NRDC

August 19, 2020

Justine Woodward
U.S. Army Corps of Engineers, Norfolk District
803 Front St., Norfolk, VA 23510

Re: Miami-Dade Back Bay Coastal Storm Risk Management Feasibility Study, Draft Integrated Feasibility Report and Programmatic Environmental Impact Statement

Dear Ms. Woodward:

Thank you for the opportunity to comment on the U.S. Army Corps of Engineers ("USACE" or "the Corps") Miami-Dade Back Bay Coastal Storm Risk Management Feasibility Study (the "Feasibility Study" or "Project"), which seeks to develop a plan to protect people who live and work in the Miami metropolitan region from the effects of coastal storm damage.

I write on behalf of the Natural Resources Defense Council ("NRDC") to raise some preliminary concerns about the Feasibility Study. In short, while we agree that it is essential to address Miami-Dade County's coastal storm risk, we are concerned that the proposed structural and nonstructural measures will not sufficiently protect the Study Area and that they may pose unintended consequences that will negatively affect the very communities the Corps aims to protect. In addition, the Study gives minimal attention to the natural and green infrastructure preferred by community residents and other local stakeholders.

We provide technical comments below on selected components of the Study. Overall, however, we are concerned that the Project will be an expensive, temporary, and inflexible solution applied to a complex and evolving problem. As the Project moves forward, we urge the Corps to more closely consider environmental justice, nature-based solutions, and the long-term effects on Miami-Dade's communities.

I. Background

A. The Natural Resources Defense Council

NRDC is an international, nonprofit environmental organization with more than three million members and online activists, including approximately 160,000 in Florida. For five decades, NRDC has been committed to the preservation, protection, and defense of the environment, public health, and natural resources. Over the years, NRDC has worked to protect the Everglades in South Florida and its diverse ecosystem from the fossil fuel industry; collaborated with Miami-Dade and Orange Counties to create energy efficiency policies and programs; and partnered to increase protection of Florida's oceans and coastal areas and reduce pollution of Florida's waters. NRDC is also a member of the Miami Climate Alliance, which works for community equity and resilience to address climate change.

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's Water and Climate Team focuses specifically on incorporating the current and future effects of flooding, sea level rise, and other climate-driven hazards into local, state, and national decision making, with the goal of ensuring that adaptation and resilience policies are equitable and benefit those on the front lines of climate change.

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

The threat of increased flooding and coastal storm risk 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 Miami-area residents is urgent. We are experiencing 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. The effects of global climate change worsen deadly heat waves; promote the spread of insect-borne diseases; intensify storms and flooding that cause death and injury and disrupt communities; 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, people of color, and indigenous populations. The National Oceanic and Atmospheric Administration ("NOAA") ranked March through May 2020 as the second-hottest three-month period ever in the 141-year global record.[1] Globally, sea levels have risen over 3 inches compared to levels in 1993.[2]

These changes in climate are forcing the displacement of populations across the globe. According to the Internal Displacement Monitoring Centre, over 900,000 Americans were displaced by disasters in 2019 alone.[3] While most U.S. disaster-related displacements are currently temporary, a large number are permanent; for example, in the aftermath of Hurricane Maria, nearly 130,000 residents of Puerto Rico left the island, many relocating to Orlando, Florida.[4] And the displacement will only intensify as time goes on. Between now and 2100, researchers estimate that between 4 and 13 million Americans will be displaced due to sea level rise, which would be one of the largest population migrations in U.S. history.[5] The Miami region might see 3.6 million people leave for safer locations, while another 1.2 million arrive from elsewhere.[6] As with other climate and environmental risks, the risk of displacement is higher among lower-income communities, communities of color, and other minoritized and marginalized communities.

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[1] National Oceanic and Atmospheric Administration (NOAA), "May 2020 tied for hottest on record for the globe," June 12, 2020, https://www.noaa.gov/news/may-2020-tied-for-hottest-on-record-for-globe.

[2] National Aeronautics and Space Administration (NASA), "Sea Level," https://climate.nasa.gov/vital-signs/sea-level/ (accessed July 21, 2020).

[3] Internal Displacement Monitoring Centre, "United States Profile," https://www.internal-displacement.org/countries/united-states (accessed July 21, 2020).

[4] Guillermo Ortiz, Heidi Schultheis, Valerie Novack, and Aleah Holt, "A Perfect Storm: Extreme Weather as an Affordable Housing Crisis Multiplier," Center for American Progress, August 2019, https://www.americanprogress.org/issues/green/reports/2019/08/01/473067/a-perfect-storm-2/.

[5] Mathew E. Hauer, Jason M. Evans, and Deepak R. Mishra, "Millions Projected to Be at Risk from Sea-Level Rise in the Continental United States," *Nature Climate Change* 6, no. 7 (July 2016): 691–95, https://doi.org/10.1038/nclimate2961.

[6] Matthew E. Hauer, "Migration induced by sea-level rise could reshape the US population landscape," *Nature Climate Change* 7, no. 5 (May 2017): 321–325, https://doi.org/10.1038/nclimate3271.

Similar to other locations on the U.S. East Coast, sea levels in southeastern Florida are rising faster than the global average.[7] In 2019, Miami broke its all-time record for the number of high-tide (also known as "sunny day" or "nuisance") flooding days.[8] At the same time, the southeastern U.S. is experiencing more heavy precipitation events.[9] The Miami area's porous limestone bedrock further complicates these issues, as it allows seawater to flow into local aquifers, which raises the water table, reducing the effectiveness of drainage systems and contaminating drinking water supplies.[10]

While these impacts illustrate the need for improved resilience and adaptation strategies, it is imperative to carefully consider and disclose the projects' effects on the natural and human environment to ensure that their benefits outweigh their social, environmental, and economic costs. It is also critical to assess the underlying systems, structures, and processes that govern our nation's adaptation decisions to ensure they facilitate the selection of effective, equitable, and sustainable options.

