WEATHER IT TOGETHER

Facing the Challenge

Sea Level Rise Adaption
Planning for the Annapolis Waterfront

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Planning for the Annapolis Waterfront

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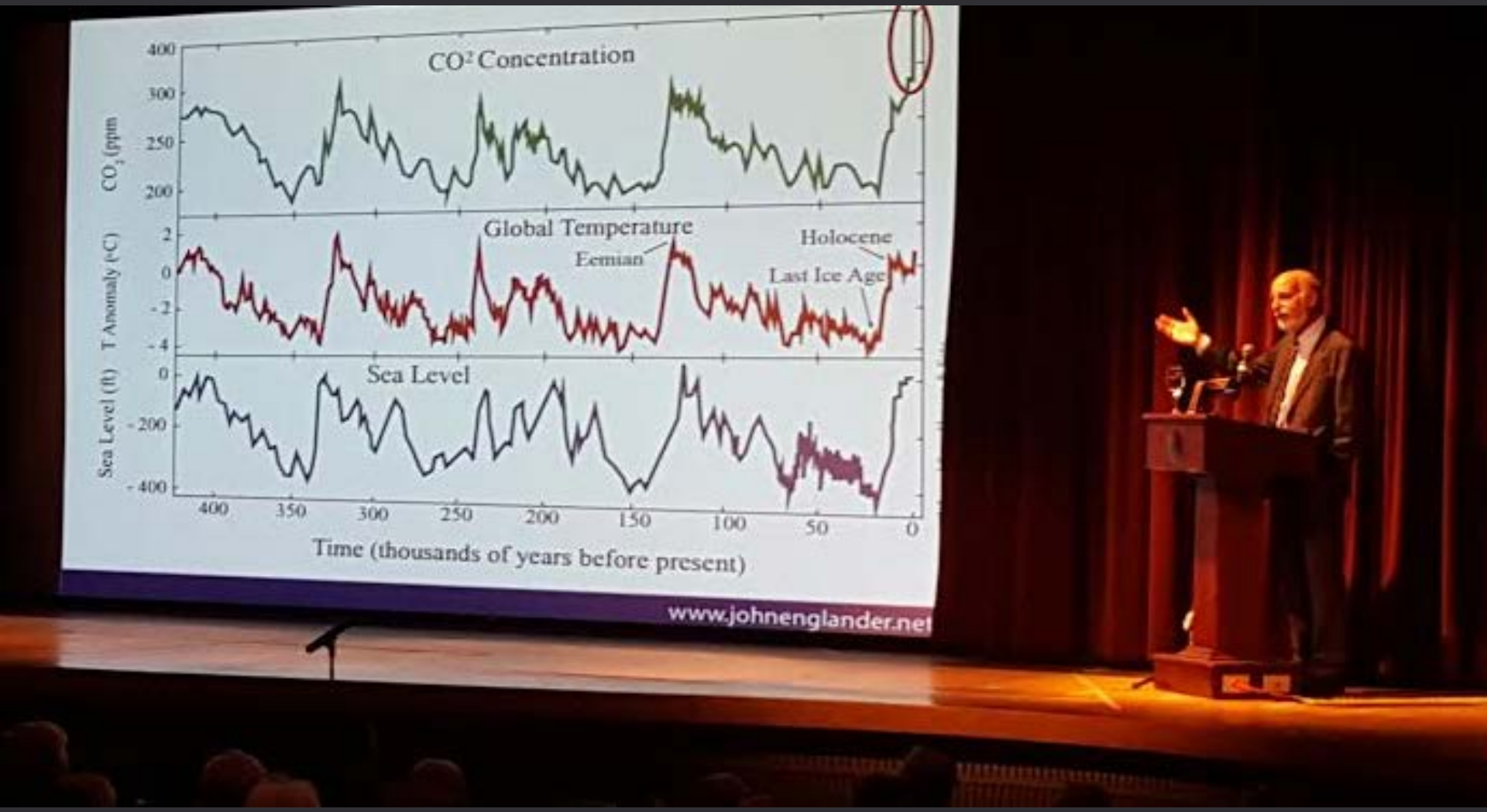
United States Army Corps of Engineers ▪ Chesapeake Bay Foundation
Rising Seas Group ▪ Annapolis Partnership ▪ Pennsylvania State Historic Preservation

High Tide on Main Street

Annapolis Prepares for Rising Seas: History Meets the Future



Union of Concerned Scientists

National Landmarks at Risk

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.

