National Landmarks at Risk: A Colonial Capital Case Study
Annapolis, Maryland

Union of Concerned Scientists – May 20, 2014
Lisa Craig, Chief of Historic Preservation
City of Annapolis
National Landmarks at Risk:
A Colonial Capital – Planned City

Annapolis laid out in 1695 in a Baroque plan. Contains 120 colonial-era buildings including the Palladian-style Hammond Harwood.
National Landmarks at Risk: A Colonial Capital - Landmarks

Home to all four Maryland signers of the Declaration of Independence
George Washington Resigns His Commission – 1783
Nation’s Capital – 1783-1784
National Landmarks at Risk:
A Colonial Capital – Naval Academy
Sea-level Rise in the Chesapeake could reach 17-28 inches above 1990 levels by 2095. To date, 13 islands have been lost.
National Landmarks at Risk: Maryland Climate Action Plan

Predictions for Sea level rise along Maryland’s coast:
By 2050 - Best estimate mean sea level rise is 1.4’
By 2100 - Best estimate mean sea level rise is 3.7’
National Landmarks at Risk:
City of Annapolis Flood Mitigation

• Given the importance of the historic district and the waterfront… the Annapolis response to sea level rise must focus on protecting existing structures and infrastructure.
• The downtown should be the subject of a study to determine the costs and benefits of public decision-making in mitigating property damage.
• Future planning efforts can evaluate the need and options for protecting historic structures…
• Require floodproofing to the extent feasible while preserving the historic building exterior.
National Landmarks at Risk: Annapolis Flood Plain Mapping

2010
100 yr. Flood Plain at 7.8 ft
High Tide (Nuisance Flooding) 3.4
2050
100 yr. Flood Plain at 8.3 ft
1775 – Hurricane claims State House roof, which is then replaced by a hurricane resistant dome.
1915 – Wind damage and flooding
1933 – Chesapeake and Potomac Hurricane
1955 – Hurricane Connie sinks tour schooner Levin J. Marvel outside of Annapolis
1999 – Hurricane Floyd results in 11.6 in. of rain
National Landmarks at Risk:
Hurricane Isabel - September 19, 2003

Market Space

Main Street

U.S. Naval Academy

Eastport
Annapolis City Dock Master Plan
A Framework to Guide Improvements & Redevelopment

“…the historic built environment of City Dock [is] threatened by sea level rise. In conjunction with the development of a Hazard Mitigation Plan to protect historic resources within the 100-year flood plain that is currently underway, the City will explore and present to the City Council for consideration several strategies for addressing the 100-year flood and sea level rise…”
National Landmarks at Risk: Cultural Resources in Annapolis
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.

Process includes:

- Organizing your efforts to develop an effective mitigation plan;
- Identifying hazards and assessing losses to your community;
- Setting mitigation priorities and goals and writing the plan;
- Implementing the mitigation plan, including project funding.
National Landmarks at Risk: 

Funding & Partners

City of Annapolis - All Agencies
Annapolis Business and Resident Associations

State Agencies – State Historic Preservation Office, Dept. of Natural Resources, Maryland Emergency Management Agency


Nonprofits – National Trust for Historic Preservation, Preservation Maryland, Maryland Humanities Council, Historic Annapolis, Union of Concerned Scientists
National Landmarks at Risk: Assess Risks to Cultural Resources

1. Identify the hazards that can affect your community
2. Profile hazards to determine hazard-prone areas and magnitude of each hazard.
3. Inventory vulnerable historic/cultural resources
   • assess vulnerability
   • establish preservation priorities
4. Estimate the associated amount of potential losses
### National Landmarks at Risk: Cultural Resource Inventory

<table>
<thead>
<tr>
<th>Worksheet #3 (cont.)</th>
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<tbody>
<tr>
<td>- Property Vulnerability (High, Med. Low)</td>
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<tr>
<td>- Loss to Structure ($)</td>
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<tr>
<td>- Loss to Contents ($)</td>
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<tr>
<td>- Loss of Function / Use ($)</td>
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<tr>
<td>- Displacement Cost</td>
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<tr>
<td>- Total Loss for Hazard Event</td>
</tr>
<tr>
<td>Community Value (High, Med. Low)</td>
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</tbody>
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National Landmarks at Risk: 
Private Property - Flood Mitigation

Door/window barriers, wall barrier and elevated interior first floor
National Landmarks at Risk: Public Infrastructure Protection

• City Dock flood protection measures limited due to majority of land being privately owned.
• Shared responsibility with the Naval Academy for protecting 4,500 linear feet of shoreline adjacent to the Academy.
• Backflow preventers need to be installed at each sewer connection.
• Floodwalls, coffer dams, pumping station, temporary pumps, backflow preventers, flap valves and duckbill valves needed.
“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, Office of Preservation Planning
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National Landmarks at Risk: A Colonial Capital Case Study - Annapolis

Slide 1
- Sea-level rise is threatening Maryland's historic seaports.
- In Annapolis, the City's Historic Preservation Division is partnering with local, state and federal agencies, resident associations, businesses and historic preservation groups to prepare a disaster mitigation plan addressing the threat associated with sea level rise and flooding.
- Developing a property inventory, public outreach program, risk assessment tool and model mitigation projects, the plan's development follows the approach recommended by the Federal Emergency Management Agency through its "how-to" guide to State and Local mitigation planning.