C. The Corps' Proposal

The Feasibility Study assesses eight alternatives to address coastal storm flood risk in Miami-Dade County (excluding barrier island beach areas, which the Corps is studying separately); according to the report, "The study seeks not only to reduce coastal storm risk, but also to build on resilience by implementing strategic approaches that address identified stresses from major storms, and the impact on residents and economic activity."[11] The Study states that it does not attempt to "provide a holistic or comprehensive risk reduction plan for the County" and it explicitly excludes flood risk due to sources other than coastal storm events.[12]

The Corps identified seven geographic areas ("focus areas") that it determined to be vulnerable based on flood risk and social vulnerability factors: Arch Creek, Aventura, Cutler Bay, Little River, Miami River, North Beach, and South Beach. The Corps' Tentatively Selected Plan ("TSP") proposes structural measures including floodwalls and pump stations to protect three of these focus areas. The TSP proposes nonstructural measures including elevations and floodproofing for the remaining four focus areas, as well as parts of the previously mentioned focus areas that are outside/downstream of the locations protected by structural features. Natural and nature-based features ("NNBF")—in this case, mangrove and other native vegetation plantings—are proposed only for the Cutler Bay focus area.

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[7] Arnoldo Valle-Levinson, Andrea Dutton, and Jonathan B. Martin, "Spatial and temporal variability of sea level rise hot spots over the eastern United States," *Geophysical Research Letters* 44, no. 15 (August 2017): 7876–7882, https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2017GL073926.

[8] NOAA, "2019 State of U.S. High Tide Flooding with a 2020 Outlook," July 2020, https://tidesandcurrents.noaa.gov/publications/Techrpt_092_2019_State_of_US_High_Tide_Flooding_with_a_2020_Outlook_30June2020.pdf.

[9] U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, volume II*, D. R. Reidmiller et al., eds., 2018, doi: 10.7930/NCA4.2018.

[10] U.S. Geological Survey, *Origins and Delineation of Saltwater Intrusion in the Biscayne Aquifer and Changes in the Distribution of Saltwater in Miami-Dade County, Florida*, Scientific Investigations Report 2014–5025, 2014, https://www.nrc.gov/docs/ML1621/ML16216A235.pdf.

[11] Feasibility Study, p. iii

[12] Ibid.

II. Social Vulnerability Analysis/Focus Area Selection Process

A. Low-Income Communities and Communities of Color Face Disproportionate Climate Impacts

Researchers, policymakers, and communities all recognize that climate change impacts hit communities of color and low-income communities first and worst.[13] The legacy of redlining and other racist housing and land ownership policies means that people of color are more likely to live in flood-prone neighborhoods; in many places, low-income communities and communities of color are likely to experience higher flood risk due to lower-lying elevations and/or underinvestment in flood mitigation infrastructure.[14,15,16] Disaster assistance funding—which is most available in whiter, wealthier communities, and most accessible to those who already have resources and social capital—compounds this inequity.[17] In fact, research shows that white families tend to gain wealth after disasters while Black families lose wealth, exacerbating already longstanding racial gaps.[18]

These issues are very apparent in the Miami area. Research shows that neighborhoods with greater percentages of Black and Latino residents (especially those of Colombian and Puerto Rican origin) have higher inland flood risk, and residents of Mexican origin are disproportionately exposed to coastal flooding.[19] Meanwhile, residents of traditionally underinvested Black and Latino neighborhoods located on higher ground face pressure from real estate developers and wealthy residents trying to reduce their own exposure to coastal flood risks.[20]

As stated in the Fourth National Climate Assessment, "with the limited and often expensive adaptation opportunities currently under consideration, including elevating properties or constructing seawalls, climate-driven impacts may lead to a great deal of unplanned and undesired community change that is

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[13] Lorah Steichenv, Jacqueline Patterson, and Katherine Taylor, *In the Eye of the Storm: A People's Guide to Transforming Crisis & Advancing Equity in the Disaster Continuum*, National Association for the Advancement of Colored People (NAACP) Environmental and Climate Justice Program, 2018, https://live-naacp-site.pantheonsite.io/wp-content/uploads/2018/09/NAACP_InTheEyeOfTheStorm.pdf.

[14] Thomas Frank, "Flooding Disproportionately Harms Black Neighborhoods," *E&E News*, June 2, 2020, https://www.scientificamerican.com/article/flooding-disproportionately-harms-black-neighborhoods/.

[15]Jeremy Deaton, "Hurricane Harvey Hit Low-Income Communities Hardest," Nexus Media, September 1, 2017, https://nexusmedianews.com/hurricane-harvey-hit-low-income-communities-hardest-6966d859e61f.

[16] Jonathan M. Katz, "Who Suffers When Disasters Strike? The Poorest and Most Vulnerable," *Washington Post*, September 1, 2017, https://www.washingtonpost.com/outlook/who-suffers-when-disasters-strike-the-poorest-and-most-vulnerable/2017/09/01/0efab8a2-8e65-11e7-84c0-02cc069f2c37_story.html?utm_term=.7d109ef88418.