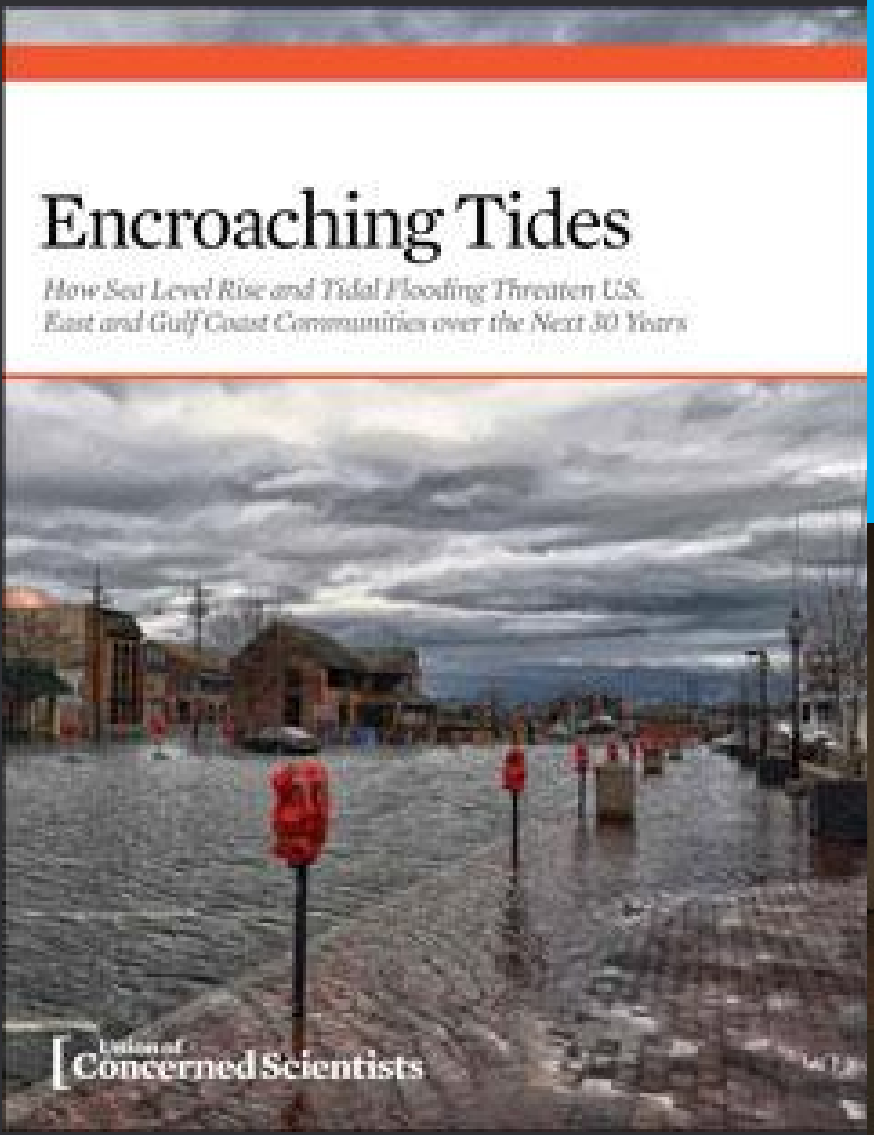
NOAA Technical Report

Sea Level Rise and Nuisance Flood Frequency Changes around the United States

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.

