The Committee of 100
on the Federal City

May 8, 2019

Planning for Flooding

Introduction

The map, "Washington DC Buildings at Risk from Flooding," shows the effects of the 100-year[1] and 500-year floodplains on the current and future built environment.[2] This map was produced using data from the Office of the Chief Technology Officer (OCTO). OCTO maintains map data for many aspects of geography, e.g., streets, rivers, buildings, and also receives flood plain data from FEMA (most recently in 2016). This data was downloaded from www.octo.dc.gov and combined to show flood plains in relation to streets, rivers and buildings, using ESRI software. [3] Figure 1.

There are already buildings within the flood plains, and more are planned, e.g., at Buzzard Point, which is almost completely covered by the 100-year and 500-year flood plains. See also Figure 2 DOEE's "Vulnerability & Risk Assessment: Climate Change Adaptation Plan for the District of Columbia" (2016), Map 7, "Compilation of Community Resources Most at Risk**."**

Comprehensive Plan

It is critical that the Comprehensive Plan adopt the 500-year floodplain as the basis for climate change planning, and the Generalized Policy Map and the Future Land Use Map must show the 500-year floodplains.

There are four possible options to respond to flooding, used separately or in combination. Some options must be required.

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[1] The "100-year" flood plain is sometimes expressed as a one percent (1%) chance of flooding in a given year, and the "500- year" flood plain as a 0.2 percent (1 in 500 chance) of flooding in a given year.
FEMA Map Service Center: https://hazards.fema.gov/wps/portal/mapviewer. Internet; accessed 26 Apr. 2019.

[2] The map shows the FEMA flood data for:

- 100 year zone (no base flood elevation),
- 100-year flood zone, base flood elevation
- 500-year zone

The base flood zone is the computed elevation to which floodwater is anticipated to rise during the base flood. Base Flood Elevations (BFEs) are shown on Flood Insurance Rate Maps (FIRMs) and on the flood profiles. https://www.fema.gov/base-flood-elevation. Internet; accessed 26 Apr. 2019.

[3] *Sustainable DC Plan 2.0* (2019) , contains a very similar map FLOOD RISK PROJECTED FOR 2080. [i.e., the 500-year floodplain}

- Option 1: Build a wall/berm along certain sections of the Anacostia River and place new development behind the berm.
- Option 2: Raise flood-prone areas elevation to be above the 500-year level.
- Option 3: Require land uses in flood plains that can easily survive flooding.
- Option 4: Build all structures in the floodplain using flood-resistant materials and designs. Option 4 must be required, not optional.

Option 1: Build a wall/berm along certain sections of the Anacostia River and locate new development behind the berm.

Example 1: The Washington Navy Yard is considering building a 14-foot wall along the Anacostia River to prevent flooding its facility.[4]

Example 2: New York City plans to build floodwalls around lower Manhattan (the area flooded in Superstorm Sandy), and create new land for parks.[5]

Comment: Walls/berms are very expensive, preventing all but the few with every expensive condos or offices with river views from enjoying the amenities of the waterfront, unless public access to the waterfront is maintained.

Option 2: Raise flood-prone areas elevation to be above the 500-year level
Example: Governor's Island in the New York City harbor has been raised to avoid its possible submersion, as sea levels raise. [6]

Option 3: Require land uses in floodplains that can easily survive floods.
The first example that comes to mind is preserving open space for passive and active public recreation, and wildlife habitat including wetlands. Examples include: most of Hains Point, Anacostia Park, RFK Stadium, Kenilworth Aquatic Gardens.

Comments: Flood sustainability supports the important goal of preserving public access to the waterfront. In our comments on the Comprehensive Plan we noted that public access is or may be threatened by private development and new road-building, at several key areas, including Buzzards Point, RFK Stadium, Reservation 13 (aka Hill East Waterfront/ DC General campus), Boathouse Row (west side of the Anacostia near Sousa Bridge), Poplar Point. Unless prompt action is taken, DC's waterfront will be Manhattanized into a wall of high-rise buildings and future generations will be unable to enjoy much of our waterfront in its natural, public