[17] Rebecca Hersher and Robert Benincasa, "How Federal Disaster Money Favors The Rich," NPR, March 5, 2019, https://www.npr.org/2019/03/05/688786177/how-federal-disaster-money-favors-the-rich.

[18] Junia Howell and James R. Elliott, "Damages Done: The Longitudinal Impacts of Natural Hazards on Wealth Inequality in the United States," *Social Problems* 66, no. 3 (August 2019): 448–467, https://doi.org/10.1093/socpro/spy016.

[19] Marilyn C. Montgomery and Jayajit Chakraborty, "Assessing the Environmental Justice Consequences of Flood Risk: A Case Study in Miami, Florida," *Environmental Research Letters* 10, no. 9 (September 1, 2015): 095010, https://doi.org/10.1088/1748-9326/10/9/095010.

[20] Robynne Boyd, "Has Climate Gentrification Hit Miami? The City Plans to Find Out," NRDC, March 11, 2019, https://www.nrdc.org/stories/has-climate-gentrification-hit-miami-city-plans-find-out.

likely to disproportionately impact communities that are already marginalized."[21] The Project represents an important opportunity to address coastal storm risk in Miami-Dade County and may well set an example for other coastal cities in the United States and across the world. It is crucial that potential equity implications are thoughtfully and comprehensively addressed throughout the design and planning process. As a bare minimum, the Project should not exacerbate existing inequities or pose an undue burden on underserved communities living in vulnerable locations.

B. The Corps' Process is Insufficient to Select and Refine the Project Areas

Section 2.15 of the Feasibility Study describes the socioeconomic characteristics of Miami-Dade County and Section 3.8.1 presents the Corps' use of this information to identify project areas. The Corps used the Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI) tool to identify areas of high social vulnerability and used FEMA's Hazus software to identify areas highly vulnerable to coastal storm damage. The Corps compared the SVI and Hazus results "to determine which damage centers were also areas of highest risk to vulnerable populations" and used this to identify "refined focus areas" for the Project.[22]

This approach is not sufficient to select the most at-risk areas. First, while the SVI product is a valuable screening tool, it only provides information at the Census tract level; according to the American Community Survey, some Census tracts in Miami-Dade county are home to over 10,000 or even 15,000 people.[23] With social and physical risk characteristics sometimes shifting on a block-to-block basis, more granular information is needed to truly understand the social vulnerability of an area. The SVI data elements also do not capture several key factors relevant to environmental, heath, or disaster risks, such as specific race or ethnicity (other than "minority status"), housing tenure (homeownership vs. tenant status), immigration status, or cost burden of housing. Finally, the tool cannot assess qualitative characteristics such as community ties and sense of place, which are essential to consider in a resilience context. (While the Feasibility Study states that the Corps will consider neighborhood cohesiveness during the next phase of the study, this and other critical information should not be relegated to an afterthought in project planning.)

Second, this approach focuses on areas with high potential for economic damage, rather than centering the needs of people and communities. As described in the Feasibility Study, Hazus predicts "possible capital stock losses due to structures, contents, vehicles, schools, as well as income losses such as relocation, capital related, wages, and rental income."[24] There are well-documented equity issues associated with using economic losses (or avoided losses) to guide investment; for example, it assumes that all costs and benefits are equal, regardless of who reaps the benefit or suffers the cost.[25] In this case,

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[21] USGCRP, *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, volume II*, Chapter 8.

[22] Feasibility Study, p. 10.

[23] U.S. Census Bureau, "2013–2018 American Community Survey 5-Year Data," https://data.census.gov/cedsci/ (accessed July 23, 2020).

[24] Feasibility Study, p. 10.

[25] Organisation for Economic Cooperation and Development (OECD), "Equity and Cost-benefit Analysis," in *Cost-Benefit Analysis and the Environment: Recent Developments*, 2006, https://dx.doi.org/10.1787/9789264010055-16-en.

areas with higher-value buildings, infrastructure, or commercial activity would presumably receive a higher Hazus score and therefore more consideration for Corps intervention. Simply overlying areas of high economic loss potential with areas of high social vulnerability is not sufficient to identify focus areas in a way that is responsive to community needs.

Third, the Feasibility Study does not sufficiently describe how the Corps combined the SVI and Hazus results or how it incorporated the outcome into its consideration of Project benefits. Section 1.5.6 of the Feasibility Study states that the Corps overlaid the SVI shapefile with the Hazus results using ArcGIS. Was this simply a visual comparison? Was any consideration given to land use (e.g., risk to commercial vs. residential areas) or other factors when making this comparison? In addition, it is unclear whether or to what extent the Corps incorporated the SVI data into its benefits assessments. The descriptions in Sections 6.10.4 and 8.1, for example, consider only the overall benefits (such as the total number of home elevations) and not how they would be distributed.

In general, the Feasibility Study does not clearly describe how specific communities and vulnerability criteria will or will not be affected by specific Project activities. Further, the Study's socioeconomic impact analysis does not consider indirect effects or effects outside of the focus areas. While the proposed structural and nonstructural features will not cover the entire County, their costs and benefits will be felt in communities across the area. It is important to consider the possibility of consequences for locations outside of the focus areas. We urge the Corps to take a more detailed, comprehensive approach to environmental justice analysis in future phases of this project. The Corps should go beyond superficial screening tools to assess the specific impacts of the proposed activities, prioritizing the input of affected communities and incorporating place-based socioeconomic factors into all aspects of the Project.