Union of Concerned Scientists

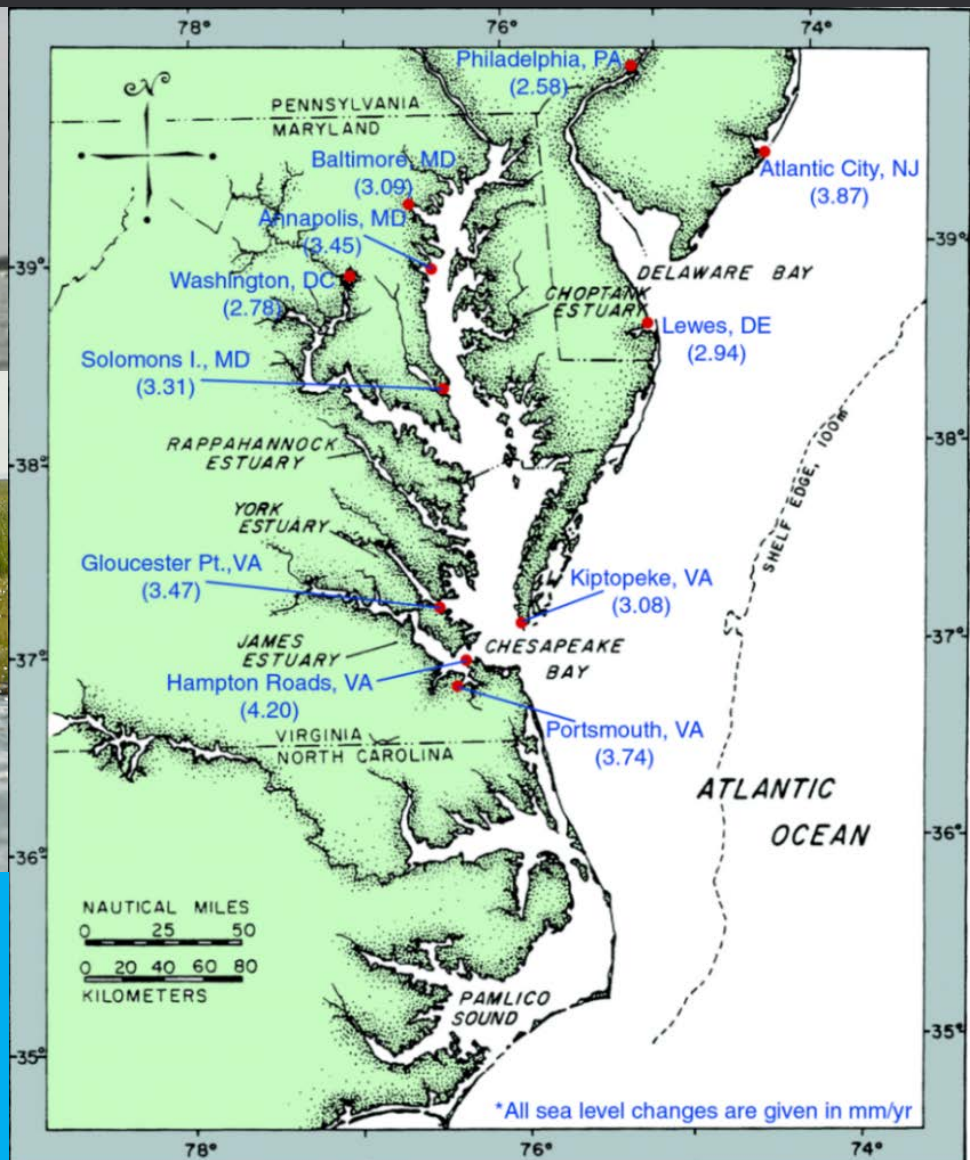
Encroaching Tides – Economic Impacts



"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."

