NRDC

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U.S. Army Corps of Engineers, New York District
Programs and Project Management Division, Civil Works Programs Branch
26 Federal Plaza, Room 2127
New York, NY 10279-0090

Re: New York/New Jersey Harbor & Tributaries Focus Area Feasibility Study

Dear Mr. Wisemiller:

Thank you for the opportunity to comment on the U.S. Army Corps of Engineers' New York/New Jersey Harbor & Tributaries Focus Area Feasibility Study (the "Feasibility Study" or "Project"), which seeks to develop a plan to protect millions of people who live and work in the New York/New Jersey metropolitan region from the effects of coastal storm damage.

We write on behalf of the Natural Resources Defense Council (NRDC) to raise some preliminary concerns about the Feasibility Study. In short, while we share the Corps' desire to address coastal storm risk, we strongly oppose the use of offshore storm surge barriers, which could cause serious and irreparable harm to the ecosystem and coastal communities of the region. *We recommend that, rather than construct a series of offshore barriers, the Corps adopt an integrated system of discrete onshore projects that would be less costly, more protective, and less destructive to the environment and local communities*.

We raise several main points in our initial concerns. Primarily, 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. There are more affordable, more localized, and more effective solutions to the problem, such as the construction of dunes, floodwalls, levees, offshore breakwaters, local storm surge barriers, and wetlands, living shorelines, and reefs. Many of these proposed solutions also address other climate change vulnerabilities, such as sea level rise and sunny day tidal flooding. To the extent the Corps moves forward with this project, we urge the Corps to reject any proposal under the Feasibility Study that would erect offshore storm surge barriers in New York Harbor. Instead, we urge the Corps to consider adopting coastal projects, such as dunes, dikes, and levees, and natural options like wetland restoration, that would be less costly, more protective, and less destructive to the environment and local communities.

Our preliminary comments to the Feasibility Study are divided into six parts. Part I provides some relevant background information to place the project and our comments in context. Part II outlines how offshore storm surge barriers could significantly affect nearby communities. Part III describes how offshore storm surge barriers could significantly affect nearby water resources, wetlands, vegetation, and wildlife, especially aquatic flora and fauna. Part IV explains how such barriers would not be effective against sea level rise and may only have a relatively short lifetime until storm surge levels, compounded by sea level rise, exceed the

height of the barriers. Part V outlines the potential monetary cost of offshore barriers. Part VI suggests other, less expensive, more effective, and more sustainable methods that should be considered to mitigate the effects of storm surge in lieu of offshore storm surge barriers. Finally, Part VII requests that the Corps enhance the public scoping process to ensure meaningful participation by the public and affected community members in the process.

I. Background

A. The Natural Resources Defense Council

The Natural Resources Defense Council is an international, nonprofit environmental organization with more than three million members and online activists, including nearly 130,000 in New York State. For five decades, NRDC has been committed to the preservation, protection, and defense of the environment, public health, and natural resources. NRDC has for more than 25 years been a principal advocate for pollution prevention and watershed protection for the Catskill and Delaware watersheds, which provide drinking water to more than nine million residents. In the 1990s NRDC brought federal Clean Water Act litigation that led to the establishment of total maximum daily load (TMDL) pollution standards in New York's upstate reservoirs and other state waterbodies. NRDC has also been a key advocate since the 1970s for full cleanup of toxic PCBs from the Hudson River. And NRDC played an important role in the successful public campaign leading to Governor Andrew Cuomo's announced ban on fracking, which avoided a major water quality threat to water supplies across New York State.

As part of our work to mitigate the harms from climate change, NRDC advises government officials on plans to protect residents against extreme heat, floods, sea level rise, and other climate-related hazards. NRDC scientists also track predicted changes in allergens, disease transmission, and other health impacts of climate change and alert residents and local governments to potential risks. In the New York metropolitan region, NRDC has actively supported federal, state, and local programs to purchase the land of residents whose property was adversely affected by storm surges and flooding. NRDC also urged government officials at all levels to use natural barriers to protect shorelines. For example, NRDC advocated for the adoption of the Staten Island Living Breakwaters Project, an innovative coastal green infrastructure project that utilizes breakwaters to both reduce the harm of storm surges while also providing habitat to local aquatic species.

B. Anthropogenic Climate Change is Real, and We Are Suffering Its Effects Now

We are undergoing a new phase in our planet's climatic history—Heat-trapping pollution is destabilizing the climate, posing a dire threat to public health and welfare. Higher temperatures worsen deadly heat waves, promote the spread of insect-borne diseases, intensify storms and flooding that cause death and injury and enormous property damage, displace wildlife and irreversibly alter ecosystems, and deepen droughts that threaten crops and water supplies. These harmful impacts are already being felt and they disproportionately affect children, the elderly, low-income populations, communities of color, indigenous populations, and developing countries. The U.S. National Oceanic and Atmospheric Administration (NOAA) ranked this past

3-month period, from May through July 2018, as the hottest period ever in the lower 48 states.[1] Sea levels have also risen about 3 inches higher than levels in 1993.[2] It is no coincidence that the amount of carbon dioxide in the atmosphere was found in 2017 to be at its highest level in 800,000 years.[3] The threat of storm surges and sea level rise as a result of anthropogenic climate change is no longer a hypothetical scenario—it is real, it is currently happening and the need to protect New Yorkers is urgent.

These changes in climate are forcing the displacement of populations across the globe—in Bangladesh, for example, over six million people have already been displaced by the effects of climate hazards.[4] And the displacement will only intensify as time goes on. By one estimate, sea level rise resulting from an increase in temperature of 2 degrees Celsius could submerge land that is currently home to 280 million people,[5] and the risks of displacement are significantly higher among people living in poverty and in coastal communities.[6]

As the New York City Panel on Climate Change has observed, "climate risks in the New York metropolitan region are increasing and are projected to continue to increase throughout the 21st century."[7] Higher temperatures, heavy downpours, sea level rise, and intensified coastal flooding are expected to be the major climate hazards for the region.[8] While these impacts cry out for new resiliency adaptations, it is imperative to carefully consider and disclose both the human health and environmental impacts of these projects as early as possible to ensure that their benefits outweigh their economic, social, and environmental cost.

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[1] *Climate at a Glance: Global Mapping*, NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (Oct. 2018), https://www.ncdc.noaa.gov/cag/.