III. Proposed Structural Measures Could Harm Vulnerable Communities

Coastal storms are just one factor in Miami-Dade's flood risk profile. While the Feasibility Study's scope is limited to storm surge and coastal storm risk management, other types of flooding will interact with the proposed structural features, potentially affecting their efficacy and changing the County's overall flood risk.

To be sure, we recognize that floodwalls can temporarily protect certain communities from storm surges. But at the same time, these barriers may lead to or exacerbate flooding in areas adjacent to and outside of the barriers, and placing large concrete structures within neighborhoods may disrupt communities. We are concerned that these unintended consequences will disproportionately affect low-income communities and communities of color.

While we commend the Corps for considering social vulnerability factors, building structural features in historically disinvested or disenfranchised communities comes with a serious responsibility to ensure the project does not further past social, economic, and environmental injustices. It demands deep, meaningful community engagement and real responsiveness to the needs of community members.

A. Proposed Structural Measures Will Not Fully Protect Communities

Structural barriers such as floodwalls are inherently inflexible and one-dimensional, addressing a limited mode of vulnerability while largely ignoring all others. In general, we believe the Project will not provide the protections needed by Miami-Dade County because the analysis is limited to storm surge and does not

consider other, closely related aspects of climate vulnerability. Furthermore, we are concerned that the Corps underestimates local sea level rise, resulting in proposed storm surge barriers that would be vulnerable to overtopping during extreme events. This could leave the socially vulnerable communities meant to be protected by the barriers in harm's way, and especially unable to respond to increased flood risk.[26]

Structural features are only as effective as their design assumptions. In this case, sea level rise projections are key to the proposed floodwalls' and barriers' effectiveness. The Study uses the USACE "high" sea level rise projection curve, assuming a sea level rise change rate of 0.012 ft per year based on records from the Vaca Key tide gauge.[27] The Study notes that the USACE high curve "falls in line with the Southeast Florida Climate Compact that the Miami-Dade County is a part of."[28]

However, the Southeast Florida Regional Climate Change Compact's Unified Sea Level Rise Projection guidance recommends that the NOAA high curve—a more aggressive sea level rise projection than the USACE high curve—be used for critical projects.[29] The Project undoubtedly qualifies as critical under the Compact's description, which includes "those projects which are not easily replaceable or removable, have a long design life (more than 50 years), and are interdependent with other infrastructure or services;" the Compact further states that "If failure of the critical infrastructure would have catastrophic impacts, it is considered to be high risk."[30] As shown in the Study's Figure 3-2, the NOAA high curve predicts a relative sea level rise change that is approximately 1 foot greater than that predicted by the USACE high curve in 2080. Further, the Study states that "the USACE low curve and intermediate curve will also be used to optimize the Tentatively Selected Plan once selected."[31] Because of the critical, high risk nature of the Project, the Corps must use the NOAA high curve when refining the TSP.

Of course, storm surge is not the only type of flooding that faces Miami. The structural features, by design, will not protect communities from "sunny day" or tidal flooding that is the direct impact of sea level rise and that affects communities far more often than coastal storms.[32] Climate change is also increasing storms' precipitation amounts and possibly affecting their forward speed, leading to more intense, prolonged periods of extreme rain.[33] Floodwalls will not protect against pluvial (rain-induced) flooding, and could trap floodwaters inside the barrier—in the very communities the Project is meant to

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[26] Substance Abuse and Mental Health Services Administration, *Greater Impact: How Disasters Affect People of Low Socioeconomic Status*, Disaster Technical Assistance Center Supplemental Research Bulletin, July 2017, https://www.samhsa.gov/sites/default/files/dtac/srb-low-ses_2.pdf.

[27] Feasibility Study, Appendix B, p. 29.

[28] Feasibility Study, p. 171.

[29] Southeast Florida Regional Climate Change Compact, *Unified Sea Level Rise Projection: Southeast Florida*, 2019, https://southeastfloridaclimatecompact.org/wp-content/uploads/2020/04/Sea-Level-Rise-Projection-Guidance-Report_FINAL_02212020.pdf.

[30] Southeast Florida Regional Climate Change Compact, p. 14.

[31] Feasibility Study, p. 171.

[32] The Miami area experienced a record number of tidal flooding events in 2019 and is projected to have as many as 55 flood days per year by 2050. See NOAA, *2019 State of U.S. High Tide Flooding with a 2020 Outlook*, July 2020, https://tidesandcurrents.noaa.gov/HighTideFlooding_AnnualOutlook.html.

[33] Jeff Berardelli, "How climate change is making hurricanes more dangerous," Yale Climate Connections, July 8, 2019, https://yaleclimateconnections.org/2019/07/how-climate-change-is-making-hurricanes-more-dangerous/.

protect. This is particularly important given the Miami area's porous limestone geology, which makes the region very susceptible to saltwater intrusion and flooding related to high water tables.[34,35]

The Corps proposes pump stations that would remove this excess water but, again, it is unclear whether the pumps' design parameters will be sufficient, e.g. if the pumps will be able to address the potentially huge amounts of water from a precipitation event on the scale of Hurricanes Harvey, Irma, or Florence. (Appendix B of the Feasibility Study only states that "The sizing of the pump capacities and pump stations at this time has yet to be determined."[36]) Increased frequency and duration of pumping also means increased noise, water and air quality effects, and maintenance needs, likely exacerbating the "temporary and minor" or "temporary and moderate" adverse impacts noted in the Study.[37]

Finally, what will happen to communities beyond the Project's planned lifetime? The Study assesses a 50-year period, assuming that construction will begin in 2026 and that the Project's benefits will accrue between 2030 and December 31, 2079.[38] Based on the long timeframes and delays of similar Corps projects (e.g., the New York-New Jersey Harbor & Tributaries Focus Area Feasibility Study), it is unclear whether communities would truly see benefits beginning in 2030. In addition, sea level rise will continue beyond 2080 (and, in fact, the NOAA high curve diverges considerably from other projections after that time), and the Study does not assess the consequences of having outdated structural features in low-lying neighborhoods.