The Chesapeake Bay

Lost Landmarks

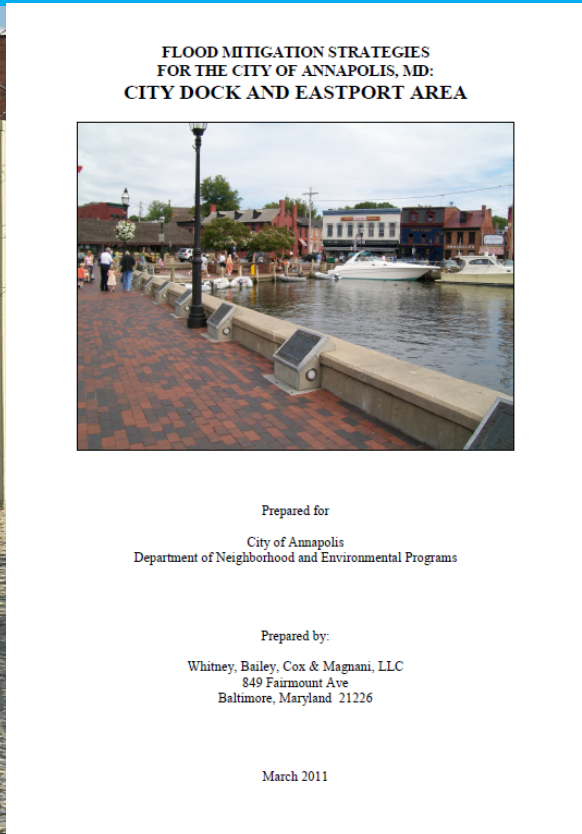


Within the next 100 years, sea level rise is estimated to reach 44 inches. To date, 13 islands have been lost in the Chesapeake.

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*



FLOOD MITIGATION STRATEGIES
FOR THE CITY OF ANNAPOLIS, MD:
CITY DOCK AND EASTPORT AREA

Prepared for

City of Annapolis
Department of Neighborhood and Environmental Programs

Prepared by:

Whitney, Bailey, Cox & Magnani, LLC
849 Fairmount Ave
Baltimore, Maryland 21226

March 2011

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

City of Annapolis / USNA

FEMA FIRM - 2100

Flood elevation 8.2 ft.

1% annual chance flood (4.5') plus 3.7 feet for sea level rise by 2100

Chesapeake Storm History

Photo Courtesy of Charles Wagner

THE DEVESTATION OF AGNES is evident in this dramatic photo of the bridge connecting Oella to Ellicott City. The bridge was almost demolished and had to be rebuilt.

AGNES

DAYS OF RAGING RIVERS

25 years later, memories of that powerful storm and the resilience of the people left to rebuild still survive

"It was awful but it was awesome. ... I had never experienced such a sight."

CHARLES COHEN

Exactly 25 years ago today, on June 19, Agnes touched down on Florida and started her deadly march up the East Coast.

In the same unidiscriminating way, it hit Maryland, with light to moderate rains on the Eastern Shore, and 13 drenching inches of rain in the Patapsco reservoir.

Most people never thought flooding could do so much damage.

It was June 1972, and a typical Maryland summer with its sticky heat had already made its presence known. At first, the rain was a relief, but the storm front locked over the East Coast and the skies opened up. The soil couldn't absorb any more water but there was much more to come. A Hurricane called Agnes emerged just south of Puerto Juarez, Mexico on June 15 and marched across the Gulf of Mexico, fading into a tropical storm through Georgia, then resurrected as a hurricane as it entered North Carolina.

Continued on page 9

"People had to decide whether to move away, or stay and make things better."

JANET KUSTERER

On June 21 and 22, 1972 the heavy rains of Tropical Storm Agnes made history on the East Coast by causing extensive flooding in many locations, causing the loss of several lives and destruction that took years to repair, if it could be repaired at all. The storm caused over $77 million worth of property damage to the state of Maryland—the largest ever recorded from a natural disaster in the state's history. President Nixon declared most of the state a disaster area, and Vice-President Agnew visited Ellicott City personally to assess the damage.