[2] Somini Sengupta, *2018 Is Shaping Up to Be the Fourth-Hottest Year. Yet We're Still 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.

[3] AMERICAN METEOROLOGICAL SOCIETY, STATE OF THE CLIMATE IN 2017 Sxvi (Jessica Blunden et al. eds., 2018), *available at* https://www.ametsoc.net/sotc2017/StateoftheClimate2017_lowres.pdf.

[4] EZEKIEL SIMPERINGHAM, DISPLACEMENT SOLUTIONS, CLIMATE DISPLACEMENT IN BANGLADESH: THE NEED FOR URGENT HOUSING, LAND AND PROPERTY RIGHTS SOLUTIONS 4–5 (2012), *available at* http://displacementsolutions.org/wp-content/uploads/DS-Climate-Displacement-in-Bangladesh-Report-LOW-RES-FOR-WEB.pdf.

[5] BENJAMIN STRAUSS, ET AL., CLIMATE CENTRAL, MAPPING CHOICES: CARBON, CLIMATE AND RISING SEAS – OUR GLOBAL LEGACY 10 (2015), *available at* http://sealevel.climatecentral.org/uploads/research/Global-Mapping-Choices-Report.pdf.

[6] JULIE-ANNE RICHARDS & SIMON BRADSHAW, OXFAM, UPROOTED BY CLIMATE CHANGE: RESPONDING TO THE GROWING RISK OF DISPLACEMENT 3 (2017), *available at* https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/bp-uprooted-climate-change-displacement-021117-en.pdf.

[7] CYNTHIA ROSENZWEIG ET AL., N.Y.C. PANEL ON CLIMATE CHANGE, BUILDING THE KNOWLEDGE BASE FOR CLIMATE RESILIENCY: N.Y.C. PANEL ON CLIMATE CHANGE 2015 REPORT 107 (2015), *available at* https://nyaspubs.onlinelibrary.wiley.com/toc/17496632/1336/1

[8] *Id.*

C. The Corps' Proposal

To date, the Corps has provided very little information about the five alternatives proposed in the Study—the publicly available information included in the Federal Register[9] and on the Corps website[10] provide only very general information about the five proposed alternative projects, failing to, for example, state what type of offshore barrier will be used,[11] the height of the proposed barriers, and what types of natural and nature-based features and non-structural measures will be included in each alternative, among other things. This paucity of detail related to the proposed alternatives makes it difficult to provide detailed comments to the Project during this phase of environmental review.

Our current understanding of the Project is as follows:

- **Alternative 2** proposes a 5-mile storm surge barrier from Sandy Hook in Monmouth County, New Jersey to Breezy Point in Queens, New York, flanked by approximately 10 to 12 miles of shoreline-based measures (floodwalls, levees, etc.) on both the New Jersey and New York coastlines. This alternative also includes a smaller-scale storm surge barrier at Throgs Neck.

- **Alternative 3A** proposes storm surge barriers at Arthur Kill, Jamaica Bay, Pelham, Throgs Neck, and the Verrazano Narrows. Several miles of shoreline-based measures would be placed along the Rockaway Peninsula and the Brooklyn coastline between Jamaica Bay and the Verrazano Narrows, as well as along the proposed barriers.

- **Alternative 3B** proposes storm surge barriers at Arthur Kill, Jamaica Bay, the Gowanus Canal, Kill Van Kull, Newtown Creek, and Pelham. Shoreline-based measures would be placed adjacent to each barrier (including along the Rockaway Peninsula and between Jamaica Bay and the Verrazano Narrows), as well as along East Harlem, the New Jersey Upper Bay/Hudson River Shoreline area (Jersey City), and the West Side of Manhattan.

- **Alternative 4** proposes storm surge barriers at Jamaica Bay, the Gowanus Canal, the Hackensack River, Newtown Creek, and Pelham, with placement of shoreline-based measures similar to Alternative 3B. Additional shoreline-based measures would be placed along the Hudson in certain locations between Yonkers and Albany.

- **Alternative 5** proposes shoreline-based measures at East Harlem, the Gowanus Canal, Newtown Creek, the New Jersey Upper Bay/Hudson River Shoreline area (Jersey City),

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[9] Notice of Intent To Prepare a Tiered Environmental Impact Statement for the New York New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study, 83 Fed. Reg. 6169 (Feb. 13, 2018).

[10] *FACT SHEET - New York/New Jersey Harbor & Tributaries Focus Area Feasibility Study*, NEW YORK DISTRICT, U.S. ARMY CORPS OF ENGINEERS, 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 updated Feb. 2018).

[11] Several types of gates are available for use when constructing offshore storm surge barriers, and could have different effects on the environment and nearby communities. These include: vertical lift gates, vertical rising gates, segment gates, rotary segment gates, sector gates, inflatable gates, flap gates, barge gate, and rolling gates. LESLIE F. MOOYAART ET AL., STORM SURGE BARRIER: OVERVIEW AND DESIGN CONSIDERATIONS 3-14 (2014), *available at* https://repository.tudelft.nl/islandora/object/uuid%3A8ca0ffc7-c317-4c80-aadb-d35323f51824.

and the West Side of Manhattan, as well as unspecified "perimeter-based measures" in the Meadowlands area of New Jersey—it is unclear what these would involve. As in Alternative 4, additional shoreline-based measures would be placed along the Hudson in certain locations between Yonkers and Albany.

The Corps states that each alternative may also include the use of unspecified "natural & nature-based features" and non-structural measures; however, no information has been provided on the types of measures that would be considered and where they would be placed.

Because of the environmental, cost, logistical, and flood protection issues associated with large-scale storm surge barriers, Alternative 2 raises the most concerns. However, all proposals that form an impediment to the natural flow of water could have serious consequences for the New York-New Jersey region, as described below.

