ▪ F: 718-225-3112 ▪ E: office@dmanyc.org ▪ DMEAnyc.com.

SWIM Coalition
Stormwater Infrastructure Matters

Testimony of Stormwater Infrastructure Matters (SWIM) Coalition

Before the New York City Council Committee for Environmental Protection Hearing on Resolution 509 - Calling on the United States Army Corps of Engineers to reconsider the proposals made in the New York - New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study pursuant to the National Environmental Policy Act (NEPA) to consider sea rise in addition to storm surge.

October 22, 2018

My name is Julie Welch, I am the Program Manager for the Stormwater Infrastructure Matters Coalition. I am testifying today on behalf of the SWIM Coalition Steering Committee and our 70+ Coalition members. Thank you to the City Council Committee for Environmental Protection for providing the opportunity to offer the following comments today in support of resolution 509.

SWIM Coalition is a citywide group of 70+ member organizations who are dedicated to ensuring swimmable and fishable waters around New York City through natural, sustainable stormwater management practices in our neighborhoods. Our members are a diverse group of community-based, citywide, regional and national organizations, water recreation user groups, scientists, architects, institutions of higher education, and businesses.

Since our founding in 2007, SWIM has worked closely with waterway stewards and City officials to ensure that New York City's waterways are made safe for fishing and swimming. Through our advocacy work, we have informed the development of the City's Sustainable Stormwater Management Plan, the inclusion of green infrastructure in the CSO consent order between the City and State, the green roof tax abatement program to incentivize green roofs, and the public process for the City's CSO Long Term Control Plans.

While we recognize and appreciate that the Army Corp feasibility study is intended to identify potential solutions to protect New York and New Jersey from catastrophic storm surge scenarios like those experienced during superstorm Sandy and other recent storms, we are concerned about the environmental impacts that the in - water barrier alternatives in the study would have on our neighborhoods and waterways, and their long term effectiveness in the face of sea level rise.

In a public testimony delivered by a NOAA Oceanographer (see attached) to the City Council at a public hearing in April of this year (where legislation was introduced to support a study of the impacts on sea level rise in New York City) it was noted that, according to the National Oceanographic and Atmospheric Administration's tide gauges at the Battery, Sandy Hook and Bergen Point, sea level rise is already happening along New York and New Jersey shorelines. NOAA also pointed out that over the last 30 years, the annual frequency of high tide flooding reaching or exceeding 2 feet above the highest average high tide (as measured at the Battery tide gauge) has increased 200%.

Over the years, as sea levels continue to rise, smaller and smaller storms will cause flooding in our communities which means that the proposed storm barrier gates in the feasibility study would potentially be closed more and more often and could cause a host of negative impacts on our communities and waterways. It is possible that storms like Sandy would happen more often due to climate change induced weather patterns and the surge from these storms could overtop the offshore barriers that the Army Corps is considering today. And when these storms and tides begin overtopping the barriers, the complex system of gates and walls could not be easily modified or heightened.

Costs for barrier projects throughout the harbor have been estimated at $10 billion to $36 billion to build, and $100 million to $2.5 billion to maintain every year. If the in harbor barriers were to be recommended and built, it would be short sighted to spend this kind of money only to find that the barriers could potentially cause irreversible harm to adjacent communities and our waterways, and wouldn't protect against permanent flooding due to sea level rise over the long term. Worst case sea level rise scenarios must be integrated into the Army Corp's evaluation process for the proposed harborwide barriers as well as cost effective, onshore measures, which can be built now, and more easily be modified as needed over time.

We also note that critically important environmental studies must be completed in advance of any action or decision made as part of the New York - New Jersey Harbor and Tributaries (NYNJHAT) Coastal Storm Risk Management Feasibility Study. These environmental studies must evaluate the potential impacts on all the affected communities and water bodies throughout the entire study area over the lifespan of any structures - 100, 200, 300 years out.

