WEATHER IT TOGETHER
Facing the Challenge

Sea Level Rise Adaption
Planning for the Annapolis Waterfront
WEATHER IT TOGETHER
Facing the Challenge

Sea Level Rise Adaption
Planning for the Annapolis Waterfront

Charrette Sponsors
City of Annapolis ▪ Maryland Emergency Management Agency
Federal Emergency Management Agency
Urban Land Institute – Baltimore & National

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Chandler, LLC ▪ Hammond Wilson ▪ Watermark ▪ Buddy’s Crabs & Ribs
Maryland Historical Trust ▪ National Park Service
United States Army Corps of Engineers ▪ Chesapeake Bay Foundation
Rising Seas Group ▪ Annapolis Partnership ▪ Pennsylvania State Historic Preservation
High Tide on Main Street
Annapolis Prepares for Rising Seas: History Meets the Future
Since 2001, water has reached flood levels an average of 20 days or more a year in Annapolis, MC; Wilmington, NC; Washington, D.C.; Atlantic City & Sandy Hook, NJ; and Charleston, SC. Annapolis had the highest average number of days a year above flood threshold since 2001, at 34.
Annapolis experienced the greatest increase in nuisance flooding during the last 50 years - 925% - from an average of 3.8 to 39.3 per year. In the next 50 years, nuisance flooding is estimated to occur more than once a day.
“In Annapolis, home to the U.S. Naval Academy, half a foot of water flooded the colonial district, a National Historic Landmark, at high tide on Chesapeake Bay during rainstorms on April 30, May 1 & 16 and Aug. 12. Shopkeepers blocked doorways with wood boards and trash cans; people slipped off shoes to wade to work in bare feet.”
Within the next 100 years, sea level rise is estimated to reach 44 inches. To date, 13 islands have been lost in the Chesapeake.
City of Annapolis
Flood Mitigation Strategies

- Focus on protecting existing structures
- Study downtown to determine the costs and benefits of public decision-making in mitigating property damage
- Evaluate the need and options for protecting historic structures
- Require floodproofing to the extent feasible
City of Annapolis

FEMA Flood Insurance Rate Map (FIRM) - 2015

Blue shading 1% annual chance (100-year) flood
Orange shading is 0.2% annual chance (500-yr) flood
Flood elevation 8.2 ft.
1% annual chance flood (4.5') plus 3.7 feet for sea level rise by 2100
Chesapeake Storm History

High Tide Marker

2003 – Isabel = 7.58’
1972 – Agnes = 3.04’
1954 – Hazel = 5.33’
1933 – C&P = 6.35’
Tropical Cyclone Isabel

September 19, 2003

Naval Academy

Market Space

Eastport
In conjunction with the development of a Hazard Mitigation Plan to protect historic resources... the City will explore and present to the City Council for consideration several strategies for addressing the 100-year flood and sea level rise...
Hazard mitigation planning is the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural and manmade hazards.

1. Organizing your efforts to develop a mitigation plan;
2. Identifying hazards and assessing losses to your community;
3. Setting mitigation priorities and goals and writing the plan;
4. Implementing the mitigation plan, including project funding.
Weather It Together
Identify & Map the Floodplain Study Area
# Worksheet #3

- **Name/Address of Resource**
- **Date of Construction**
- **Type of Property**
- **Square Footage**
- **Structural System**
- **Primary Materials**
- **Current Function**
- **Current Condition**
- **Owner Interest in Mitigation**

## HAZARD: Coastal

<table>
<thead>
<tr>
<th>SDAT Tax ID Number</th>
<th>Name and Address of Asset Subject to Hazard (same as previous Page)</th>
<th>MHT Inventory Number (AA#)</th>
<th>Date of Construction</th>
<th>Type of Property / Type of Resource</th>
<th>Total Square Footage</th>
<th>Number of Stories</th>
<th>Structural System</th>
<th>Primary Exterior Materials of Property / Resource</th>
<th>Current Function / Use</th>
<th>Current Condition (Excellent / Good / Fair / Deteriora)</th>
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## Weather It Together