II. Storm Surge Barriers Could Harm Vulnerable Communities

Communities of color and low-income communities are disproportionately vulnerable to the health and economic effects of extreme weather events. While some observers have described extreme weather events as "social equalizers" that do not differentiate based on ethnicity, race, or class, data show that extreme weather events usually hit environmental justice communities the hardest.[12] According to researchers at Stony Brook University, for example, census blocks with lower median income experienced greater damage from Superstorm Sandy than wealthier census blocks.[13] They also found that the majority of New York City schools that reported flooding during Superstorm Sandy were located in African-American and Latino neighborhoods.[14] New York City Housing Authority (NYCHA) buildings, home to some of the city's poorest residents, were also hit hard by Hurricane Sandy. According to an audit by the New York City Comptroller's office, approximately 80,000 residents in 402 NYCHA buildings lost power, heat, and hot water because their heating and electrical systems were flooded.[15] And once hit by these events, it is much harder for low-income households to recover from the devastation.

To be sure, we recognize that storm surge barriers could temporarily protect certain communities from storm surges. But at the same time, the barriers maybe lead to or exacerbate flooding, in areas adjacent to and outside of the barriers.[16] Based on past experience, we are

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[12] Kim Knowlton & Miriam Rotkin-Ellman, *Preparing for Climate Change: Lessons for Coastal Cities from Hurricane Sandy*, NATURAL RESOURCES DEFENSE COUNCIL 13 (2014).

[13] Chris Sellers et al., *Median Income versus Damaged Housing*, CENTER FOR THE STUDY OF INEQUALITY, SOCIAL JUSTICE AND POLICY, STONY BROOK UNIVERSITY (2017) https://inequality.studies.stonybrook.edu/wordpress/damaged-housing-by-median-income/.

[14] Chris Sellers et al., *Race, Ethnicity, and Flooding*, CENTER FOR THE STUDY OF INEQUALITY, SOCIAL JUSTICE AND POLICY, STONY BROOK UNIVERSITY (2017) https://inequality.studies.stonybrook.edu/wordpress/mapping-sandys-inequalities/race-ethnicity-and-flooding/.

[15] OFFICE OF THE COMPTROLLER, CITY OF NEW YORK, AUDIT REPORT ON THE NEW YORK CITY HOUSING AUTHORITY'S EMERGENCY PREPAREDNESS 4 (Dec. 14, 2015), *available at* https://comptroller.nyc.gov/wp-content/uploads/documents/SR14_113A.pdf.

[16] N.Y.C. ECONOMIC DEVELOPMENT CORPORATION, A STRONGER, MORE RESILIENT NEW YORK 41 (2013), *available at*

concerned that those adjacent areas will be disproportionately composed of low-income communities and communities of color.

Thus, it is critical that the interests of low-income communities and communities of color are not left out of this on-going process. This means, for example, that all communities should be proactively engaged in developing solutions that are part of regional climate mitigation efforts. At a minimum, the Corps should host additional stakeholder meetings in all potentially affected areas inside and near the Study Area at times when full-time employees are not at work and with translators for languages that reflect the diversity of languages spoken in those areas. If such proactive outreach engagement does not take place, the Corps may unintentionally exclude critically vulnerable communities.

As noted, because there is little detail at this time about the proposed alternatives, our comments are at best educated guesses about the potential impacts of each alternative. While all of the proposed alternatives may have unique and potentially detrimental community impacts, we are particularly concerned with Alternatives 2, 3A, 3B, and 4, as they include offshore barriers that threaten to exacerbate flooding in certain communities, including some environmental justice communities.

Alternative	**Communities that may be protected by proposed offshore storm surge barriers**		**Communities that may experience increased flooding due to proposed offshore storm surge barriers**	
Alternative 1	N/A		N/A	
Alternative 2	Queens County, NY	College Point The Rockaways* Whitestone	Queens County, NY	Bay Terrace Bayside
			Westchester County, NY	Pelham Manor
			Nassau County, NY	Inwood* Atlantic Beach Long Beach
	Bronx County, NY	Castle Hill* Hunts Point* Clason Point*	Bronx County, NY	City Island* Middletown-Pelham Bay Throgs Neck* Schuylerville
		Northern Jersey Shore from Highland to Long Branch		The Jersey Shore south of Long Branch

https://www.nycedc.com/sites/default/files/filemanager/Resources/Studies/Stronger_More_Resilient_NY/Ch3_Coastal_FINAL_singles.pdf.

Alternative 3A	Bronx County, NY	Hunts Point* Portions of Throgs Neck*	Bronx County, NY	City Island* Middletown-Pelham Bay Schuylerville
	Kings County, NY	Bay Ridge* Brighton Beach* Coney Island* Sheepshead Bay*	Kings County, NY	Fort Hamilton* Bensonhurst* Gravesend
			Nassau County, NY	Atlantic Beach Inwood* Long Beach
	Queens County, NY	Whitestone Portions of the Rockaways*	Queens County, NY	Breezy Point* Bay Terrace Bayside
	Richmond County, NY	Portions of St. George	Richmond County, NY	Arrochar Tottenville
			Middlesex County, NJ	Perth Amboy* South Amboy
			Westchester County, NY	Pelham Manor
Alternative 3B	Bronx County, NY	Hunts Point* Clason Point* Castle Hill*	Bronx County, NY	City Island* Throgs Neck* Middletown-Pelham Bay Schuylerville Mott Haven*
			Middlesex County, NJ	Perth Amboy* South Amboy
	Kings County, NY	Bensonhurst* Brighton Beach* Coney Island* Gowanus Gravesend Greenpoint Sheepshead Bay*	Kings County, NY	Bay Ridge* Fort Hamilton* Red Hook* Greenpoint*
			Queens County, NY	Long Island City* Breezy Point* East Elmhurst* Jackson Heights*
	Queens County, NY	Astoria* Ditmars Steinway* Portions of the Rockaways*		
	Richmond County, NY	St. George	Richmond County, NY	Tottenville
			Nassau County, NY	Atlantic Beach Inwood* Long Beach
			Westchester County, NY	Pelham Manor
			Hudson County, NJ	Bayonne*

Alternative 4	Kings County, NY	Bensonhurst* Brighton Beach* Coney Island* Gowanus Gravesend Greenpoint Sheepshead Bay*	Kings County, NY	Bay Ridge* Carroll Gardens Fort Hamilton* Red Hook* Williamsburg
	Queens County, NY	Flushing* Portions of the Rockaways*	Queens County, NY	Breezy Point* East Elmhurst* Jackson Heights*
	Bronx County, NY	Hunts Point* Clason Point* Castle Hill*	Bronx County, NY	City Island* Throgs Neck* Middletown-Pelham Bay Schuylerville Mott Haven*
			Nassau County, NY	Atlantic Beach Inwood* Long Beach
			Westchester County, NY	Pelham Manor
	Hudson County, NJ	Kearny, NJ	Essex County, NJ	South Ironbound* Newark*
Alternative 5	N/A		N/A	