Slide 2
- Laid out in 1695, Annapolis was one of the first planned cities in the United States. Its historic core contains the country’s largest concentration of eighteenth-century brick buildings, including the Palladian-style Hammond-Harwood House, widely regarded as one of the finest colonial buildings in America.
- Settled by nonconforming Protestants from Virginia and other religious independents, Annapolis later became the capital of the colony, and the state of Maryland.
- The city’s eighteenth-century waterfront bustled with ships bringing visitors, immigrants, servants, and slaves to town.
- Imported goods from Europe, the Caribbean, and other colonies filled dockside warehouses.

Slide 3
- All four of Maryland’s signers (Thomas Stone, Samuel Chase, William Paca and Charles Carroll) of the Declaration of Independence lived in Annapolis.
- The city was the first post-Revolutionary War capital of the United States, hosting the Continental Congress in 1783 and 1784.
- George Washington resigned his commission as commander of the Continental Army here in 1783, and the Treaty of Paris, which formally ended the war, was ratified in the State House in 1784, now the longest operating State House in the nation.
Slide 4
- Annapolis is also known as the home of the U.S. Naval Academy.
- Founded as the Naval School in 1845, with an initial enrollment of about 50 students, most of its Beaux Arts–style historic buildings date from the early 1900s, including the chapel with its iconic dome.
- Hurricane Isabel caused widespread and serious flooding in the city during September 2003, when water levels at the Naval Academy reached about six and a half feet above average, more than two feet over the current 100-year flood level; causing more than $120 million in damage.

Slide 5
- The next major storm that hits Annapolis, MD, could cause extensive flooding and widespread damage to the city’s historic center.
- Because sea levels continue to rise in Chesapeake Bay, a so-called 100-year storm (a severe event with a 1 percent chance of occurring in any given year) would likely severely damage many historic structures in Annapolis, take years from which to recover, and seriously harm the city’s tourism economy.
- With its expansive coastline, low-lying topography, and growing coastal population, the Chesapeake Bay region is among the places in the nation most vulnerable to sea-level rise.
- Sea-level rise in the Chesapeake Bay region could reach 17-28 inches above 1990 levels by 2095.

Slide 6
- **As to Predictions for Sea level rise along Maryland’s coast, by 2050** the best estimate mean sea level rise is 1.4’ **By 2100**, best estimate mean sea level rise is 3.7’
- The State of Maryland has developed a Climate Action Plan to protect people, property, natural resources and public investments from impacts due to climate change.

Slide 7
As part of the Maryland Climate Action Plan, sea rise studies conducted for lower Eastern Shore counties evaluated three possible responses to sea level rise: protect, retreat/relocate, and abandon. In Annapolis, the results of that analysis were as follows:
• Given the importance of the historic district and the waterfront, and the recreational and economic needs for waterfront access, the Annapolis response to sea level rise must focus on protecting existing structures and infrastructure.
• The downtown should be the subject of a study to determine the costs and benefits of public decision-making in mitigating property damage.
• Future planning efforts can evaluate the need and options for protecting historic structures...
• Require floodproofing to the extent feasible while preserving the historic building exterior.

Slide 8
2010 - 100 yr. Flood Plain at 7.8 ft / High Tide (Nuisance Flooding) 3.4
2050 - 100 yr. Flood Plain at 8.3 ft

Slide 9
• Since 1667 - The "Year of the Hurricane" when the first recorded severe storm tracked through the Chesapeake region on Sept. 6, the Chesapeake Bay and Annapolis has realized a doubling of severe storm events each Century.
• With major storm events occurring In 1769 - The Great Chesapeake Bay Hurricane, in 1775 the hurricane which claimed the State House roof in Annapolis resulting in today's striking hurricane-resistant dome. In 1878 the Great October Gale, In 1915 a tropical storm which tracked through Annapolis, the worst storm in years with sustained wind damage and flooding, the 1933 Chesapeake and Potomac Hurricane made landfall in North Carolina on August 23 before tracking through Virginia and pounding Annapolis, 1954 Hurricane Hazel with gusts near 100 mph in 1955 Hurricanes Connie and Diane resulted in strong gales which sunk the tour schooner Levin J. Marvel, about 20 miles south of its home port of Annapolis resulting in 14 passengers drowned. In 1972 - Hurricane Agnes was one of the state's most destructive natural disasters, an ecological calamity for the Chesapeake Bay, In 1999 Hurricane Floyd dumped more than 11.60 inches of rain on Annapolis... and then there was 2003, Tropical Cyclone Isabel with more than nine hours of high winds creating extreme flooding along the Chesapeake Bay and its tidal tributaries.
Slide 10
Initially a Category 4 Hurricane, Isabel was downgraded to a Tropical Cyclone by the time it reached the Chesapeake Bay. Isabel was the worst hurricane to affect the Chesapeake Bay region since 1933. Storm surge values of more than 8 feet flooded rivers that flowed into the Bay across Virginia, Maryland, Delaware, and Washington, D.C. The most intense hurricane of the 2003 season directly resulted in 17 deaths and more than 3 billion dollars in damages. The storm surge from Isabel caused disastrous flooding in the historic City Dock area, damaging dozens of buildings. It took a decade before the 1858 Market House was restored, reopening in 2013.