B. Structural Features May Pose Unintended Consequences for Communities

The Study's stated constraints include the commendable requirements of not reducing evacuation capacities, not creating or exacerbating social justice issues, and avoiding induced flooding within or near the Project area.[39] However, the Study does not sufficiently describe how these goals will be achieved, particularly with respect to the proposed structural features. For example:

- Some of the proposed structural features intersect existing roads and are located adjacent to evacuation corridors, as shown in Figure 2-48. It is unclear how the Corps will address potential impacts to evacuation routes. The Study includes only generic statements, such as "Coordination with all applicable emergency service agencies, local, state, and federal regulatory agencies, and the general public would be conducted to ensure that safety concerns are all addressed, to include those specific to evacuation measures"[40] and "Any potential temporary disruptions to designated

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[34] Jeffrey Czajkowski, Vic Engel, Chris Martinez, Ali Mirchi, David Watkins, Michael C. Sukop, Joseph D. Hughes, "Economic impacts of urban flooding in South Florida: Potential consequences of managing groundwater to prevent salt water intrusion," *Science of the Total Environment* 621 (April 15, 2018): 465-478, https://doi.org/10.1016/j.scitotenv.2017.10.251.

[35] Miami-Dade County, *Report on Flooding and Saltwater Intrusion*, Final Report for Resolution R-48-15 in Support of the Sea Level Rise Task Force Final Recommendations, Attachment 4, September 2016, https://www.miamidade.gov/green/library/sea-level-rise-flooding-saltwater-intrusion.pdf.

[36] Feasibility Study, Appendix B, p. 41.

[37] Feasibility Study, p. viii (re: water quality); Feasibility Study, p. ix (re: noise); Feasibility Study, p. x. (re: air quality).

[38] Feasibility Study, Appendix C, p. C-11.

[39] Feasibility Study, p. 165.

[40] Feasibility Study, p. 343.

evacuation routes or zones would be developed by USACE and approved by FEMA, FDEM, Miami-Dade County and other applicable agencies."[41]

- Some amount of community disruption and/or displacement will be required to construct the structural features. How will this affect residents and businesses, and who will be most affected? The Study does not sufficiently describe the community impacts of the land acquisition, easements, rights of way, relocations, and disposal areas needed for the proposed floodwalls and barriers.
- As the Project's non-federal sponsor, Miami-Dade County must pay a 35% cost share, as well as costs for relocation, land acquisition, and annual operations, maintenance, repair, rehabilitation, and replacement activities (ongoing costs are estimated to be $12.6 million per year).[42] Particularly if sea level rise or coastal storm impacts are greater than anticipated (e.g., resulting in additional repair costs or increased frequency of opening/closing storm surge gates) these costs could be much higher. We are concerned that this funding need could take away from other urgent community needs faced by the County, especially in a time of economic, health, and social crisis during which region will also face many other climate-related stresses.

As the Project progresses, we urge the Corps to take these considerations into account and incorporate the input of local residents and community groups that could be negatively affected by these and other unintended consequences.

IV. Proposed Nonstructural Measures Could Harm Vulnerable Communities

The Study proposes nonstructural measures (primarily residential elevations and non-residential floodproofing) for areas not protected by the structural features. The TSP includes approximately 2,300 residential elevations and the floodproofing of approximately 3,800 non-residential structures and pieces of critical infrastructure. The Study states that property acquisitions/buyouts are not currently planned, but that they may be included as the Corps further refines the Project.[43]

As with the proposed structural features, we are concerned that the proposed nonstructural measures are also insufficient to protect communities and that they may involve unintended consequences that disproportionately affect low-income communities and communities of color.

A. Proposed Nonstructural Measures Will Not Fully Protect Communities

The Corps has not yet determined which specific properties (or specific sub-areas within the nonstructural Focus Areas) will receive elevations or floodproofing. However, the proposed number of home elevations seems unlikely to address risk to all households within the nonstructural Focus Areas. Appendix F states that an "estimated 9,100 structures are included" for "property owners receiving voluntary benefits under

[41] Feasibility Study, p. 347.

[42] Feasibility Study, p. 387.

[43] Feasibility Study, Appendix F, p. F-9.

the nonstructural measures of elevation."[44] The source of this number is not clear, as the rest of the Study refers to 2,300 residential elevations.

Per Appendix G of the Feasibility Study, property owners interested in elevations must submit an application, provide proof of ownership, and demonstrate that no taxes are due and that any mortgage is in good standing. The property owner is also responsible for any necessary remediation identified by an environmental site assessment and the structure itself must meet certain criteria.[45] These requirements have equity implications, as discussed below; while criteria such as these may be practically or legally necessary, the Project should include methods to mitigate disproportionate outcomes. And regardless of their social or economic characteristics, it appears that residents not selected for home elevations will simply be left to deal with flooding on their own. This is particularly concerning for the areas outside/east of the proposed structural features.

In addition, as with structural features, nonstructural measures must be planned with appropriate consideration of projected future conditions. As described in Section III.A above, we are concerned that the Corps is not applying a sufficiently high sea level rise projection. With most structural components of homes expected to last for 50 years or more,[46] it is crucial that floodproofing and elevation designs anticipate the conditions that the upgraded buildings (and their residents) will face.