** Communities marked with an asterisk ("*") have poverty rates above the national average, and, as a consequence, are especially vulnerable to storm surge and sea level rise.*

As indicated in the above table, while some communities will be protected by the proposed barriers, many may well become sacrifice zones. And while some alternatives may protect areas that were flooded by Hurricane Sandy, like portions of the Rockaways (Queens County) and Coney Island (Kings County), others are still left vulnerable. These neighborhoods include Tottenville (Richmond County), the Battery (New York County), the Gowanus Canal (Kings County), and Sea Gate (Kings County). All of these neighborhoods were subjected to over 10 feet of storm surge during Superstorm Sandy.[17]

Further, if in future years, sea levels rise to eventually overtop the barriers, we are concerned that even low-lying communities behind the barrier could be vulnerable to storm surge. Due to lack of resources and support, low-income communities will be especially unable to respond to increased flood risk.[18] These low-lying communities include: Red Hook (Kings County), Sunset Park (Kings County), Harlem (New York County), the Rockaways (Queens

[17] N.Y.C. ECONOMIC DEVELOPMENT CORPORATION, A STRONGER, MORE RESILIENT NEW YORK 41 (2013), *available at* https://www.nycedc.com/sites/default/files/filemanager/Resorces/Studies/Stronger_More_Resilient_NY/Ch3_Coastal_FINAL_singles.pdf.

[18] DISASTER TECHNICAL ASSISTANCE CENTER, SUBSTANCE ABUSE AND MENTAL HEALTH SERVICES ADMINISTRATION, GREATER IMPACT: HOW DISASTERS AFFECT PEOPLE OF LOW SOCIOECONOMIC STATUS 12-13 (2017).

County), Coney Island (Kings County), and areas of South Brooklyn, the South Bronx and Coastal Queens.

In summary, we strongly urge the Corps to carefully consider and disclose the impacts of the proposed alternatives on nearby communities—including which neighborhoods are protected, which may become sacrifice zones, and what criteria is used for protecting certain neighborhoods over others. We also respectfully request that, as soon as possible and as part of its environmental review, the Corps carefully examine and disclose the environmental justice implications of each alternative, and select a final alternative that does not lead to the flooding of any single community.

III. Offshore Storm Surge Barriers Could Significantly Harm the Marine Environment

The New York-New Jersey Estuary is a thriving, interconnected system of waterbodies that supports a great variety of estuarine species. The storm surge barriers proposed in Alternative 2 (Sandy Hook-Breezy Point and Throgs Neck), Alternative 3A (Jamaica Bay, Verrazano Narrows, Arthur Kill, and Throgs Neck), Alternative 3B (Jamaica Bay, Arthur Kill, and Kill Van Kull), and Alternative 4 (Jamaica Bay) could significantly disrupt the natural flow of water in the Hudson River, Long Island Sound, and New York-New Jersey Harbor, as well as their tributaries, potentially resulting in significant ecological impacts, described below.

The Study Area's marine resources are in many ways defined by their estuarine nature—the levels of salinity, distribution and movement of sediment, and the tidal movement of water to and from the New York-New Jersey Harbor, the Hudson River Estuary, and Long Island Sound. The estuary supports a high volume of algae, phytoplankton, and zooplankton, which in turn support a high variety of aquatic species, including the blue crab,[19] ribbed mussel,[20] Shortnose Sturgeon,[21] bottlenose dolphin,[22] and the harbor seal.[23] While each of these estuaries has distinct features, they are all connected to each other by a variety of openings and tributaries. Any impediment to circulation in one waterbody could affect the characteristics in other parts of the system.

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[19] NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SIGNIFICANT HABITATS AND HABITAT COMPLEXES OF THE NEW YORK BIGHT WATERSHED – LOWER HUDSON RIVER ESTUARY 4 (2011) *available at* https://www.nodc.noaa.gov/archive/arc0034/0071981/1.1/data/1-data/disc_contents/document/wp/low_hud.pdf.

[20] NEW YORK-NEW JERSEY HARBOR & ESTUARY PROGRAM, HUDSON-RARITAN ESTUARY COMPREHENSIVE RESTORATION PLAN 37, 82 (2016), *available at* http://www.harborestuary.org/watersweshare/pdfs/CRP/FinalReport-0616.pdf.

[21] *Id.*

[22] D. F. SQUIRES & J. S. BARCLAY, NEW YORK-NEW JERSEY HARBOR & ESTUARY PROGRAM, NEARSHORE WILDLIFE HABITATS AND POPULATIONS IN THE NEW YORK/NEW JERSEY ESTUARY 92 (1990), *available at* http://www.harborestuary.org/pdf/NearshoreWildlife1990.pdf.

[23] *Id.*

A. Offshore Storm Surge Barriers Could Change the Salinity of the New York-New Jersey Harbor

All three estuaries within the Study Area—the Hudson River, Long Island Sound, and New York-New Jersey Harbor—rely on the flow of saltwater upstream and flow of freshwater downstream to maintain the proper salinity levels to sustain aquatic life endemic to the region. Physical barriers could constrain the distribution of salt within the Study Area, altering the entire ecosystem.[24]

The composition of benthic communities in the Hudson River, for example, is a strong function of salinity.[25] While marine species (those that thrive in salt water) like polychaetes and bivalves such as *mya* and *mocoma* are dominant downstream closer to Manhattan, freshwater species of oligochaetes, insects, and bivalves dominate upstream north of Newburg where the water is less salty.[26] A physical barrier could impede the natural flow of seawater into the river system, resulting in reduced salinity and a freshening of the Hudson River.[27]

Changes in salinity can dramatically alter the types of organisms that live in a body of water—For example, changes in salinity have been found to alter some species' metabolic rates[28] and accumulation of cadmium,[29] a chemical that is toxic to all life.[30]