Slide 11
“…the historic built environment of City Dock [is] threatened by sea level rise… the City will explore and present to the City Council for consideration several strategies for addressing the 100-year flood and sea level rise. The study of strategies will include impacts on the historic fabric and infrastructure, visual impact, economic impact, engineering feasibility, insurability of structures, cost/benefit analysis, impact on the use of space in the city dock area for other purposes, and relationship to the flood control measures and plans of the United States Naval Academy.”

Slide 12
The city is preparing for the inevitability of another major storm and, by 2050, for at least a doubling of high-tide flooding events. In order to ensure the preservation of the buildings and streetscape within the 100-year floodplain of the city’s Historic Landmark District, Annapolis is developing a Cultural Resource Hazard Mitigation plan—beginning with a comprehensive survey of all 140 at-risk buildings in the district— supported in part by the National Trust for Historic Preservation, the Maryland Historical Trust, Preservation Maryland, the Maryland Dept. of Natural Resources and the US Army Corp of Engineers.

Among the many important buildings close to the City Dock that the survey will include are the waterfront Tobacco Warehouse (early nineteenth century); Middleton Tavern (ca. 1750), from which renowned visitors including George Washington and Thomas Jefferson traveled by ferry across the bay; and the Sands House (ca. 1739), one of the city’s oldest and lowest-lying buildings. Annapolis’s
pioneering approach to minimizing damage and disruption from future climate change is likely to become a model for other historic coastal cities.

**Slide 13**
Whether a disaster impacts a major cultural institution, a historic "main street," or collections of family photographs or business records, the sudden loss of historic properties and cultural resources can negatively impact a community's character and economy, and can affect the overall ability of the community to recover from a disaster event. FEMA has provided a publication to show communities, step by step, how to develop and then implement a pre-disaster planning strategy for their historic properties and cultural resources.

**Slide 14**

**Slide 15**
Plan requires communities to 1) Identify the hazards that affect the community 2) Profile to determine hazard-prone areas and the magnitude of each hazard 3) Inventory vulnerable historic/cultural resources and establish preservation priorities and 4) Estimate the associated amount of potential losses

**Slide 16**
Risk assessment includes analysis of the property’s vulnerability, values associated with the loss of the structure, its contents, its function, and displacement of the residents or the business. In completing the preliminary estimates on damage impacts to properties within the 100 year flood plain area, we calculated that for 11 representative properties in the Historic District – mix of new and old, masonry and frame, residential and commercial, public and private, the resulting in a combined economic loss of totaled $23,879,149 with the lowest at $163,550 and the highest at $8,529,290.
Slide 17
Mitigation strategies for individual properties include several types of purpose-built flood barriers suitable for historic buildings. Most door and window barriers consist of various types of waterproof board and seals, which are inserted at times of flooding into small-section timber or metal channels on either side of the front door frame. Perimeter barriers are installed at the boundary of the property, and are intended to prevent water reaching the building at all. The City of Annapolis will develop design guidelines to assist property owners in deciding which barrier type works best for their property.

Slide 18
Flood protection measures for public areas within the City Dock are limited due to the fact that the vast majority of the land is privately owned. The City of Annapolis is working to share responsibility with the United State Naval Academy for protecting the shoreline at the area where the Dock is adjacent to the Academy. There is roughly 4,500 linear feet of shoreline that will need protection. A combination of floodwalls, coffer dams, pumping stations, temporary pumps, backflow preventers, flap valves and duckbill valves will be incorporated into the strategy.

Slide 19
“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.” As a matter of fact, the Technical Survey team currently working on the Annapolis plan traveled to Crisfield MD, which is still recovering from the impacts of Hurricane Sandy, to provide some necessary technical expertise to that small historic Eastern Shore community.

Slide 20
Last night I was at a City Council hearing where cuts to our Emergency Preparedness and Response Management office were proposed. Beyond the obvious concern expressed by the community about the value this program offers, one insightful comment was made by a representative of Chesapeake Ready... “the local community is responsible for their business resiliency.” And that is what we in Annapolis are doing... taking the lead in planning responsibly, one property at a time, for a more resilient Historic District that will take our 3 centuries of landmarks safely into tomorrow’s economy.