In our recent public comment letter to the Army Corp, which we have attached to ourwritten testimony today, we list a series of potential impacts that much be studied for each of the proposed alternatives in the New York - New Jersey Harbor and Tributaries (NYNJHAT) Coastal Storm Risk Management Feasibility Study. Key among them:

- The long term impacts of sea level rise on the effectiveness of the proposed in-harbor storm barriers to protect our communities and waterways.
- How the barriers being closed more and more often due to sea level rise over time could:
    - Cause changes in contamination levels both in the water and in river and harbor sediments
    - Impact water quality in the harbor, rivers and bays
    - Change Dissolved oxygen levels throughout the study area
    - Impact water temperature throughout the study area
    - Change nutrient concentrations throughout the study area
    - Increase the frequency of algae blooms throughout the study area
    - The degree and cost of wastewater treatment measures that would be required to ensure compliance with the Clean Water Act in light of reduced tidal exchange / flushing caused by the closure of the gates
    - Induce coastal flooding or deflect storm surge to areas adjacent to any barrier alternatives
    - Cause back-flooding inland of any barriers due to heavy rain events

We fully support the City Council's resolution 509 and urge the Army Corp to conduct an evaluation of the impacts of sea level rise on the alternatives in the New York - New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study, and to provide the public with a thorough review of the social, environmental, and economic impacts of each alternative before any decisions or recommendations are made.

Thank you council member Constantinides and the City Council Committee for Environmental Protection for introducing resolution 509 and addressing the public's concerns about the impacts of the storm surge barrier alternatives currently under review by the Army Corp of Engineers.

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

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.

SWIM Coalition
Stormwater Infrastructure Matters

September 24, 2018

Nancy Brighton
Chief, Watershed Section, Environmental Analysis Branch, Planning Division
U.S. Army Corps of Engineers, New York District
26 Federal Plaza, Room 2151
New York, NY 10279-0090

Sent via email to: NYNJHarbor.TribStudy@usace.army.mil

RE: New York – New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study

Dear Chief Brighton,

Thank you for the opportunity to provide preliminary public comment on the New York – New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study currently being reviewed by the U.S. Army Corps of Engineers, New York District.

We, the Steering Committee for Stormwater Infrastructure Matters (SWIM) Coalition, write today on behalf of our member organizations to provide public comment regarding the storm surge barrier alternatives featured in the New York – New Jersey Harbor and Tributaries (NYNJHAT) Coastal Storm Risk Management Feasibility Study.

SWIM Coalition represents over 70 organizations dedicated to ensuring swimmable and fishable waters around New York City through natural, sustainable stormwater management practices such as green infrastructure in our neighborhoods. Our members are a diverse group of community-based, citywide, regional and national organizations, water recreation user groups, institutions of higher education, and businesses.

We are very concerned about the significant environmental impacts and other consequences that could result from the alternatives under review in the study, particularly the alternatives that include in-water barriers throughout New York Harbor. Please accept the following comments.

****

Firstly, the public needs much more information than what has been shared at the public meetings in July and on your website. We can't comment effectively, as is our legal right, without detailed information and data on the social, economic and environmental impacts of each alternative in the study. The PowerPoint slides, maps and fact sheet provided to the public thus far do not contain enough detail.

We appreciate that you've extended the comment period and are hosting additional scoping sessions but the information shared at the public meetings thus far has not been detailed enough for us to effectively evaluate the impacts of the alternatives and provide meaningful feedback on these plans.

At a recent public meeting it was stated that you will use existing environmental studies and public input on the various resources and habitats that would be impacted by the in water barriers to inform your evaluation of the alternatives but we also want to see specific environmental impact studies conducted for each alternative in the study. At the next round of public meetings and on your web page, it would be helpful if you can provide a detailed description of all the environmental variables you will consider as you evaluate each alternative. Below is a list of recommended elements to consider.