B. Offshore Storm Surge Barriers Could Change the Sediment Distribution of the New York-New Jersey Harbor

Storm surge barriers could also alter the transport and distribution of sediment within the Study Area, encouraging the distribution of harmful contaminants throughout the New York-New Jersey Harbor. Typically, sediments tend to flow from the Atlantic Ocean and the Long Island Sound to the Upper Bay of New York Harbor.[31] While difficult to model, the construction of in-water barriers could trap sediments outside of the barriers, filling the shipping channel,

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[24] R.L. Swanson et al., *Storm Surge Barriers: Ecological and Special Concerns, in* AMERICAN SOCIETY OF CIVIL ENGINEERS, STORM SURGE BARRIERS TO PROTECT NEW YORK CITY AGAINST THE DELUGE 122, 124, 127 (Douglas Hill et al. eds., 2013).), *available at http://www.msaudcolumbia.org/summer/wp-content/uploads/2013/06/Storm%20Surge%20Barriers%20to%20Protect%20New%20York%20City-%20Against%20The%20Deluge.pdf.*

[25] David L. Strayer, *The Benthic Animal Communities of the Tidal-Freshwater Hudson River Estuary, in* THE HUDSON RIVER ESTUARY 266, 270 (Jeffrey S. Levinton & John R. Waldman eds., 2006), *available at* https://www.researchgate.net/publication/285877649_The_Benthic_Animal_Communities_of_the_Tidal-Freshwater_Hudson_River_Estuary.

[26] *Id.*

[27] *Id.* at 124.

[28] Marisela Aguilar et al., *The Effect of Salinity on Oxygen Consumption and Osmoregulation of* Macrobrachium Tenellum, 31 Marine and Freshwater Behav. & Physiology 105 (1998).

[29] D. A. Wright, *The Effect of Salinity on Cadmium Uptake by the Tissues of the Shore Crab Carcinus Maenas*, 67 J. Experimental Biology 137-146 (1977).

[30] Stuart M. Levit, *A Literature Review of Effects of Cadmium on Fish*, Nature Conservancy (2010), https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/alaska/sw/cpa/Documents/L2010CadmiumLR122010.pdf.

[31] Swanson et al., *supra* note 21, at 127.

which could require more frequent dredging. [32] This in turn could disrupt the seafloor and resuspend contaminated sediments that have settled to the bottom.[33]

While the Hudson River and New York-New Jersey Harbor are naturally turbid waters,[34] increased turbidity could in turn increase the distribution of contaminants in the Study Area. Contaminants such as organic and inorganic toxins, PCBs, pesticides and other harmful substances bind to and are transported by suspended solids, expanding the distribution of these harmful chemicals as turbidity increases.[35] This could be dangerous for all life that relies on the New York-New Jersey Harbor, as described in more detail in Part III.C., below.

Changing sediment distribution could harm New York and New Jersey's growing shellfish population. Native shellfish, such as oysters, hard clams, and soft clams, rely on gravel bottoms and cobble bars free of mud and sediment for attachment, protection, feeding, and oxygen consumption.[36] A change in sediment distribution may result in changes to the shellfish population that are difficult to predict without additional study.

C. Offshore Storm Surge Barriers Could Expose the New York-New Jersey Harbor to Increased Sewage and Other Pollution

A storm surge barrier could also trap sewage and other pollutants behind the barriers for, at minimum, the time during which the storm surge barriers are closed, but also when they are open. There are approximately 460 Combined Sewer Overflow (CSO) outfalls in New York City alone.[37] When a wastewater treatment plant fails, or when it rains and the system is overloaded with water, raw sewage effluent is pumped out of CSO outfalls into New York City's waterways. A storm surge barrier, even when open, could restrict the movement of raw sewage out to sea, jeopardizing water quality and subjecting aquatic species and members of the public to health risks.

A barrier impeding the natural tidal flow of the estuaries could also diminish the effectiveness of current pollution control efforts and could require billions of dollars of additional pollution reduction investments to meet current water quality standards, as well as more stringent standards that the Environmental Protection Agency has deemed necessary to protect public health. Clean Water Act compliance efforts in New York, New Jersey, and Connecticut, are all based on hydrodynamic modeling of the New York-New Jersey Harbor estuary and Western Long Island Sound. Hydrodynamic modeling has been and continues to also be used as the basis for past and impending decisions concerning billions of dollars of infrastructure investment to reduce critical pollutants, such as nutrients discharged from wastewater treatment plants and raw sewage discharges from CSOs. These models assume the

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[32] *Id.*

[33] *Id.*

[34] Nancy Steinberg et al., *Health of the Harbor: The First Comprehensive Look at the State of the NY/NJ Harbor Estuary*, NY/NJ Harbor & Estuary Program (2004), at 26, http://www.harborestuary.org/reports/harborhealth.pdf.

[35] *Id*. at 29.

[36] Lucie M. Lévesque & Monique G. Dubé, *Review of the Effects of In-Stream Pipeline Crossing Construction on Aquatic Ecosystems and Examination of Canadian Methodologies for Impact Assessment*, 132 Envtl. Monitoring & Assessment 395, 400 (2007).

[37] Mem. from N. G. Kaul, N.Y. Dep't of Envtl. Conservation Water Division Director, to Regional Water Engineers, Bureau Directors & Section Chiefs (Oct. 1, 1993), https://www.dec.ny.gov/docs/water_pdf/togs163.pdf.

natural tidal exchange of water moving across the "borders" of the areas where barriers are being considered. Barriers that impede that tidal flow could throw into disarray that entire Clean Water Act compliance effort.

This applies to, for example, the ongoing PCB cleanup process and related natural resources restoration in the Hudson River. That effort is based upon hydrodynamic models of how PCBs flow downstream in the tidal portion of the Hudson. While the current cleanup efforts are already insufficient, a barrier impeding the tidal flow could further diminish the effectiveness of the PCB cleanup and thereby endanger human health.

D. Storm Surge Barriers Could Serve As a Physical Barrier for Aquatic Life

The construction of barriers could also harm aquatic species endemic to the Study Area by creating a physical obstacle that impedes their migratory patterns. The Hudson River is home to a number of anadromous fish species, including river herring, striped bass, American shad, and Atlantic sturgeon, the latter two of which are listed by the National Marine Fisheries Service as "species of concern."[38] These species travel upstream each year to spawn, and are able to return to their spawning location many years later.[39] The proposed storm surge barriers could interfere with the natural migratory patterns of aquatic species, potentially resulting in decreased spawning rates and lower population numbers.