Most dramatically hit in Howard County was the area now known as the Historic District of Ellicott City, then simply as Main Street. A flood marker next to the Ellicott City B&O Railroad Station Museum looks impossibly high, but marks the area that was under ten feet of water at one point.

Continued on page 11

<u>High Tide Marker</u>

2003 – Isabel = 7.58’

1972 – Agnes = 3.04’

1954 – Hazel = 5.33’

1933 – C&P = 6.35’

Tropical Cyclone Isabel

September 19, 2003

Comprehensive Plan

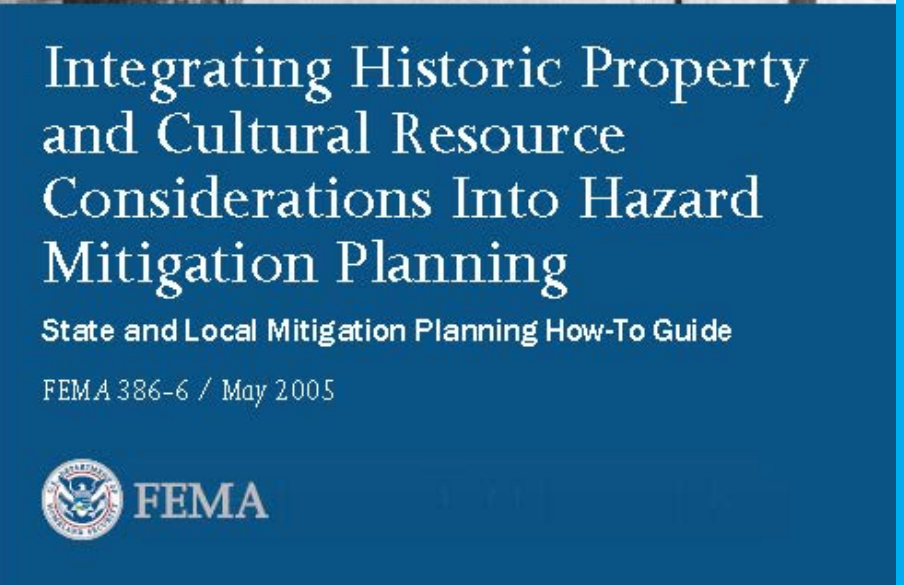
Annapolis City Dock Master Plan

A Framework to Guide Improvements & Redevelopment

"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…"

Protecting Our Historic Seaport

FEMA Hazard Mitigation Planning



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

Weather It Together

Conduct a Cultural Resource Survey

A	B	C	D	E	F	G	H	I	J	K	L	M
			HAZARD: Coastal									
		SDAT Tax ID Number	Name and Address of Asset Subject to Hazard (same as previous Page	MHT Inventory Number (AA#)	Date of Construction	Type of Property / Type of Resource	Total Square Footage	Number of Stories	Structural System	Primary Exterior Materials of Property / Resource	Current Function / Use	Current Condition (Excellent / Good / Fair /Deteriora
1		06 000 00030807	1 Southgate Avenue	1450	1910 - 1915	Detached House	4901					
2		06 000 05035575	12 Fleet Street	1267	1875	Attached House / Duplex	840					
3		06 000 00143206	9 Pinkney Street	1241	1880	Attached House / Rowhouse	1336					
4		06 000 03587510	18 Pinkney Street / Shiplap House	643	1713 / 1723	Detached House / Historic	2255					
5		06 000 02047510	130 Prince George Street / Sands House	652	1739 / 1765	Detached House	2740					
6		06 000 07808800	142 Dock Street / Stevens Hardware	458	1880	Attached Comm Bldg	5720					
7		06 000 02423500	100 Main Street / A.L.Goodman	536	1908 - 13	Attached Comm Bldg	7354					