We request that comprehensive, critically important environmental studies be completed in advance of any action or decision made as part of the New York - New Jersey Harbor and Tributaries (NYNJHAT) Coastal Storm Risk Management Feasibility Study. These studies must evaluate the potential effects on all the affected water bodies, including the Hudson River and its tributaries, New York Harbor, Hackensack River, Passaic River, Raritan River, the Meadowlands, Jamaica Bay and Long Island Sound. Studies must examine how the impacts would vary over the life of any structures, 100, 200, 300 years out.

The Corps should include "ecosystem services" in its evaluation of the current array of alternatives. In any cost-benefit analysis of the alternatives, including those with harbor-wide barriers, the Corps should include the cost of shoreline measures that are essential to protect against flooding from sea level rise.

We request that you study (and report your findings to the public) each of the plans' potential impacts on the following, before you eliminate or select any of the six alternatives under consideration:

- Tidal range / regime and flow velocity.
- Migration of all native fish species.
- Abundance of all native and currently existing fish species.
- Abundance and distribution of all mollusk species throughout the study area.
- Current and potential commercial and recreational fisheries.
- Endangered, threatened and special-concern fish and wildlife species (both federally and state designated) in the New York Bight and in the Hackensack River, Passaic River, Raritan River, Meadowlands, Jamaica Bay and Long Island Sound.
- Vegetation (subaquatic and intertidal).
- Birds.
- Habitat for fish, birds and other wildlife.
- Sedimentation rates, scour and elevation in the rivers, bays and harbor.
- Changes in contamination levels both in the water and in river and harbor sediments.
- Rate at which PCBs and other contaminants will be transported from the rivers and harbor to the sea.
- Water quality in the harbor, rivers and bays.
- Dissolved oxygen levels throughout the study area.
- Salinity throughout the study area.
- Water temperature throughout the study area.
- Nutrient concentrations throughout the study area.
- Frequency of algae blooms throughout the study area.
- The degree and cost of wastewater treatment required to comply with the Clean Water Act, in light of reduced tidal exchange / flushing.
- Induced coastal flooding or deflection of storm surge to areas adjacent to any barrier alternatives.
- Back-flooding inland of any barriers due to heavy rain events.
- Commercial shipping.
- Recreational boating.
- Cost to state taxpayers for future operation and maintenance of ship and tide gates in any barriers.

Given the enormous and perpetual consequences that would result from the project alternatives listed in the NYNJHAT Feasibility Study, any initial selection or prioritization of alternatives is unconscionable without first sharing detailed information about the full range of potential impacts of each alternative with the public.

Thank you for your consideration of our requests and for your service.

Respectfully,

Julie A. Welch

Julie A. Welch, Program Manager
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

cc: Basil Seggos, Commissioner, NYSDEC
Bryce Wisemiller, NY District Project Manager, U.S. Army Corps of Engineers, NY District
Costa Constantinides, Chair of City Council Committee for Environmental Protection
Dan Zarrilli, Senior Director, Climate Policy and Programs, New York City Office of the Mayor

Testimony submitted by Dr. Gregory O'Mullan, Queens College October 22, 2018

Thank you for the opportunity to speak today on this important topic. It is essential for the City Council and the people of New York to be engaged, and actively involved, in the issues of climate change response and environmental protection. The issues of storm surge protection, rising sea level, and the need for broader climate change responses are real and require serious planning and action.

My name is Gregory O'Mullan, I am an environmental microbiologist specializing in issues of water quality and water resource management and an Associate Professor at Queens College in the City University of New York. I have twenty years of experience as a scientist and have studied local water quality issues for more than a decade.

The scientific evidence is clear- climate is changing and sea level is rising. We have repeatedly seen the devastating consequences of intense storms on coastal cities, including New York. In the days following Superstorm Sandy, I saw the impacts of coastal flooding, and the interaction with environmental pollution, as I sampled water quality and storm debris in the flooded streets and basements bordering Newtown Creek. The Intergovernmental Panel on Climate Change reports provide a high degree of confidence that sea level will continue to rise, on a scale that is relevant coastal flooding in areas including New York City. There is a high degree of confidence that storms will intensify. The combined risk is real and it is appropriate to take action, but carefully considered action.