Because offshore barriers could harm the local marine ecosystem as described above, we urge the Corps to select a project that does not include offshore storm surge barriers.

IV. Sea Level Rise Would Undermine the Efficacy of Offshore Storm Surge Barriers

The efficacy of offshore storm surge barriers would be significantly threatened by sea level rise. Specifically, the barriers could be rendered insufficient if sea level overtops the closed barriers—this scenario is not adequately considered by the Corps' worst-case-scenario projection. Moreover, in any scenario, whenever the barriers are open, they would completely fail to protect the Study Area[40] from the effects of sea level rise, one of the greatest threats resulting from climate change.

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[38] Swanson et al., *supra note* 21, at 129.

[39] Clyde L. Mackenzie, Jr., *The Fisheries of Raritan Bay, New Jersey and New York*, 52 Marine Fisheries Rev. 1 (1990).

[40] The Corps defines the Study Area as the area encompassing "approximately 2,150 square miles and includes parts of Bergen, Passaic, Morris, Essex, Hudson, Union, Somerset, Middlesex, and Monmouth Counties in New Jersey and Rensselaer, Albany, Columbia, Greene, Duchess, Ulster, Putnam, Orange, Westchester, Rockland, Bronx, New York, Queens, Kings, Richmond, and Nassau Counties in New York. The Study Area extends upstream of the Hudson River to the federal lock and dam at Troy, New York, the Passaic River to the Dundee Dam, and the Hackensack River to the Oradell Reservoir." Notice of Intent to Prepare a Tiered Environmental Impact Statement for the New York New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study, 83 Fed. Reg. 6169 (Feb. 13, 2018).

A. The Corps Is Underestimating Future Sea Level Rise, Undermining the Effectiveness of Any Proposed Offshore Storm Surge Barrier

Based on the little information provided by the Corps about the Project, it appears as if the Corps is underestimating the worst-case scenario for sea level rise. By underestimating potential sea level rise, the Corps risks constructing a storm surge barrier that could be overtopped in several decades, significantly undermining the Project's efficacy. 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.[41] In comparison, the Project assumes a worst-case scenario of seven feet of sea level rise,[42] which is less than NOAA's worst-case scenario by almost three feet. Furthermore, NOAA's projections are only applicable up to the year 2100—sea levels will continue rising far into the future and, at some point, will exceed these projections in the next century, when it is likely that the study region would still be relying upon one of the proposed storm surge alternatives offered by the Corps.

Additional factors throw the Corps' sea level rise estimates into further uncertainty—while NOAA has estimated that there is a 0.1 percent probability that its worst-case-scenario will be exceeded, NOAA acknowledges that this probability increases if areas of Antarctica melt and destabilize faster than expected. There is now mounting scientific evidence that sensitive areas of the Antarctic are melting faster than current projections anticipate,[43] meaning that even NOAA's worst-case-scenario projections may be surpassed. NRDC requests that, when calculating for sea level rise, the Corps incorporate the worst-case-scenario reflecting the most up-to-date science.

Given these considerations, it is extremely risky to move forward with any alternative that would be rendered obsolete in the face of worst-case-scenarios for sea level rise.

B. Storm Surge Barriers Are Not Protective Against the Many Other Dimensions of Climate Vulnerability

Storm surge is not the only climate threat facing coastlines—the New York City metropolitan area can also expect to experience sea level rise, tidal or sunny day flooding,[44] and the expansion of floodplains due to high levels of precipitation and riverine flooding. As proposed, Alternatives 2, 3A, 3B, and 4 address only a single dimension of the Study Area's

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[41] *Global and Regional Sea Level Rise Scenarios for the United* States, Nat'l Oceanic & Atmospheric Admin. (Jan. 2017), https://tidesandcurrents.noaa.gov/publications/techrpt83_Global_and_Regional_SLR_Scenarios_for_the_US_final.pdf. 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.

[42] *New York/New Jersey Harbor & Tributaries Coastal Storm Risk Feasibility Study*, U.S. Army Corps of Engineers, http://www.nan.usace.army.mil/Portals/37/docs/civilworks/projects/nj/coast/NYNJHATS/NJHatPres.pdf?ver=2017-10-16-141621-747 (last visited Oct. 26, 2018).

[43] *See* Robert M. DeConto & David Pollard, *Contribution of Antarctica to Past and Future Sea-Level Rise*, 531 Nature 591-597 (Mar. 2016); *see also* Robert E. Kopp et al., *Evolving Understanding of Antarctic Ice-Sheet Physics and Ambiguity in Probabilistic Sea-Level Projections*, 5 Earth's Future 1217–33 (2017).

[44] See *Seeking Higher Ground: How to Break the Cycle of Repeated Flooding with Climate-Smart Flood Insurance*, Natural Resources Defense Council (July 2017), at 5, https://www.nrdc.org/sites/default/files/climate-smart-flood-insurance-ib.pdf for more information.

future vulnerabilities—namely, the surge associated with coastal storms. Because the gates will remain open during non-storm events, these open water barriers will contribute little or nothing to addressing the long-term risks associated with any of the future sea level rise scenarios.

As sea levels rise, water levels will rise on both sides of the open water barriers, doing nothing to mitigate tidal or sunny day flooding, the direct inundation of vulnerable areas, or the expansion of floodplains due to high levels of precipitation and riverine flooding. Indeed, after construction of the barriers, forty-three miles of New York City's coastline, or eight percent of the total, could remain vulnerable to tidal flooding in 2050.[45]

Because offshore storm surge barriers as designed do not account for the worst-case scenario for sea level rise and because they may be rendered ineffective after several decades of sea level rise, we urge the Corps to select an alternative that relies on other methods to protect the New York-New Jersey metropolitan region from the effects of climate change.