B. Non-Structural Features May Pose Unintended Consequences for Communities

The Corps has not yet provided any detailed plans for where home elevations will take place, how inequitable outcomes will be avoided, how the Project will interact with local affordable housing and anti-displacement work, and how residents will be supported during implementation. The Feasibility Study prompts more questions than it answers regarding the impact on communities. For example:

- Appendix G of the Feasibility Study states that only tenants (not homeowners) are eligible for relocation assistance during the period when their home is being elevated.[47] The Corps estimates that it will take three or four months to elevate a structure, depending on the type of foundation.[48] Considering the high cost of housing in Miami-Dade County, three to four months' rent in a temporary residence is likely to run thousands of dollars.[49] Homeowners whose residences are elevated should be provided with means-tested relocation assistance for the period during which they are displaced.
- The Study categorizes "multifamily structures such as condominium and apartment buildings that cannot be elevated or acquired" as commercial buildings that are potentially eligible for

[44] Feasibility Study, Appendix F, p. F-13.

[45] Feasibility Study, Appendix G, pp. G-5–G-7.

[46] National Association of Home Builders (NAHB) Economics Group, *Study of Life Expectancy of Home Components*, NAHB and Bank of American Home Equity, February 2007, https://www.interstatebrick.com/sites/default/files/library/nahb20study20of20life20expectancy20of20home20components.pdf.

[47] Feasibility Study, Appendix G, p. G-9.

[48] Feasibility Study, Appendix G, p. G-4.

[49] Rob Wile, "Miami-Dade is one of the most expensive areas in the nation for renters," *Miami Herald*, June 5, 2019, https://www.miamiherald.com/news/business/real-estate-news/article229131929.html.

floodproofing.[50] This is consistent with FEMA's Mitigation Measures for Multi-Family Buildings guidance.[51] However, property owners must apply for floodproofing and the decision to pursue this option seems to rest entirely with the owners. What is the mechanism for the residents of multifamily buildings (particularly tenants) to express interest in floodproofing their building and, more broadly, to ensure that floodproofing benefits are equitably distributed?

- The elevation eligibility criteria described in Appendix G may be difficult to meet for lower-income residents, leading to inequitable outcomes. For example, residents must be able to show satisfactory proof of ownership and must not owe any taxes; all mortgages or liens must be in good standing or released.[52] Demonstrating proof of ownership may be challenging for homes held by families over multiple generations, and the current economic crisis due to COVID-19 seems likely to increase the number of lower-income households who are unable to pay property taxes. What methods will the Corps use to mitigate disproportionate outcomes?

- The Corps should also clarify how it will allocate elevation funding among focus areas and neighborhoods within those focus areas. Tables 21 and 22 in Appendix G show that the Aventura focus area will receive the most elevation funding, but it is unclear how the Corps made this determination. A rough assessment of Census data indicates, for example, that the Cutler Bay focus area has perhaps twice as many single-family homes and duplexes than the Aventura focus area (and generally higher social vulnerability according to the SVI output), despite being allocated less than half as much elevation funding.[53]

- In particular, determining which homes will be elevated should not be driven solely by standard benefit-cost analyses. The cost of home elevation is largely driven by the size of the building, meaning that a 1,000 sq. ft. home in a less expensive neighborhood is expected to cost approximately the same amount to elevate as a 1,000 sq. ft home in more expensive neighborhood. Elevating a higher-value home may appear to have greater benefits (because more financial losses are avoided), but this approach can direct funding away from lower-income or disinvested neighborhoods with artificially devalued properties. In addition, during a storm or flood, lower-valued homes are more likely to sustain damages that represent a larger proportion of their value, representing a greater loss of household wealth and requiring owners to pay for expensive upgrades to bring their "substantially damaged" property up to code.[54] As part of a suite of efforts to reduce disproportionate outcomes, we recommend using an approach similar to

[50] Feasibility Study, Appendix G, p. G-12.

[51] FEMA, *National Flood Insurance Program Flood Mitigation Measures for Multi-Family Buildings*, FEMA P-2037, October 2019, https://content.govdelivery.com/attachments/USDHSFEMA/2020/06/24/file_attachments/1481529/16-J-0218_Multi-FamilyGuidance_06222020.pdf.

[52] Feasibility Study, Appendix G, pp. G-5–G-6.

[53] NRDC submitted a USACE public records request for the spatial data files of the Study Area, but had not yet received them at the time this comment letter was prepared. Because of this, the assessment mentioned in this paragraph consisted only of a Census tract-level visual comparison.

[54] Rob Moore, *Seeking Higher Ground: How to Break the Cycle of Repeated Flooding with Climate-Smart Flood Insurance Reforms*, NRDC, July 25, 2017, https://www.nrdc.org/resources/seeking-higher-ground-how-break-cycle-repeated-flooding-climate-smart-flood-insurance.

FEMA's Pre-Calculated Benefits, which considers any home elevation of $175,000 or less in the Special Flood Hazard Area to be automatically considered cost effective.[55]

The Corps should also consider the potential for acquisitions/buyouts more carefully. The Feasibility Study states that the Corps does not plan on acquiring or buying out any properties at this time, though "it may be a possible measure once optimization and neighborhood cohesiveness analysis is performed showing acquisition to be more feasible compared to elevating."[56] Specifically, the Corps would propose acquisition for a home if elevation will "cost more than the total monetary value of the flood damage anticipated to be avoided over the 50-year period of analysis."[57] As Corps policy requires that any planned acquisitions ultimately take place, including the use of eminent domain if needed,[58] the question of acquisitions must be considered with extreme caution and with buy-in from the County and community members.