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[4] Jayleen R. Heft, "Pentagon weighs 14-foot flood wall at historic DC Navy yard," Propertycasualty360.com 2 Feb. 2019. Internet; accessed 26 Apr. 2019.
[5] Henry Goldman and Christopher Flavelle, "Bill de Blasio Seeks to Flood-Proof Lower Manhattan by Adding Land, " *Bloomberg*.https://www.bloomberg.com/news/articles/2019-03-14/de-blasio-seeks-to-flood-proof-lower-manhattan-by-adding-land. Leanna Garfield, "Manhattan plans to build a massive $1 billion wall and park to guard against the next inevitable superstorm," *Business Insider* 2018. http://static7.businessinsider.com/new-york-city-flooding-manhattan-coastal-barriers-2018-4
[6] " New York's remodelled Governors Island has built-in climate change defense, " https://www.theguardian.com/us-news/2016/jul/19/governors-island-remodelled-climate-change-new-york.

state. The solutions to mitigate flood damage and preserve waterfront access include:

- Allow no new non-recreational development within 600 feet from the high water mark of the Anacostia River.
- Delete the concept of extending streets to the waterfront and stop encouraging moderate-high density on the waterfront with pedestrian access.
- Preserve waterfront viewsheds
- Preserve natural habitat space, including wetlands, near the waterfront.[7]

These measures will implement an important goal in the Nature section of *Sustainable DC 2.0* (2019):

> ... not only on protecting and restoring the District's unique natural environment, including our rivers, streams, and meadows, but also on expanding our tree canopy and creating new wetlands. Sustainable DC 2.0 seeks to weave the natural environment throughout Washington DC's urban footprint by incorporating access to nature in the places where we live, work, and play. p. 106.

Option 4 (required): Build all structures in the floodplain with flood-plain resistant materials and designs.

Example 1: Washington Harbour was built with movable flood gates, which have been used during seven floods between 1986 and 2012.[8]

Example 2: The Wharf. We understand that this project is elevated 18 inches to clear the 100-year flood plain.

*Sustainable DC 2.*0 (2019 advocates "living shorelines:"

> ***Partner with developers to incorporate living shorelines in waterfront developments***. Developing land adjacent to waterways can increase flooding, erosion, sea level rise, and hurt aquatic habitats. One way to minimize these negative impacts is to construct living shorelines as part of waterfront developments. Living shorelines use native plants, trees, grasses, and other natural elements to stabilize a shoreline and help to minimize erosion along shorelines, reduce flooding, and help Washington, DC become more resilient to sea level rise. By partnering with developers early in the planning process, more living shorelines can be incorporated into waterfront developments. *Sustainable DC 2.0* (2019), p. 111

Comment: The zoning regulations and the building code can be amended to require flood mitigation measures and the living shoreline in all new construction.

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[7] " Wetlands provide a wealth of benefits to humans, reduce flooding, and support diverse animal and plant life.." *Sustainable DC 2.0,* p. 110.

[8] "Washington Harbour," wikipedia. Internet; accessed 29 Nov. 2017.

Key roads in the 500- year floodplain should be redesigned to accommodate low-level flooding in order to reduce the impact on surrounding buildings by channeling rainwater. Copenhagen, New Orleans and other cities are designing these "cloudburst boulevards."[9]

See Appendix: Additional recommendations

[9]"Copenhagen unveils first city- wide masterplan for cloudburst." TheSourceMagazine.org. Internet; accessed 13 Dec. 2016.

Figure 1. Buildings at risk from flooding.