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

Weather It Together

Assess Property Vulnerability

FLOOD HAZARD MATRIX

#	Street	OBJECT ID	SDAT	MHT Inventory	Date of Construction	Use	First Floor Elevation	Lowest Opening Elevation	Total Square Footage	Number of Stories	Basement
142	DOCK ST	115	20600007808800	AA-548	1880	Attached Comr	3.74	3.74	5720	2	No
126	DOCK ST	113	20600006983200	AA-1239	1875	Commercial			6026	3	No
136	DOCK ST	71	20600006109313	AA-457	1850	Commercial	1.76	1.76	4320	3	No
132	DOCK ST	70	20600005295300	AA-457	1825	Commercial	2.17	2.17	2240	2	No
130	DOCK ST	73	20600001160625	N/A		Co					
124	DOCK ST	153	20600006983200	AA-455	1900	Co					
122	DOCK ST	152	20600006983200	AA-1239 AA-456	1875	Co					
120	DOCK ST	151	20600001157800	AA-456	1916	Co					
118	DOCK ST	150	20600001160700	AA-455	1891-1897	Co					
110	DOCK ST	110	20600000142123	AA-455	1930	Co					
12	DOCK ST	144	20600090019164	N/A	1960	Co					
10	DOCK ST	138		N/A		Co					
6	DOCK ST	124		AA-455	1940's	Co					
4	DOCK ST	80	20600006384160	AA-455	1974	Co					
1	DOCK ST	17		N/A		Co					
8	DOCK ST	41	20600003321968	N/A	1960	Co					
13	EAST ST	44	20600002427600	N/A	N/A	Of					
16	EAST ST	20	20600002844800	AA-1803	1891-1897	Re					
6	FLEET ST	6	20600004692602	AA-1265	1885-1889	Co					
14	FLEET ST	58	20600000951000	N/A	1946	Re					
10	FLEET ST	61	20600002365950	AA-1266	1975	Re					
8	FLEET ST	125	20600004692602	AA-1265	1885-1889	Re					
12	FLEET ST	60	20600005035575	AA-1267	1885-1889	Re					
193	GREEN ST	86	20600000761000	AA-521	1819	Co					
195	GREEN ST	139	20600003092900	N/A		Co					
151	KING GEORGE ST	22	20652090030056	N/A	1980	Re					
149	KING GEORGE ST	23	20652090030055	AA- 1112	1880	Re					
147	KING GEORGE ST	25	20600090005540	AA-1111	1913-1921	Re					
145	KING GEORGE ST	24	20600090005539	AA-1110	1891-1897	Re					
143	KING GEORGE ST	1	20600002847600	AA_1109	1891-1897	Re					

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.

Name and Address of Asset	Column 1 Historic Designation (National Register, Local Landmark, etc.)*	Column 2 Geographic Context of Significance (National, Tribal/ State, Local)	Column 3 Level of Significance (High, Medium, Low)	Column 4 Public Sentiment (High, Medium, Low)	Column 5 Economic Importance (High, Medium, Low)	Column 6 Degree of Integrity (High, Medium, Low)	Column 7 Total Level of Community Value (High, Medium, Low)
ANNAPOLIS SUMMER GARDEN THEATRE 143 COMPROMISE	~~LOCAL~~ NR / AHD	LOCAL					
GIBSONS LODDINGS 110 FR GEORGE	NR / AHD	STATE					
MIDDLETONS TAVERN 2 MARKET SP	NR / AHD	STATE					
FACTORS ROW 26 MARKET ST	NR / AHD	LOCAL					
16 REVELL ST	NR / AHD	LOCAL					
TOBACCO PRISE WATERFRONT WAREHOUSE 2(4) PINKNEY	NR / AHD ? INDIVID	NATIONAL					
RETAINING WALL BEHIND 77 MAIN #143 COMPROMISE							
BENEFICIAL-HODSON BOATHOUSE ST. JOHNS							
1 DOCK ST HARBORMASTER							

Worksheet #4

Determine Community Value for Historic Property and Cultural Resource Assets

Date:

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

US Army Corps of Engineers

Complete a Non-Structural Mitigation Assessment

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

FIGURE 2-1 BUILDING ELEVATION SURVEY POINT TYPES

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

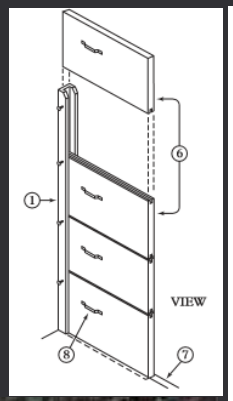
Develop Adaptation Alternatives
Natural Resources

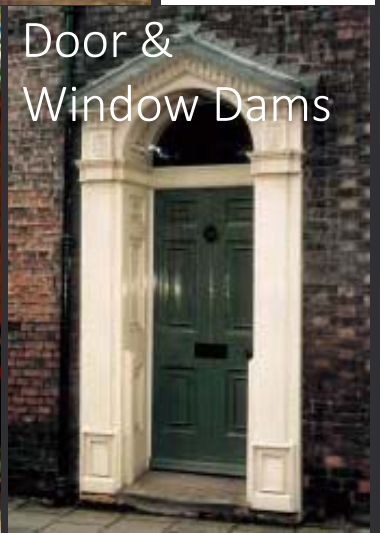
Weather It Together

Develop Adaptation Alternatives - Dry Floodproofing

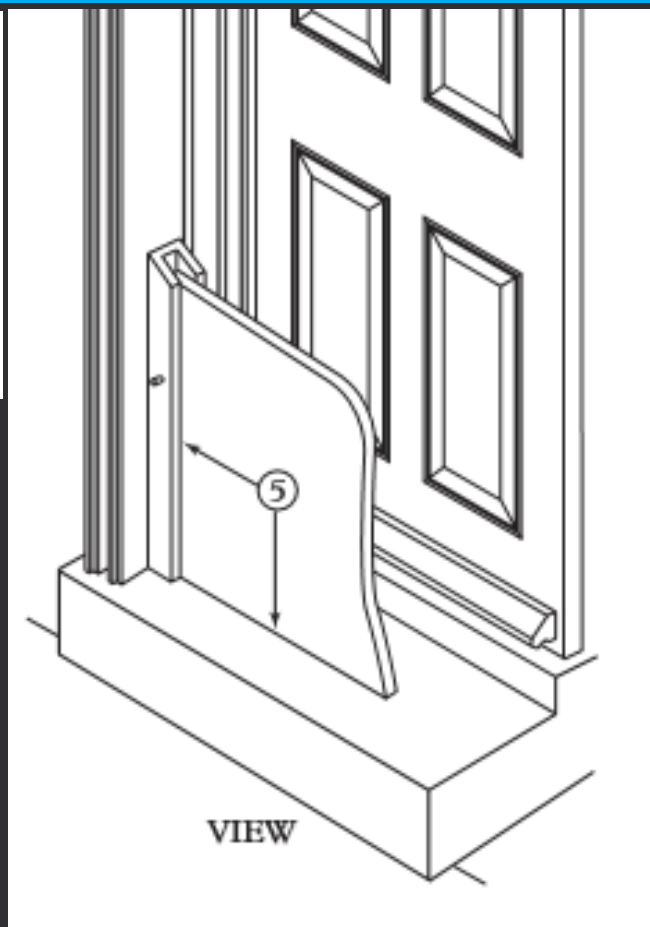
Dry floodproofing involves sealing building walls with waterproof compounds and using shields (dams or perimeter barriers) to seal off doors, windows and other openings to keep the building watertight. This technique can only be used when the walls are strong enough to withstand the hydrostatic force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

Storefront Vestibule - CMU





Door &
Window Dams



Weather It Together

Develop Adaptation Alternatives – Barriers

Weather It Together

Develop Adaptation Alternatives - Elevation

"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…"

Weather It Together

Promote the Program Model

"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

Crisfield, Somerset County

St. Michaels, Talbot County

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