V. Storm Surge Barriers May Not Be Worth the Cost

Large-scale storm surge barriers can be extremely expensive and, given their many negative effects on the community and environment, may not be worth the extraordinary cost. Construction of existing barriers in Europe and the United States cost millions of dollars per meter, plus millions more each year for operations and maintenance.[46] According to a report by the New York City Economic Development Corporation, a system of New York City/New Jersey barriers might cost $20 to $25 billion.[47] Depending on the configuration of the barriers, annual maintenance costs could be over $125 million,[48] and these costs would presumably need to be borne by any local governments who will ultimately own or operate the structures.[49] Some researchers estimate even higher operations and maintenance costs for similar structures—perhaps up to ten percent of the initial construction costs per year.[50]

Rising sea levels would likely cause maintenance costs to increase over time as greater water depths, increased erosion, and larger wave heights put stress on the structures.[51] Greater frequency of coastal flooding would also mean that gates and sluices are opened and closed more

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[45] *A Stronger More Resilient New York, Chapter 3: Coastal Protection*, N.Y.C. Office of the Mayor (2013), at 42, https://www.nycedc.com/sites/default/files/filemanager/Resources/Studies/Stronger_More_Resilient_NY/Ch3_Coastal_FINAL_singles.pdf.

[46] *See* Jeroen C. J. H. Aerts et al., *Cost Estimates of Storm Surges*, Annals N.Y. Acad. Sci. 69 (2013); *see also* Leslie Mooyaart, *Storm Surge Barrier: Overview and Considerations*, 34 Coastal Engineering 1 (2014).

[47] *A Stronger More Resilient New York*, *supra* note 44, at 49.

[48] Jeroen C. J. H. Aerts, *supra* note 44, at 69.

[49] Congressional Research Service, *Locally Operated Levees: Issues and Federal Programs*, CRS Report for Cong. ii (Apr. 5, 2011) ("No general federal authorities exist for the Corps to assist with the regular operation and maintenance of locally operated levees.").

[50] Robert J. Nicholls, *The Management of Coastal Flooding and Erosion, in Future Flooding and Coastal Erosion Risks* (Colin R. Thorne et al. eds., 2007).

[51] Ian Townsend & Kevin Burgess, *Methodology for Assessing the Impact of Climate Change Upon Coastal Defence Structures*, 29 Coastal Engineering 1 (2004).

often, leading to increased wear on moving parts. Studies also show that maintenance of onshore structures like dikes, levees, and floodwalls grow more costly as sea levels rise.[52]

These funds would be better spent on more effective, locally tailored strategies that can be adjusted to reflect changing conditions. Offshore storm surge barriers are fixed in place and, as explained in Part II, would commit the New York City region to our current predictions for extreme weather and sea level rise. Such a permanent structure likely cannot not be adjusted if weather patterns, land use, or other risk factors change during the construction or operation phases of the barriers. And if the predicted lifespan of the structures is shorter than currently predicted, the barriers will prove even less protective. And because offshore storm surge barriers do not protect against sea level rise outside of storm surge events, onshore flood protection measures will be necessary regardless of whether offshore barriers are built. Instead of locking in an expensive capital project with limited utility and an estimated 20 to 30-year design, approval, and construction process,[53] shoreline measures can be implemented in the near term, in more flexible ways and at a lower cost.

Because of the extraordinary cost associated with offshore storm surge barriers, we urge the Corps to abandon the consideration of these barriers as part of the Feasibility Study.

VI. There Are Better Alternatives to Offshore Storm Surge Barriers

Offshore storm surge barriers protect against only one aspect of a potential hazard, while potentially exacerbating flooding in some communities and contributing to environmental and coastal degradation. Other alternatives, such as the use of natural infrastructure, the restoration and expansion of existing natural features such as dunes, assisted relocation of residents most vulnerable to sea level rise and storm surge, and the erection of onshore storm surge barriers can be designed to address multiple dimensions of vulnerability—we recommend substituting offshore storm surge barriers with a combination of these alternatives, as they are both more localized, more environmentally sustainable, and more affordable than the construction and maintenance of offshore barriers.

Use of natural infrastructure and the restoration and expansion of existing natural features, for example, can provide similar protection against storm surge, while also providing water quality improvements, enhancing habitat for wildlife as well as freshwater and marine species, and improving resilience to other types of flooding. Many studies show that nature-based interventions in coastal areas that incorporate wetlands and other green infrastructure provide more economic, environmental, and resiliency value to communities."[54]

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[52] Sebastiaan N. Jonkman et al., *Costs of Adapting Coastal Defences to Sea-Level Rise – New Estimates and Their Implications*, 29 J. Coastal Res. 1212 (2013).

[53] NYC OFFICE OF THE MAYOR, A STRONGER MORE RESILIENT NEW YORK (2013), https://www.nycedc.com/sites/default/files/filemanager/Resources/Studies/Stronger_More_Resilient_NY/Ch3_Coastal_FINAL_singles.pdf.

[54] ALLYSON SCHRIER, ET AL., WHAT IS YOUR PLANET WORTH? A HANDBOOK FOR UNDERSTANDING NATURAL CAPITAL (2013), *available at* https://www.yumpu.com/en/document/view/33070059/a-handbook-for-understanding-natural-capital-earth-economics.

In the aftermath of Sandy, for example, areas with established dunes and natural features fared much better in terms of damage and losses.[55] According to the New York City Economic Development Corporation, areas on the Rockaway Peninsula with established dunes, such as Beach 56th Street, suffered substantially less damage and less sand migration into neighborhoods than areas without them, such as Beach 94th Street.[56]

Helping people relocate from areas vulnerable to flooding and rising seas is another strategy that has multiple benefits, providing the only guaranteed and permanent mechanism for reducing and eliminating the potential for damages while also creating new areas where green infrastructure, natural infrastructure, and ecological restorations can take place.[57]

Even onshore storm surge barriers, when thoughtfully designed, can provide multiple dimensions of protection against flooding, sea level rise, and other benefits. Some examples of onshore protections that provide multiple benefits are in the Study Area, such as projects initiated through Rebuild By Design, including The Big U and Hunts Point Lifelines projects.[58] It is important to note, however, that sea walls and structural shoreline protections are not without their own risks, as they can create a "bathtub effect" for floodwaters, inhibiting floodwaters from draining away in the aftermath of a major storm and necessitating the construction of large pumps to remove water. Failure of any aspect of these more complex structural systems can make flooding worse and can lead to a Katrina-like disaster as experienced by New Orleans in 2005.