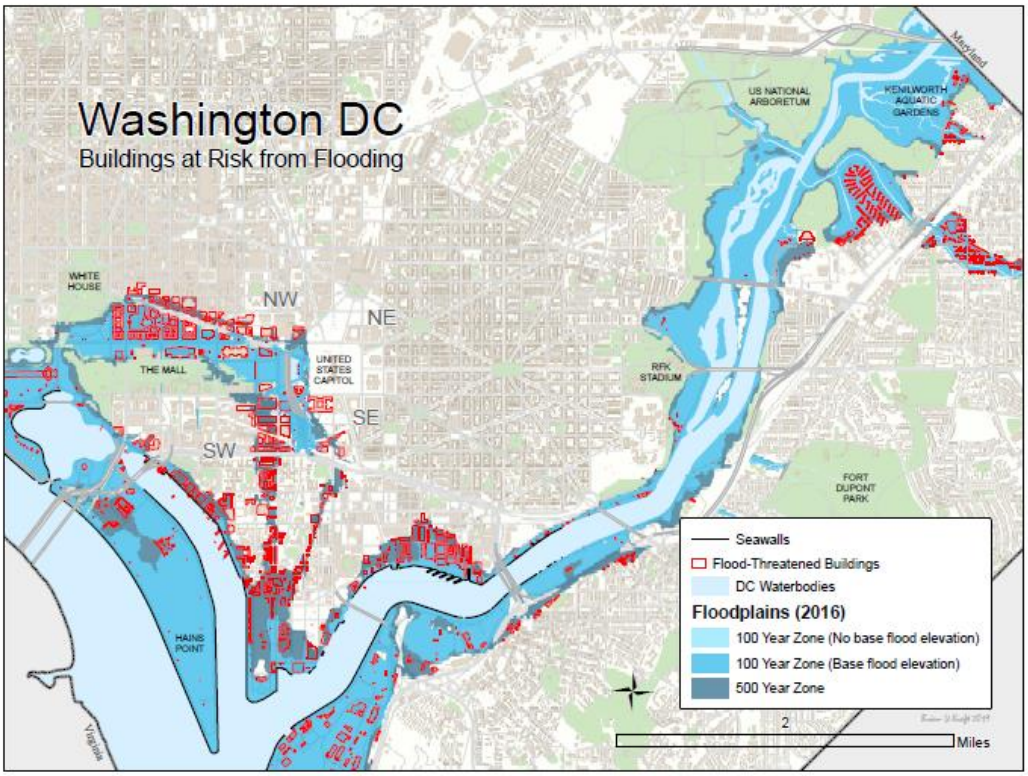
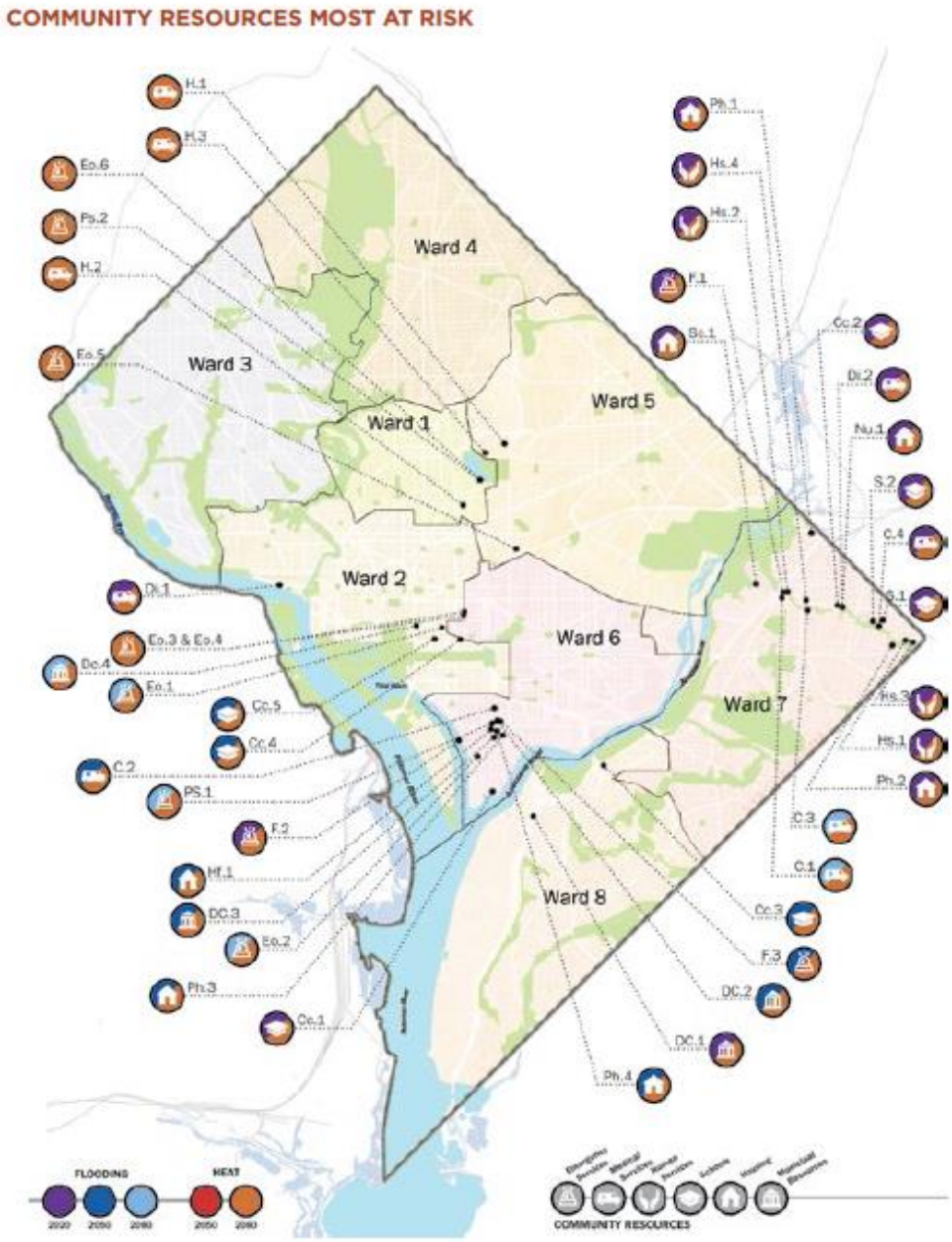
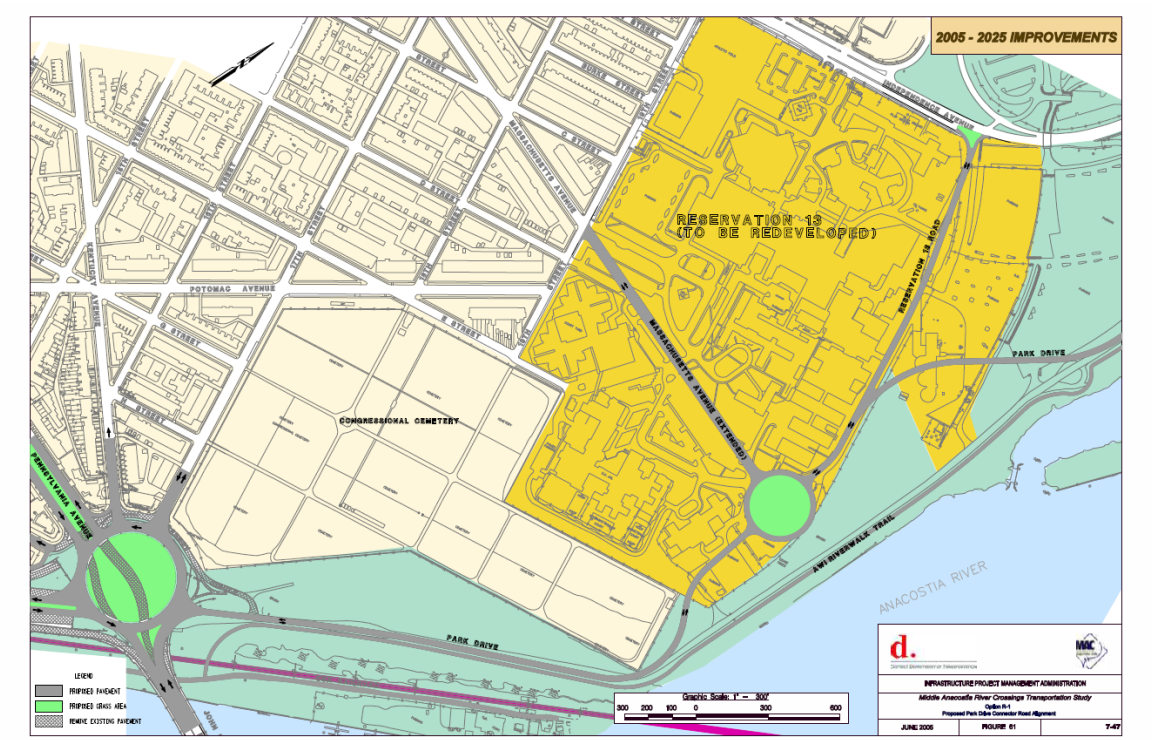