### Assess Property Vulnerability

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**22 Sample Properties**

- Property Vulnerability (High, Med, Low)
- Loss to Structure ($)
- Loss to Contents ($)
- Loss of Function / Use ($)
- Displacement Cost ($)

**Total Projected Loss/Cost**

$55,155,554$
Weather It Together
Determine Community Value

List the name and address of vulnerable historic properties and cultural assets. For each asset (row), fill in Columns 1 to 6. Define High, Medium, and Low for Columns 3, 4, 5, 6, and 7 at the bottom of this worksheet (optional). Fill in Column 7 by qualitatively adding Columns 3 to 6. Enter the results of Column 7 in Column 16 of Worksheet #3.

<table>
<thead>
<tr>
<th>Name and Address of Asset</th>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
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**Worksheet #4**

- Historic Designation (NR, Local)
- Geographic Context of Significance
- Level of Significance (H/M/L)
- Public Sentiment (H/M/L)
- Economic Importance (H/M/L)
- Degree of Integrity (H/M/L)

Total Level of Community Value
Nonstructural Mitigation Assessment for the City of Annapolis Historic District
Annapolis, Maryland

Prepared for: City of Annapolis
145 Gorman Street, 3rd Floor
Annapolis, Maryland 21401

Prepared by: Planning Division
U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, Maryland 21203-1715

DECEMBER 2014

Lowest adjacent grade in this example is the front left corner, the lowest point closest to where the water is coming from. Low opening in this example is the basement window, where water would first enter the building during flooding. First floor opening here is the front door, where the most damage would typically occur if flood waters reached this elevation.
Weather It Together

Develop Adaptation Alternatives
Planning, Land Use & Building Codes

- Density controls
- Design Review Standards
- Easements
- Floodplain Overlay Zoning
- Open Space Preservation
- Special Use Permits
- Subdivision & Development Regulations
- Transfer of Development Rights
- Environmental Review Standards
- Building Codes
- Coastal Zone Management
Weather It Together
Develop Adaptation Alternatives
Public Engagement

- Website / Social Media
- Branding
- High Water Markers
- Interpretive Kiosks
- Videos
- Media
- Publications
Weather It Together

*Develop Adaptation Alternatives*

Natural Resources

Before - Erosion

After – Living Shoreline
Dry floodproofing involves sealing building walls with waterproof compounds and using shields (dams or perimeter barriers) to seal off doors, windows and other openings to keep the building watertight. This technique can only be used when the walls are strong enough to withstand the hydrostatic force of the water.
Weather It Together

Develop Adaptation Alternatives – Barriers

- Temporary Door Dam
- Permanent Flood Wall
- Temporary Flood Wall
- Backflow Preventers
“Elevation may alter the appearance and scale of a historic building and redefine its relationship to its setting... If the building is raised only several feet, elevation should not severely alter scale.”

“A preservation-sensitive alternative would be the elevation of floors within the building, particularly feasible in historic commercial structures with tall ceilings...”
“MHT is funding the project in part so that we can use it as a model for other communities throughout the state that have cultural resources threatened by sea-level rise.” – Nell Ziehl, Chief of Planning
Weather It Together

2016 Maryland Historical Trust Preservation Award Excellence in Education and Community Engagement

www.Annapolis.gov/WeatherItTogether

WHAT PLACES MATTER MOST TO YOU?
Weather It Together
Facing the Challenge

Maintain – Preserve, protect and prepare your property

Mobilize – Create and share resources that educate, inform and incentivize your community

Mitigate – Eliminate or reduce impacts and risks of hazards through pre-disaster planning in your community

Monitize – Protect and enhance the value of your building, business, community and the Chesapeake

“Every $1 spent on mitigation saves society an average of $4.”
National Institute of Building Sciences