At a minimum, the Corps must calculate the number of properties likely to meet the acquisition criterion stated above before moving forward with future phases of the Project. If this analysis indicates that any homes will potentially qualify for acquisition, the Corps must conduct an in-depth assessment of the impacts, benefits, and implications. (For example, the Corps should develop a detailed, realistic timeframe for these activities and use that to communicate with stakeholders. The current assumption of "1 month to acquire/demolish structures"[59] is laughable considering the years-long timeframes typically seen during federally funded buyout projects.[60])

More broadly, the Corps should conduct an environmental displacement and affordability analysis consistent with the principles of the Miami Climate Alliance's housing justice policy demands, considering each of its planned structural and non-structural measures.[61]

V. Proposed Natural and Nature-Based Features are Insufficient

Scientific research as well as coastal communities' lived experience demonstrates the ability of NNBF to reduce coastal storm risk while providing a multitude of other environmental, social, and economic

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[55] FEMA, "Cost Effectiveness Determinations for Acquisitions and Elevations in Special Flood Hazard Areas Using Pre-calculated Benefits," https://www.fema.gov/sites/default/files/2020-04/fema_bca_pre-calculated_special-flood-hazard-area.pdf.

[56] Feasibility Study, Appendix G, p. G-10.

[57] Feasibility Study, Appendix G, p. G-3.

[58] Feasibility Study, Appendix G, p. G-11.

[59] Feasibility Study, Appendix G, p. G-4.

[60] Anna Weber and Rob Moore, *Going Under: Long Wait Times for Post-Flood Buyouts Leave Homeowners Underwater*, NRDC, September 12, 2019, https://www.nrdc.org/resources/going-under-long-wait-times-post-flood-buyouts-leave-homeowners-underwater.

[61] Miami Climate Alliance, *Housing Justice in the Face of Climate Change: A Vision for Equitable Housing Policy for South Florida Communities & Advocates Fighting for Dignified and Sustainable Housing for All*, 2020, https://d3n8a8pro7vhmx.cloudfront.net/catalystmiami/pages/140/attachments/original/1590720073/Housing_Justice_is_Climate_Justice_2020-compressed.pdf?1590720073.

benefits.[62,63,64] In addition, Corps guidance directs efforts such as the Feasibility Study to seriously consider NNBF, evaluating them "at the same level of detail and consistent with existing policies regarding the evaluation of [non-NNBF] alternatives."[65] However, the Study includes only a brief and cursory consideration of NNBF. The Corps considered only a few locations and types of these features, despite community preferences and the potential for substantial and multiple benefits.

A. The Corps is Missing an Opportunity to Reduce Risk, Provide Multiple Benefits, and Respond to Local Stakeholders' Priorities

Natural infrastructure and the restoration and expansion of existing natural features can provide protection against storm surge comparable to structural measures, 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.

The Corps considered the following NNBF for the Study: "mangrove and native vegetation plantings at the Cutler Bay Site (east of Old Cutler Road and south of 184th street extending to southwest 188th street and extending to Biscayne Bay), enhancements or additional construction of dredged material spoil islands in Biscayne Bay, restoration of SAV in Biscayne Bay, and restoration of Bird Key in Biscayne Bay."[66] According to the Study, the Corps also considered living shorelines and coral reefs, but did not identify "site-specific locations" for these features and so did not consider them further.[67] The TSP only includes the Cutler Bay mangrove/native vegetation plantings, as the Corps determined this was "the most feasible and cost effective NNBF measure."[68]

It is unclear how the Corps determined the initial list of NNBF for consideration, as it excludes much of the Study Area and (as described the Study's Table 6-4) primarily includes efforts that it deems not necessary and/or that are already underway. It is critical that the Corps consult more thoroughly with local stakeholders and prioritize their suggestions for additional NNBF when refining the Project. In addition, the Corps should not restrict their NNBF selection to only offshore or shoreline features, as NNBF and green infrastructure in inland areas/within neighborhoods (e.g., green streets, urban trees, rain gardens,

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[62] Patty Glick, Emily Powell, Sara Schlesinger, Jessie Ritter, Bruce A. Stein, and Amanda Fuller, *The Protective Value of Nature: A Review of the Effectiveness of Natural Infrastructure for Hazard Risk Reduction*, National Wildlife Federation, 2020, https://www.nwf.org/protective-value-of-nature.

[63] The Nature Conservancy, "Mangroves Reduce Flood Damages During U.S. Hurricanes, Saving Billions of Dollars in Property Losses," October 29, 2019, https://www.nature.org/en-us/newsroom/mangroves-reduce-florida-flood-damages/.

[64] Borja G. Reguero, Michael W. Beck, David N. Bresch, Juliano Calil, and Imen Meliane, "Comparing the cost effectiveness of nature-based and coastal adaptation: A case study from the Gulf Coast of the United States," *PLOS ONE* 13, no. 4 (April 11, 2018): e0192132, https://doi.org/10.1371/journal.pone.0192132.

[65] Ryan A. Fisher, "Implementation Guidance for Section 1184 of the Water Resources Development Act of 2016 (WRDA 2016), Consideration of Measures," Department of the Army, Office of the Asst. Secretary (Civil Works), November 16, 2017, https://planning.erdc.dren.mil/toolbox/library/WRDA/WRDA16IGSection1184_16Nov17.pdf.