Figure 2. DOEE, "Vulnerability & Risk Assessment: Climate Change Adaptation Plan for the District of Columbia" (2016), Map 7, "Compilation of Community Resources Most at Risk."



MAP 7: Compilation of Community Resources Most at Risk (Source: Kleinfelder, February 2016)

Figure 3. DC Department of Transportation's s proposed Park Drive, DDOT, "Middle Anacostia Crossings Study," p. 7-47 (2005).



Appendix: Additional recommendations

Infrastructure and government buildings

Build or expand roads and DC government facilities outside the 500-year flood plain

Other cities contending with rising water levels have had to completely rebuild roads in flood zones. For example, some streets in Miami have been raised three feet above their prior grade to be safe from everyday flooding.[10] Road rebuilding to cope with rising water levels will become necessary in Washington, and when it does, it will be expensive. For this reason, in the interim, the city should invest only in essential roads in the 500-year floodplain, non-essential roads in the flood plain should not be expanded, and new non-essential roads should never be built.[11]

A number of DC government facilities (including government agencies, schools, libraries, recreation facilities, police and fire stations, public housing, senior centers, homeless shelters) will be vulnerable to flooding by 2020, and even more will be vulnerable by 2080.[12] Figure 2. For example, by 2050, the First District Police Station at 101 M Street, SW will be vulnerable to flooding. In the intervening years, the police station should be relocated outside the 500-year floodplain, or alternatively adapted to withstand flooding, including having back-up power. DC residents depend on these facilities, and taxpayers have invested substantial sums to construct and maintain them. For this reason, as new or replacement facilities are planned, they should be outside the 500-year flood plain whenever possible, or alternatively, retrofitted to withstand flooding.