The New York City Economic Development Corporation, in an assessment of available climate resiliency measures, has observed the following about offshore barriers:

> As attractive as the concept of a single 'silver bullet' solution may be, though, a closer examination of this strategy strongly suggests that relying on such a solution would pose significant risks to the city that far outweigh its theoretical benefits. Given this, the City believes that the right approach to coastal protection is an integrated system of discrete coastal projects, that together would constitute the elements of a multilayered approach also involving resiliency measures for buildings and protections for critical infrastructure.[59]

We urge the Corps to take heed of the New York City Economic Development Corporation's findings and reconfigure its alternatives to exclude the construction of offshore storm surge barriers.

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[55] NYC OFFICE OF THE MAYOR, *supra* note 53, at 43.

[56] NYCEDC, "Coastal Protection," in *A Stronger, More Resilient New York*, 2013, 43, https://www.nycedc.com/sites/default/files/filemanager/Resources/Studies/Stronger_More_Resilient_NY/Ch3_Coastal_FINAL_singles.pdf.

[57] See *Seeking Higher Ground: How to Break the Cycle of Repeated Flooding with Climate-Smart Flood Insurance*, *supra* note 43, for more about relocation assistance.

[58] See descriptions of these projects and status of implementation at *Hurricane Sandy Design Competition*, *supra* note 50.

[59] *A Stronger More Resilient New York*, *supra* note 44, at 50.

VII. The Corps Should Ensure Meaningful Public Participation in the Environmental Review Process

The National Environmental Policy Act (NEPA)[60] "makes environmental protection a part of the mandate of every federal agency and department."[61] It provides that "'it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy,' to avoid environmental degradation, preserve 'historic, cultural, and natural' resources, and promote 'the widest range of beneficial uses of the environment without . . . undesirable and unintended consequences.'"[62]

Under NEPA, before an agency undertakes any "major Federal action[] significantly affecting the quality of the human environment," it must produce and make publicly available a document known as an environmental impact statement (EIS).[63] This includes a requirement that federal agencies engage in "scoping" before preparing the EIS.[64] "The primary purpose of the scoping period is to notify those who may be affected by a proposed government action which is governed by NEPA that the relevant entity is beginning the EIS process; this notice requirement ensures that interested parties are aware of and therefore are able to participate meaningfully in the entire EIS process, from start to finish."[65] "It is clear from the CEQ regulations that scoping will be effective only if people who are, or may become, interested in the proposed action are involved. To ensure awareness on the part of such persons, the regulations require the agency to publish a notice in the Federal Register, invite them to participate in the scoping process, and encourage meetings with the public about the impact statement's scope."[66]

Consistent with NEPA and its implementing regulations,[67] we request that the U.S. Army Corps of Engineers ensure meaningful participation in the environmental review process. Specifically, we ask that the Corps: (1) provide additional public meetings throughout the area affected by the project; and (2) make additional information about the proposed alternatives, framed in publicly-accessible, clearly-understood language, publicly available.

Unfortunately, notice of the Feasibility Study and of the time and location of the public scoping meetings was disseminated in a manner that minimized true public participation. Instead, notice of the Feasibility Study was provided only via publication in the Federal Register and an e-mail to a small number of individuals on a Corps mailing list, and the Corps provided the public with just several days' notice of the meetings. As noted, the proposed Project, if advanced, would affect millions of people who work and live in and around the New York metropolitan region. The limited advanced notice to such a small subset of the potentially

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[60] National Environmental Policy Act, 42 U.S.C. § 4321 (1970).

[61] *Calvert Cliffs' Coordinating Comm'n, Inc. v. U. S. Atomic Energy Comm'n*, 449 F.2d 1109, 1112 (D.C. Cir. 1971).

[62] *Id.* (quoting 42 U.S.C. § 4331(b)).

[63] 42 U.S.C. § 4332(2)(C).

[64] 40 C.F.R. § 1501.4(d) (2012).

[65] *Kootenai Tribe of Idaho v. Veneman*, 313 F.3d 1094, 1116–17 (9th Cir. 2002), *abrogated by Wilderness Soc'y v. U.S. Forest Serv.*, 630 F.3d 1173 (9th Cir. 2011).

[66] *Northwest Coal. For Alternatives to Pesticides v. Lyng*, 673 F. Supp. 1019, 1023 (D. Or. 1987), *aff'd* 844 F.2d 588 (9th Cir. 1988) (citing 40 C.F.R. §§ 1508.22, 1501.7(a)(1), 1501.7(b)(4)).

[67] 42 U.S.C. § 4331; 40 C.F.R. § 1501.7 (2012); 33 C.F.R. § 230.12 (2011).

impacted population provided the public little time to prepare and organize for these meetings. While we greatly appreciate the Corps' decision to extend the comment period deadline to November 5 and the addition of public forums in Brooklyn, Westchester and Long Island, these steps are not sufficient to overcome the other shortcomings of the notice and comment process described above.

Moreover, information about the Feasibility Study is not sufficient to adequately notify the public of the potential scope of environmental impacts of the Project. As explained above, the lack of information about each alternative necessarily permits only general comments about the Feasibility Study.

To make this a truly public process, we ask that the Corps improve opportunities for the public to learn and comment on the Feasibility Study by holding more public meetings and providing more detailed information about each alternative. Granting these requests would be fully consistent with both federal law and Army Corps regulations, which provide that the process should be "early and open,"[68] and require all federal agencies to "[m]ake diligent efforts to involve the public."[69] This is especially critical since the combined effects of climate change and any of these five proposed storm barrier Alternatives could have appreciable harmful impacts on community health. As the Corps regulations emphasize, the scoping process "is the key to preparing a concise EIS and clarifying the significant issues to be analyzed in depth."[70] As such, we request that the Corps undertake the necessary steps to ensure public participation going forward.

CONCLUSION

NRDC thanks the Corps for the opportunity to comment on this important issue. The effects of human-induced climate change are real, and we are grateful that the Corps is exploring steps to mitigate some of its most severe effects. While we recognize the need for action in the face of storm surges and sea level rise, there are more effective and affordable options that protect the people and environment of the region than the construction of offshore storm surge barriers, which could be expensive, ineffective, harmful to the environment, and injurious to the health and economic well-being of communities throughout the region. Any actions should be part of a comprehensive approach that considers ecological effects, impacts to vulnerable communities, and long-term effectiveness.

Sincerely,

Kimberly Ong
Staff Attorney
Natural Resources Defense Council

[68] 40 C.F.R. § 1501.7.
[69] 40 C.F.R. § 1506.6.
[70] 33 C.F.R. § 230.12.