[66] Feasibility Study, p. 201.

[67] Ibid.

[68] Ibid.

restored wetlands) can also reduce the flood hazard associated with coastal storms as well as protecting against other types of flooding.[69]

Organizations such as Miami Waterkeeper and their partners have repeatedly asked the Corps to prioritize a broader range of NNBF for the Miami area,[70] and the Southeast Florida Regional Climate Change Compact emphasizes the importance of NNBF in its Regional Climate Action Plan,[71] as does the Resilient305 climate strategy.[72] Local residents also clearly support NNBF and have expressed this through community meetings, written comments, and other venues. For example, as Miami Waterkeeper Executive Director Rachel Silverstein described a public meeting to WLRN News, "Almost every individual who showed up to make a public comment about this study was almost begging for green infrastructure. […] Things like restoring coral reefs, building mangroves, dune ecosystems, wetland restoration, and all of those things both provide an environmental benefit, but have also been shown to be really potent storm surge protection features."[73]

The Corps cites procedural restrictions for why it does not consider NNBF more fully. The Study's Frequently Asked Questions explains that "it is difficult to quantify the benefits of the NNBF in the context of coastal storm risk" and therefore that "These features have been difficult to justify within the U.S. Army Corps of Engineers Planning process."[74] However, that does not absolve the Corps from considering and evaluating the multiple benefits of NNBF to the fullest extent it can. Various approaches exist to quantitatively value natural features, green infrastructure, and ecosystem services.[75,76,77] In fact, the Corps itself is developing such methods and is leading an international effort to create guidelines on

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[69] NOAA, "Put Green Infrastructure between Your Community and the Next Coastal Storm," March 2017, https://coast.noaa.gov/data/digitalcoast/pdf/gi-benefits.pdf.

[70] Miami Waterkeeper, "USACE Replies to Miami Waterkeeper and Partners' Comments on Back Bay Study," June 12, 2020, https://www.miamiwaterkeeper.org/usace_replies_to_miami_waterkeeper_and_partners_comments_on_back_bay_study.

[71] Southeast Florida Regional Climate Change Compact, "Action Plan Recommendations: Natural Systems," https://southeastfloridaclimatecompact.org/recommendation-category/ns/.

[72] Resilient Greater Miami & Beaches, *Resilient305*, 2019, http://www.mbrisingabove.com/wp-content/uploads/Resilient305_final.pdf.

[73] Jenny Staletovich, "Army Corps Unveils $4.6 Billion Plan To Protect Miami-Dade From Storm Surge," WLRN News, June 5, 2020, https://www.wlrn.org/post/army-corps-unveils-46-billion-plan-protect-miami-dade-storm-surge#stream/0.

[74] USACE, "Miami-Dade Back Bay Coastal Storm Risk Management Feasibility Study: Frequently Asked Questions," https://www.saj.usace.army.mil/MiamiDadeBackBayCSRMFeasibilityStudy/.

[75] Andrea M. Bassi, Georg Pallaske, Laurin Wuennenberg, Lidia Graces, and Lydia Silber, *Sustainable Asset Valuation Tool: Natural Infrastructure*, The International Institute for Sustainable Development, 2019, https://www.iisd.org/sites/default/files/publications/sustainable-asset-valuation-tool-natural-infrastructure.pdf.

[76] Allyson Schrier, Justine Bronfin, and Jennifer Harrison-Cox, *What is Your Planet Worth? A Handbook for Understanding Natural Capital*, Earth Economics, September 2013, https://www.yumpu.com/en/document/view/33070059/a-handbook-for-understanding-natural-capital-earth-economics.

[77] Center for Neighborhood Technology, *The Value of Green Infrastructure: A Guide to Recognizing Its Economic, Environmental, and Social Benefits*, January 2011, https://www.cnt.org/publications/the-value-of-green-infrastructure-a-guide-to-recognizing-its-economic-environmental-and.

implementing NNBF.[78,79] The Corps must take seriously its responsibility to evaluate NNBF alternatives and not dismiss them as "difficult to justify."

VI. Conclusion

NRDC thanks the Corps for the opportunity to comment on this important issue. We recognize that planning for Miami's future is not an easy task—but that is exactly why it must be done in a thoughtful, inclusive, and holistic manner. The Project is an opportunity not just to address Miami-Dade County's storm surge risk but to provide economic, environmental, and community benefits and to increase the County's overall resilience.

Miami's approaches to climate change adaptation will be showcased on the world stage. The stakes are extremely high—not just for Miami-Dade County itself, but for other cities that use its methods as a model. With the Study, the Corps has an opportunity to invest billions of dollars to further adaptation and resilience, protecting the homes, lives, and livelihoods of millions of people. This investment must fully consider the needs of and prioritize benefits to the currently and historically marginalized communities that are already on the front lines of climate change in the Miami region.

Sincerely,

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Natural Resources Defense Council

[78] Nicole T. Carter and Eva Lipiec, "Flood Risk Reduction from Natural and Nature-Based Features: Army Corps of Engineers Authorities," Congressional Research Service, R46328, April 27, 2020, https://crsreports.congress.gov/product/pdf/R/R46328.

[79] Holly Kuzmitski, "Landmark guidelines on natural and nature-based features is an international effort," USACE, February 13, 2020, https://www.erdc.usace.army.mil/Media/News-Stories/Article/2083132/landmark-guidelines-on-natural-and-nature-based-features-is-an-international-ef/.