The Army Corp of Engineers is proposing large-scale engineered storm surge barriers, as part of a fast moving process with extremely limited information about the proposed alternatives. The expenditures are enormous, and while that is likely appropriate for an issue of this magnitude, it also requires that the investment is well placed. For example, it is important that the storm surge barriers be carefully considered in the context of rising sea level. The environmental and infrastructure interactions of the various alternatives are also far reaching. The majority of the options being considered include including largely blocking off the estuary with limited gates for tidal flow that can be closed during storm events. There are extremely important questions that need carefully considered answers: How much restriction of the tidal exchange? How often would the tidal gates be closed? How do the requirements of a barrier for protection from storm surge change with changing sea level? What are the consequences for habitat alteration and environmental health? What will be the consequences for pollution in the estuary? These are just a few of the questions.

Cost benefit analyses must include the value of our environment and the consequences for environmental pollution. These are not simple questions to answer, and therefore the process must provide adequate information and allow

sufficient time to consider the interactions with other environmental issues and with other components of our infrastructure.

It is also important for the actions that we take to be carefully considered. The concerns for barriers that seriously alter tidal exchange are real and must be adequately addressed as part of the process.

Based on more than a decades experience studying water quality and sewage pollution, I have seen the influence of tidal circulation on the quality of our local water. New York City continues to deliver large quantities of untreated sewage, as well as untreated urban stormwater, to our waterways. Pipes delivering pollutants, regulated and unregulated, are abundant along our shoreline. Areas with restricted tidal circulation tend to have poor water quality due to the local density of pollution sources. The timescale of conditions improving, in terms of fecal bacteria, oxygen levels, and unregulated contaminants such as pharmaceutical pollution, after pollutant delivery is related to tidal exchange. We are spending billions on sewage infrastructure and CSO long term control plans- even these billions are not enough to completely address the issues. How will altered tidal circulation influence the effectiveness of our planned sewage infrastructure improvements. How much worse will our pollutant concentrations and exposure be in a scenario where tidal circulation is altered? These are important questions to consider- among others. Doing so will take more time and more information than the current Army Corp process allows.

We should be responding to climate change. We should be preparing for sea level rise and intensified storms. It seems likely that shoreline protections are a more prudent course of action than estuary wide barriers. We must respond to climate change and coastal flooding in an informed manner that considers associated components of our infrastructure and environment.

I don't have all of the answers. Neither do you. It is my professional opinion that there are important environmental and infrastructure questions that we need better answers to before we proceed with selecting alternatives for storm surge barriers.

Thank you.

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THE CITY OF NEW YORK

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Name: Andrew Juhl

Address: 126 Piermont Ave Nyack NY

I represent: myself

Address:

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Name: NIKITA SCOTT

Address: 275 SOUTH STREET 3L, NY, NY, 10002

I represent: Surfrider Foundation NYC

Address: PO BOX 1236 NY, NY, 10002

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Name: JOHN INGRAM

Address: 434 E 10th St NYC.

I represent: 350 NYC

Address:

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Name: RICHARD REISS

Address: 42 W. 56 ST.

I represent: MYSELF & NEWYORK.THECITYATLAS.ORG

Address: HUNTER COLLEGE

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Name: KAREN IMAS

Address: _____

I represent: WATERFRONT ALLIANCE

Address: _____

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Name: Michael Marrella

Address: _____

I represent: Dept. City Planning

Address: _____

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Address: _____

I represent: DEP

Address: _____

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Name: Michael DeLoach

Address: _____

I represent: DEP

Address: _____

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Name: Jainey Bavishi

Address: 253 Broadway, 14th fl

I represent: Mayor's office

Address: _____

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Date: 10/22

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Name: ROBERT FRIEDMAN

Address: 40 W. 20TH ST, NY

I represent: NRDC

Address:

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Date: 10/22/18

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Name: TRACY BROWN

Address: MAMARONECK, NY

I represent: SAVE THE SOUND

Address:

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Date: 10/22/18

(PLEASE PRINT)

Name: Bob Schleck

Address: 200 Rector Place

I represent:

Address: Apartment 4K

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Date: 22 Oct '18

(PLEASE PRINT)

Name: Joseph Seebode

Address: 26 Federal Plaza, 21st

I represent: U.S. Army Corps of Engineers NY District

Address: New York, NY 10278

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Date: _____

(PLEASE PRINT)

Name: Jessica Roff

Address: 20 Secor Road, Ossining

I represent: Riverkeeper

Address: see above

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☐ in favor ☐ in opposition

Date: _____

(PLEASE PRINT)

Name: Paul Gallay

Address: ~~Roer~~ 20 Secor Road Ossining

I represent: Riverkeeper

Address: see above

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Date: 10/22/2018

(PLEASE PRINT)

Name: Danielle Manley

Address: 2880 Broadway, Suite 504, New York NY 10025

I represent: New York City Panel on Climate Change

Address: _____

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Date: 22 Oct 2018

(PLEASE PRINT)

Name: Michelle Luebke

Address: 1 Bronx River ~~Alliance~~ Parkway, Bronx NY

I represent: Bronx Rivers Alliance

Address: _____

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Date: _____

(PLEASE PRINT)

Name: Greg O'Mullan

Address: 95 Jefferson St Garden City NY

I represent: Scientist

Address: _____

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Date: 10/22/18

(PLEASE PRINT)

Name: PERRY SHEFFIELD (WITH KEVEN CABRERA + TERESA HERRERA + KIELEY O'CONNOR)

Address: _____

I represent: pediatric + public health community

Address: _____

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Date: 10/22/18

(PLEASE PRINT)

Name: Teresa Herrera

Address: _____

I represent: Pediatric & Public Health Committee

Address: _____

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Date: 10/22/18

(PLEASE PRINT)

Name: Kiley O'Connor-Chapman

Address: _____

I represent: Pediatric + Public Health Community

Address: _____

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Date: 10/22/18

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Name: Keven Cabrera

Address: _____

I represent: Pediatric + Public Health Community

Address: _____

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☐ in favor ☐ in opposition

Date: 10-22-18

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Name: JOANNA CRISPE

Address: 488 MADISON AVENUE

I represent: MUNICIPAL ART SOCIETY OF NY

Address: 488 MADISON AVENUE

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☆ modify ☐ in favor ☐ in opposition

Date: _____

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Name: Dan Gutman

Address: _____

I represent: expert witness

Address: _____

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I intend to appear and speak on Int. No. 509 Sea Level Rise Res. No. ______

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Date: 10/22/2016

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Name: [illegible] Hughes

Address: ______

I represent: [illegible] Association

Address: ______

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☒ in favor ☐ in opposition

Date: 10/22/18

(PLEASE PRINT)

Name: REBECCA DE LA CRUZ

Address: 1 CIVIC CENTER PLAZA POUGHKEEPSIE NY 12607

I represent: SCENIC HUDSON, INC.

Address: 1 CIVIC CENTER PLAZA SUITE 200 POUGHKEEPSIE NY 12607

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☐ in favor ☒ in opposition

Date: 10/22/18

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Name: JAY LEHR

Address: 6011 HOUSEMAN RD OSTRANDER, OH

I represent: The HEARTLAND INSTITUTE

Address: ARLINGTON Heights, IL. 3939 N. Wilke RD

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☒ in favor ☐ in opposition

Date: 10-22-2018

(PLEASE PRINT)

Name: Julie A Welch

Address: _____

I represent: SWIM Coalition

Address: 121 Ave of Americas

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~~☒~~ modify ☐ in favor ☐ in opposition

Date: 10/22/2018

(PLEASE PRINT)

Name: Catherine McVay Hughes

Address: _____

I represent: Financial District Neighborhood Association

Address: _____

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