Study where additional levees or other flood control measures may be needed

There are levees at the National Mall, Bolling AFB, Naval Station Anacostia, Poplar Point, and floodgates at Washington Harbour.[13] We recommend studying where other flood control measures, such as nature-based measures including wetlands and living shorelines may be needed and identifying the best design practices. In addition, the Mall Underground Project has the potential to alleviate flooding on the National Mall and should be studied.[14]

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[10]Kolbert, "The Siege of Miami," 49-50.

[11] An example of non-essential road in a floodplain is DC Department of Transportation's proposed new Park Drive running along the Anacostia River from Benning Road to Barney Circle, in the flood plain, not needed to develop the Hill East Waterfront, and therefore should never be built.[11] See Figure 3.

[12]DOEE, "Vulnerability & Risk Assessment," 47. DOEE, Climate Ready DC," 15.

[13]NCPC, "Washington, DC Flooding Protection." "Washington Harbour," wikipedia.org. Internet; accessed 14 Nov. 2016. Justin Gillis, "Global Warming's Mark: Coastal Inundation," *New York Times*, 4 Sept., 2016, 1. Brady Dennis, "City Weighs choices against rising seas," [Hoboken, NJ] *Washington Post*, 14 Aug. 2016.

[14]http://www.nationalmallcoalition.org/innovation/resilience-to-ensure-the-future.

Regulation

- Adopt zoning and building code changes to require private sector schools, childcare facilities, medical facilities, senior housing, and human resource services to be located outside the 500-year flood plain whenever possible, or, alternatively, require retrofitting of vulnerable buildings to withstand flooding, based on best practices.

- Study and adopt best zoning and building practices in other cities for new buildings, retrofitting existing buildings, and design standards for infrastructure in floodplains.

Incentives and resources

- Provide incentives to private property owners to provide nature-based flood-control measures such as increased pervious surfaces, restoring natural flood plains, and creating wetlands. Encourage or require these nature-based measures in planned unit developments and city-funded projects.

- Request the US Army Corps of Engineers to perform a technical engineering review of the Mall Underground Project.

- Provide incentives to protect privately owned forest land, such as present-use value tax status, forest mitigation bank programs, or transfer of development rights.

- Explore public/private ventures to spur the clean up and preservation of land that is currently developed in the flood zone (development of a system where homeowners who want to add impervious space to their existing homes (throughout the city) and property owners that want to build in the flood zone would have to purchase credits to do so (the public side)]. On the private side, businesses would create the credits that they could then sell by purchasing property in the flood zone, cleaning it up of any contaminants and putting conservation easements on the land.

- Create a dedicated fund to pay for future needed changes in infrastructure to respond to climate change, such as rebuilding bridges, roads, the Anacostia Riverwalk, and bike paths above the higher future water levels. A fee on new development or redevelopment in 500-year flood plain area could be paid into this fund.

Study a buyout program for properties in the most flood-prone areas

FEMA offers buyout programs for properties that have repeatedly flooded. If there are areas in a city that have repeatedly flooded, the city prepares a flood mitigation

plan, which, if FEMA approves, allows the purchase of properties using federal and state funds. There may be areas in DC that would qualify for buyouts.[15]

Protect historic resources

As both our Nation's Capital and a historic city in its own right, the District of Columbia's consideration of impacts upon our historic resources during every phase of resiliency planning is paramount. There will be considerable pressures upon historic buildings, structures, features, landscapes and archaeological sites located within the 500-year flood plain. There must be an evaluation of the resources that may be impacted and careful consideration of what measures are appropriate to assure the preservation of the most significant. In some cases DC can employ minor strategies to enable the resource to withstand flooding events as-is (grading, hardscaping, elevations, relocation of HVAC and other mechanical systems to upper floors, etc.) More extreme situations concerning highly significant resources may require broader thinking. Planning for this should begin now.

[15]DOEE, "Climate Ready DC," 17. FEMA, "For Communities Plagued by Repeated Flooding, Property Acquisition May Be The Answer," 28 May 2014. www. fema.gov/news-release/2014. Internet; accessed 14 Nov. 2016.